UNIVERSAL
LIBRARY

OU_152457

UNIVERSAL
LIBRARY

BUSINESS CYCLES

VOLUME I

BUSINESS CYCLES

A Theoretical, Historical, and Statistical Analysis of the Capitalist Process

BY

JOSEPH A. SCHUMPETER

Professor of Economics, Harvard University

VOLUME I

FIRST EDITION

McGRAW-HILL BOOK COMPANY, INC.

NEW YORK AND LONDON

1939

COPYRIGHT, 1939, BY THE
McGRAW-HILL BOOK COMPANY, INC.

PRINTED IN THE UNITED STATES OF AMERICA

All rights reserved. This book, or parts thereof, may not be reproduced in any form without permission of the publishers.

THE MAPLE PRESS COMPANY, YORK, PA.

Preface

Analyzing business cycles means neither more nor less than analyzing the economic process of the capitalist era. Most of us discover this truth which at once reveals the nature of the task and also its formidable dimensions. Cycles are not, like tonsils, separable things that might be treated by themselves, but are, like the beat of the heart, of the essence of the organism that displays them. I have called this book "Business Cycles" in order to indicate succinctly what the reader is to expect, but the subtitle really renders what I have tried to do.

This attitude to our subject is anything but novel, though I may have made it stand out more conspicuously than other economists have done. Nor do I think that there is anything novel in my combination of historical, statistical, and theoretical analysis—as far as that goes I have merely moved with the general tendency toward their mutual peaceful penetration. But the explanatory principles are my own. The professional reader will have no difficulty in seeing their relation to the scaffolding which I published nearly thirty years ago. The beginner or non-professional reader should not bother about this—and still less about how my exposition differs from doctrinal tradition—but accept in a common-sense spirit what I believe to be fundamentally nothing but very practical common sense.

It took longer than I thought to turn that scaffolding into a house, to embody the results of my later work, to present the historical and statistical complement, to expand old horizons. Nevertheless I doubt whether the result warrants that simile. The house is certainly not a finished and furnished one—there are too many glaring lacunae and too many unfulfilled desiderata. The restriction to the historical and statistical material of the United States, England, and Germany, though serious, is not the most serious of all the shortcomings. The younger generation of economists should look upon this book merely as something to shoot at and to start from—as a motivated program for further research. Nothing, at any rate, could please me more.

The reader will find the structure of the argument complex. To his justifiable groan I have nothing to oppose but the question whether he

expected to find it easy. The book cannot be glanced through for sweeping results. It must be worked with. But I will make bold to say that if this be done, all the repetitions, qualifications of qualifications, doubts, apparent contradictions, all the details and case studies, will justify themselves. Readers who do the work, master the method, follow up the suggestions, answer the questions left to them will at the end of their labor be able to feel that they have really come to grips with what goes under the heading of Business Cycles.

To that there is no royal road. But I have done what I could to make sure that the general reader who is willing to take the trouble will be able to travel the one mapped out in this book. Insertion of an introductory chapter, constant attention to the common-sense meaning of technicalities, utmost simplification throughout were the chief means to that end.

I recommend no policy and propose no plan. Readers who care for nothing else should lay this book aside. But I do not admit that this convicts me of indifference to the social duty of science or makes this book—including its historical parts—irrelevant to the burning questions of the day. What our time needs most and lacks most is the understanding of the process which people are passionately resolved to control. To supply this understanding is to implement that resolve and to rationalize it. This is the only service the scientific worker is, as such, qualified to render. As soon as it is rendered everyone can draw for himself the practical conclusions appropriate to his individual interests or ideals. And it will be seen (and often pointed out) that my analysis can in fact be used to derive practical conclusions of the most conservative as well as the most radical complexion, exactly as one and the same body of engineering or medical knowledge can be used for the most varied purposes.

But scientific analysis of an organic process easily creates the impression that the analyst "advocates" letting that process alone. Such an impression would have been another psychic barrier between myself and most of my readers, additional to the inevitable ones that arise in the course of an argument which in important points challenges old-established habits of mind. In order to remove it and to make it clear that my analysis lends no support to any general principle of *laisser faire*, I have sometimes indicated valuations of my own, though I do not think them interesting or relevant in themselves.

I had my own tale to tell. In doing so I have derived much benefit from the work of a long list of writers—there is in fact little in the work done by economists during the last two or three decades that does not bear upon problems of economic cycles in one way or another. It has been my endeavor to weave into my argument all that seemed appropri-

ate to the level of approximation I had to be content with and to add, though not a bibliography, sufficient references for further study of what has been done in what I believe to be the most important lines of advance.[1] But I cannot say the same for the literature that comes under the heading of general theories of business cycles. The facts and ideas presented in that sector until about 1934 have, of course, been dealt with. But the general schemata of the individual authors have not, and many names of authors whom I highly respect are hence absent from my pages. Most readers, however, will miss still more comment upon several important treatises of this type which have been published since, in particular those of Mr. Keynes, Professor Haberler, and Mr. Harrod. The plan and aim of my book account for that. Systematic comparison of my analytic scheme with others is one of the things that I leave to the reader whose judgment and choice I do not wish to influence except by expounding my case. He needs no urging in order to refer to those authors. And I can assure him that lack of admiration was not among the motives which prompted me to leave unchanged all that I had written or planned to write when those three books appeared. Nor did I wish to criticize them, which it is necessary to add because, in the nature of things, some passages will read exactly like attacks on them.

The work partly summed up in this book has been made possible by a series of grants from the Harvard Committee on Research in the Social Sciences.

Much of the charting and calculating work has been done in that Committee's statistical laboratory. I wish to express my thanks to its staff and in particular to its head, Mrs. E. W. Gilboy.

I had the help of three research assistants whose cooperation I remember with gratitude. Dr. M. J. Fields assisted in the beginnings and did many an irksome job of digging. Dr. Edgar M. Hoover, Jr., now Professor at the University of Michigan, succeeded him to continue the digging and to nurse the growing child, contributing several independent pieces of research as well as valuable criticisms. And Dr. Alice Bourneuf, now of Rosemont College, Pennsylvania, attended to the last stages. Dr. Carl E. Thomas, though working with me mainly on other lines, has lent his aid on many individual points pertaining to the sphere of monetary and banking statistics.

I have used a wide variety of material produced by, or published in, private sources. The requisite permissions have always been most

[1] Some omissions are explained by the length of the time it took to prepare this book for press. I regret particularly that the latest books by Professors Hansen and Tinbergen, Professor Marget's book on the theory of prices, and Dr. Macaulay's book on bond yields, interest rates, and stock prices appeared after what was a dead-line for me.

readily granted and are in every individual case acknowledged in the Appendix, in which I have assembled the description of the material that went into the charts. I wish to avail myself of this opportunity to thank all the authors, institutes, and publishing firms who so generously facilitated my task.

This acknowledgment fails, however, to convey adequately my sense of obligation in several cases. Individual endeavors like mine are so dependent on the splendid work which has been done by several great organizations and which proffers to all of us possibilities nobody would have dreamed of twenty years ago, that these organizations almost have to share in the responsibility for the publication of a book such as this whether they like it or not. Far beyond anything that quotation on particular points, however careful, can express, reaches my obligation to the pioneer work of the Harvard Economic Society, to the National Bureau of Economic Research, to the Research Divisions of the Federal Reserve Board and the Federal Reserve Bank of New York, to Professor Ernst Wagemann and his creation, the Institut für Konjunkturforschung, to Professors Bernhard Harms and Andreas Predöhl and the Institut für Weltwirtschaft, to the London and Cambridge Economic Service, and to several others.

More debts to one's environment than it is possible to mention or even to remember accumulate in the course of such protracted work, especially if one teaches the subject to small and active groups of graduate students. Help and advice generously given by Professors Crum and Harris of Harvard, Professor Gordon, now of the University of California, and Dr. Clausing of the University of Bonn should, however, be particularly acknowledged.

JOSEPH A. SCHUMPETER.

TACONIC, CONNECTICUT,
July, 1939.

Contents

VOLUME I

	Page
PREFACE	v
CHAPTER I	
INTRODUCTORY	3
A. Business Situations and the Businessman's Normal	3
B. External Factors	6
C. Importance of External Factors	11
D. Common-sense Semeiology	14
E. Elementary Critique and Treatment of Series Representing the Symptoms	17
F. Empirical Linking of Factors or Symptoms	25
CHAPTER II	
EQUILIBRIUM AND THE THEORETICAL NORM OF ECONOMIC QUANTITIES	30
A. The Meaning of a Model	30
B. The Fundamental Question about Cycles	33
C. The Stationary Flow	35
D. Equilibrium and the Theoretical Norm	38
E. Complications and Clarifications	45
F. Imperfect Competition	56
1. Bilateral monopoly	57
2. Oligopoly	60
3. Monopolistic competition	63
G. Equilibrium Economics and the Study of Business Fluctuations	68
CHAPTER III	
HOW THE ECONOMIC SYSTEM GENERATES EVOLUTION	72
A. Internal Factors of Change	72
1. Changes in consumers' tastes	73
2. Changes in quantities of factors of production, saving and investing in an otherwise stationary process	74
3. Changes in the methods of supplying commodities, innovation and invention, the concept of economic evolution	84
B. The Theory of Innovation	87
C. The Entrepreneur and His Profit	102
1. Who, in a given case, is the entrepreneur?	103
2. The entrepreneurial function as distinguished from that of supplying capital, risk-bearing, and others	103

PAGE

3. The emergence of entrepreneurs' profits. 104
4. The struggle for shares in functional profits . 106
5. Decreasing importance of the entrepreneurial function 108

D. The Role of Money and Banking in the Process of Evolution . . 109

1. The place of credit creation in our schema 110
2. The meaning of credit creation illustrated 111
3. Forms of credit creation, the commercial and the investment theories of banking, the true function of banking 113
4. Types of "deposits"; redemption of deposits in legal tender, theoretical limits to the creation of deposits 118

E. Interest a Premium on Present over Future Balances (Money Market; Capital) 123

CHAPTER IV

THE CONTOURS OF ECONOMIC EVOLUTION 130

A. The Working of the Model; First Approximation 130

The modus operandi of enterprise under simplified conditions, behavior of volume of transactions, costs, and total output in the process of innovation 130
The two phases of each unit of the process, reaction by old firms, the "turn" 133
Autodeflation and readjustment . . . 136

B. Looking at the Skeleton 138

The element of innovation sufficient to produce a logical sequence of "prosperities and recessions" (two-phase cycle); commonsense of the thesis that "progress" unstabilizes the economic world . . 138
The place of errors and anticipations, relation of this analysis to other explanations of cycles 140
The welfare connotation of prosperity and recession 142
The "rhythm". 143
Partial and general disequilibria 144
The institutional character of our model. . 144

C. The Secondary Wave; Second Approximation 145

Secondary effects induced by the fundamental process, depression and the four-phase cycle 145
1. The "abnormality" of depression . . 150
2. The theory of the recovery point . . . 151
3. The cyclical unit and its phases 155
4. Introduction of additional facts that complete the second approximation 157

D. Many Simultaneous Cycles; Third Approximation. 161

The historical development of the problem of cycles, Juglar and the single-cycle hypothesis, the "discovery" of long and of short waves 162
Derivation of the three-cycle schema . . 166
1. The three-cycle schema not another hypothesis 169
2. Motives of the decision to work with three cycles . 170
3. Relations between the Kondratieffs, Juglars, and Kitchins 171

E. Other Fluctuations. 174

1. "Waves" produced by external factors, in particular by wars, chance variations in gold production, and in crops (special cycles) . 175
2. Waves of adaptation or oscillations, the Slutsky effect, cumulation, acceleration, and self-reinforcement, an illustrative example 179
3. Hesitations and vibrations, fluctuations in aggregates (macrodynamics), Mr. Kalecki's theory and other models . . . 188
4. Replacement waves and cognate topics 189

CHAPTER V

TIME SERIES AND THEIR NORMAL 193

A. Introduction (The Nature of Time Variables and the Task of Time Series Analysis) 193

PAGE

B Various Meanings of the Term Trend 200
Formal definition of "Trend" and "Cycle" 200
1. Descriptive trends 201
2. Real trends 203
3. Reference trends. 204
4. Special trends 205
5. Kondratieff movements often taken as trends 205

C. A Single Cyclical Movement 205
The statistical normal and the concept of "result trend" 205
The solution of the trend problem for two-phase cycles . . . 207
The solution for four-phase cycles, R. Frisch's method of normal points. 207

D. Many Simultaneous Waves. 212
A composite of three cycles 212
Problems incident to the method of normal points 215
The comparison of time series 219

CHAPTER VI

HISTORICAL OUTLINES I: INTRODUCTION; 1787–1842. 220

A. The Fundamental Importance of the Historical Approach to the Problems of the Cyclical Process of Evolution. 220

B. Questions of Principle 223
1. The definition of capitalism. 223
2. How old is capitalism? 224
3. Continuity and revolution in economic change; the "rise of capitalism"; "original accumulation", spurious problems. 226

C. Conditions and Processes in the 300 Years Preceding the Epoch Usually Studied for the Purpose of Business Cycle Analysis 231
The background; influence of the increase in precious metals, of mercantilist policies; and of public expenditure 231
Some features of English economic evolution. 236
1. Agricultural enterprise 237
2. Innovations in the woolen textile industry 240
3. Other industrial developments; the conquest of the home market 241
4. Forms of resistance by the environment 243
5. Monopolies 244
6. Commercial and colonial enterprise 245
7. The role of government finance, external factors, crises, and the problem of the presence of cycles 248
8. A note on John Law 250

D. The Long Wave from 1787 to 1842 252
1. The meaning of the term Industrial Revolution . . 253
2. External factors, the Napoleonic wars in particular 255
3. American protectionism 258
4. "Inflation," "deflation," and "reckless banking". 260
5. Agrarian developments 266
6. English industrial and commercial developments 270
7. German developments. 280
8. Developments in the United States 285
9. The role of credit creation and of monetary policy 292
10. The dating of Juglar cycles, discussion of the major crises 296

CHAPTER VII

HISTORICAL OUTLINES II: 1843–1913 303

A. The Period 1843–1897 Considered as a Unit of the "Long Cycle" (Second Kondratieff). 303
1. Social atmosphere of the "bourgeois" Kondratieff 304
2. Nature of institutional change and of the policies of the period . . 306

PAGE

3. External disturbances 311
4. The American Civil War, and the prosperity at falling prices after it 314
5. Silver strategy 317

B. The Agricultural Situations of the Period (and the Agricultural Depression) 319

C. Railroadization 325

1. The early stages and general features of the railroadization of the United States 325
2. Problems of financing; the Illinois Central as an example 327
3. The crisis of 1857 in the United States . . 331
4. The end of the second and the third Juglar, the boom 1869–1872 and the crisis of 1873 333
5. The depression 1874–1877, changing character of railroad enterprise 337
6. Railroad development in England, the crisis of 1848 . 341
7. The role and features of railroad development in Germany, the industrial or promotion banks 346

D. Some Features of the Development of Manufactures in Our Three Countries 351

1. German industrial evolution, the course of Juglar phases. . . 351
2. English industrial and commercial evolution, finance, the course of Juglar phases 366
3. Industrial evolution in the United States, cyclical calendar . . 383

E. The First Sixteen Years of the Third Kondratieff (1898–1913) 397

A new industrial revolution . . . 397
1. Social changes and policies during the Neomercantilist Kondratieff, the shadows of the War, various disturbances 398
2. Agricultural developments until 1914 . . 401
3. The last instalment of railroad construction . 402
4. The merger movement, mainly in the United States, its financial complement 403
5. The theory and practice of industrial mergers, the U. S. Steel Corporation as an example 403
6. Electrification in the United States 411
7. The rise of the automobile industry and its subsidiaries, other industrial developments in the United States . 411
8. Discussion of the course of cyclical phases, the question of dating; the crisis of 1907 in the United States . . . 422
9. Features and contours of English developments to 1914, cyclical phases 429
10. Features and contours of German developments to 1914, cyclical phases 436

VOLUME II

CHAPTER VIII

THE PRICE LEVEL 449

A. A Preliminary Warning Concerning the Causal and the Symptomatic Importance of Variations in Price Level 449
B. The Theory of the Price Level. 452
C. The Practical Question. 458
D. Analysis of the Behavior of Price-level Series; the Pulse Charts; the Gold Factor 461
E. Group Prices; the Salient Fact of Covariation . 475

CHAPTER IX

PHYSICAL QUANTITIES. EMPLOYMENT . . . 483

A. Individual and Composite Quantities; Three Methods of Indicating Variations in Total Output. 483
B. The Analysis of the Trend in Total Industrial Output; the Problem of Retardation 491

PAGE

C. The Cyclical Behavior of the Physical Volume of Production 500
Behavior of output and price level compared . 506

D. Employment of Labor 509
Discussion of the English unemployment series, absorption of cyclical unemployment at rising wage rates, cyclical behavior 516

CHAPTER X

PRICES AND QUANTITIES OF INDIVIDUAL COMMODITIES . 520

A. Prices and Quantities of Individual Commodities (Including Services) 520
1. Expectation for infinite variety of responses to cyclical situations 521
2. The competitive case, the "nominal" effect of cyclical variations in expenditure 522
3. Reaction of competitive industries to "real" changes in receipts 524
4. Illustrative discussion of various types of behavior 525

B. Special Cases 528
Recent work on price analysis 528
The case of coffee 529
The hog cycle and other "animal cycles" . 530

C. The Cycle in Shipbuilding; Professor Tinbergen's Model . . 533

D. Entrepreneurial Price Policies. . . 535
The case of entrepreneurs confronted by a demand of infinite elasticity . . . 535
The imperfectly competitive situation, oligopoly in particular 536
Rigidity or stability of price 538

CHAPTER XI

EXPENDITURE, WAGES, CUSTOMERS' BALANCES 544

A. Some Propositions about Money 544

B. System Expenditure (Outside Clearings); the Cyclical Behavior of Producers' and Consumers' Expenditure 548

C. National Income and Wages 561
1. The behavior of national income as to trend and cyclical variations, comparison with other series, the profit item 561
2. Factual and conceptual difficulties about wages, various definitions. . . . 564
3. Analysis of trends in, and cyclical variations of, wage bills and wage rates . . 567
4. The question of lags 572
5. A difficulty in theoretical interpretation 574

D. Deposits and Loans 578
1. Possible ways of financing an act of expenditure 578
2. The relation between (outside) deposits, loans, and clearings . 581
3. Qualifications of the expectation for parallelism 584
4. On underspending, nonborrowing, and the role of saving in the cycle 587
5. Customers' balances and bank loans in detail, behavior of various monetary ratios 594
6. Real and monetary investment . 598

CHAPTER XII

THE RATE OF INTEREST. 602

A. Earlier Argument Resumed. 602
1. The concepts of a demand for balances and of an equilibrium rate of interest; the adapted rate . 602
2. The secondary wave and the cyclical shifts in the demand for balances, the lag of interest . . 604
3. The "supply" of balances. . . . 606
4. The position of interest in the cyclical process, capitalization of quasirents 607
5. The pricing of titles to future balances 611

PAGE

B. Discussion of Various Rates 614
The historical course of interest rates 614
1. Factual difficulties. 615
2. The mortgage rate. 618
3. Bond yields 671
4. The rates of the open market 622
5. The rates of the Bank of England and of the Reichsbank. . . . 625

C. Discussion of the Time Shape of Interest Rate 626
1. The absence of trend in the series . . . 627
2. The cyclical behavior of interest . . 628
3. Interest and profits, pig iron production, total output, and price level . 632
4. The consequential character of interest and Professor von Hayek's theory; the lag in short and long rates . . 634

CHAPTER XIII

THE CENTRAL MARKET AND THE STOCK EXCHANGE. 639

A. Banks and the Pulse of Industry 639
1. Limitations to the initiative of banks; banks are normally not "loaned up" . . 639
2. Member banks' operations in the open market, their secondary reserves, investments, and loans 643
3. Other factors affecting banks' investments, the investments of industrial or promotion banks . . 646

B. The Central Market (in an Isolated Domain). 648
Position and influence of bankers' banks; their behavior with respect to cyclical situations 651

C. The Cyclical Aspects of International Relations. . . 666
1. Exports and imports under the influence of cyclical fluctuations, the role of central banks 666
2. Capital movements and central bank policy, the English case, pivotal importance of short claims on foreign countries 668
3. The London gold market, the gold policy of the Bank of England, gold stock, bank rate, and price level . . 675

D. Stock Exchange Series 678
1. Cyclical nature and cyclical effects of the trade in stocks and bonds; peculiarities of the pricing of stocks 679
2. Theory of stock-market "tendencies" 682
3. Analysis of the behavior of stock prices, various covariations 684
4. Banks and stock speculation . . 689

CHAPTER XIV

1919–1929. 692

A. Postwar Events and Postwar Problems (Introduction) 692

B. Comments on Postwar Patterns 695
1. Some factors and symptoms of change in the social structure 697
2. The world war and its consequences as external factors . 700
3. Survey of postwar foreign policies and economic relations, reasons for the failure of the provisional arrangements arrived at 702
4. Various other types of war effects exemplified 704
5. Postwar protectionism and the refusal of this country "to accept its creditor position" 705

C. Further Comments on Postwar Conditions in Our Three Countries 708
1. The United States, mentality of the country and its fiscal policy . . . 708
2. Digression on the effects of taxation . . 710
3. Germany; the postwar situation and the social atmosphere; expenditure and fiscal policy 714
4. Facts and theory of the German "capital imports" . . 718
5. England; the postwar situation, monetary policy; the social atmosphere; fiscal policy 722

PAGE

D. Outlines of Economic History from 1919 to 1929 782

1. Agrarian developments; diagnosis of the agrarian depressions in the United States, England, and Germany . . 732

2. The building booms of the twenties in the United States, Germany, and England 743

E. The "Industrial Revolution" of the Twenties 753

General features . . . 753

1. English developments, external factors, motorcars, iron and steel, electricity; the expanding industries; cycles and phases 755

2. German developments, "rationalization", public enterprise, mergers; the "crisis of concerns", the potash problem, iron and steel, organizational innovations, the chemical industry, rayon in particular; cycles and phases . 759

3. Developments in the United States, the general pattern; aviation, power production, electrical equipment; motorcars, oil and rubber, the chemical industry, rayon and textiles, iron and steel, aluminum, copper, value added and value added divided by payroll in industries, whose value added was 50 millions or more in 1929; detailed discussion of cyclical fluctuations through 1929 785

F. The Behavior of Systematic Series from 1919 to 1929 794

I. Output (*a*), prices (*b*), interest rates (*c*) . . 794

a. 1. Total industrial output and output per employee 795

2. Producers' and consumers' goods, equipment goods, "overproduction" and "excess capacity" . . 799

3. Employment and the absorption of unemployment 803

b. Price levels as shaped by the evolutionary process and by reaction to war inflation 807

1. Analysis of variations in the American price level 808

2. The English case 810

3. The German case. 811

c. Interest rates. 811

1. The behavior of interest rates in the United States . . 812

2. The German case . . 815

3. The English case 816

II. *a*. Debits outside New York, national income, and payroll in the United States 817

b. Corporate accumulation in the United States 820

c. Total realized income and consumers' expenditure, households' borrowings, inference about households' savings 823

d. German and British national incomes, wage bills, consumers' expenditures, and savings . . . 827

e. The behavior of profits in the United States . 830

f. The behavior of wage rates . 834

1. American wage rates during the twenties 835

2. Their relation to the amount of unemployment and to prosperities 838

3. German wage rates during the twenties . 844

4. Wage rates in the United Kingdom during the twenties 847

III. Series descriptive of processes in the sphere of money and member bank credit, mainly in the United States . 850

a. The nature of time deposits . 851

b. Outside deposits and loans and the structural change in assets . . . 857

c. Banks' investments and general business practice 862

d. German and English banking developments 868

IV. Stock speculation and the monetary investment process mainly in the United States 870

a. The theory of brokers' loans . 870

b. The speculative outburst; call rate; minor points; issues for real investment 874

c. Stock exchange and investment processes in Germany and in England . 880

V. Central banking in the United States and England . . 885

a. The American postwar situation . . . 885

b. The mechanics of Federal reserve credit . . . 888

c. The reserve system's postwar policy; conclusions, its "failure to prevent the depression" 894

d. Comments on the policy of the Bank of England 904

CHAPTER XV

THE WORLD CRISIS AND AFTER. 906

A. The World Crisis and the Cyclical Schema 906

PAGE

B. 1930 911
1. The United States 911
2. England 917
3 Germany . 920

C. 1931 and 1932 924
1. Physical Production, on the downgrade and at the bottom 924
2. Incidents, Accidents, and Policy in Germany 930
3 Incidents, Accidents, and Policy in the United States 936
4 The behavior of other American and German time series around the bottom of the depression 944

D. The United Kingdom, 1931–1938 954
1. The abandonment of the Gold Standard 955
2. The subsequent management of money and credit 958
3. Some effects of abandonment and cognate policies 959
a. The relief to exports 960
b England's conversion to protectionism and the Ottawa achievement 961
4. England's industrial processes, the great building boom in particular 963
5. The testimony of time series, especially of output, unemployment, prices, wages, income, clearings, issues, stock prices 966

E. The State-Directed Economy of Germany, 1933–1938 . 971
Employment and production 971
Efforts toward autarky 973
Policy in the recovery phase 974
Government expenditure in the prosperity phase 976
Prices, wages, incomes, consumption 977
Monetary management and the behavior of monetary and banking series 979

F. Recovery and Recovery Policy in the United States from 1933–1935 983
The problem 983
1. "Minor" measures surveyed 986
2. Recovery and the AAA 988
3. Recovery and the NRA 992
4. Monetary policy 996
5. Income-generating expenditure, facts and theory 1001
6. The statistical picture 1006

G. The Disappointing Juglar 1011
The problem raised by American developments since 1935 1011
1. Time series contours 1013
2. The money market and the banking sphere, behavior of price level 1016
3. The industrial process 1020
4. The reciprocal trade agreements; monetary "restriction" and "expansion", the stoppage of income generation 1026
5. Stagnation of the capitalist process 1032
a. The theory of vanishing investment opportunity 1032
b. Its inadequacy 1036
c. The alternative explanation by means of the social atmosphere resulting from capitalist evolution 1038
d. Reasons for believing this explanation to be adequate 1044

APPENDIX: DESCRIPTION OF THE STATISTICAL MATERIAL EMBODIED IN CHARTS I–LX 1051

Index 1079

BUSINESS CYCLES

CHAPTER I

Introductory

A. Business Situations and the Businessman's Normal.—Every businessman knows that his success or failure depends not merely on the degree of efficiency with which he manages his firm and on the fortunes of the particular branch of industry in which he works, but also on a set of conditions over which neither he nor that branch as a whole has any control. These conditions made up what he calls the General Business Situation, which he readily distinguishes from that group of factors making for success or failure within his own concern: the quality of his plant, the vigor of his management or of his advertising campaigns, his skill in buying raw materials, or his smooth cooperation with his employees. He also distinguishes it from another group of factors which affect the prosperity of his particular branch of industry: its competitive position, the rate of change of its total productive capacity, the state of its customers' demand, its labor conditions or raw-material supply. He knows that there is something else which affects the fortunes of all individual concerns and of all industries, and which is not simply the sum total of the factors acting within each concern or each branch of industry, but a general background for all individual endeavors in the nation or even in the whole industrial world that sometimes makes for their success and sometimes for their failure, irrespective, as it seems to him, of their individual merits: something, finally, the elements of which weld into one connected whole capable of being described in terms of comparatively few strong contour lines. Price structures and price levels, the state of credit, consumers' expenditure, employment, and other such well-known factors form at any time a set of data which the individual firm has to accept and to which it must try to adapt itself. Waiving for the moment the question of the precise nature of that general pattern of economic life, which it is the aim of this book to interpret, and the further question whether its changes display any significant regularities, we may well take that common sense idea of Business Situations as a starting point. From everyday experience, from the contents of the business page of every newspaper, and from what the various forecasting services report, we know sufficiently well what they are. If our idea is not yet quite clear

or definite, it has the compensating advantage of being saturated with practical fact.

Next let us observe that businessmen, when, for example, they are writing their yearly reports to their shareholders, seldom fail to describe business as having been normal or above or below normal. Everybody understands this. A firm has had a normal year if it has succeeded in earning enough to cover current expenditure, depreciation, contractual interest on its debt, plus such remuneration of the owners' services and capital as is sufficient and not more than sufficient to induce them to go on without either increasing or decreasing their investment.[1] The general business situation will be called normal if it allows all firms not working under advantages or disadvantages peculiar to them, to earn about that much. Later on we shall link up this concept of normal business with two others which are related to it, though not identical with it: the concept of the Statistical Normal that has grown out of that analysis of time series with which the reader is familiar from the charts in his newspaper or his statistical service; and the concept of Equilibrium which, though less familiar, is an indispensable tool of scientific analysis of the chronic disequilibria of economic life.

For the moment, however, we are content with the rough commonsense of the matter. All that is important to note is that businessmen actually compare any actual situation with that kind of normal. Both their talk and their actions testify to a feeling they have that in the long run things have a way of conforming to it, and that, barring special circumstances, situations much above and situations much below it are not likely to last. Both these habits, embodying as they do long, even ancestral, business experience, deserve notice. The habit of comparing actual results as presented by a profit-and-loss account with what the executive considers normal, supplies a sufficient answer to all those who say that the idea of normal business has no importance because business never is normal, and who go on to draw the conclusion that the concept of economic equilibrium is useless. We shall see later on that business situations sometimes approach and sometimes draw away from these normals in a characteristic way. But we see already that even if real life were always equally far removed from equilibrium, our concept would still be indispensable as a standard by which to diagnose and, if possible, to measure actual states of the economic organism. The habit of

[1] That is not, of course, offered as a satisfactory definition. Still less is the next sentence to be so interpreted. Nevertheless, it may seem to the reader that we are not justified in imputing even as much as that to the unscientific mind. This impression will, however, vanish if it be remembered that the above definition does not mean anything more than that each firm gets what the management considers to be adequate and not more than adequate.

expecting return to normal (which explains why a certain state of profit-and-loss accounts is called *normal*) shows that businessmen have a very full idea of that logic which is inherent in economic things and which it is the task of scientific economics to formulate somewhat more rigorously.[1]

With reference to their idea of normal business they identify prosperities or booms and depressions or slumps. If they feel sufficiently uncomfortable, they speak of a crisis. Not only in everyday parlance but also as they are used by economists and historians those terms, although not actually lacking meaning, yet do lack precise meaning. In particular, the term *crisis* is quite loosely used in the literature of our subject, and so are its specifications, *commercial crisis*, *financial crisis*, *agrarian crisis*, and so on. This is, in fact, the main reason why the historical lists of crises which have been drawn up differ—beyond a number of standard cases which everybody includes—so considerably. We shall not give any technical meaning to the term *crisis* but only to prosperity and depression. The word *cycle* did not originate in the business community and does not concern us just now.

We can learn more than that from our businessman and his perception of what with him we call the General Business Situation. He tries, from his standpoint and for his purposes, to diagnose and to prognosticate it. This he often does subconsciously, sometimes even deprecating anything that would look like "theoretical" analysis. There is common sense in this: sometimes the unanalyzed impression of an experienced man is likely to be a safer guide to correct action than is analysis, which by its nature stresses a limited number of measurable elements and thereby misses other factors so as to lose the intimate flavor of things.

This, of course, is especially true for short-time considerations, such as those which occur in trying to forecast the events on a stock market from day to day, for here knowledge of the technical position and of the temperament and motives of leading groups often counts for much more

[1] The concept of a normal business situation is, therefore, no mere "figment," although it is an abstraction—one of the many which practical life imposes upon us. It implies, moreover, no circular reasoning, as we might think when we reflect that normal business implies normal profits (in the bookkeeping sense) and that normal profits are sometimes defined with reference to a normal situation. It is, finally, directly gleaned from observation But that it is not so obviously present in the American businessman's mind as it is in the minds of his European brethren, must be admitted. Here we strike for the first time a note which unavoidably sounds each time our subject requires reference to sociopsychological attitudes. The spirit of pioneer times has in America not died out as yet from under an uncongenial superstructure, and asserts itself in an impulsive belief in increasing rates of growth, particularly of capital values. This in less sober minds often blurs the picture of the plain facts embodied in our concept. The same spirit manifests itself in the naïve enjoyment of prosperities and "new eras" and in corresponding dejection if the shocking disaster of depression occurs. It is a real factor in shaping those secondary phenomena, which we have a right to attribute to "psychology."

than does the understanding of the deeper forces which underlie the currents of the day or the week. But it also applies to attempts at long-range prognosis and even to analysis carried out by scientific methods for purely scientific purposes. As a doctor at the bedside sees and understands more than he would be able to prove by exact test, so every economist who is at all worthy of this name acquires by lifelong familiarity with contemporaneous and historical fact a vision or an understanding of the intimate necessities in the life of the organism he deals with which carries him much further than the exact tools at his command and may count for more in remedial advice than provable theorems.

There is no warrant for the view that what we cannot measure does, therefore, not exist. This, by the way, partly explains the fact that the problems of applied economics are seldom handled satisfactorily by the mere technician, and that even competent economists who agree perfectly about the scientific basis of a diagnosis may yet differ as to advice, just as doctors do. Whether or not to operate on the patient is no mere question of better or inferior knowledge of a given state of things, but also of temperament; as far, however, as it is a question of knowledge, it is not wholly a question of provable, still less of quantitative, knowledge.

Yet our businessman analyzes whenever new situations arise. He does so himself in a manner which is unscientific but often shrewd, or other people do it for him—his banker, his newspaper, or any of the services which present current business facts and inferences therefrom by methods which vary as to scientific value from zero up to anything that can be fairly asked in the present state of our knowledge. There always have been, probably, some rules by which businessmen formed their judgment about existing business situations and the changes to be expected, ever since business operations extending over time and space came into existence; but with increasing wealth of, and with improving methods of treating, statistical facts an ever-expanding number of "indices," which look objective and sometimes are, have come to the assistance of even the untutored mind. We shall presently draw up a list of those symptoms which are more attentively observed than others. But now we want to learn from, and incidentally improve upon, a certain mental attitude or method which we observe that our businessman applies to the material before him. In trying to diagnose economic change, he forms an idea about its causes. And these he classifies by means of a distinction which is fundamental also for us.

B. External Factors.—Everyone is conscious of the fact that, for example, political events, while not business phenomena themselves, are very important elements to take account of in diagnosing a business situation or forecasting the economic future. Every conversation, every circular from a bank or investment house to its customers, every speech

at a shareholders' meeting, every newspaper's commercial page touches on this subject. But businessmen would also readily agree to the following generalization and further distinction. Among the factors which determine any given business situation there are some which act from within and some which act from without the economic sphere. Economic consideration can fully account for the former only; the latter must be accepted as data and all we can do about them in economic analysis is to explain their effects on economic life. Hence we arrive at the very important concept of factors acting from without (let us call them External Factors), which it stands to reason we must try to abstract from when working out an explanation of the causation of economic fluctuations properly so called, that is, of those economic changes which are inherent in the working of the economic organism itself.[1] We will group them into two classes, the first of which contains instances which are, and the second instances which are not, readily recognizable as extra-economic disturbers of the flow of economic life.

1. The best examples of what we mean by an external factor are offered by such events as the great Tokyo earthquake, the virtue of which from our standpoint consists in the fact that, so far at least, no one has thought of attributing responsibility for them to our industrial system. Whenever a disturbance is the product of social processes, the difficult question arises whether it is not as much a consequence as a cause of economic events and situations and hence whether we are within our rights if we speak of it as "acting from without the economic sphere." In a deeper sense, and especially for those of us who accept the Marxian theory of the social process, the answer is undoubtedly in the negative. But for our purpose[2] it is yet permissible to draw a line between the phenomena directly incident to the working *of* the economic system and the phenomena produced by other social agencies acting *on* the economic system, however obviously this action may be conditioned by economic

[1] The effects of these external factors will be called the *external irregularities* of our material, as distinguished from its *internal irregularities*, to be defined later. The distinction between external and internal factors is related to, though not always synonymous with, the distinction widely used in classifying "theories" of the cycle, between exogenous and endogenous factors (on which see, for example, Spiethoff, art. on Krisen in Handworterbuch der Staatswissenschaften). Neither is it synonymous with the distinction between economic and extra-economic factors as usually understood. The factors that are clearly extra-economic in origin are merely the most obvious instances of external factors. But the principle of analysis underlying all these and similar distinctions is the same. They are all meant to express the fact that what we are faced with is an economic process disturbed by events not inherent in it. What precisely is looked upon as inherent in it will, of course, depend on how we delimit it and which facts and relations we decide to treat as data, and which as variables.

[2] It is readily admitted that, in a sense, this purpose limits us to the surface of things.

situations or propelled by economic aim or class interest. In a sense, therefore, we may within the limited range of our investigation look upon wars, danger of war, revolutions, and social unrest as external factors. Changes in the tariff policy of a country or in its system of taxation, measures of social betterment, and government regulations of all kinds we include in the same class. After all, there is probably little that could be objected to in our recognition of the fact that it would not help us much, for instance in an analysis of the problems of foreign exchange, to deal indiscriminately with cases in which exchanges are determined by commercial factors alone and cases in which they are "pegged" as the French exchange was during the war.[1] And this is all that our distinction amounts to so far. But for obvious reasons it is less easy to carry out the distinction in other cases, and great care—carried even to the extent of hairsplitting—is required in order to do justice to the endless variety of the social patterns we encounter.

2. Variations of crops due to natural causes, such as weather conditions or plagues, raise a problem only because of the difficulty of separating them from variations due to other causes. But for this, we could class them with the effects of earthquakes.[2] Gold discoveries also could be listed in the same category as far as they may be considered, from the standpoint of the business organism, to be chance events. But it is a fact that variations in the *total* supply of gold often come about in response to business situations and in exactly the same way as variations in the supply of any other commodity. The variations in the *monetary* supply of gold are never conditioned by chance discoveries alone. Hence we have here a case of mixed character not always easy to interpret.

3. This, however, raises the question of discoveries of new countries and of what is readily seen to be for our purposes similar in character and effect, inventions. Both create new possibilities and are no doubt among the most important causes of economic and social change. But are they external factors in our sense? Our answer will best be given by way of examples. If we scrutinize the motives and methods of Columbus's venture, we find that it would be by no means absurd to call it a business venture. In this case it would be just as much an element of the business situation as is any other enterprise. But if we refuse to

[1] Example: There cannot be any doubt, of course, that England's policy of free trade grew out of a definite business situation, and that every explanation of the former must run in terms of the latter. It still remains true that from the standpoint of the industrial and commercial organism the repeal of protective duties came about as an outside event and was not evolved by its working: something else, another mechanism, stood between the two.

[2] Meteorological conditions acting not through crops but through human behavior would be ideal external factors if we accepted Dr. G. Mata's theory, *Quarterly Journal of Economics*, November 1934, which is an excellent example of a rigorously exogenous theory of the business cycle.

do this, the discovery of America does not thereby become an external factor, for it was not directly relevant to the course of the economic process at all. It acquired relevance only as and when the new possibilities were turned into commercial and industrial reality, and then the individual acts of realization and not the possibilities themselves are what concern us. Those acts, the formation of companies for the exploitation of the new opportunities, the settling of the new countries, the exports into and the imports from them, are part of the economic process, as they are part of economic history, and not outside of it. Again, the invention of, say, the Montgolfier balloon was not an external factor of the business situation of its time; it was, indeed, no factor at all. The same is true of all inventions as such, witness the inventions of the antique world and the middle ages which for centuries failed to affect the current of life. As soon, however, as an invention is put into business practice, we have a process which arises from, and is an element of, the economic life of its time, and not something that acts on it from without. In no case, therefore, is invention an external factor. All this may sound strange. We do not mean to say that the social and cultural importance of the discovery of America consists in the business transactions to which it led, or that the point of view we adopt does justice to the broader consequences of the growth of knowledge. We formulate as we do merely for the purposes of a study of economic fluctuations and for it, as in fact our businessman would agree, things acquire proportions very different from those they would have in a general sociology.

We shall return to the subject in Chap. III, Sec. A and in Chap. IX, Sec. B, but two examples will show at once that this is no play with words. We sometimes read that in the nineteenth century the opening up of new countries was the background on which economic evolution achieved what it did. In a sense this statement is true. But if the inference is that this circumstance was, in our parlance, an external factor, that is, something distinct from that very economic evolution and independently acting upon it, then the statement ceases to be true: our vision of the evolution of capitalism must precisely include the opening up of new countries as one of its elements and as a result of the same process which also produced all the other economic features of that epoch. Among them is the mechanization of industry. Again, we read a statement made by a high authority in our field, to the effect that it is not "capitalistic enterprise" *but* technological progress (invention, machinery) which accounts for the rate of increase in total output during the nineteenth century. Obviously it is not a matter of indifference whether we accept the theory underlying that statement, namely that the mechanization of industry was a phenomenon distinct from "capitalistic enterprise" and independently influencing it—a phenomenon which could and would have

come about in substantially the same way whatever the social organization—or whether we hold as we do (in this respect entirely agreeing with Marx) that technological progress was of the very essence of capitalistic enterprise and hence cannot be divorced from it. This view will be developed as we go along and is mentioned here only for the purpose of illustrating our terminology.

4. We need not stay to explain why, for any country, business fluctuations in another country should be looked upon as external factors. But to treat in this way variations in the number and age distribution of populations is less easy to justify. Migrations in particular are so obviously conditioned by business fluctuations that no description of the mechanism of cycles can claim to be complete without including them, and including them—at least some of them—as internal factors.[1] However, as we shall not deal with this group of problems in this volume—although the writer is alive to the seriousness of this breach in our wall—it will be convenient to consider migration over the frontiers of the territories to which our statistics refer, provisionally, as an external factor, while migration within those territories, which it would be impossible so to consider, will be noticed but incidentally. Changes in numbers and age distributions due to other causes than migration sometimes are in fact external factors or consequences of external factors, such as wars. Sometimes they are not, as we may see from the cyclical component in marriage rates. But as it is impossible to accept a minimum-of-existence theory of wages—which it would be necessary to do in order to make the relation between the rate of change of population and economic situations stringent—and as nativity and mortality display substantive independence of economic fluctuations—however much their historic changes have to do with the ulterior cultural effects of the working of the capitalist machine—it has seemed best to class them with external factors[2] (see Chap. III, Sec. A).

5. Finally, we have had examples (changes in tariff policy, taxation, and so on) of what we may term changes in the institutional framework. They range from fundamental social reconstruction, such as occurred in

[1] There are some, however—*e.g.*, emigrations because of religious oppression—which are external factors in the full meaning of the term.

[2] Readers will see that our arrangements about the element of population are partly motivated by factual propositions and partly by considerations of expository convenience arising out of the purposes of this book. It is not, of course, held that those arrangements would be satisfactory outside of these purposes or that the subject of population has no claim to other treatment than is given to it here. Work done by Dr. A. Lösch, Bevölkerungswellen und Wechsellagen, 1936, has even shaken the writer's conviction, which used to be strong, that changes in population, although they certainly are among the most important conditions of capitalist evolution and also among its most important ulterior effects, have no place among the causal factors of economic cycles.

Russia after 1917, down to changes of detail in social behavior or habits, such as keeping one's liquid resources in the form of a demand deposit rather than in the form of cash at home or contracting collectively rather than individually. It is entirely immaterial whether or not such changes are embodied in, or recognized by, legislation. In any case they alter the rules of the economic game and hence the significance of indices and the systematic relations of the elements which form the economic world. In some cases, however, they so directly act by means of business behavior that it may become difficult to recognize them as external factors. The Owen-Glass reform is readily recognized as a rearrangement by political means of part of the setting within which business works. But change of practice by the Federal Reserve System or by any Central Bank in Europe may be itself an act of business behavior and an element of the mechanism of cycles, as well as an external factor; and so may collective measures taken by the business world itself. Every such case must be treated on its merits, and decision may be difficult indeed. Our distinction must be kept in mind even in such cases, but it works with increasing difficulty the more frequent they become. This is but a consequence of the fact that our economic system is not a pure one but in full transition toward something else, and, therefore, not always describable in terms of a logically consistent analytic model. But for the common sense of the principle we may again appeal to our businessman, who as a matter of fact does distinguish each time between the elements of the business situation, and the elements acting on the business situation—while to possible sociological criticism we again reply that it would be quite justified if this were a book on, say, the rise of American civilization, but that it is not justified if aimed at the purpose in hand.[1]

C. The Importance of External Factors.—Now, it is obvious that the external factors of economic change are so numerous and important that if we beheld a complete list of them we might be set wondering whether there was anything left in business fluctuations to be accounted for in other ways. This impression is much intensified by the fact that the impact of external factors would of itself account for wavelike alternation of states of prosperity and of depression, both because some disturbances occur at almost regular intervals and because most of them induce a process of adaptation in the system which will produce the picture of a wavelike oscillation in every individual case.

[1] Changes of the "rules of the game" and changes brought about in the data of business action, if of more than passing importance, might be called *structural changes*. This concept, as used by Harms, Löwe, Wagemann, and others, is handy for some purposes. But we will avoid it, because it includes also some of the more durable effects of the process that we wish to investigate and hence tends to obliterate what it is important for us to keep distinct.

We shall return to this subject (see Chap. IV, Sec. D), but really do not need any theory or apparatus in order to realize this much. In fact, it would be possible to write, without any glaring absurdity, a history of business fluctuations exclusively in terms of external factors,[1] and such a history would probably miss a smaller amount of relevant fact than one which attempts to do without them. Consequently, a theory of business fluctuations to the effect that they are caused by external factors would not lack verifying evidence; indeed, it might be the first to suggest itself to an unprejudiced mind.

There are instances covering considerable stretches of our material, in which effects of external factors entirely overshadow everything else, either in the behavior of individual elements of business situations or in the behavior of business situations as a whole. The fall of greenback prices during the greenback "deflation" after 1866, which even the prosperity of 1872 was powerless to reverse (although it did arrest it) is an instance of the first class. The whole course of economic events from 1914 to about 1920 may be cited as an instance of the second. There is no perfectly satisfactory remedy for this. We shall, indeed, exclude from the facts on which we are to base fundamental conclusions, material which is obviously vitiated by such things as the World War, "wild" inflations, and so on. This is the reason why we shall deal with postwar cycles separately and try, as far as possible, to work out fundamentals from prewar material, although sources of facts and figures flow much more freely since 1919 than they did before 1914.[2] We cannot, however, go very far in this direction without losing too much of our material. But the influence of external factors is never absent. And never are they of such a nature that we could dispose of them according to the schema of, say, a pendulum continually exposed to numerous small and independent shocks. We shall see that the power of the economic machine is great enough to hold its own to an astonishing degree, even as it shows its working in the worst material and the most faultily constructed indices. But it never works entirely true to design, although at some times more

[1] The reader who wishes to use this book as an instrument for professional training is urgently advised to make the experiment. This can be done with little trouble by reading, for example, W. Thorp's Business Annals and interpreting, by means of the outside factors mentioned there, some business index, *e.g.*, that of Col. Ayres, published by the Cleveland Trust Company.

[2] Among leading students of the business cycle we may cite, in support of the above procedure, Professor Spiethoff. The reason why we do not treat the Napoleonic Wars and their aftermath similarly is that the World War not only spelled much greater disturbance and exhausted the industrial system much more but also was, though not the cause, yet the catalyzer of a different attitude toward business activity which affected the functioning of the economic machine much more than its more obvious consequences did (see Chap. XIV).

so than at others. Several conclusions of great, if sinister, importance follow from this.

In the first place, it is absurd to think that we can derive the contour lines of our phenomena from our statistical material only. All that we could ever prove from it is that no regular contour lines exist. We must put our trust in bold and unsafe mental experiments or else give up all hope. Here also we strike one of the fundamental difficulties about economic forecasting—one which goes far to explain and even to excuse some of the failures of predictions to come true. At almost any point of time statistical contour lines bear uncomfortable resemblance to the skyline of a city after an earthquake. Hence it is as unreasonable to expect the economist to forecast correctly what will actually happen as it would be to expect a doctor to prognosticate when his patient will be the victim of a railroad accident and how this will affect his state of health.

Second, it is important to keep in mind that what we know from experience is not the working of capitalism as such, but of a distorted capitalism which is covered with the scars of past injuries inflicted on its organism. This is true not only of the way in which our business organism functions but also of its structure. The very fundaments of the industrial organisms of all nations have been politically shaped. Everywhere we find industries which would not exist at all but for protection, subsidies, and other political stimuli, and others which are overgrown or otherwise in an unhealthy state because of them, such as the beet-sugar industry in Europe and shipbuilding all over the world. Such industries are assets of doubtful value, in any case a source of weakness and often the immediate cause of breakdowns or depressive symptoms. This type of economic waste and maladjustment may well be more important than any other.

Third, in some cases we may gather enough information about the nature, range and duration of a big disturbance to know more or less precisely which of our figures are vitiated by it. Then we can either drop these items or try to correct them—as we sometimes do, for instance, in the case of prices during an inflation. But whether we do this or something else or nothing at all, it is always of the utmost importance for us to be thoroughly masters of the economic history of the time, the country or the industry, sometimes even of the individual firm in question, before we draw any inference at all from the behavior of time series. We cannot stress this point sufficiently. General history (social, political, and cultural), economic history, and more particularly industrial history are not only indispensable but really the most important contributors to the understanding of our problem. All other materials and methods, statistical and theoretical, are only subservient to them and worse than useless without them.

D. Common-sense Semeiology.—After having tried to identify and appraise external factors, either actually present in any business situation or expected, our businessman generally takes it for granted that there are other things to be taken into consideration. Questioned, he—and, in fact, everyone who ever came under the writer's observation—can readily be made to testify to a belief or impression that there would be economic change even in the absence of any external factor or, to put it differently, that, besides factors acting on the business situation, there also are factors in it which make for what we may call *autonomous change*. Accordingly, he takes a second step in analysis and attempts to diagnose this class of facts also. It is hazardous to say more, because beyond this, as we observed above, the businessman's own contribution to his diagnosis becomes indistinguishably merged in a heterogeneous mass of all sorts of information, "theories," and advices that come to him from various sources. But as a result of the mixture certain practical recipes emerge which in turn reveal a definite, if rough, method of analyzing business situations that does not differ in principle, however much it may differ in technique, from what we want to do.

Perhaps the most generally useful of these practical rules is not to trust to any single symptom nor to trust hastily to any combination of a few, but to survey as many as possible. This will tend to eliminate the influence of errors about the significance or importance of any single element, and to give a more lifelike picture. Another piece of advice is to prefer "sensitive indices." In acting upon it one must, however, bear in mind that indices which fluctuate violently are apt to give an exaggerated picture of economic movements and so may be misleading for some purposes. Still another rule is to try to pick out symptoms of causal significance in preference to indices which reveal only the consequences of the action of initiating factors. There is no doubt about the wisdom of this advice if it be addressed to the investigator who analyzes for scientific purposes. But for practical purposes it is inapplicable, first because it presupposes a rational opinion about the causation of industrial fluctuations, and second because, if we may express ourselves thus paradoxically, in our field causes do not always precede effects. Of course there is no real paradox in this: we merely mean to refer to the fact that anticipation of coming events sometimes produces the same effect on the behavior of business communities as do these events themselves, and that symptoms sometimes lag behind the events to which they refer. This may occur, for instance, in the case of a credit expansion and its relation to a rise in prices: the credit expansion may be the "cause" or condition of the rise in prices, but if the commodities in question are paid for, say, six months after date, the rise in their price will be registered before the increase in firms' borrowing, which, of course, need not take place before

the date of payment. Among the innumerable types of a more concrete kind of advice given by practical men to practical men,[1] we wish to quote but one because of both its usefulness and its neatness. At the beginning of 1907 somebody asked M. Yves Guyot whether he thought that a crisis was likely to occur in the United States. He answered very emphatically in the affirmative. To the further question as to the signs by which its approach could be foretold, his answer was: "Observe the railways, the orders of the United States Steel Corporation, and the prices of metals."

The interpretation and coordination of such symptoms are what we call Semeiology. At its highest this is not a branch of economics, but really the whole of economics—for all the acquirements of our science, all its statistical, historical, and theoretical tools are relevant to it and can be brought to bear upon it; in fact, it is here that they meet their ultimate test and that we become conscious of what we can and cannot do. Thus, semeiological work is not confined to the analysis of business fluctuations; its primary task is really the diagnosis of the economic state of a country.[2]

The method simply consists in observing facts—if possible, figures—concerning phenomena which are by experience known to be important either in themselves or as symptoms; in the most favorable cases, importance attaches to a figure on both counts. At least by rough estimation, each figure must be linked to a reference magnitude—to what it would be were the business situation normal. Also each symptom must be judged in the light of the corresponding (not necessarily exactly contemporaneous) states of some of the others, which precisely means judging it in the light of the whole business situation. From businessmen's discussions, the business pages of the daily press, circulars of banks and other concerns, trade journals, and so on, a list has been compiled of what most people agree are relevant facts illustrative of business situations, although not all people would admit the amount of theorizing unavoidably implied in calling them so. Nothing has been done to the list beyond clearing it of the most obvious duplications:

1. Profits and *expected profits.*

2. Consumers' (household) demand for consumers' goods—"consumers' purchasing power."

3. Producers' demand for producers' goods—"producers' purchasing power."

[1] Some of them have grown into proverbs, for instance: *Quand le bâtiment va, tout va.*

[2] In the seventeenth century, the analysis of given economic situations in individual countries was the foremost task to which not only "Political Arithmetick," but economics in general applied itself. This tradition, both sound and promising, was practically lost in the eighteenth century, notably after A. Smith and largely through his fault. It was for more than a century pushed back into the role of a statistical specialty, and only in comparatively recent times have economists again become aware of its importance and of the fact that a new, more realistic, and more quantitative theory might evolve from it.

4. Commodity prices at wholesale and at retail. No rational concept of price level has been offered although an effort to elicit it was made whenever possible. "Slope of prices in general" was the best definition heard. Of particular levels, the level of "basic commodities" has been most frequently mentioned, of individual prices wheat and pig-iron prices, and also the price of electrolytic copper.

5. Money rates, bond yields.

6. Bank rate (mentioned only by Englishmen).

7. Employment.

8. Bank clearings and debits, New York and outside (attended to only by Americans, excepting the case of a Hamburg merchant who was, however, thoroughly familiar with the usual methods of business-cycle analysis). Often mentioned in reply to the request to give precision to such terms as "business activity" or "volume of business."

9. U. S. Steel Corporation—unfilled orders (mentioned at least as frequently by Europeans as it was by Americans).

10. Business failures. Amount of liabilities of bankrupt concerns. Bank failures.

11. Exports and imports, both quantities and values.

12. Building permits or contracts awarded.

13. Securities issued. On reflection this was readily reduced to "issues of domestic business corporations."

14. Stock prices. Number of shares traded.

15. Production: Total; finished goods; finished equipment goods; finished consumers' goods; semifinished metal products; iron and steel; "materials"; electric power.

16. Consumption: similar divisions. Also shifts of consumption as between consumers' goods.

17. Sum total of money incomes. Several times also changes in the distribution of this sum as between classes of income receivers were mentioned, but there was suspicion of scientific or ideological influence in each case.

18. Stocks of finished products or staple commodities. Visible supplies. Also, whether they are accumulating with producers or merchants or other manufacturers.

19. Sales by chain stores, department stores, mail-order houses (mainly emphasized in this country, but retail traders' receipts also mentioned in Europe).

20. Reserve ratio of banks, especially central banks. New York banks' loans. Outside banks' loans. "All other loans." Discounts. Deposits, particularly Demand Deposits. Lawful money outside of banks. Commercial bills drawn (Germany: "Wechselziehungen"). Once any one of these was mentioned, it was easy to elicit the whole list

of figures which compose bank statements and the usual banking ratios. To these it was always possible to reduce such terms as "easy" or "tight money," "soundness of credit position," "tension," and so on.

21. Brokers' loans (U. S.).

22. Motor car sales (U. S.). Sales of beer (Germany).

23. Cost of production, mostly identified with wage rates, which were also frequently mentioned by themselves as symptoms or even causes of a prosperous or depressed state of things.

24. New firms founded, new incorporations. Per contra: liquidations.

25. Urgency of creditors and promptness or otherwise of debtors.

26. Fussiness of customers over quality and so on of deliveries.

27. Temper of banking community, as evidenced by "reasonableness" and courtesy or otherwise in their dealings with customers. Their "running after" or "riding high horses."

28. Gold production. Gold flows in and out of country.

29. Freight cars active. Freight-car loadings. Basic material transported. Miscellaneous merchandize transported. Less-than-car-load-lots. Passenger traffic receipts. Railroad earnings. While the last mentioned and the figure of idle cars were universally given attention, the finer analysis implied in the other headings is predominantly American.

30. Condition of the real estate market.

31. Public finance, chiefly receipts from excise, stamp duties, and turnover taxes, but also from income taxes.

32. Foreign exchange rates.

33. Percentage of industrial capacity active.

34. Dividends declared.

35. Marriage rate.

36. Migration to and from industrial centers. Immigration and emigration.

37. Temper of business community. Confidence. Optimism.

38. Advertising.

39. Competitive position in industry. "Overproduction."

40. Rate of spending. Velocity of circulation of deposits. "Hoarding." Once, relation between savings and investment turned up, but a quotation from Mr. Keynes' Treatise on Money followed.

41. Attendance at divine service, the implication being of an inverse relation with the degree of business prosperity.

E. Elementary Critique and Treatment of Series Representing These Symptoms.—This list could easily have been run to something like 200 items, merely by drawing it up somewhat differently.[1] Statistical

[1] Much provisional clarification can be derived from classifying our series in various ways. We may group them in prices, physical quantities and values (price times quantity), or according to whether the series show fluctuations merely, or also a persistent

series obviously relevant to the fluctuations of business are now available by hundreds of thousands, if we include also the short and otherwise less valuable ones, and if we count the series for each individual commodity separately and as often as it appears in different countries or is within the same country independently compiled. The first thing to do is to judge them not only as to reliability of source and method of compilation, but also as to what it is they really measure and how accurately they reflect what we want them to indicate. Evidently this kind of critique is of basic importance and, in spite of the "index credulity" so frequently observable, by no means foreign to the mind of the practical man who, occasionally at least, discovers to his cost the true significance of an index, the very function of which is to indicate something that cannot be measured directly. While all of this applies to any material, also to material which is allowed to retain its *natural* significance, such as the price of a commodity of given quality, it holds true with additional force for what we shall term *synthetic* series, such as the series of total output, which, representing the variation of a quantity that is the creation of the statistician, should never be used without previous critique of the process of synthesis to which they owe their existence.

This is not all, however. Included in our list are instances of cases, in which businessmen themselves ask what a certain figure means. Such instances could be readily multiplied. A series of figures of collateral loans, for example, is often taken to indicate the amount of resources engaged in speculation. But however accurate the figure may be, this is certainly wrong, for loans against collateral are applied for and given for many other purposes. The series of clearings or debits outside of New York is sometimes used—and has been so used in the work summed up in this book—in order to give an idea of the course of producers' and consumers' expenditure on commodities and services. It may, indeed, give an idea, but in itself it certainly is not the series (or a simple invariant function of the series) of this expenditure. The less-than-carload figure is not itself retail trade; pay-roll statistics do not accurately reflect total wage earners' income; building permits are not building; time deposits are not savings; and so on.

In all these and innumerable other cases, there is more or less discrepancy between what a set of figures actually measures and the factor or symptom the behavior of which we wish to infer from it. But in all of

tendency to increase or decrease, or according to whether it is absolute magnitudes or rates of change of magnitudes which matter, or according to whether the series reflect primarily events in some particular sector of the economic process, for instance activity of cotton mills, or like the rate of interest immediately the state of things in the economic process as a whole. Whoever reads this book in order to learn how to reason on business-cycle facts should not neglect to carry out what is a very useful if elementary exercise.

them at least the meaning of that factor or symptom is perfectly clear. Very often, however, that is not so. There are two kinds of cases in which this supreme difficulty occurs. The one kind arises from the fact that even if we know quite well what that factor is, we sometimes find it difficult to associate a given behavior of it consistently with either good or bad business: such *erratic* series sometimes increase and sometimes decrease, *e.g.*, when business is good and grows better. The other kind arises from inability to define what the thing is that a given set of figures represents—price level is an instance—and bars, where it occurs, the way of common-sense semeiology.

Moreover, a series may veil the business situation it is to indicate by displaying a movement of its own which is out of keeping with the rest of the symptoms. Nobody will, for example, accept the sales of chain stores as reflecting the tendencies of retail trade when that particular form of organization is rapidly gaining ground at the expense of others, or electric power production in a country which is in process of electrification as a satisfactory index of the general situation. Everybody will try to take account of that in some rough "empirical" way.

Certain refinements immediately suggest themselves, however, which have their roots in the mental attitudes of everyday life, although professional work has carried some of them beyond the range of untutored common sense. They bear both on the material and on the way of drawing inferences from it. An example of such refinements upon our factual evidence is the habit of looking separately at, and interpreting differently, statistics of New York and of outside banks. Another is splitting up, where we can, the statistics of building activity: it stands to reason that, while the total figure is what we want if we wish to estimate the *influence* of building on a given situation, building as a *symptom* may be rendered valueless by the inclusion of building for the account of public bodies, and is much reduced in value by failure to distinguish between residential and industrial building. Or, the diagnostic value of pig-iron production is much reduced by the fact that the industries whose activity it is to reflect also feed on imported pig iron, while in slack times reduction of output of pig iron that would otherwise ensue may be prevented by export, possibly at a loss.[1] It has, therefore, been suggested by Spiethoff that the figure of consumption of pig iron (production plus imports minus exports) be used instead. The principle, of course, applies to all commodity series.

As to the handling of series or their formal treatment, everyone nowadays appreciates the common-sense virtues of expressing them as percentages of a fixed base, or as chains, of using semilogarithmic paper,

[1] The diagnostic value is further reduced, of course, by the changes that have occurred in its technological significance. No satisfactory remedy has been found for this.

smoothing devices, and the like. But our businessman also knows that, in appraising any change in the factors or symptoms he habitually watches, it is necessary to form an idea as to how far it really indicates a change in the underlying condition of business and how far it is merely seasonal. Professional work only adds precision to this eminently practical idea. As that problem does not play a major role in the argument of this book and as no contribution to it is offered here, we may as well dispose of it once and for all. The problem cannot be said to be satisfactorily solved. For although the phenomenon presents much greater regularity, particularly as to period, than the others we have to deal with, it is unfortunately not independent of these nor without influence on them. We may overlook this in a first approximation, and even eliminate it by suitable conventions about the meaning to be attributed to "figures corrected for seasonal variations"; but we cannot overlook the other difficulty which consists in the fact that, mainly owing to persistent efforts (but also to other circumstances), seasonal fluctuations are not invariant in time. Broadly speaking, they tend to decrease in amplitude and to become less important: hens have been persuaded to be more regular in laying eggs, building is not nearly so much interfered with by winter weather as it used to be, money rates are not nearly so seasonal as they were in the nineteenth century. Even where the demand of ultimate consumers remains seasonal in spite of the tendency of modern life to become independent of part of the factors that account for seasonal variations, the intermediate demand of dealers in some cases, such as that of the automobile industry, is schooled by producers to distribute itself more evenly over the year. This difficulty has been largely met by a method devised by W. L. Crum[1] which consists in finding, by one of the usual methods, the trend of seasonal variations and using, for correction, the trend values of every month. It amounts to using a moving, instead of a fixed, seasonal index.

The work summed up in this book has sometimes used series corrected by others in various ways.[2] Sometimes simple smoothing was used. In some cases the problem did not arise, because yearly figures had to be used, while in others it has been deemed advisable to refrain from correction in order to avoid any tampering with the testimony of facts. While where we actually use corrected figures we shall have to look out for seasonal influence not entirely eliminated, or for injury to the material

[1] Cf. W. L. Crum, Progressive Variation in Seasonality, *Journal of the American Statistical Association*, March 1925, and others quoted there. The paper also serves to introduce the reader to the setting and bearings of the problem.

[2] For most purposes the writer prefers what is called the median-link-relative method, which preference derives support, *ex visu* of 1925 at least, from the authority of Professor Crum, see the paper quoted.

due to the operation, we shall always argue as if the problem had been solved in a perfectly successful manner and as if seasonals were independent things capable of being taken off as easily as a hat. This is an important part of the schema of simplifications made both necessary and permissible by the purpose of this book.[1]

Although laymen sometimes display a disconcerting habit of referring magnitudes and relations between magnitudes to the corresponding magnitudes and relations of some bygone epoch, *e.g.*, the last prewar decade, they mostly realize that the normal business situation itself changes in time. And they face the problem of how to disentangle from the figures of each moment that pattern which would be normal at that moment and with reference to which those figures are to be appraised. This is the common sense of trend analysis, and statisticians have but come to the aid of business opinion by devising formal methods which are to accomplish this. We shall deal with this subject later on (Chap. V) and then find reasons to doubt the validity of the usual procedure and of the trends, as well as of the fluctuations, produced by it. For the present it is enough to state that elimination of, or correction for, trend is as practical an idea as correction for seasonal variation. If, then, we use the concept of trend and confine ourselves to studying the deviations from trend, probably the prima-facie most plausible method as yet devised of expressing these, is to put them in terms of standard deviations as the Harvard Service does. The fundamental problem which arises here—the problem of the correlations that may exist between trends and deviations—is not disposed of thereby. On the other hand, however, the method can be used to improve material that displays different intensity of fluctuation in different epochs. Common sense also suggests the application to our economic symptoms of a rule which we apply as a matter of course to the symptoms of temper observed in different men. We evaluate differently a given manifestation according to whether it comes from a man we know to be irascible or from a man we know to be even-tempered. Experience teaches that there are irascible and even-tempered series. It would not do, as far as diagnosis of a business situation is concerned, to attach the same importance to a given amount of deviation in both. When they are expressed in "standard units" their temper is equalized.

[1] In leaving the subject, reference should be made to S. Kuznets, Seasonal Variations in Industry and Trade, also to Donner, Saisonschwankungen als Problem der Konjunkturforschung, Sonderheft 6 of the *Vierteljahrshefte zur Konjunkturforschung*, and Sonderheft 11 of the same periodical, in which the same author analyzes seasonal variations in Germany since 1924, also to Abraham Wald, Berechnung und Ausschaltung von Saisonschwankungen, Wien, 1936, and to Wisniewski, Seasonal and Cyclical Fluctuations, *Econometrica* for April 1934.

When a time series[1] has been treated thus, that is, when having been "corrected" for seasonal variation and for trend, its items are expressed in standard units, we get a remainder displaying a roughly wave-like form. These "waves" are—as everybody knows—usually referred to as *cycles*. The implication is that they represent a distinct element of the historic reality described by the series which it is possible to separate in that way from the other two, or rather, since the influence of external factors cannot be eliminated, that distinct element as disturbed by external factors. This is the essence of the so-called Harvard method. Its validity and, in particular, the justification or otherwise of the claim that it in fact succeeds in isolating the cyclical movement will later engage our attention. What matters now is that the reader should see the common-sense basis of that method which it has become the fashion to criticize adversely without any regard to the historic importance of the progress achieved by it and to the fact that it taught their business to very many students of the business cycle, some of its most ferocious critics included.[2] It follows faithfully, improves upon, and gives numerical precision to, ideas which can be readily seen to arise from the needs and cares of the businessman—which may, of course, be recorded against as well as for it. A similar statement would hold true of other such methods of treating statistical fact with a view to making it yield additional information, and in particular of some of the best of them.[3]

Moreover the very idea of a business situation implies the impression based upon partly subconscious experience that the fluctuations in measurable symptoms or factors have a way of roughly moving in step. What professional effort adds to this is, first, a statistical picture and,

[1] Later on, time series will have to be carefully defined. For the moment we rely on everybody's familiarity with the term.

[2] Criticism of the forecasts based upon that method has been particularly unfair. Taking due account of what economic forecasting can mean and achieve, results were by no means bad, although judgments must necessarily differ according to the method of measurement of success and failure applied and according to the weight we attach to external disturbances. On the measures of success which attended the efforts of various forecasters, see G. V. Cox, An Appraisal of American Business Forecasts, 1930. But what irritated people against the service in question was not failure but success. Even as people cannot stand depressions, so they cannot stand unfavorable forecasts.

[3] We will mention but two. The one is described in *Bulletin* 57 for July 1, 1935, of the National Bureau of Economic Research: Wesley C. Mitchell and Arthur F. Burns, The National Bureau's Measures of Cyclical Behavior, used by the National Bureau group in many important investigations. The other is due to Mr. Frickey, see *Review of Economic Statistics* for Nov. 15, 1935. We are not able to give to either contribution the attention it merits, but the reader is strongly urged to familiarize himself with both. The writer wishes to express his gratitude to Professor Mitchell for generously permitting him to read a preliminary draft of chapters one and two of the forthcoming second volume of his great work.

second, a number of refinements. The most primitive, but also the most straightforward, way of supplying the statistical picture consists in simply plotting on the same chart as many time series as may be thought useful or convenient. If before being plotted they are all treated according, say, to the Harvard method, comparison will in some respects be made easier and richer. For obvious reasons, everyone will try to reduce the number of series thus plotted and then arises the question which will be dealt with in the next section. The Harvard "barometer," for instance, compresses into three curves the information it wishes to convey,[1] but others, although they never fail to present by way of illustration a number of other series, yet try to focus the business situation in a single figure. If that figure has definite meaning, that is to say, if the single figure index of business conditions is simply arrived at by choosing one of the many series available in order to characterize the whole situation, we may indeed object that such characterization must necessarily be very imperfect, but there is no other objection. A business index consisting exclusively of a series of bank debits falls into this category and so do indices which are constructed for the purpose, but from material which we are in the habit of combining into indices in any case: of this type are those indices of business conditions which merely purport to describe the variation of total physical output. The difficulties inherent in the latter concept are not relevant here—granted that the concept is admissible at all, we may also use it for the purposes in hand.[2]

[1] Similarly, Mr. B. B. Smith's barometer compares an index of business activity (the American Telephone and Telegraph Company's and the Cleveland Trust Company's indices) with four curves. One is an average of interest rates and bond yields, one is gold and United States securities held by the Federal Reserve banks, one an inverted twelve-month trailing regression coefficient of yields of securities on time, and one the amount of new long-term bond flotations.

The Econostat index has three components, representing finance, distribution, and production.

The Axe-Flinn index of business conditions for Germany has also three curves representing speculation (stock prices), business (prices, production, etc.), and money (money rates, bank advances, etc.); see the *Review of Economic Statistics* for October 1925.

[2] The following are some single-figure indices of the type described above. The American Telephone and Telegraph Company Index of General Business since 1922; physical series; see the *Harvard Business Review*, January 1923. The Harvard Economic Service Sensitive (Ten Commodity) Price Index of Business Cycles; see W. Persons and Coyle, *Review of Economic Statistics*, 1921, pp. 353, 369. Carl Snyder's Clearings Index of Business; see his Business Cycles and Business Measurements. The New York Times Weekly Index of business; physical series. Edwin Frickey's Clearings Index of Business; see *Review of Economic Statistics*, October 1925. The Babson's Reports Inc. Index; physical series. Carl Snyder's Deposits Turnover Index; see *Review of Economic Statistics*, 1924, p. 253. Power production index; see Persons and Mathews, *Review of Economic Statistics*, 1928, p. 196. Persons' Index of Trade; since 1915 physical series; see *Review of Economic Statistics*, 1923, p. 71.

But in other cases the single-figure index has no such meaning of its own, and then the question arises whether it has any meaning at all. There is, of course, no warrant for assuming that the state of any organism can be characterized by a single figure. In order to realize the nature of such an attempt, we need only visualize the analogous idea being applied to the biological organism. Let us think, for instance, of a doctor trying to express his diagnosis of a case entrusted to his care by a number, or the variations in the physical state of his patient by a series of numbers. That the idea of such an index agrees so well with the index credulity of our time only makes matters worse. An arithmetical average of such things as railway operating revenues, value of total merchandise imports, pig-iron production, cotton consumption, coal production and clearings is not immediately recognized as meaningless only because of the rough covariation existing between those and many other series. But the numerical exactness which is what it adds to the *impression* which in any case we would get from inspection of the individual graphs, is nevertheless entirely spurious and can only mislead.[1]

Finally, the businessman's impressions can be refined upon by measuring periods and amplitudes and also the timing of the movements of each series relatively to the fluctuations of other series. This soil is fertile in new theoretical problems and its surface only has been scratched so far. The study of amplitudes, in particular, is as yet in its infancy. The Harvard method has proved especially useful when brought to bear on the task of measuring precedences and lags.[2]

[1] The following are some one-figure indices of the type discussed above. The American Telephone and Telegraph Company Index: before 1922 physical series, prices, clearings (see the preceding note). The Ogburn-Thomas Index of Business Cycles: prices, failures, physical series, employment, clearings; see D. S. Thomas, Social Aspects of the Business Cycle, p. 57, also the *Journal of the American Statistical Association*, September 1922, p. 324. The Economist's Index of Business Activity: employment, physical series, clearings, postal receipts; see the *Journal of the Royal Statistical Society*, 1934, article by Geoffrey Crowther. B. B. Smith's Forecasting Index of Business Cycles is a weighted average of the four curves mentioned in the preceding note (the weights being chosen to give the best correlations between the forecasting index and business). For this index, however, a case could be made. Persons' index of trade: before 1915, clearings, physical series, railroad earnings, and employment (see preceding note). Miss Thomas's quarterly index of British business cycles: physical series, clearings, unemployment, prices; see the *Journal of the American Statistical Association*, March 1926. Axe and Houghton index of business activity: clearings, physical series, prices; see the *Annalist*, Jan. 15, 1926. Carl Snyder's index of volume of trade: clearings, physical series, employment, and security issues; see Business Cycle and Business Measurements. Carl Snyder's index of business activity, one of the constituents of the index of the volume of trade; debits, postal receipts, physical series; see Business Cycles and Business Measurements. The Econostat index (see previous note) combines the three curves into a one-figure index, including therein physical series, bank deposits, clearings etc.

[2] Reference must, therefore, be made primarily to the work of the Harvard Committee,

F. Empirical Linking of Factors or Symptoms.—When our businessman surveys the material within his reach, he first makes the discovery that several series or nonquantitative symptoms frequently measure or indicate the same or nearly the same thing. Sometimes different series even lead back to the same, or the same kind of material; but it is more important that different materials often reflect the same factor or symptom. In most cases this is obvious. Carloads of coal transported by railroads and coal produced are statistically independent symptoms of the situation and they do not quite coincide. But they are only two different measurements of approximately the same thing. The United States Steel Corporation's unfilled orders and consumption of pig iron could for many purposes be interchangeably used and only for very special purposes measure different things. In a wider sense, pig-iron and copper consumption, when studied as symptoms of the business situation, may be said to measure the same thing. And several other cases of this kind have in our list been lumped into single items.

Next he discovers that some series reflect more directly than others conditions of the whole of the business organism. We shall call them *systematic* series in distinction from *individual* ones, which are primarily indicative of conditions in some part of it. Some synthetic series, foremost among which are the price level and total production, afford instances of systematic series, but some natural ones are systematic as well, foremost among them the clearing-debit, the unemployment, and the interest series. It should be observed, however, that although some series, such as price level, can never be anything else but systematic, others may be considered as either individual or systematic according to the purpose in hand. Pig-iron consumption is an individual series by nature; but, looked at as an index of the activity of equipment industries, it becomes a systematic one.

Two other distinctions may be held to be, in germ at least, present in any attempt to practice common-sense semeiology. Factors may be *causal* or *consequential*, and they may be *primary* or *secondary*. As before, *causal* is used in its obvious meaning in the parlance of everyday. But it is also used in a relative sense, in which an event may be a cause of some phenomena and a consequence of others. *Primary* indicates neither temporal precedence nor relative importance, but only that the element so designated will, in the opinion of our semeiologist, be always present in

---

particularly to the results presented in the *Review of Economic Statistics* for 1919 (p. 184 *et seq.*). The rationale of the idea that the lag for which two corrected series display a maximum of correlation is revelatory of the fundamental relation in the cyclical process of the quantities reflected by those series, merits closer examination than has so far been bestowed on it. For a presentation of the idea see W. M. Persons' contribution on Time Series in the Handbook of Mathematical Statistics, ed. H. L. Rietz.

a boom or a depression, unless suppressed or overshadowed by some accident. An example will clarify. Inasmuch as it would be difficult to find any marked business boom or depression without corresponding movements on the stock exchanges, the latter will by most people be called a primary phenomenon in our sense. But most people will also agree that such movements are not causal to business booms but rather consequential, although they may be causal to certain secondary phenomena, such as a fall in demand for jewelry after a stock-exchange crash. The example shows also that the two distinctions cross—as a primary element may be consequential, so a causal one may be secondary.

This modest equipment suffices for many purposes. Even many scientific descriptions, particularly of the historic sort, need never use any other. In one respect it works particularly well in the hands of the businessman, who is more likely than the statistician to know and understand the industrial process and the situations which underlie the statistical surface. After having cleared his list of symptoms of both what may be termed statistical and what may be termed economic duplications, he will form groups descriptive of the various sectors of the organism (agriculture, industry and mining, wholesale and retail trade, transportation, and so on) and link them together in a common-sense way. He will realize, for instance, the importance of fluctuations in agricultural revenue for the demand for agricultural machinery and fertilizers and for the condition of banks in agricultural districts. He will evaluate railway receipts and employment, both as factors in and as symptoms of the situation. He will observe building activity in its various branches, the state of the money market, and so on. In all these cases he will also try to form estimates of both quantities and tendencies.

The reader is strongly advised to do the same. The success of this useful exercise depends of course on his ability to divest himself of all theoretical preconceptions and to listen to the voice of his common sense as if he never had heard or read anything on the subject.[1] In order to

[1] It would also be useful to make a note of results and to refer to it at such turns of the argument as may seem to stand in need of support or criticism in the light of everyday experience, for the writer wants to repeat that he is not aware of anything in the whole of his analysis that could not be put into terms of plain business fact. Of course, the reader may, but need not, start from our list. Common-sense interpretation of any of the factual reports the reader may be in the habit of using would serve equally well, provided he abstracts from the theoretical suggestions almost invariably implied. Perusal, in the way alluded to, of the publications of the Standard Statistics Corporation or of Moody's service, or again of the facts reported on in the *London Economist* or *Statist*, the *Annalist* or the *Commercial and Financial Chronicle*, or the German *Wirtschaftsdienst*, would be invaluable. No academic course in business cycles should neglect it.

The author has made an attempt to show how it is possible to lead up from such common-sense linking of factors and symptoms to more efficient analysis in his paper: Die

avoid interference with the reader's judgment, the writer must refrain from carrying out the operation of "linking up symptoms." But he may still be permitted to make his idea of this exercise clearer by an example and to offer a few general comments.

It is obvious, for instance, that briskness of sales to consumers (households) is one of the basic elements of a prosperous business situation, sluggishness of such sales a basic element of an unfavorable one, both as a symptom and because of its effects. Now items 2, 7, 16, 17, 19, 22, 26, 29, 31, 35, 40, although most of them will also appear in other connections, are all more or less, in one way or another, related to actual and prospective sales to consumers, and may be lumped together and checked against each other for the purpose of diagnosing and prognosing them. The various aspects and the different phases of a distinct chain of events may readily be unraveled and dovetailed into each other. From an attempt to forecast the variation in "consumers' taking" in the immediate future we are led, via money incomes, to producers' expenditure, and we shall have no difficulty in linking that to expectation of profits, particularly that part which implies large commitments for a considerable time—expenditure on construction and equipment—thus deriving as a by-product an element of a common-sense theory of the role played in the process of changing business situations by the heavy industries and by building for business purposes. Profits, *causal* so far, in turn depend not on the price level nor on any absolute prices as such but on relations between prices, hence one important causal factor will obviously be the presence or absence of any possibility of changing, for the individual firm, the relation between expected prices and costs. Since it is not simply profits that affect the businessman's decisions but that part of the profits which will remain for him, we hit upon taxation and interest at exactly the right point, from which interest appears in its true role, without acquiring the position of either a necessary or a sufficient condition of the events to be prognosticated.

Wherever we start on our list, it is possible to establish short links between the item chosen and others, which carry us much beyond mere impressions, without using any elaborate statistical or theoretical technique, solely by our common-sense understanding of how things are related in the business process. The economic world and the mechanism of change may thus be explored, and two things readily accomplished. First, it is perfectly possible to arrive at reasonable diagnosis and prognosis from the standpoint and for the purposes of the individual firm. This is facilitated by the fact that for it most of the economic variables

---

Wellenbewegung des Wirtschaftslebens, *Archiv für Sozialwissenschaft und Sozialpolitik*, 1914.

are data which it cannot influence by its own action and the more recondite relations between which do not concern it. To be sure the individual firm may err, because of the inadequacy of its survey of facts or because of mistaken inferences from them. But very serviceable judgments can, nevertheless, be arrived at by taking reasonable care about one's facts and inferences. Second, both the fact and the form (in the rough) of the general interdependence between all the factors or symptoms of the situation can be established and indeed stand out so as to be unmistakable. Residential building, for instance, is obviously as much a function of national income as in turn it is, together with all its subsidiaries, a factor in shaping national income, and there is no item in our list for which an analogous statement would not hold true. We may and often do use the cheap device—unavoidable sometimes, useful often, misleading very frequently, always doing violence to truth—of either neglecting the weaker direction of a two-sided or many-sided relation or assuming that in a particular instance influence is exerted only by A on B, and not by B on A. Our businessman may have reason to suppose, for instance, that profits will not substantially vary in the near future but that the rate of interest will. For his purposes, in this case, interest will in fact acquire a causal role. The source of some of the gravest errors in practical judgment and of some of the most vicious theories lies in this method, which, if used with proper care and without pretensions as to the generality of results, is really helpful in the common-sense exploration of the economic cosmos.

This is all, however. And that it is not all we want, and where the limits of common-sense semeiology lie, is best seen when we attempt to generalize both in the sense of trying to arrive at statements which will be true for the whole of the organism and in the sense of trying to arrive at statements which will always hold true, or if we may use what really are inadmissible words, when we ask questions about fundamental causes and effects. Let us try one example. Is a rising price level essential to, perhaps the lever of, prosperity? Is it a cause, an effect, or a symptom of prosperity? Are profits and losses windfalls due to the mechanical effects of variations in the price level? And are these variations in price level in turn the mechanical effects of changes in the rate of interest and hence, possibly, of the policy of central banks? To this class of questions common-sense semeiology supplies no answer. The associations between series to which one might look for an answer can be interpreted in many ways. The voice of unanalyzed business fact repeats, almost mockingly, the one word Interdependence—at best—for anything more concrete is more often than not downright wrong, if intended to formulate general truth. Nor can we fall back upon that stock of experimental results which public policy has accumulated for us, for its testimony is incon-

clusive so long as we have no other means of interpreting it than those under discussion. All that can be said, from this standpoint, about, for example, whether or not a cheap money policy is effective in stimulating business, is that it sometimes does and sometimes does not take effect. And the layman has every reason to cry out in honest bewilderment, "Is it capitalism which upsets money, or is it money which upsets capitalism?"[1]

[1] The sentence quoted is faithfully transcribed from a political and literary periodical. A much better instance to illustrate what the present writer wishes to convey is vol. IV of the report of the English Committee on Industry and Trade (Balfour Committee), entitled Further Factors in Industrial and Commercial Efficiency (H. M. Stationary Office, 1928), which in Chap. VI deals with business fluctuations. Surely there is reason to try what other methods can do for us, if that is all that a group of able and experienced practitioners has to say after having completed so careful a survey of industrial facts.

CHAPTER II

Equilibrium and the Theoretical Norm of Economic Quantities

A. The Meaning of a Model.—We have seen that much can be done by the mere survey of those facts which we designate by the expression *business situation* and by the common-sense discussion of them. To make headway beyond this, it is obviously necessary to collect more facts and to find more elaborate statistical methods with which to treat and marshal them. It should be obvious, in particular, that we must go as far as possible into the past—because we have no other means of observing a large number of units of fluctuation—and that hence historical research must be of paramount importance even for dealing with the most practical of contemporaneous problems.

But we have also seen that in any such discussion of economic fact we run up against a wall which blocks the road toward precise answers to many of our questions, and which is not likely to crumble before any amount of fact, however complete, or any statistical method, however refined. The *reason* for this is that raw facts are, as such, a meaningless jumble. Even that amount of information which we have been able to derive so far was as much due to the application of our common-sense understanding of the *modus operandi* of our facts as it was to the facts themselves. The *consequence* of this is that we must now try, with a view to acquiring a more powerful apparatus of analysis, to refine upon our common-sense methods exactly as we must try to increase our stock of facts and to improve upon our statistical methods. That is what we propose to do in this chapter and the two that follow.

Surely this is the most natural, as well as necessary, thing to do. But since well-known controversies have arisen about it, the following remarks are submitted in explanation and defense.

1. If we present certain concepts and propositions at the outset and in a connected argument, this is partly a mere matter of expository convenience. Other concepts and propositions will follow later, as the need for them arises. But this method of exposition carries the danger of a misunderstanding. It will seem to many readers as though the facts

introduced later had no other role to fill than that of verifying a preexisting theory. We cannot enter here into the epistemological problem of the relation between "theory" and "facts." But it must be emphasized that what will be said in this chapter and those following is, in part, nothing but generalized formulation of some of the facts presented later. Therefore, the term *verification* does not accurately describe that relation. A much wider claim than it implies—the writer entirely agrees in this with some who profess to be enemies of all theory and never mention it except in quotation marks—must be made and is here made for the direct study of historical and statistical fact.

2. It is true, however, that some of our refinements upon common sense are logically anterior to the facts we wish to study and must be introduced first, because our factual discussions would be impossible without them. The implications of this will become more acceptable if we make it clear that what we mean differs from what students of economic cycles usually understand by a "theory." Many even of those who do not look upon theory as "babble,"[1] are in the habit of identifying it with explanatory hypotheses. And it is reckless or dilettantist hypothesis making which is responsible for, and to a certain extent justifies, both the discredit into which theory has fallen and the contrast which for some students exists between factual (or "realistic" or "empirical") and theoretic work. But the framing of hypotheses, although sometimes as necessary in our science as it is in all others, is neither the sole nor the main function of a theory in the sense in which it is synonymous with "analytic apparatus." If we are to speak about price levels and to devise methods of measuring them, we must know what a price level is. If we are to observe demand, we must have a precise concept of its elasticity. If we speak about productivity of labor, we must know what propositions hold true about total product per man-hour and what other propositions hold true about the partial differential coefficient of total product with respect to man-hours. No hypotheses enter into such concepts, which simply embody methods of description and measurement, nor into the propositions defining their relations (so-called *theorems*), and yet their framing is the chief task of theory, in economics as elsewhere. This is what we mean by *tools of analysis*. Obviously, we must have them before we take hold of the material we wish to measure and to understand. A set of such analytic tools, if framed to deal with phenomena which form a distinct process, we call a *model* or *schema* of this process. To the question what it rests on, if it does not rest on the facts of the process to be described, the only possible answer is that it rests on other facts.

3. Some workers in our field not only neglect the task to which we are about to turn, but take pride in doing so. They justify this by the claim

[1] The expression is Mr. Carl Snyder's.

that they are applying to social facts the methods of the physical sciences. Analogy with the entirely different problems of physics is much more apt to be misleading than helpful, but for the sake of argument we accept it. The case of those fellow workers of ours is not in the least improved thereby, for they entirely overlook the role of theory in physics, which is precisely the kind of arsenal of tools we have in mind and which even in hypothesis making goes much beyond anything we shall attempt here. Those of us who derive any comfort from possible similarities between our methods and the methods of physics, are invited to look up, for example, *Corollarium V* of Newton's Principia, or Bohr's model of the atom, which may serve to elucidate our meaning. However right, therefore, it may sometimes be to enter solemn protests against preconceived ideas, speculation, and metaphysics, no argument of weight can be gained from the physical analogy for the view that the right way to go about our task is to assemble statistics, to treat them by formal methods, and to present the results as the solution of a problem.[1] The illusion underlying this view may be further exposed by an instance of what we may term Nonsense Induction.[2] In every crisis or depression we observe that commodities become unsalable. If on the strength of this we say, "People produce too much, hence they are, from time to time, unable to sell what they produce," we are saying something for which there is really no warrant in the factual finding itself. Yet we have to make statements of this kind. If we do so on the finding alone, we are performing an operation void of sense, although it may be clothed in terms that look exact.

4. We have seen, above, that statistical and historical facts have, on the one hand, much more important roles to play in the building of our knowledge of a phenomenon than to verify a theory drawn from other sources. They induce the theoretical work and determine its pattern. But now we have to add that, on the other hand, they cannot be said to fill quite satisfactorily the function that theorists usually assign to them—the function of verification. For there is, along with Nonsense Induction, such a thing as Spurious Verification. An example will best show what it consists in. Starting from the common-sense impression that the interest rate is an important factor in business situations, we may jump to the conclusion that it is the causal factor responsible for booms and slumps. In fact, almost always a low rate of interest precedes a boom and a high rate of interest a slump. If this were enough to establish causal connection, this proposition would be one of the safest of our science. Yet, it is wrong and could be proved to be so, even if no statistical fact

[1] Veblen has somewhere said about as much as that, although he added common sense to statistics and mathematics. The fallacy of this and the danger of subconscious and primitive theorizing should not require further argument. Our choice is not between theory and no theory but between workmanlike theory and theory that is not workmanlike.

[2] M. F. Simiand's book on wages may be cited as particularly fertile in examples.

ever contradicted it. Nor is this all. Even if the proposition were correct, statistics could not prove it to be so, for it stands to reason that the behavior of our time series which accords so well with it, could also be explained by another relation or on grounds perfectly free from causal implication—for instance, on the ground that every boom must be preceded by a state of things which we recognize as being the reverse to "booming," that in such nonbooming situations there is little demand for money and, therefore, a low rate of interest. Hence prosperous business would always be preceded by low interest, even if this had nothing to do with bringing it about or if it were an obstacle to it.

The time sequences we observe are, of course, part of our material from which we have to start and for which we have to account. And we have to bring every new factual finding into accord with the rest of the facts of the economic process and not with any poetry of ours. But no statistical finding can ever either prove or disprove a proposition which we have reason to believe by virtue of simpler and more fundamental facts. It cannot prove such a proposition, because one and the same behavior of a time series can analytically be accounted for in an indefinite number of ways. It cannot disprove the proposition, because a very real relation may be so overlaid by other influences acting on the statistical material under study as to become entirely lost in the numerical picture, without thereby losing its importance for our understanding of the case. It follows that the claim usually made for statistical induction and verification must be qualified. Material exposed to so many disturbances as ours is, does not fulfill the logical requirements of the process of induction.[1]

B. The Fundamental Question.—When we behold one of the familiar graphs of economic time series—such as the graphs of the U. S. Bureau of Labor price index, the commercial paper rate, bank clearings or debits, numbers of unemployed—or of one of the business barometers, *e.g.*, that of the American Telephone and Telegraph Company, we undoubtedly have, as our businessman had, the impression of an "irregular regularity" of fluctuations. Our first and foremost task is to measure them and to describe their mechanism. It is primarily for this purpose that we shall now try to provide the analytic tools or a schema or model. But our mind, functioning in this field as it does in all the others, will never be content with this. However much wisdom there may be in the warnings against premature questions about causes,[2] they will always be asked

[1] Statements from the writings of such leading students of business cycles as W. C. Mitchell, W. Persons, and A. Spiethoff might readily be quoted in support of the assertion, that the above is not more than what either is already, or is fast becoming, commonly accepted opinion.

[2] There is, of course, a strong argument against using that questionable term at all. We shall speak of causes in a common-sense way, which, it is believed, is not subject to

until they are answered. Moreover, our mind will never be at rest until all our measurements and descriptions of mechanisms and propositions about relations are linked to the causes indicated in such a way that they may be understood to follow from them or, to put the same thing in our language, until we have assembled in one model causes, mechanisms, and effects, and can show how it works. And in this sense, whatever we may object, the question of causation is the Fundamental Question, although it is neither the only one nor the first to be asked.

Now if we do ask this question quite generally about all the fluctuations, crises, booms, depressions that have ever been observed, the only answer is that there is no single cause or prime mover[1] which accounts for them. Nor is there even any set of causes which account for all of them equally well. For each one is a historic individual and never like any other, either in the way it comes about or in the picture it presents. To get at the causation of each we must analyze the facts of each and its individual background. Any answer in terms of a single cause is sure to be wrong.

But an entirely different question emerges behind this one. If we succeed in describing the economic system by means of a general schema embodying certain properties of it, there is obviously some point and much practical utility in asking the question whether the system, as thus depicted, will *by its own working* produce booms or crises or depressions, and, if so, under what circumstances. Similarly, there is no sense in looking for a single reason why men die, for there is obviously a great variety of reasons. But there is both sense and interest in the question whether and why death would come about, in the absence of all lesions, by virtue of the working of the human organism or the cells of which it consists. This is the truly fascinating problem, although it hardly ever enters into the ordinary mental operations of medical practice, which are always concerned with one or another of the innumerable patterns of the actual occurrence of death. To put the same thing in a general form, if we have a set of "real" phenomena, X, which we try, for some purpose, to handle by a conceptual schema, X', then if an event Y occurs in X, it will not necessarily have meaning to search X for a single cause of Y; but there is always meaning to the question, whether X' implies or not the occurrence of Y, and which of the properties of X' are responsible for it.

---

epistemological indictment. If a definition be thought desirable, we may say that we mean by causes of a phenomenon a set of circumstances without which it would not present itself. We might define them as "necessary and sufficient conditions," but the greater precision only opens up new difficulties.

[1] So far, with the qualification which is to follow, the present writer entirely agrees with Professor Wesley C. Mitchell.

Having formulated the question as we wish it to be understood, we have to admit that the answer may still be negative. We have seen before, that external factors certainly account for much in economic fluctuations, and that they might even account for everything. This would amount to a theory of the cycle which may be very simply stated: a crisis or depression occurs whenever there is an unfavorable event of sufficient importance. For reasons glanced at in the first chapter, we cannot dismiss this view a priori. Moreover, it derives some support from traditional economics. Where economic life is not treated as stationary, it is, by the best authorities, treated as a process of organic growth which simply adapts itself to changing data. Barring the waves which can easily be shown to result from the properties of the adaptive mechanism, this does not point to any internal cause of cycles. Some have frankly held the cycle to be a "sham" or a random fluctuation.[1]

No doubt, the testimony of facts might be such as to make the existence or absence of a cyclical component inherent in the economic process a practical certainty. But actually they do not speak with a certain voice —especially, though not exclusively, because prima-facie adequate external factors are always with us—and however we may treat them by formal methods, they leave the Fundamental Question unanswered. Nothing remains, therefore, but to construct a model of the economic process and to see how it works in the study of time series. It also follows that in doing so we cannot take for granted that there is a cyclical movement inherent in the economic process, as we could if this were an indubitable fact of economic experience.

C. The Stationary Flow.—The analytic treatment of the facts of autonomous change in a closed domain of which it is our task to give account, begins conveniently with the construction of the model of an unchanging economic process which flows on at constant rates in time

[1] Any of these views may be right, of course, while it is certain that some supporters of the contrary view are guilty of faulty reasoning or have otherwise failed to establish the claim they make for the cycle as a distinct phenomenon. In part, also, final decision will simply rest on fertility in results and satisfactory fit to facts. Just here, however, it is important to emphasize that even straight negation of the existence of the cycle may mean very different things. Mr. Carl Snyder, for example, seems to mean no more than that the importance of the business cycle, taken by itself, has often been exaggerated—which is quite true. Professor Irving Fisher, in *Econometrica*, October 1933, p. 338, however, says that "the notion of the business cycle as a single simple self-generating cycle" is a myth. We quite agree, as the reader will see, that the business cycle does not consist of a single wavelike movement and that it is not "simple." It is very difficult to say whether the passage quoted means more than that. Other authors, again, when they deny the existence of the cycle, mean only to deny exact periodicity in the sense of constancy of period. In any case, in order to deny anything we have expressly or by implication claimed so far, it would be necessary to deny that business is sometimes good and sometimes bad.

and merely reproduces itself.[1] Obviously, such a model will present the fundamental facts and relations of economic life in their simplest form, and it is hardly possible to bring them out satisfactorily without it. Implicitly and in a rudimentary form it has, therefore, always been present in the minds of absolutely all economists of all schools at all times, although most of them were not aware of it. Some even displayed hostility to it as soon as it was rigorously defined and made to stand out in all the gauntness of its abstractions. This was attempted by the physiocrats and definitively achieved by Léon Walras. The Marshallian structure is based upon the same conception, which it is important to emphasize in view of the fact that Marshall did not like it and almost made it disappear from the surface of his exposition.

The commonsense of this tool of analysis, its nature and factual basis, may be formulated as follows: first, if we deal with, say, the organism of a dog, the interpretation of what we observe divides readily into two branches. We may be interested in the processes of life going on in the dog, such as the circulation of the blood, its relation to the digestive mechanism, and so on. But however completely we master all their details, and however satisfactorily we succeed in linking them up with each other, this will not help us to describe or understand how such things as dogs have come to exist at all. Obviously, we have here a different process before us, involving different facts and concepts such as selection or mutation or, generally, evolution. Incidentally, it may be observed that it is impossible to proceed from the dog backward to, say, a fish, in the hope that we might thereby add to our understanding of the processes

[1] The nonprofessional reader who in economic subjects is not so patient of the rigors of scientific apparatus as he is in a subject like physics, where he accepts unfamiliar ideas as a matter of course, will find this section, and perhaps others, difficult to absorb. And so it is, although the writer has simplified to the point of risking incorrectness of statement. The professional reader, in turn, will take offense at this simplification. In particular, he will find that some tools used by the writer are antiquated and that in many points recent progress of analysis has not been sufficiently taken into account. This will be done in another book which, in a wider frame, will among other things overhaul the purely theoretic parts of the present argument. Here, no other course seemed open to the writer than the one he has taken.

The first two tools we have just introduced—the idea of the closed domain and the stationary process—although absolutely necessary for straight thinking, already call for apologies. The first, while unexceptionable in itself, becomes very doubtful when applied to countries linked to each other and the rest of the world by a multitude of economic relations, of which we shall take but the most superficial account. This is a very serious imperfection, not only because we miss and relegate to the realm of disturbing factors what is part of the real process of economic change, but also because the most urgent task in the field of the theory of international trade is obviously its reconstruction from the standpoint of the theory of cycles. The second tool meets with objections even from specialists. We want it in order to bring out, by contrast, the contours of the phenomena of economic evolution.

in the dog as it is: these processes as such go on in a logically endless circular flow and always presuppose previous turnings of the wheel similar to the one under study—and we run up against hen-and-egg problems exactly analogous to the one which confronts us when analyzing the model of an invariant flow of economic life. In the case of biological organisms nobody takes offense at the distinction we are trying to make clear. There is nothing artificial or unreal about it and it comes naturally to us; the facts indeed impose it on us. As a matter of history, it is to physiology and zoology—and not to mechanics—that our science is indebted for an analogous distinction which is at the threshold of all clear thinking about economic matters.

Second, our distinction is by no means foreign to the ways of thinking of practical business. Every businessman realizes that running his plant in the customary way, going through all the motions of daily business routine, is one thing and that setting up the plant or changing its setup is another. He approaches these tasks with attitudes which differ characteristically from each other. There would be no object in trying to fuse into one schema the things to be done and the behavioristic types encountered in the two cases, merely because "real life" hardly ever presents one of them without the other, or because the real world is always "dynamic." The answer to any unwillingness to accept our distinction on the score of its being too theoretical is simply that everybody actually works with it, both in practical life and in analysis, although in a subconscious and inexact way—and that it is just as well to put logical definiteness into this universal practice. We shall see, moreover, that this is one of the most important means of understanding the mechanism of the business cycle.

The degrees of rigor to be applied in constructing this model are as numerous as the purposes for which we construct it. When trying to impart to a group of beginners a first idea of the relations constituting an economic system, the best way probably is to admit the whole range of ordinary occurrences and relax considerably on the various implications of the assumption of perfect invariance. The habit of doing this, however defensible it may be pedagogically, easily leads us into the error of overestimating the amount of facts which we really explain: we drift into the belief that if we only make the construction in a sufficiently comprehensive manner we shall account for everything there is to consider in a purely economic investigation. If then we slur over the logical difficulties which do not fail to arise, by replacing absence of change by "balanced" or "equilibrated progress," we arrive at a picture which really deserves to be called the more unrealistic, the more it presents the misleading appearance of lifelikeness. This applies with special force to the Marshallian model, which, precisely because of the virtues of its more

exact parts and the efficiency of some of the tools it provides, becomes particularly misleading when applied to the problems clustering around what Marshall calls "the element of time." The same is true of Professor G. Cassels' "steadily progressing society" and similar concepts.

D. Equilibrium and the Theoretical Norm.—For our present argument we may thus visualize an economic process which merely reproduces itself at constant rates: a given population, not changing in either numbers or age distribution, organized for purposes of consumption in households and for purposes of production and trade in firms, lives and works in an unchanging physical and social (institutional) environment. The tastes (wants) of households are given and do not change. The ways of production and usances of commerce are optimal from the standpoint of the firms' interest and with respect to existing horizons and possibilities, hence do not change either, unless some datum changes or some chance event intrudes upon this world.

Technological data may be expressed, for every firm, by a function which links quantities of factors, such as labor, services of natural agents and means of production that are themselves produced ("intermediate products": raw material, equipment, and so on) to the quantity of the product which it is possible to produce by each of the infinite number of ways in which they can be combined for this productive task, technological practice and the whole environment being what they are. This function, known as the production function,[1] tells us all we need to know for purposes of economic analysis about the technological processes of production. To the uninitiated it is strongly recommended to become familiar with the idea that production, in the sense relevant to economics, is nothing but combining quantities of factors and that it is, for economic purposes, exhaustively described by such a combination (productive combination). We can do little to facilitate understanding of this piece of apparatus beyond saying that while the production function itself, in the case of a stationary economy, is a datum and invariant in form, the actual combinations of factors, as measured, for example, by coefficients of production (see note), are among the variables of the problem, and

[1] There is by now a rich literature discussing this fundamental tool of economic analysis and its properties. Into these problems we cannot enter here, but a few important concepts may be mentioned. For this purpose we designate any product by P, the factors used in its production by $a, b, c, \cdots$, and write $P = f(a, b, c \cdots)$. P/a is then the quantity of product per unit of factor a, say man-hour, a/P *the coefficient of production* or the quantity of factor a that enters into a unit of product, $\partial P/\partial a$ *the marginal degree of physical productivity of factor* a. $\frac{a}{P} \cdot \frac{\partial P}{\partial a}$ is called by H. L. Moore the partial relative efficiency of organization but had better be called *product elasticity with respect to factor* a. The difference, so invariably overlooked by statisticians and engineers, between, say, in the case of labor, product per man-hour and productivity of a man-hour, should be particularly kept in mind.

must be determined by economic considerations. If these coefficients were all fixed, that is, if in order to produce, say, a bushel of wheat it were necessary to combine land, labor, seed, fertilizers, and so on, in given and unalterable proportions, there would be no economic problem of production beyond deciding whether to produce the bushel or not. If, however, there is some freedom of choice between combinations, which means that it is possible to produce the bushel of wheat either with, say, a certain quantity of land and a certain quantity of labor or with more land and less labor or less land and more labor, other factors remaining constant, then the economic problem emerges in the shape of considerations about costs and values. This is what is usually referred to as Substitutability of Factors. Inasmuch as that freedom of choice is not absolute and substitution is possible only according to certain rules and within certain limits, the production function which embodies these rules and limits may be looked upon as a condition or constraint imposed by the technological horizon and the structure of the economic environment on economic decision or on the maxima of economic advantage or profitableness which economic decision strives to attain. So far as substitution is not possible at all, analytic difficulties arise which need not detain us here.

But another point calls for notice. If all factors were infinitely divisible, the production function would be continuous and we could move about on it by infinitesimal steps. Many factors, however, are not infinitely divisible but available only in such large minimum units—think, for example, of a railroad track or even a steel plant—that product responds to addition of a unit not by a small variation but by a jump, which means that the production function is discontinuous in such points. Such factors we call *lumpy* (the term is Mr. Robertson's, the writer believes; at all events, it sounds like him). Now in the presence of a lumpy factor it will very often happen that production below a certain quantity of output will entirely have to do without that factor. An instance is the small-scale production of the artisan type, in which it would not pay to use costly machinery. In this case, mere increase in output within the technological horizon of the producers and along one and the same production function may spell change in what is usually referred to by the ill-defined term Method of Production. The same effect, not however contingent upon lumpiness, may be brought about by change in the relative prices of factors: an increase in wages may induce agriculture to proceed from intensive to extensive methods of cultivation, or industry to replace labor by machinery which may involve complete change of technological processes or principles. Yet both classes of cases may come about within one and the same production function.

In view of much that is to follow, it is as important as it is difficult to distinguish those classes of cases from others—which could also be

described as changes in method of production but which do, while those do not, imply changes in the production function. The criterion is whether or not the change occurs within the given horizon of businessmen. Or, to put it in another way, whether or not firms would have from the outset adopted the method which they actually adopt when their output has increased sufficiently, had the output been at that figure from the outset, or whether or not firms would have adopted production by, say, machinery from the outset, had wages also stood at their higher figure from the outset. In general, though not universally, this is equivalent to saying that we move on an invariant production function as long as variations in the quantity of product either can be decomposed into infinitesimal steps *or cannot be so decomposed exclusively because of lumpiness in factors.*

No other than ordinary routine work has to be done in this stationary society, either by workmen or managers. Beyond this there is, in fact, no managerial function—nothing that calls for the special type of activity which we associate with the entrepreneur. Nothing is foreseen but repetition of orders and operations, and this foresight is ideally borne out by events.[1] The productive process is entirely "synchronized," which means that there is no waiting for the results of production, all of which present and replace themselves at the moment they are wanted according to a plan to which everything is perfectly adapted. Everything is financed by current receipts. When dealing with the pure logic of the process, it is convenient to exclude savings—unless we define savings so as to cover replacement—since the man who saves obviously does something either to change his economic situation or to provide for a change in it which he foresees; and these cases violate, if we take the strictest view, the assumptions defining the stationary process. The income stream, constant if we neglect such things as seasonal variation, consists of wages —payments for productive and consumptive services rendered by human beings, managers included—and rents—payments for services of natural agents. There may be monopoly gains, but they must be entirely consumed either by the monopolists themselves or by some agency which takes them away from the monopolists, for otherwise they would change the stationary flow. As far as monopoly gains are due to the peculiar quality of some factor or to a monopolistic organization of those who own the factor, these gains will simply appear as wages or rents and may be entered into the appropriate category. If there are appliances, which

[1] The reader may pause for a moment to reflect on the nature of such statements. Is it not useful to distinguish, for the sake of clarity, phenomena which would present themselves under such assumptions from those which are contingent upon failure of a foreseen course of events to come true? And is the above statement really quite so unrealistic as it sounds? Why should the businessman be surprised when his foresight fails, if there were not a great mass of routine things which actually do conform to expectation?

are themselves products but infinitely durable ones, we may also list the return from them under the Marshallian title *quasi-rent*. But no other cases of quasi-rent would exist in so perfectly balanced a state of things. Readers who hold any theory of interest according to which that phenomenon would be present also in a perfectly stationary state (which the writer does not believe) are free to insert here also interest as a payment for the productive service which the particular theory chosen holds to be responsible for it.

Such a process would turn out, year after year, the same kinds, qualities, and quantities of consumers' and producers' goods; every firm would employ the same kind and quantities of productive goods and services; finally, all these goods would be bought and sold at the same prices year after year. Yet all these prices and quantities are "variables" in the sense that they are not uniquely determined by extra-economic constraint but may, ordinarily, vary within wide limits imposed by the physical and social environment. If in the stationary state they do not vary as they could within those limits, this is a purely economic fact which is to be accounted for by purely economic reasoning. We know from experience what kind of relations subsist between prices and quantities, by virtue of which they influence each other. This we express by saying that prices and quantities of all goods and services are *interdependent* and form a *system*. The quantities are really rates per element of time, but for some purposes it is more convenient to eliminate the time factor and to speak of absolute quantities. This is always possible if flows are constant, when any period of account may be arbitrarily chosen, or if they are strictly periodic, when the period of account would have to be a common multiple of all the periods.

The first and foremost task of economic analysis is to explore the properties of that system. The method of doing this is analogous to the method known in mechanics as the method of virtual displacements. What we want to learn before anything else is whether or not the relations known to subsist between the elements of the system are, together with the data, sufficient to determine these elements, prices and quantities, uniquely. For our system is logically selfcontained only if this is the case: we can be sure that we understand the nature of economic phenomena only if it is possible to deduce prices and quantities from the data by means of those relations and to prove that no other set of prices and physical quantities is compatible with both the data and the relations. The proof that this is so is the magna charta of economic theory as an autonomous science, assuring us that its subject matter is a cosmos and not a chaos. It is the rationale of the idea of variables that do not vary, the justification of the schema of a stationary economic process. The values of prices and quantities which are the only ones, the data being

what they are in each case, to satisfy those relations, we call *equilibrium values*. The state of the system which obtains if all prices and quantities take their equilibrium values we call the *state of equilibrium*.[1] Should there be more than one set of values of variables satisfying these conditions, we speak of a multiple equilibrium. The terms *stable, neuter* (or *indifferent*), and *unstable equilibrium* are self-explanatory. Equilibrium that is unique and stable is, of course, the only perfectly satisfactory case.

So far we have been using the concept of *general* or *Walrasian equilibrium*. It implies that every household and every firm in the domain is, taken by itself, in equilibrium. For the households, this means that, under the existing circumstances, tastes and economic horizon included, no household feels able to improve its situation by transferring any element of its money income from the commodity on which it is actually spent to any other commodity. For the firms this means that, under existing circumstances, technological and commercial knowledge and economic horizon included, no firm feels able to increase its revenue by transferring any element of its monetary resources ("capital") from the factor it is actually spent on, to any other factor. More simply and yet somewhat more generally, all households and all firms must believe that, under the circumstances and considering those elements of their economic situation which it is in their power to change, they cannot improve their position by altering their behavior—that is to say that their pattern of consumption (consumers' budget) and production (producers' budget or combination of factors) is trimmed to perfection. Mathematically, of course, this is expressed by maximum and minimum theorems. Prices and quantities must also fulfill the following conditions if Walrasian equilibrium is to prevail. Every household's and every firm's budget must exactly balance. All quantities of all commodities produced by firms must be bought by households or other firms. All existing factors must

[1] Friction may keep stationary an economic process that is not in equilibrium. This case is of considerable importance for any study of business situations and their changes, particularly for a study of their reactions to any impulse to change. It divides up into the subcase in which there is no equilibrium position and the subcase in which the system displays no tendency to move toward an equilibrium position, which may, nevertheless, be proved to exist. For the rough purposes of our volume, we shall not have to go into this matter except incidentally. Let us, however, settle on a term by which to identify the case, and call it *inactive*. Whenever it obtains, we do not "understand" the particular prices and quantities which exist, in the sense mentioned above. They could, *so far as the relations embodied in our theory are concerned*, just as well be different from what they are. But in all cases in which there is an economic rationale for unchanging prices and quantities (to these we will henceforth confine the term *stationary*), this rationale is afforded by the concept of equilibrium. Hence, in these cases, *stationary flow* and *equilibrium* are analytically equivalent and, describing the same mass of facts, have the same empirical basis, the statistical part of which consists primarily in the well-known findings about the great stability in time of the pattern of consumption.

be used as far as their owners wish to see them used at the prices they can get, and no demand, effective at those prices, must go unsatisfied. The last condition affords the basis of a rigorous definition of unemployment.

Let us, however, note in passing two more concepts of economic equilibrium, which we shall designate by the terms *partial* or *Marshallian*, and *aggregative equilibrium*. If general equilibrium prevails, every firm and every industry is individually in equilibrium; but an individual firm or an individual industry may be in equilibrium while there is no general equilibrium. And for some purposes, an individual industry may, in an obvious sense, be said to be in a state of equilibrium while the firms composing it are not. This concept is appropriate to the Marshallian type of analysis, and recommends itself for many purposes by its simplicity and "handiness." But the concept which, barring such special purposes, matters to us and which is the only strictly correct one, is the Walrasian equilibrium.

Whoever works with partial equilibria soon discovers the necessity of an instrument that will enable him to handle processes going on in the system as a whole which escape his "partial" tools. He is then likely, especially if trained in the Marshallian tradition, to complement his apparatus by a system of relations between social aggregates—such as total output,[1] total income, net total of profits—and to reason on these, together with elements of outstanding importance for the system as a whole—such as quantity of money (whatever that may mean), rate of interest, and price level. If these elements are so adjusted that there is no tendency to change *arising from their relations to each other*, we may speak of *aggregative equilibrium* and formulate certain propositions about it. This is the equilibrium concept used, for example, in Mr. Keynes' Treatise on Money. Its usefulness for some purposes we do not deny. But it is obvious that this kind of equilibrium is compatible with most violent disequilibria in every other sense. And these disequilibria will assert themselves by changing the given situation, *including the aggregative quantities themselves*. It is, therefore, misleading to reason on aggregative equilibrium as if it displayed the factors which initiate change and as if disturbance in the economic system as a whole could arise only from those aggregates.[2] Such reasoning is at the bottom of much faulty

[1] It should be observed that an industry singled out for "partial" investigation by means of the Marshallian apparatus must be, strictly speaking, a small one, *i.e.*, so small that what happens in it does not materially affect what goes on without it. Transition from this to "total output" is by no means plain sailing. See, however, Mrs. Robinson's article in the first number of the *Review of Economic Studies* for a highly interesting view on that problem.

[2] Cf. *infra*, Chap. IV, Sec. B, "sixth." As an instance of the attitude referred to in the text, we may quote Mr. Harrod's statement (Doctrines of Imperfect Competition, *Quarterly Journal of Economics*, 1934, p. 465): "Ultimately trade cycle theory is concerned with the

analysis of business cycles. It keeps analysis on the surface of things and prevents it from penetrating into the industrial processes below, which are what really matters. It invites a mechanistic and formalistic treatment of a few isolated contour lines and attributes to aggregates a life of their own and a causal significance that they do not possess. If we consider what those aggregates are, we understand immediately how easy it is, once this starting point is chosen, to slide off into all the superficialities of monetary theories of cycles. It should, however, be noticed that, for a point of equilibrium, one of the relations subsisting between aggregative quantities may be expressed by what is known as the *equation of exchange* or even in terms of the "quantity theory of money," which is formally correct for such points and only for such points. In fact, it is simply a condition of equilibrium. We shall refer to it as the *monetary ligamen*.

Another distinction may be introduced here which applies to all of the three concepts of equilibrium but is of special importance in the case of general equilibrium. If the elements of the economic system exactly satisfy all the relations, conditions, or ligamina constitutive of the system, we shall say that the system is *in perfect equilibrium*. If we find that a system, without satisfying ligamina exactly, is as near to perfect equilibrium as it will go, and that it will not move from that position unless some event impinges upon it, we shall say that it is *in imperfect equilibrium*.[1] An equilibrium the imperfection of which consists exclusively in the facts that firms use more factors and keep larger stocks and balances than would be the case if they were organized according to the highest standard of efficiency possible under the circumstances and that there is unemployment of resources from indolence of owners we shall, with apologies to readers of refined taste, call *sloppy*.

---

conditions which determine the equilibrium of the level of output as a whole in contradistinction to the particular equilibria of each industry which are determined by the demand and cost conditions of each"—one of those statements which, while not actually untrue, yet effectively bar the way to the core of the matter. *Mutatis mutandis*, the same applies to the "partial aggregative" concepts noticed in the previous paragraph of the text, such as the concept of an industry which, as such, is in equilibrium without (in the limiting case) any of its firms being in equilibrium.

[1] There are, of course, many reasons for the prevalence of such imperfections besides the fundamental one that no part of the world of real phenomena ever lives up to its conceptual picture. But our distinction is not intended to express the mere fact that schemata never fit reality exactly. This we could dispose of by saying that the theoretical schema of perfect equilibrium is simply our tool by which to express some aspects of what in reality is always but imperfect equilibrium. The distinction is not between schema and reality, but between two schemata designed to take account of differences in factual situations which are not negligible but important and productive of consequences, which deserve separate theoretical treatment.

We have not had to make any reference to time since we replaced rates by absolute quantities. This is as we should expect in dealing with a system which links its elements by relations that must be satisfied simultaneously, and into which we have not yet had the opportunity of introducing relations between quantities referring to different points or intervals of time. But now it is convenient, although it is not quite satisfactory in logic, to follow Marshallian tradition and to make use of time in order to define another type of imperfection of equilibrium. What was meant above was the case of a system so circumstanced as never to reach perfect equilibrium. But in other cases we find that, while the system is not, as it were, constitutionally incapable of reaching perfect equilibrium, changing conditions or disturbing events require adaptations which can be made only in time. In such cases there may be equilibrium as far as rapidly changing elements are concerned and disequilibrium in elements of slower adaptation, such as contracts and equipment. These "momentary" or "provisional" or "short-time" or, to use H. L. Moore's phrase, "tentative" equilibria may usefully be contrasted with "definitive" or with "long-time" equilibria.

There is some danger in associating a certain *state of the system* with a *lapse of time* during which changes will unavoidably occur that will substitute a set of prices and quantities entirely different from the one which would have satisfied equilibrium conditions before and toward which the system was conceived to be drifting. What matters here, however, is only that Marshallian readers should realize that our concept of perfect Walrasian equilibrium is akin to what Marshallian theory means by the long-time equilibrium, if the conditions thus designated are satisfied for every individual element of the economic system. The values which elements must take to satisfy those conditions, Marshall's Normal Values, we call their Theoretical Norms. And that state of the system in which every element conforms to its theoretical norm, however distant it may be from actual life, is what renders to the theorist the service which to the businessman is rendered by the idea of a normal business situation. Logically purified, the latter concept merges into the former.

E. Complications and Clarifications.[1]—Before going on, we must pause to glance for a moment at our magna charta. Is it satisfactory in

[1] The writer wishes to repeat a warning uttered in a previous note. This section contains arguments which will be found difficult precisely because all technical apparatus has been left out. Possibly the best advice to give the general reader is that he skip this section; but the writer hesitates to give that advice because the contents of the section are essential to the understanding of some of the phenomena which are the object of our study. Every reader should peruse Sec. G. To the theorist apology is again due for brevity of statement amounting to dogmatism, for failure to supply proofs, and for simplification verging on incorrectness.

every respect, *i.e.*, has it been satisfactorily proved that for each set of data there is a unique set of prices and physical quantities? No; nor is, for that matter, the magna charta of any other science entirely satisfactory, for everywhere a keener spirit of criticism and more powerful tools of observation *and analysis* have destroyed the primitive simplicity and comfortable determinateness of earlier stages. It is, however, possible to prove beyond reasonable doubt and with but unimportant qualifications that there exists a uniquely determined equilibrium state of the economic system in the special case which, following usage, we shall call the case of *perfect competition*. This case is defined by the conditions (*a*) that no seller or buyer is able to influence the price of any commodity or factor by his own action and that there is no concerted action, and (*b*) that there is perfect mobility of commodities and factors all over the economic field (*i.e.*, among all possible uses). Léon Walras has built the relations subsisting between the elements of the economic system into equations, and has shown that they suffice to determine unique values of variables. His proof left much to be desired in technique and details,[1] but later analysis still retains the principle. However, several comments are called for, even in the case of *perfect equilibrium in perfect competition*.[2]

[1] It must be admitted that, mathematically, our proof is even now imperfect and becomes convincing only when supplemented, step by step, by economic considerations. The original method of counting equations, showing that they are linearly independent and in the same number as the variables is, of course, inadequate. Considerable progress achieved mainly by Amoroso and Wald (the latter a member of K. Menger's mathematical seminar in Vienna, in the reports of which for 1935 the contribution has first been published) has not quite overcome the difficulty. But critics forget (besides the fact that our proof is no worse than many currently used in physics) that the proof does not rest on mathematics alone.

[2] The importance of the case does not, of course, rest with the frequency of its occurrence in actual life. A system satisfying its conditions in all its parts has probably never existed. For individual industries the case may be illustrated by farmers who can, within their individual possibilities, sell any amount of product they please at the current price which, individually, they are powerless to alter. The mass effect of their actions produces then the consequences characteristic of perfect competition. But even if there were no practical instances of the case, it would still retain scientific importance as an instrument for proving that purely economic logic is capable of determining uniquely purely economic variables, and that the case in which this holds true is endowed with interesting properties—such as zero profits, optimum output in the sense of output up to the point of minimum unit cost, equality of factor prices and physical marginal product times price of product, and so on. But in this book the concept would not have been mentioned if it were to serve a purpose no more concrete. The case does serve primarily as a steppingstone from which to proceed to more lifelike patterns. But it is also held that within the period covered by our material it affords a sufficiently close approximation to reality in many cases and that in others the actual patterns, although not fulfilling requirements, yet work in a way not fundamentally differing from the working of perfect competition.

1. The proof, were it even perfectly satisfactory in logic, that, given certain data and certain relations, there is one and only one set of values of the variables that will satisfy the latter and, at the same time, be compatible with the former, does not imply that firms and households will actually behave in such a way as to arrive at that set of values or return to such a set when some disturbance has driven them from it. Yet, we cannot rest content with a mere existence theorem of the former sort. What matters to us is precisely the presence or absence of an actual tendency in the system to move toward a state of equilibrium: if this concept is to be useful as a tool of business-cycle analysis, the economic system must strive to reestablish equilibrium whenever it has been disturbed or, to put the same thing in the language of a principle associated in physics with the name of Le Châtelier, it must tend to move, in reaction to every disturbance, *in such a way as to absorb the change.*

This problem has first been seen by Walras, although some critics do not seem to be aware of the fact. His solution starts from the observation that disequilibrium, which means deviation of at least one price or quantity from its equilibrium value, necessarily spells profits or losses to somebody at the spot or spots in which it occurs. And the argument is that this somebody can, under conditions of perfect competition, get out of that loss or fully reap that profit in no other way than by decreasing or increasing the quantity of his commodity. This will drive him toward equilibrium, and if all firms and households simultaneously react in the same manner, it will eventually bring the whole system to equilibrium, *provided that all actions and reactions are performed within the bounds of familiar practice that has evolved from long experience and frequent repetition.* Common sense tells us that this mechanism for establishing or reestablishing equilibrium is not a figment devised as an exercise in the pure logic of economics but actually operative in the reality around us. Yet it also tells us that the Walrasian or, for that matter, Paretian or Marshallian description constitutes but a first approximation which stops far short of what we need for an analysis of processes in an incessantly disturbed economic world, and leaves out of account many facts that may practically, if not logically, be just as important as those it includes and even go far toward producing exactly opposite results.

2. Later on we shall, of course, often meet with patterns of reality which require qualification, improvement, or even abandonment of that Walrasian model. Here, by way of development of some remarks previously made and in order to complete this preparatory discussion, we will notice a few points that seem particularly relevant to the question of principle. All, or nearly all, of the difficulties we encounter will be seen to be amenable to reduction, directly or indirectly, to the one fact that economic behavior cannot be satisfactorily expressed in terms of the

values which our variables assume at any single point of time.[1] For instance, quantity demanded or supplied at any time is not merely a function of the price that prevails at the same time, but also of past and (expected) future values of that price: we are, therefore, driven to include in our functions values of variables which belong to different points of time. Theorems which do this we call, in deference to Professor Frisch, *dynamic*.

The simplest case in point arises from technological lags which, in a world in which disturbances never cease to occur for any considerable length of time, would in themselves suffice to account for the fact that in practice we never observe any but those provisional or short-time equilibria mentioned above. There are always elements in the setup of a *firm*, as well as in the economic *system*, which for technological reasons cannot be adapted quickly, while others can. Now the importance of this for our present discussion does not lie in the obvious fact that full or perfect equilibrium, since it takes so much time to come about, may fail to come about at all and that, therefore, new disturbances always impinge on an imperfectly equilibrated system. For this fact does not *per se* negative the existence of a tendency toward perfect equilibrium which will assert itself in spite of it and serve to explain many actual processes, even if it never reaches its goal—which is all we want. In order to produce new phenomena and to impair seriously the usefulness of the Walras-Marshall description, reaction to the intermediate situations created by such partial adaptation would have to counteract or to reverse that tendency and to lead away from instead of toward full equilibrium.

This is not in general so: necessity for intermediate adaptation and for reaction to measures of intermediate adaptation, of course, alters the path the system takes and thereby almost unavoidably also the particular set of values which will eventually be reached, but does not in itself bar the way to *some* equilibrium. Technological facts which entail this are data. The perfect equilibrium we can still visualize in this case is relative to them and different from what it would be if they were different. In the general case, however, this is all. We shall meet exceptions, but they must be recognized as such and treated on their merits and with due regard to their particular causes. Nothing is gained by overstressing them, as has become the fashion of late, or by attributing to them what

[1] As far as the writer knows, Maffeo Pantaleoni was the first to see this problem and to use the phrase that was to acquire such prominence in the thought of our own time, "phenomena which go on indefinitely" (*che si perpetuano indefinitamente*). The paper, an address given in 1909, is reprinted in his collected essays (Erotemi di Economia, vol. II, third essay). The second essay is also relevant to our subject. It was first published in the *Giornale degli Economisti* for October 1901.

is really due to another process: a practice responsible for certain "endogenous" theories of the business cycle which, however useful they may be in elucidating certain properties of the adaptive apparatus, only obscure the fundamental problem we face.

3. As an instance which, though somewhat different from the cases just envisaged, yet enters into the class of lag effects and which will call for attention at later stages of our analysis, we will mention the cases in which producers' reactions to changes in price do not take effect at all for some time—say, in the case of many agricultural commodities, not until the next harvest—and then all take effect at once. In such cases supply does not work up to equilibrium point by small steps and stop there, but outruns it in one jerk. Price then in turn reacts with a corresponding jerk, and the process repeats itself in the opposite direction. It is theoretically conceivable that it will never stop and that prices and quantities will, without any new disturbance and under conditions of perfect competition, fluctuate indefinitely around equilibrium values without ever hitting them. Whether these fluctuations display increasing or decreasing or constant amplitudes—whether they are *explosive*, *damped* or *stationary*—depends on the constants of the demand and supply functions. This is the Cobweb Problem of recent fame, previously dubbed the *run-around* by agricultural economists, which first attracted widespread attention in the shape of the so-called Hog Cycle.[1] Just now we will merely notice, first, that it is obviously not the lag alone which produces the phenomenon and, second, that damped fluctuations of this sort are, of course, movements toward equilibrium. Stationary fluctuations would have to take the place of the equilibrium point but would not otherwise affect our argument.

4. Not only the lags envisaged in 2, but any kind of provisional equilibria, however conditioned, may create that difficulty.[2] In any market which is not organized in a very peculiar manner or concentrated in a single point of time, ultimate equilibrium, even if reached and even if nothing has occurred to change the situation, will in general depend on the path by which it is reached, *i.e.*, on the whole series of transactions that are usually carried out at varying prices as the situation unfolds. In this sense the outcome is indeterminate. Walras arrived at his unique

[1] The Hog and similar cycles will come in for discussion. The theoretical problem involved in these fluctuations of prices and quantities which suggest the picture of a spider web, has been, after earlier suggestions (H. L. Moore, U. Ricci, and others), treated by O. Lange, Formen der Anpassung und wirtschaftliches Gleichgewicht, *Zeitschrift fur Nationalokonomie*, 1935, and W. W. Leontief, Verzögerte Angebotsanpassung und partielles Gleichgewicht, *ibid.*, 1934.

[2] See Mr. P. N. Rosenstein-Rodan, Das Zeitmoment in der mathematischen Theorie des wirtschaftlichen Gleichgewichts, *Zeitschrift fur Nationalokonomie* vol. I, no. 1. Pareto spoke of a "curve of pursuit."

equilibrium by starting from a *prix crié par hazard* and allowing people to say what quantities they would be willing to demand and to supply at that price without actually buying or selling until that initial price is—*par tâtonnement*—so adjusted as to equate quantity supplied and quantity demanded. Edgeworth for the same purpose admitted "recontracting." But if the tâtonnement consists in people's actually buying and selling at the initial price, this will absorb part of the supply and satisfy part of the demand and the equilibrium price for the rest will be different from what the equilibrium price for the whole would have been, which argument can be repeated for any subsequent price that is not yet an equilibrium price. Some equilibrium, however, will be reached: barring the case to be noticed below (6), reaction to the various intermediate situations that arise is corrective and not disruptive. Moreover, experience acquired in dealing with other people and the possibility of profiting in each market period from the lessons taught by the preceding ones, tend to reduce the practical importance of the pattern under consideration and to make results approach those of the Walras-Edgeworth schema. It is incessant change in the data of the situations, rather than the inadequacy of the data of any given situation, which creates what looks like indeterminateness of pricing. We conclude, on the one hand, that we must take account of this pattern when dealing with the process of change which it is our task to analyze in this book and which must be expected to create precisely such situations, and, on the other hand, that it does not paralyze the tendency toward equilibrium.[1]

5. As provisional equilibria may result from causes other than lags, so lags may result from causes other than technological. Friction is an example. The reader may think of costs incident to change of occupation or to any shift from the production of one kind or quality of commodity to the production of another kind or quality, or to the exchange, by means of selling and buying, of one asset for another, or of the resistance to change of some prices or of the difficulty of adapting long-time contracts or of persuading oneself or other people to act, and so on. The presence of friction, will, of course, always entail an equilibrium different from that which would otherwise be reached, as well as slow up progress toward

[1] It is believed that the above is substantially compatible with the results of Mr. N. Kaldor's analysis in his Note on the Determinateness of Equilibrium, *Review of Economic Studies* for February 1934. The present writer submits that the distinction, so often stressed in these pages, between phenomena that are incident, or owe their importance, to the fact that things incessantly change and phenomena inherent to the economic process irrespective of change, is not idle and cannot be disposed of by saying that, since incessant change is the fact, it is irrelevant to speculate about what would be if it were absent. The distinction serves to separate different processes which are equally real and, in particular, to improve our picture of the mechanism by which economic life reacts to every change that occurs.

equilibrium. Moreover, if different elements or different sectors of the system work with different amounts of friction, as in general they do, lack of harmony will ensue, the more slowly and the more quickly adaptable elements getting out of step with each other. The same question arises and the same answer suggests itself as in the case of technological lags. The very existence and length of those periods of adjustment which we shall study later on, though, of course, not due to the element of friction alone, testify to the importance of the phenomenon.

It is not superflous to note that the effect of friction on the progress of the system toward an equilibrium state is not wholly of that negative kind. Its presence may steady adaptation by making it impossible to react to every disturbance instantaneously and to the full extent it may seem to justify at the moment. Some friction may even be said to be necessary for the economic system to function at all: it is in part due to friction which slows up the adaptation of supply that the equilibrium point is not much more frequently outrun. Just as the physical world would be an uninhabitable chaos if the slightest difference in temperature sufficed to transfer *all* heat instantaneously to the region of the minimum, so the economic world could not function if, for example, the slightest variation in a rate of exchange sufficed to set *all* gold flowing at once. Where modern technique approximates this state of things, cases of instability arise, carrying with them well-known measures of defense which abundantly illustrate our point.

6. Many cases of frictional resistance to change, especially in prices of commodities and factors of production, are frequently referred to as Stickiness or Rigidity. In view of the role these terms play in modern discussions of economic policy and in arguments about business cycles, it is necessary to point out that they are nontechnical and cover many different patterns. And to the difficulty of defining—we might facilitate the task by considering Rigidity as the limiting case of Stickiness—corresponds the difficulty of measuring them.[1] There are, of course, numbers of reasons why some prices should move more slowly or less strongly than others or all of them more slowly or less strongly than other elements of the system, and nothing can be inferred from the statistical fact alone. The latter may even mean no more than that demand and cost conditions are more stable in some sectors than in others, or that a price holds place behind others in the time sequence of events.[2] But

[1] See Professor Mills's method of measuring variability in his Behavior of Prices, *passim*. Number of relative changes weighted by their amplitudes, per suitably chosen unit of time, gives perhaps as serviceable a measure as we can hope for.

[2] That distinction between sequence and lag which is introduced by our turn of phrase is often difficult to carry out. Its reality is, nevertheless, beyond question. In a statistical sense consumption of the dessert "lags" behind the consumption of the soup, yet this simply

there is, nevertheless, a distinct group of facts which has some claim to a name of its own, *viz.*, what we might call willful stickiness. If a price be "regulated" either by public authority or by the individual or group in control of supply, this need not either in intention or in fact imply that it will move less often or less strongly than it would if its determination were left to the competitive pricing process. Even if it does, this may be due to friction only, for instance to the friction incident to a public authority's producing a new decision. But it is also possible that the policy of that public authority or that private group is to "stabilize" the price in question. Then we have before us a phenomenon *sui generis*, to which we shall have to return more than once.

For the moment it is enough, first, to point out that our definition turns on the comparison of the actual behavior of a price with what it would do under perfect competition. While it is recognized that this criterion is extremely difficult to handle, it is not admitted that this constitutes an objection if criteria that are easier to apply lack either precise meaning or relevance. Second, it should be noticed that occurrence of stickiness or rigidity in our sense—as distinguished especially from the frictional type—presupposes absence of perfect competition, although this is not in itself sufficient to produce it. A perfectly competitive system cannot display stickiness in that sense, however sluggish it may be to react.

If a value other than the equilibrium value be imposed by public authority upon an element—a price, for instance—of a perfectly competitive system otherwise in equilibrium, we have a particular case of imperfection. The system will adapt itself to this condition but, when it has done so, will no longer fulfill all the other conditions of perfect equilibrium. Since inserting a new condition into a determinate system spells overdeterminateness, some other condition has to be dropped. Which one it will be is *quaestio facti*, the individual firm's choice being guided by a principle of minimizing the effects (in terms of money) of the disturbance. If the element which has been made rigid is the price of an original or nonproduced factor of production and if that price is higher than the equilibrium price, the condition violated is that of full employment of resources in the sense previously defined. For perfect competition this is the only possible case of underemployment of resources in a perfect equilibrium. Of course, since we never meet perfect equilibria in real life, there will in general be many other cases of it even without rigidity and even without friction, presence of which, hence, cannot be proved by the fact of underemployment alone.

7. Of course we do not, as Professor F. H. Knight believes (Risk, Uncertainty, and Profit, 1921, p. 197), attribute omniscience to our firms

follows from the fact that eating one's meal is a process in time and has nothing to do with want of promptness in reaction.

and households, or any theoretical understanding of the processes in which they play a part, but simply that amount of information and understanding which they actually possess and which varies greatly between different groups. In the case of an undisturbed stationary process this question is of little moment, everyone having been taught by experience to follow the beacon lights which are relevant to him and the meaning of which he does not need to explore. Since every decision refers to the future, this implies foresight; and since the fruits of every effort mature in the future, it also implies caring for the future—forethought. The Walrasian men, for instance, keep their durable instruments and their stocks at least intact. It is, hence, no more justifiable to call the systems of Walras and Pareto timeless than to charge them with the absurdity of assuming omniscience. The particular kind and amount of information, understanding, foresight, or forethought is one of the data of the problem perfectly on a par with the particular tastes or the particular technological knowledge of any particular people. And for the static theory of the competitive case there is no more reason to bother about the former than there is to bother about the latter. The assumption really made is that people react to existing prices only,[1] and it is from this that trouble arises as soon as we start analysis from a state of disequilibrium or investigate the effects of any disturbance that is more than an isolated interruption of the ordinary routine. It is then that expectation or anticipation enters the picture, to threaten the existence of our equilibrium tendency.[2]

The first thing to be noticed about expectation is, however, that in many cases it materially facilitates both the movement toward, and the preservation of, equilibrium, sometimes to the point of preventing disequilibria that would without it arise from the working of the Walras model. The reader has only to survey the points previously touched upon in order to see that action upon expectations such as can plausibly be attributed to firms will often tend to smooth out things and to iron out

[1] We need not add "in a certain way," for the way in which people are made to react in the Walras-Pareto picture is the only one that can be reasonably attributed to them if they really think of nothing else but of the prices existing at the moment of each decision. There is thus nothing indefinite in Walras's analysis and the complaint that he neglected to state his assumptions about foresight is entirely unjustified.

[2] We are not hunting for paradoxes and cannot go into the case of people acting on what they expect that other people expect them to expect and so on. That would indeed interest us greatly if we were dealing with the logical foundations of economic theory. As it is, we have more pressing business. On Sherlock Holmes and his fiendish enemy Moriarty chasing each other, see Professor O. Morgenstern in *Zeitschrift fur Nationalokonomie*, vol. VI, p. 343. The case has some, if limited, importance for oligopolistic situations. But if there are many Sherlock Holmeses and many Moriartys endowed with different degrees of foresight, the problem need not worry us.

fluctuations that would otherwise occur. The effects of technological lags, for instance, will be reduced if the change—in adaptation to which they occur—has been expected, and the Hog Cycle, as far as it is really—we shall see reason to doubt it—due to inability to foresee the mass effect of "improvident" reaction to a favorable fodder-pork ratio, would entirely disappear if the time range of farmers' expectations increased. Speculation of the type described by classical theory—buying in advance of a rise in price that is foreseen, selling in advance of a fall—works the same way. In such cases expectations may open up a shortcut toward a definitive (though possibly different) equilibrium state.

But this is not always so. The source of trouble is not adequately described by saying that expectations are uncertain or that they have to be currently revised or that different people form expectations differing in range and reasonableness. Uncertainty of the future course of events gives rise, to be sure, to many phenomena that are very important for any realistic study of business cycles, among them, again, the existence of prolonged periods of adjustment. It is responsible for an important type of social losses and of excess capacity.[1] It will be seen, however, that there is no great difficulty of principle—although we have every reason to lament the lack of reliable factual studies on the subject—in handling this element, and we may dismiss it here. Nor need we feel concern about the mere fact, obvious from common experience, that action on certain types of expectation may be disruptive and help to drive the system away from equilibrium. These types, instanced by expectations which simply project into the future the actual rate of change of some quantity, will, at various turns of our way, come in to complete the mechanisms of certain phases of economic fluctuations. But although they may often temporarily counteract it, they do not in themselves disprove the existence of an equilibrium tendency or the proposition that at times it prevails in such a way as actually to draw the system toward equilibrium.

The real trouble to the theorist comes from the fact that introducing expected values of his variables—we will now, on the one hand, assume that they are expected with certainty and, on the other hand, also include past values—changes the whole character of his problem and makes it technically so difficult to handle that he may easily find himself unable to prove an equilibrium tendency which, nevertheless, may exist, or even the existence and stability of the equilibrium position itself. Into ques-

[1] This has, as far as the writer knows, been most fully seen (though overstated) by F. Lavington, An Approach to the Theory of Business Risks, *Economic Journal* for June 1925. The paper, containing much matter that is important for our purpose, is strongly recommended to the reader.

tions of technique we cannot and need not enter here.[1] But the nature of our difficulty may be illustrated as follows. Suppose that any class of economic agents which have to decide on any economic quantity—consider, for instance, the firms of a competitive industry in the act of deciding what quantities of their product they are to produce—in so doing take account of the past, present, and expected future values of any economic variables they believe to be relevant, weighting those values by weights that in general rapidly decrease to zero in function of distance from the time of the decision. Those expectations are data and quite arbitrary. Given the kind of people they are—their disposition to react—it is, under acceptable assumptions about consistency and so on, possible to speak of a uniquely determined decision. When it has taken effect, however, the industry and the whole system may, in consequence of it, be farther from settling down to a stationary state just as well as they may be nearer to it. If, now, those firms suddenly began to behave in the Walrasian way, Walrasian equilibrium would be approached in either case; but since *ex hypothesi* they do not do this but, instead, revise their expectations somehow and then again behave according to their disposition to react, they may forever travel away from any state that in any sense could be dubbed equilibrium or else, turning toward it, outrun it and jump back again until doomsday.

But for our practical purposes—the pure logician's sorrows are not ours—the predicament vanishes as soon as we realize to what it is due: we have admitted any expectations and we have taken them as given. As for the first, we have ourselves to blame if with such tremendous generality we do not get any results. As for the second, we have emptied the schema of everything that matters. In other words, if we discontinue the practice of treating expectations as if they were ultimate data, and treat them as what they are—variables which it is our task to explain—properly linking them up with the business situations that give rise to them, we shall succeed in restricting expectations to those which we actually observe and not only reduce their influence to its proper proportions but also understand how the course of events molds them and at certain times so turns them as to make them work toward equilibrium. For the moment, however, this question must be left open.

In certain cases in which there is no danger of ambiguity we shall speak of correct and incorrect expectations. But in this fragment of a discussion it was not necessary to draw that distinction, which, because of the interdependence between expectations and outcome, is a difficult one at best: since most of what is relevant to us applies equally to all expecta-

[1] See, for example, Professor Tinbergen on The Notions of Horizon and Expectancy in Dynamic Economics, *Econometrica* for July 1932.

tions, we need not attach any general meaning to it.[1] It would certainly not do to define correctness of expectation by means of congruent event, or by means of an assumption that correct expectation necessarily works towards equilibrium. On the general proposition, often recklessly stated, that expectations tend to make themselves true, see Professor Pigou's Industrial Fluctuations, p. 77.

F. Imperfect Competition.[2]—From our discussion of the case of perfect competition we emerge with the result that—subject, it is true, to serious qualifications and reservations—there is a real tendency toward equilibrium states in a perfectly competitive world. Those qualifications and reservations do not materially impair our tool. They rather improve, although they also complicate, it by supplying us with a rich menu card of possible cases, the theory of which comes in usefully at many cross-roads of any study of cycles. But many readers who admit this will question whether this is still so when we leave the precincts of the perfectly competitive case. It is necessary to present at least the sketch of an answer, which may be omitted by those who feel convinced already.

The limiting case of pure monopoly is still plain sailing. If one individual or combination of individuals (which does not necessarily imply definite or legally valid agreement or even conscious cooperation) controls either the supply of, or the demand for, some commodity or service, we get a determined price and a determined output of that commodity or service,[3] irrespective even of whether the monopolist sets the price or offers, as it were for auction, the quantity most advantageous to him.[4] But even in this case we meet with an element, important for all purposes of analysis but especially for ours, which tends to deprive that determinateness of the stringency it has in the perfectly competitive case. In perfect competition, the individual firm is not only powerless to alter market price, but also under strong compulsion to accept it. The firm

[1] Of the desirability of avoiding that, the writer has been convinced by Mr. Rollin Bennett.

[2] Professor E. H. Chamberlin's Theory of Monopolistic Competition, 2d ed., 1936, and Mrs. Joan Robinson's Economics of Imperfect Competition, 1933, are the standard works to which the reader should turn. Since we can only lightly touch upon a subject which has absorbed the interest of many theorists during the last decade, we will merely add Dr. Hicks' excellent survey in *Econometrica* for January 1935. A few other references will follow under particular headings.

[3] At least under carefully delimitated assumptions. On these see P. M. Sweezy's Note on the Definition of Monopoly in the *Quarterly Journal of Economics for February* 1937.

[4] We neglect, as of little importance for our purpose, the case of indeterminateness which may arise from particular shapes of demand and cost functions. If, for example, costs are zero and the demand curve is a rectangular hyperbola for part or the whole of the useful interval, many prices—strictly speaking, an infinite number—are equally advantageous to the monopolist.

cannot charge a higher price without losing all its business. It can, of course, charge a lower price, but will be penalized for doing so by a loss which, considering the absence of surpluses, will in the long run threaten its life. If a monopolist charges a higher or lower price than the one that maximizes his gain, he will also lose but only in the sense that he will, within limits, gain less than he could. Hence he can, if he should choose, go on doing so indefinitely, and there may be reasons for it other than error, indolence, and benevolence. He may have to consider public opinion, he may wish to maximize not immediate gains but gains over time and to "nurse up demand." He may or may not discriminate. Generally, there are many courses of action open to him and many ways in which to react to a disturbance. Each of them, however, yields a determinate result and supplies an equilibrating mechanism.[1]

As long as each monopoly position is surrounded by a sufficiently broad zone of perfect competition, no new difficulty arises about determinateness, even if the system contains a considerable number of them. Every monopoly then presents an isolated maximum problem with respect to given buyers' demand curves and competitively determined factor prices. But difficulties do arise as soon as those monopolies get near enough to one another in such a way as to influence one another's orbits, or, less figuratively speaking, as to make it necessary for each monopolist to shape his policy with regard to the policy of one or more of the others. Let us take at once the limiting case, that in which every commodity and service, every product and factor, is monopolized. The trouble with this case, known as Universal Monopoly, is not in any inability of ours to prove the existence of a case in which determinateness prevails[2] but in our inability to prove that there is any tendency for reality to conform to it. In general such a system would be what we have called inactive. We shall not, however, discuss this but merely notice, as far as it is necessary to do so for our purpose, the three standard instances of imperfect competition: Bilateral Monopoly, Oligopoly, and Monopolistic Competition.

1. We have bilateral monopoly when a monopolist faces a single buyer (monopsonist). If exchange between the two is isolated—both in the

[1] For a more refined and at the same time more realistic theory of monopoly, see G. C. Evans, The Dynamics of Monopoly, *American Mathematical Monthly*, 1924, and G. Tintner, Die Nachfrage im Monopolgebiet, *Zeitschrift fur Nationalokonomie* vol. VI, no. 4. A long list of contributions would have to be quoted were it in our power to do justice to the subject. We confine ourselves to Professor Zeuthen's important book on Monopoly and Economic Warfare, 1930.

[2] See E. Schneider, Theorie der monopolistischen Wirtschaftsformen, 1932, Chap. III, where the case is presented and illustrated by a very simple numerical example, and H. von Stackelberg, Marktform und Gleichgewicht, where the reader finds the argument against it. Mrs. Robinson in her chapter on A World of Monopolies (in which, however, factors are not monopolized) agrees with us by taking existence of equilibrium for granted.

sense that they meet just once and never again, and in the sense that for the purpose in hand the economic system consists of the two only—there will, of course, be limits between which the exchange ratio must fall, but no equilibrium exists within this zone, one exchange ratio being as likely as any other.[1] This case, quite uninteresting in itself, has yet some bearings on situations which actually arise in the course of the phases of business cycles: momentary situations emerge that are very imperfectly understood by the actors on the business stage and often lead to erratic actions more or less conforming to that type. Selling and buying a going concern amidst the excesses of a violent boom may serve as an example. The only thing we can do, even in less extreme instances, is to replace an equilibrium point by an equilibrium zone. It should be observed (see above, Sec. E, 4) that under those conditions even perfect competition would not yield determinate results, particularly if parties have no experience with each other and if there are experimental transactions at the beginning of the market. At the other end of the scale of possibilities stands the case of a monopolist and a monopsonist who deal regularly with each other, know from experience all about each other's situation and ways, and desire to arrive at an agreement which will cover the whole period they envisage so that there are no experimental transactions influencing the terms of later ones. We will also let the freedom of choice be limited for both parties by the relations in which they stand to the rest of the system. On these lines we construct the following case: a trade union so strongly organized as to be perfectly safe from the breaking away of members and the intrusion into its field of outsiders, deals with a monopsonist employer. This employer, in turn, is monopolist with respect to his product, which he sells to a perfectly competitive crowd of consumers. All the other factors he buys in competitive markets which he cannot influence by his own action, the industry being too small for that and also too small to influence the purchasing power of the masses by the wages it pays.

Now in this particularly favorable case we have at least a determined demand curve of the monopsonist employer for the services of labor. This demand curve will shift in the cycle but is exactly known not only to the employer but also to, say, the secretary of the workmen's union. The employer, in turn, knows exactly from long experience with his workmen what the minimum wage rate is that the secretary can accept for each total of man-hours. Neither wants to fight,[2] which means that neither

[1] This is not quite true, however. It is not so likely that one of the parties will be able to reap the whole advantage of the bargain as it is that they will somehow divide it. This fact, possibly reinforced by the introduction of other considerations, may be used for a more refined theory of the case.

[2] Professor Zeuthen has shown, however, that even in the case of "warfare" the range

uses the threat of withdrawing the whole supply of labor or of employment. The whole strategy of both parties consists in varying rate and quantity by small steps without trying to bluff. Under these conditions there is a determined wage rate which, together with the associated amount of man-hours, will be most advantageous to the union and another determined rate which, together with the associated amount of man-hours, will be most advantageous to the employer. But those rates will not, in general, be equal. Between them we have again a zone of indeterminateness.

Although some of the highest authorities in the field, particularly Cournot and Wicksell, and many recent writers could be quoted to the contrary, this is the opinion of the majority of students and particularly of Professor Bowley. But it is, of course, true for the general case only and in the absence of any further information. The equilibrating mechanism does not work thus *in vacuo*, but within the specific circumstances of each case. Therefore, that indeterminateness does not necessarily mean, to use an expression introduced before, that such a system is constitutionally incapable of equilibrium but only that the case divides up into subcases, for each of which the question must be put separately, as in fact it must in the case of straight monopoly as well. Among these subcases there are obviously many determinate ones. If, for instance, it is the practice that the union asks for a rate and the employer simply replies by taking as many man-hours as it is most advantageous for him to take at that rate, determinate equilibrium will obviously be arrived at. Other subcases may be constructed which are indeterminate. Practically more important for our purpose is the fact that, within the process for the analysis of which we are now assembling the analytic tools, situations change so quickly as to make the assumption of perfect knowledge and invariant reaction inadmissible. The characteristics of those changing situations may, however, give us to some extent precisely that information which we need in order to reduce ranges of indeterminateness. But temporary necessity, consciously planned strategy, and fluctuating anticipation of the general course of events acquire a very much wider scope than was assumed in the foregoing analysis. We are then left not only with zones but with shifting zones. Moreover, in many cases the demand and supply curves are not independent of each other.

Whatever their importance, those subcases in which bilateral monopoly yields determined equilibrium may be used—as may, of course, the case of simple monopoly of owners of resources—to show that perfect equilibrium may, outside of the perfectly competitive case, be compatible with the existence of unemployed resources. For it is clear that

of indeterminateness may be considerably reduced. See Problems of Monopoly and Economic Warfare, Chap. IV.

the bargain most advantageous to the workmen in our example will not, in general, lead to the sale of as many man-hours per workman as each workman would individually be willing to sell at that rate. No man need actually be out of work, of course, but whether some will or not is a secondary matter to be settled between the secretary and the employer, so that it is always possible to characterize the situation by associating with it a certain number of totally unemployed men. It is, in fact, very probable that the rate which will yield the maximum sum total of real wages, the maximum being relative to the value put upon leisure and to length of period envisaged, will generally imply some unemployment. Even if the unemployed have to be kept out of the earnings of their comrades, that wage rate will *ex definitione* remain the most advantageous one. If the unemployed are partly or wholly kept from other sources, the proposition applies a fortiori, but the conditions of the maximum are altered thereby.

2. If supply in a perfect market, *i.e.*, in a market in which there can, owing to perfect homogeneity of the commodity and perfect mobility and indifference of buyers, be only one price, is controlled by firms that are in a position to influence that price by their individual action (oligopoly or, if there are but two of them, duopoly), it is easy to see that we lose the conditions which enforce determinateness of behavior in the perfectly competitive case as well as those which account for such determinateness as there is in the monopoly case. This pattern, implying as it does that all customers will instantly transfer their allegiance from one firm to another on the slightest provocation, is of very little interest to us, because it is another limiting case which in practice must be rare, if not altogether absent. The obvious thing to do for any firm that finds itself, potentially or actually, in such a situation, is to try to alter it. The typical courses that are, in practice, resorted to in order to effect this, therefore, matter more to us than does the pure logic of oligopoly.[1] They may be roughly grouped under three headings.

[1] This is not to say, of course, that oligopoly is not very interesting from the standpoint of pure theory. The case was first treated by Cournot, whose solution, adversely criticized by Bertrand and Edgeworth, later on upheld by Wicksell, to this day serves as starting point of discussion. We will confine ourselves to mentioning the contributions of Harrod (Equilibrium of Duopoly, *Economic Journal* for June 1934), von Stackelberg (Marktform und Gleichwicht, 1934), Leontief (Stackelberg on Monopolistic Competition, *Journal of Political Economy* for August 1936) and Mr. Hicks' summary in the survey quoted before. On Edgeworth's treatment of the problem, see A. J. Nichol, Edgeworth's Theory of Duopoly Price, *Economic Journal* for March 1935. The subject owes very much to T. Palander (Beiträge zur Standortstheorie, 1935) and Professor Frisch (Monopole—Polypole—la Notion de Force dans l'Economie in Tillaegshefte til Nationaloekonomisk Tidsskrift, vol. 71). The general statement that oligopolistic prices are indeterminate would be misleading. All that can be said is that oligopoly divides up into very many cases, some of which are determinate while others are not.

First, a firm may attack to kill or cow. This may result in a monopoly situation—which in most cases will be a precarious one requiring endless defensive moves—or in a situation which, while stopping short of technical monopoly, yet gives the aggressor more or less complete control, the unconquered positions being insignificant or submitting to his leadership ("follow-the-leader" system, which may, however, arise also in other ways). Since, as in the case of Dumping, it is poor method to try to cover a wide variety of different patterns by one term and one argument, we should avoid speaking simply of cutthroat competition in all cases of such attacks: the intrusion of a new and superior method of production for instance, an event of particular importance to the subject of this book, identifies a special case which should be treated differently and distinguished from the genuine case in which there is or may be "wasteful" competition, overproduction, overcapacity in a sense to which nothing corresponds in the former, although throats are being actually cut in both. Whatever the nature of the struggle, while it lasts there cannot be any equilibrium, of course. But it will, in general, lead to a state which, though perhaps never fulfilling equilibrium conditions strictly and though often sloppy or lacking in stability, yet suffices for our purpose and, indeed, for most practical purposes. We have merely to note once more that this particular type of "equilibrium tendency" issues in a set of equilibrium or quasi-equilibrium values different from that which the system would otherwise reach. Rare, indeed, are the cases in which a campaign of this kind can be embarked upon irrespectively of the general business situation: as a rule, the phase of the cycle will provide us with determining conditions for the outcome. As common experience teaches, everything will turn out differently according as such a struggle occurs in a phase of expansion when demand curves shift upward, or in a phase of contraction when demand curves shift downward. Typically, it occurs in the latter, of course, a fact which is of considerable importance to the picture of the mechanism of business cycles in a society in which big units prevail.

The same applies to the second course open to firms in oligopolistic situations—agreement. Whether this be secret or open, tacit or explicit, complete or restricted to certain regions, products, practices (such as credit to customers), whether it is aimed and arrived at directly or after struggle for shares in the trade, does not affect the principle. The outcome enters in any case into the category of monopoloids. Creation of excess capacity as a war reserve or simply for the sake of its nuisance value is particularly characteristic of this case, for which the cartel is as typical as is the "trust" of the first case. The former is the most likely outcome whenever, on the one hand, nothing can be done to alter the homogeneity of the product and, on the other hand, no firm is, or thinks it is, strong

enough to venture on a fight to a finish. This is also a kind of equilibrium tendency, although the resulting set of values will again be different from any of those that would follow from any other course. The quaint metaphor by which Edgeworth illustrates the indeterminateness of oligopoly but serves to show how very likely combination or some understanding is: Nansen and Johansen, the two explorers who are all that is left of the personnel of a polar expedition, wishing to drag their only sledge in different directions (Papers Relating to Political Economy, vol. I, p. 124) may reasonably be assumed not to go on pulling against each other for ever. It also serves to show that their final course will not be determined by any automatic result of mere dragging. Dropping metaphor, we must recognize that the monopoly that emerges, were it even much more complete and much more durable than as a rule it can be expected to be, will, save in very exceptional cases, be a compromise that could, from the standpoint of economic theory, just as well be different. There is an element in the case, the distribution of the profit, which is theoretically indeterminate and has to be settled, say, by fixing cartel quota, in order to supply the missing datum. The theorist must, hence, deny himself the comfort of being able to say that, pure monopoly being the only rational solution, the problem is determinate. For us, however, this does not matter.

As a third course, firms may try to do away with the homogeneity of the product or rather to increase, and to take shelter behind, that lack of homogeneity which already exists in most cases. Though this course may also be taken for purposes of attack, it is primarily a measure of defense. It merges oligopoly into the third standard instance of imperfect competition—monopolistic competition. Hence, though we need not deny the occasional occurrence of pure oligopoly and though we cannot deny its logical possibility, we are certainly within our rights in denying the practical importance of the question of its determinateness. Two things should be added. First, any indeterminate situations that might arise if "pure" oligopoly actually persisted for some time, must not be confused with that indeterminateness which owes its existence to incessant variation of data that confront a firm in a world full of actual and expected change and are, at any time, imperfectly known for this very reason. The latter type of indeterminateness has nothing to do with the former. Second, such cases of indeterminateness of the first and genuine kind would also suffice to produce excess capacity, quite independently of the special reasons we have above seen to expect it. This follows from the fact that, both in a short-time and in a long-time sense, firms which find themselves in an indeterminate situation can never plan except for a *range* of prices and outputs.

3. The term Monopolistic Competition will be used to connote product differentiation (*cf.* Professor Chamberlin, *op. cit.*), and not in Professor Pigou's sense. Each firm in any sector of the system in which monopolistic competition prevails offers products that differ in some way from the products of every other firm in the sector, and thus supplies a special market of its own. This product differentiation must be interpreted with reference to its rationale, the creation of such a special market, hence very broadly: it comprises not only "real" but also "putative" differences, not only differences in the product itself, but also differences in the services incident to supplying it (atmosphere and location of shops included) and every device that enables the buyer to associate the thing he buys with the name of a particular firm. Differences in location[1] and other factors which will induce customers to prefer, rationally or a-rationally,[2] one firm to another, are of course unavoidable, irrespective of any intention to create them. And there is simply no such thing as a homogeneous commodity motorcar or liver pill.

At first sight it may appear that the case is covered by the theory of monopoly and that the questions of the existence of an equilibrium and of a tendency toward it are disposed of thereby. Some authorities, Mrs. Robinson in particular, seem in fact to be of this opinion. Otherwise it would be difficult to understand the confidence they place in their well-known schema and the equilibrium it yields.[3] To a certain extent they

[1] This matter, which ought to, but cannot, occupy us here, has, after an interesting discussion started by a famous paper by Professor Hotelling and valuable contributions by Professors Zeuthen and Chamberlin, been greatly developed in Mr. Palander's important book previously quoted and in the article by A. P. Lerner and H. W. Singer, Some Notes on Duopoly and Spatial Competition, written several years ago, and at last published in the *Journal of Political Economy* for April 1937.

[2] It should be observed that here as elsewhere a-rational behavior does not necessarily mean irrational or antirational behavior. A rational motive may be subconscious. An antirational conscious motive may cover an interest that could be defended on rational grounds. And what seems, or even is, antirational in the short run and in the individual case may still be rational in the long run and as regards results. Theorists of Monopolistic Competition do not seem to take adequate account of considerations arising out of these facts when they speak of the irrational behavior of consumers and, in particular, assume them to be "blindfolded." Two other points are germane to our discussion. First, if the scientific observer, applying his own private standards, thinks certain product differentiations insignificant and hence wasteful, it does not follow that they are so from the standpoint of buyers. Second, if monopolistic competition leads to what to the scientific observer appears to be too great a number of small firms (such as barbers or gasoline stations) he ought, before concluding that this spells social waste, to consider, among other things, that many of those who operate them would otherwise be unemployed and that the existence of such a fringe of small-scale business constitutes the capitalist method of taking care of a certain type of unemployment.

[3] The nonprofessional reader should consult Mrs. Robinson's and Professor Chamberlin's

are right. Creation of a special market may be described as a device to increase the friction that militates against buyers' transferring their allegiance from one firm to another. If this friction be strong enough, it may in the limiting case annihilate, in many other cases materially reduce, that interrelation of demands for the products of individual firms which is responsible for the oligopolistic difficulty, and thus, temporarily at least, create monopoly situations or, at all events, situations which are acceptable approximations to straight monopoly. The affinity becomes still more marked when we reflect that there is in real life hardly such a thing as absolute monopoly and that at least potential competition, to use John B. Clark's term, is present in most cases. We note, therefore, that one corner of business reality is adequately taken care of by this theory.

In general, however, that is not so. The very essence of monopolistic competition is in the fact that the price at which a quantity can be sold at any time is a function of the behavior both of the firm itself (not independent of costs to the firm) and of all the other firms in the field. This might of course be still described as a monopoly with a shifting demand curve. But when these shifts are no longer external to the behavior of the individual firm but part of its very mechanism and, moreover, so important as to completely overshadow any movements along such a curve, that way of formulating the case ceases to be useful:[1] a demand curve so

---

books and Mr. Harrod's article, all of which were quoted before. The following remarks may, however, be offered. The firm is endowed with a U-shaped unit cost curve and a demand curve for its particular variety of product, the negative inclination of which expresses the fact that the firm's *individual* output will exert influence on price. A "normal" rate of profit being assumed and included in costs, equilibrium in the industrial sector under study is determined by the point in which that cost curve is tangent to that demand curve. This can occur only in the falling interval of the U. For the analysis of short-run phenomena the validity of this cost curve which then follows from the temporary fixity of some factors, seems to be beyond question. But in the short run we cannot rely on the tendency toward equalization of net earnings of firms (the normal "profits" which those theorists include in costs), which tendency is the only reason why average costs should be equal to price, as they would have to be if that point of tangency is to indicate equilibrium. For the long run, the U-shape—the descending part of which can then only be based on lumpiness and the bottom of which is likely to be very broad—and with it some of the results of that theory, become less convincing. Mr. Harrod does not insist on the U-shape as a universally valid long-run form of average costs. He secures similar results about underutilization of resources by representing the long-run cost curve as the envelope of an array of short-time cost curves, the minimum of each of which is below the minimum of its predecessor. Results attributable to this technique only cannot be relied on to reflect properties of economic processes. Doubts about the demand curve of monopolistic competition will be mentioned in the text. It is not held, however, that the apparatus is wrong or useless.

[1] There seems to be, hence, considerable merit in Mr. P. M. Sweezy's strict definition of monopoly which stresses that distinction. See his Note previously quoted. Corre-

conditioned—and as brittle as that—had better be discarded altogether. We can gain, however, in the direction of competition, some of the ground we thus lose in the direction of monopoly: since in practice almost every firm either actually produces, or at very short notice is able to produce, any of a wide variety of commodities or qualities, some of which are, as a rule, almost perfect substitutes for the products of its competitors, its price and quantity adjustments will not in general differ fundamentally from those that it would have to make under conditions of perfect competition. That is to say, if we do insist on using the language of the theory of monopolistic competition, the demand curves for the products of individual firms will, in general and in the long run, display a high elasticity, though not the infinite one of the pure logic of competition. And this, in turn, will enforce approximate realization of the results of perfect competition that follow from it—in particular, differences in the prices of different qualities or types will tend to correspond to the differences in the costs that must be incurred in producing them. Hence the tendency of firms to secure institutional protection for their special markets.

Strictly, this applies only to cases which differ from perfect competition in nothing else but product differentiation. An exception must, no doubt, be allowed in those cases which would, in the absence of product differentiation, be of the type of pure oligopoly. A certain amount of indeterminateness flows from this source. Where potential competition is no more than a remote possibility, this exception may be important for the course of events in the particular industry; but it is hardly ever important enough to interfere substantially with the working of the system as a whole. There are other qualifications. Product differentiation cannot be strictly continuous. Plants and shops cannot be spread continuously over an area. But all this is not overwhelmingly interesting or important.[1]

---

spondingly, the suggestion so strongly pressed by Mr. Harrod—or originally by Mr. Sraffa—to appeal to the theory of monopoly as a savior from theoretic troubles, is less helpful than was at first believed.

[1] The above argument seems to the writer to be substantially identical with that of Mr. Hicks in the survey quoted before. The qualification that follows in the text is also implicitly present in his exposition, as is explicitly the point about the cost curve made in our previous note. In fairness to Professor Chamberlin, it must be emphasized that the case of monopolistic competition without oligopoly verging toward perfect competition has not been overlooked but listed by him. Difference of opinion does not arise from any charge of theoretical error we have to bring against him, but from his evaluation of the practical importance of the other cases which do deviate from this schema of quasi-perfect competition. In spite of what will presently be read in our text, it seems hardly justified to claim that the perception of the monopolistically competitive pattern alters our whole outlook on economic reality or, as Professor Chamberlin has recently put it, creates a new economic "Weltanschauung." This seems to be an optical delusion, one cause of which

Two points remain. The one is the great increase in the amount of friction which, as stated above, monopolistic competition will bring about in the system. It will also produce additional sloppiness and, in some sectors, inactivity in our sense and rigidity. Traditionalistic and cooperative forms of behavior will often lead to, and be reenforced by, all that. We must expect our system—particularly its equilibrium tendency—to function much less promptly and effectively than it otherwise would and everywhere points to be replaced by zones. Moreover, it is not denied that, where circumstances are favorable, as they are, for instance, in some professions and in many branches of retail trade, the consequences predicated by some authorities on monopolistic competition may even in the long run prevail: if newcomers flock into the legal profession and fees are being kept up, all lawyers will be underemployed and feel unable to make what they consider a decent living. Acting in a well-known frame of mind, they may well try to mend the case by raising fees. Independent cabmen, retailers of milk, and so on are very likely to behave just like that. Excess capacity and the paradox of prices rising with increase of potential supply then ensue. In interpreting the details of a situation, all this must be taken into account, of course, as it always has been. In doing so, we must not forget, nevertheless, that this is but one of many possible forms of behavior and that such pyramids of prices and capacities will, as a rule, be brought down by the capitalist machine itself: into the peaceful pastures of backward retailers the department store and the mail-order house intrude, and disregarding this mechanism is, in matters of application to reality, as serious a mistake as reasoning on the hypothesis of perfect competition would be.

Second, in the short-run situations of an economic world incessantly disturbed by external and internal factors of change, immediate reaction is, indeed, very different in the case of monopolistic competition from what it would be in the case of perfect competition. This is due to the fact that the possession of a special market, however precarious, gives scope for short-time strategy, for moves and countermoves which would not otherwise exist. In particular, it is owing to that fact that reaction by decreasing output rather than by decreasing prices may suggest itself

will be explained in the text, when it will also be seen that there is more justification for Mr. Harrod's claim that the theory of imperfect competition substantially contributes to our understanding of the mechanism of business cycles. We will add, that in believing that the schema of perfect competition affords in important cases a better description of what actually happens under monopolistic competition than does the theory of monopolistic competition itself, we do not think, as Mr. Hicks seems to do, that we can now contentedly return to the Marshallian apparatus. For the industrial demand-and-supply curve is not a comfortable tool to handle if homogeneity of product is absent. At the least, it would have to be replaced by very complicated demand and supply fields. But this need not concern us here.

as a short-run policy,[1] and that if any given situation is expected to be short-lived, construction of a more elaborate plant than can be used to optimum point so often becomes advantageous. Excess capacity results from this, rather than from any particular properties of normal equilibrium in monopolistic competition that are held to account for the phenomenon irrespectively of actual or expected change.[2] Again, presence of monopolistic competition not only means a different technique of adjustment characterized by many movements that seem, and sometimes are, erratic, but possibly also a different equilibrium, if indeed any equilibrium be eventually reached. It is worth noticing, however, that unemployment could in this case be due only to imperfections of equilibrium.

On the one hand, then, change that comes from within the system, as well as change that comes from without it, impinges on situations, induces short-time adaptations and produces short-time equilibria, which in many cases conform well to the picture drawn by the authors of the theory of monopolistic competition. On the other hand, new firms producing new commodities or old commodities by new methods will, as a rule, try to behave according to it, for that is the obvious method of exploiting to the full, and of keeping alive, the temporary advantages they enjoy. It will be seen, as our argument unfolds, how important that is for the subject of

[1] The above statement will, however, be qualified in Chap. X, last section. That policy must not be confused with the other policy, also characteristic of monopolistic competition and statistically indistinguishable from the first, of offering an improved quality and other concessions, rather than reducing price. It often takes the place of price reduction in depression and is not always duly taken account of in general appraisals of the effects of monopolistic competition.

[2] This seems to be a much more straightforward explanation of such facts as there are to warrant association of monopolistic competition with excess capacity than the one usually given. It will be observed that it does not apply to those cases which really approximate monopoly and also that it differs from our theory of excess capacity in the case (if it exist) of pure oligopoly. Mr. Harrod after having linked excess capacity to the fundamental properties of monopolistic competition in general (*op. cit.*, p. 451) as the theorists of that group are in the habit of doing (Professor Chamberlin should, however, be commended for his much more guarded statement) goes on to build (p. 466, *et seq.*) a rather heavy superstructure on this slender base. He argues that if, in a system consisting of two industries only, one of them is subject to decreasing costs which, according to him, is always the case under conditions of imperfect competition, contraction of output in trade recessions will on that account be particularly severe. If the industry that displays *increasing* cost contracts fortuitously, the other will "have to restrict by a larger amount," because, as soon as it contracts at all, its cost per unit increases. Thereupon the former contracts again and so they may "chase each other indefinitely," until they hit a new equilibrium at perhaps quite abnormally low outputs. This argument has evidently been written with a view to certain well-known phenomena which its author believed he explained by it. But since they are essentially short-run phenomena, *marginal* costs would have to be falling in order to produce that pattern, which moreover is, also for other reasons, readily seen to describe what at best is a very special case.

this book. Knowledge of the mechanism of cyclical situations has, indeed, been improved by that theory. Mr. Harrod has, in this respect, not claimed too much (*op. cit.*, p. 465), although he based the claim on grounds which we cannot wholly accept.

G. Equilibrium Economics and the Study of Business Fluctuations.—In order to sum up part of the argument of this chapter and to take one further step, we will now return to the question: What is the use, for our purpose, of the analytic apparatus thus imperfectly described? For brevity's sake we will consider the perfectly competitive case only, although there is nothing to prevent us from extending the following remarks to all other cases. We have seen, first of all, that the theory of equilibrium or (as in this connection we may say equally well) of the stationary flow, gives us, as it were, the bare bones of economic logic which, however abstract or remote from real life it may be, yet renders indispensable service in clearing the ground for rigorous analysis. The best way to convince oneself of the value of this service is to try to define such phenomena as overproduction, excess capacity, unemployment, maladjustment. Very little reflection suffices to show that these terms, as commonly used, do not carry any precise meaning at all, and that the fact that they do not, explains the inconclusiveness of much argument that goes under those headings. As soon as we try to find such precise meaning for them and to fit them for the task of identifying definite states of the economic organism, the necessity of falling back on equilibrium relations becomes apparent.

Although, in the second place, every event impinges on an economic world that is already disturbed and in disequilibrium, our understanding of the way in which the economic organism reacts to any given new event is unavoidably based upon our understanding of those equilibrium relations. The time-honored exercises which consist in trying to define by means of a generous allowance of *ceteris paribus*, the consequences of the imposition of a small tax on some commodity or of a small increase in the supply of labor and so on, are nothing but a method of exploring the nature and properties of those equilibrium relations which determine how any given change in data will be absorbed by the economic system and what final results will eventually emerge. Now, what causes fluctuations may either be individual shocks which impinge on the system from outside, or a distinct process of change generated by the system itself, but in both cases the theory of equilibrium supplies us with the simplest code of rules according to which the system will respond. This is what we mean by saying that the theory of equilibrium is *a description of an apparatus of response.* We know that it is no more than a first step toward such a description, but even so it is just as important for the study of fluctuations as is the theory of disturbing events or disturbing processes itself.

Third, the concept of a state of equilibrium, although no such state may ever be realized, is useful and indeed indispensable for purposes of analysis and diagnosis, as a point of reference. Actual states can conveniently be defined by their distance from it. As far as this goes, the more rigorous procedure of the theorist does not differ fundamentally from a habit of the layman's mind. During the whole of the postwar period, for instance, individuals and groups frequently argued their case in terms of a comparison of absolute or relative quantities of commodities and of absolute or relative prices or incomes with those values of the same variables which obtained in 1913. Of course, there is no warrant for doing this. All the data of the economic system having changed, there is no reason why prices of agricultural commodities, for instance, should stand now in the same proportion to other prices as they did then. But the idea which underlies that habit also lends itself to a more favorable interpretation. It may imply recognition of the fact that there are equilibrium relations between economic quantities, departure from which creates difficulties and untenable situations, and comparison with which is the obvious method to be followed in order to estimate the nature and extent of actual deviations. If, instead of comparing the actual situation with that equilibrium state which would correspond to its data, people compare it with a past situation that was not an equilibrium state and would, even if it had been, no longer be relevant, they are simply acting on a belief that the situation of 1913 was at any rate more normal than any later one and that it is not too far removed from us to serve as a norm. This may be wrong, but the underlying principle of comparing actual with normal values is not invalidated thereby. One of the services which the business and political worlds can most justifiably expect from the economist consists precisely in devising more satisfactory methods in order to give effect to that principle.

Hence, much more interest and importance than most of us are inclined to admit attach to the endeavors of some statisticians and economists to distill from the statistical material of an economic world which is chronically in a state of disequilibrium, the time sequence of equilibrium values. Perhaps it is true to say that some such idea must be present in the back of the mind of any statistician who calculates trends. He may have no other purpose but to eliminate them in order to make fluctuations stand out more clearly. But fluctuations must be fluctuations around something and, if pressed, he would probably define that something in terms more or less related to our equilibrium concept. The first economist to develop the idea consciously and to go, at least in conception and intention, the whole way, was Henry L. Moore. Throughout his work, summed up in his Synthetic Economics, runs the principle that trends are loci of points, everyone of which indicates the ideal equilibrium

value corresponding to the actual value taken by each time variable in the same point of time. We shall not go as far as that, partly because we shall find reasons to doubt the validity of the methods of trend analysis actually used. But this is not the essential point. We entertain a more fundamental objection.

The most important of the uses we shall make of the concept of equilibrium is, fourth, contingent on the existence of a tendency toward equilibrium. We have seen that assertion of it is subject to many qualifications and is not so simple a matter as older generations of theorists have believed. Since factors of change actually impinge on a world that is disturbed already and since, even if they had the opportunity of impinging on a world that was in perfect equilibrium previously, the processes of response would in most cases not directly lead to equilibrium in a simple way, our belief in the existence of an equilibrium tendency, which after every excursion draws the system back toward a new state of equilibrium, will have to stand on trial to the last page of this book, although facts of the most common observation support it much more strongly than does general theory, which quite rightly endeavors to take account of even the most freakish cases. The thing that matters to us, is nevertheless this tendency considered as an actual force, and not the mere existence of ideal equilibrium points of reference. We take our stand on the fact that the values of economic variables fluctuate in the course of business cycles between figures which roughest practical common sense recognizes as abnormally high and figures which it recognizes as abnormally low and that somewhere between these two lie values or ranges of values which that same common sense would recognize as normal. We wish to distinguish definite periods in which the system embarks upon an excursion away from equilibrium and equally definite periods in which it draws toward equilibrium. In order to harness our equilibrium concept to this service, which is fundamental for our analytic technique, we will not postulate the existence of states of equilibrium where none exist, but only where the system is actually moving toward one. When, for instance, existing states are in the act of being disturbed, say, by a war financed by government fiat, or by a "mania" of railroad building, there is very little sense in speaking of an ideal equilibrium coexisting with all that disequilibrium. It seems much more natural to say that while such a factor acts there is no equilibrium at all. When it has ceased to act, and when we observe that readjustment sets in which we interpret as a movement toward equilibrium, then and only then the ideal equilibrium becomes the goal of an economic process, the nature of which can be elucidated by reference to it. Then and only then equilibrium becomes what we have called it before, the "theoretical norm" of the economic variables. Hence, we will, for our purpose, recognize existence of equi-

libria *only at those discrete points on the time scale at which the system approaches a state which would, if reached, fulfill equilibrium conditions.* And since the system in practice never actually reaches such a state, we shall consider, instead of equilibrium points, ranges within which the system as a whole is more nearly in equilibrium than it is outside of them. Those ranges, which are the operational form to which we shall apply properly modified equilibrium considerations, we call *neighborhoods of equilibrium* (the term must not be understood in its mathematical sense).[1]

[1] The importance of the concept of equilibrium for the analysis of business cycles is being increasingly realized. See K. Pribram, Equilibrium Concept and Business Cycle Statistics, Institut International de Statistique, 22nd session (London, 1934) and Gleichgewichtsvorstellungen in der Konjunkturtheorie, *Zeitschrift für Nationalokonomie*, vol. VIII, No. 2.

CHAPTER III

How the Economic System Generates Evolution

A. Internal Factors of Change.—We start from the picture, sketched in the preceding chapter, of an economic process which merely reproduces itself at constant rates and is in equilibrium at every point of time. We recall that there are two motives for doing so. We wish to guard effectively against circular reasoning, and to use the relations which link economic quantities in such a process as an "apparatus of response." And we ask the question: What is it that makes that process change in historic time?

One reason why the process changes, *i.e.*, why at different dates different kinds, qualities, and quantities of goods are being produced and sold at different costs and prices, is obviously that it is acted upon by what we have termed external factors. These we shall now exclude from consideration, recalling once more, however, not only that they are always important and sometimes dominant, and that the *response* of the system to their impact must always be expected to account for a great part of the economic changes we observe, but also that their occurrence may and often does *condition* changes of the kind which we are about to consider. These two things must be kept distinct. By response we mean only what may be termed passive adaptation, *i.e.*, adaptation within the fundamental data of the system. Adaptation may, however, consist in altering some of those data, and such creative response belongs to the class of internal change. For example, if government demand for any given type of weapon increases, business may adapt itself according to the rules of the game which we (virtually) observe in the stationary process: it may turn out increasing quantities of that type of weapon at increasing costs and prices, which impulse may in turn propagate itself throughout the system according to the same rules. But it may also adapt itself by turning out another type of weapon or by producing the one demanded by a new method. This would be internal change *conditioned* by an external factor.

Factors of change internal to the economic system are changes in tastes, changes in quantity (or quality) of factors of production, changes in methods of supplying commodities. One of the services that our equilibrium system renders consists precisely in assuring us that this classification of internal factors is logically exhaustive, for everything else in the system is deducible from tastes, quantity and distribution of productive resources, and production functions. Autonomous monetary changes, it will be remembered, have been included in the class of external factors. We take up those three factors in turn.

1. We will, throughout, act on the assumption that consumers' initiative in changing their tastes—*i.e.*, in changing that set of our data which general theory comprises in the concepts of "utility functions" or "indifference varieties"—is negligible and that all change in consumers' tastes is incident to, and brought about by, producers' action. This requires both justification and qualification.

The fact on which we stand is, of course, common knowledge. Railroads have not emerged because any consumers took the initiative in displaying an effective demand for their service in preference to the services of mail coaches. Nor did the consumers display any such initiative wish to have electric lamps or rayon stockings, or to travel by motorcar or airplane, or to listen to radios, or to chew gum. There is obviously no lack of realism in the proposition that the great majority of changes in commodities consumed has been forced by producers on consumers who, more often that not, have resisted the change and have had to be educated up by elaborate psychotechnics of advertising. For our purposes, the case for our proposition is not impaired by the fact that consumers' satisfaction supplies the social meaning for all economic activity, or by the fact that new and unfamiliar commodities have ultimately to be "taken up," or ratified, by consumers and may, hence, be said to have been produced with a view to latent or potential or foreseen consumers' wishes, or on indications other than effective demand. As far as changes in taste go, this is entirely irrelevant to the mechanics of the processes we are to analyze. The fact that the work of "consumers' research" is typically one of criticism of commodities, brands, and qualities may be pointed to in illustration.

But however completely the proposition that changes in consumers' tastes are brought about by the action of producers may fall in with the general opinion on the subject, it is yet not quite true. It is easy to adduce instances of initiative change of consumers' tastes and even to group them around familiar types. Two of them may be mentioned. In every social circle, particularly if it be not too large and if its members enjoy a certain minimum of means and leisure (we may think, for the earlier parts of the period covered by our material, of the society of

courts as an instance), we observe leaders of fashion, specialists in creating new forms and habits of private life. Again, there are "movements" which may powerfully influence the collection of consumers' goods that is being bought by households—the temperance movement may serve as an example.

We hold, however, that this class of facts is not important enough to matter and that its neglect will not substantially invalidate our picture. Shifts in demand which come about in that way are, besides, no more than different choices between existing commodities, and, if unsupported by a change in real income which they do not in themselves entail, create a situation to which industry can and will passively adapt itself. Whenever we meet exceptions (war demand by governments seems to be the most important of them) nothing prevents us from dealing with such cases on their merits, but we do not include them in our general schema.

The reader should observe that this arrangement rests on several assertions of fact and, of course, stands and falls with them. If anyone should hold that changes in taste, which in any case are among the most obvious phenomena of economic history, do arise regularly and systematically from consumers' initiative in the above sense, in such a way that this initiative constitutes one of the main motive powers of economic evolution, he would logically have to deny the validity of our analytic schema.

2. Increase in productive resources might at first sight appear to be the obvious prime mover in the process of internal economic change. Physical environment being taken as constant (opening up of new countries enters as we have seen into a different category), that increase resolves itself into increase of population and the increase of the stock of producers' goods. Neither can, of course, be treated as an independent variable; both are at the same time effects of economic changes and conditions of other economic changes. Our reason for listing variations in population among external factors was that there is no unique relation between them and variations in the flow of commodities. Hence, it seemed convenient for our purpose, although it would be inadequate for others, to look upon an increase in population as an environmental change conditioning certain phenomena. Moreover, it could be demonstrated by familiar cases (India and China) that mere increase in population does not *bring about* any of those phenomena which presuppose either a certain density or a certain rate of increase in population except a fall in real income per head. Finally, it occurs so continuously as to be capable of current absorption.[1] Short-time variations in marriage rates are obviously the reflex of business fluctuations and do not cause them.

[1] In fact, increase per month of population seeking gainful employment is always small in comparison with population gainfully employed. Even yearly increase—if that be the figure to take—could, barring frictions and rigidities, never by itself cause any disturb-

Similar considerations apply to the increase in the stock of durable producers' goods which would ordinarily follow from the presence in a society of a positive rate of net savings. We will profit by the occasion in order to introduce a few concepts, conventions, and propositions which will be of use later on.

By Saving we mean the earmarking, by a household, of an element of its current receipts—as distinguished from "capital gains"—for the acquisition of titles to income or for the repayment of debt. If a firm does the same thing with an element of its net receipts from the sale of products and services, we shall speak of Accumulation. The distinction between Saving and Accumulation also applies, although it may be difficult to carry out, in cases in which, as in the case of many farmers, "firm" and "household" are one. We confine both concepts to decisions about monetary funds and we neglect, for convenience's sake, any similar decision that may be taken with respect to commodities. Saving and Accumulation will thus be treated as elements of a monetary process: the complementary processes in the world of goods constitute a distinct problem. Where no confusion is to be feared we shall use the word Saving to cover also Accumulation. Dissaving—which includes consumers' spending of "capital gains"—and Decumulation are self-explanatory.[1]

Therefore, Saving (Accumulation included, when required by the context) does *not* mean:

---

ance. For Germany, for example, the highest figure on record, for prewar times, is 2.25 per cent (1902). See Losch, Bevolkerungswellen und Wechsellagen, p. 23. As has been pointed out before, however, Dr. Lösch does present an argument for believing that "waves in population" play a causative role in economic fluctuations, into which we cannot enter but which is not simply disposed of by the above remark.

[1] Full justification of the conceptual arrangement adopted cannot be given without going much more thoroughly into the theory of money than is possible in this book, and will, it is hoped, be presented in the writer's treatise on money. That provision, say, for one's old age, is Saving only if the intention is to live on the revenue from the sum assembled for the purpose, and not if the intention is to spend that sum as well (so that, ideally, there is nothing left on the dying day), sounds not less strange than that it is Saving if one "earmarks" in order to purchase a house for the purpose of letting it, while it is not Saving if the intention is to live in the house. Also, it will be objected that, the defining criterion being an intention, we cannot from observable behavior know whether there is Saving or something else until the intention is carried into effect, and that even then we could not be certain because what we see might still be Temporary Investment (to be defined presently in the text). These and similar objections vanish, however, if the purpose and the logic of our definition are kept in mind. Saving in the sense defined is a distinct phenomenon, playing a role and producing effects different from those produced by the other actions or decisions which it is usual to include in Saving, and much confusion can be averted by distinguishing them clearly. To some extent, the importance of this will become evident as we go on. We include earmarking of elements of income for the purpose of repaying debts. But this will be dealt with separately and is not considered in this section. In fact, it has no place within our present set of assumptions.

a. The assembling of a sum earmarked for the purpose of buying a durable consumers' good, or of meeting an item of expenditure which cannot be covered by current receipts: "saving" in order to buy a motor-car for nonbusiness use or a house to live in, or "saving up" for holidays is not saving at all in our sense, but merely rearranging consumptive expenditure so as to fit "lumpy" items. Nor does any mere rearrangement of the time shape of one's real income stream necessarily involve saving.

b. Notspending or deferment of spending.[1] The decision on which our definition turns, may, but need not, result in the money leaving the saver's account and eventually reaching some commodity market later than it would have done if retained in the service of financing consumptive expenditure. It may possibly reach it sooner. In itself the decision to save is not a decision not to spend or to defer spending, and the latter decision may equally well occur with respect to sums which are and remain earmarked for consumptive use or, in the case of a firm, for expenditure in the ordinary run of business. Whether the decision not to spend occurs in these spheres, or in the sphere of saving, it is in any case neither saving nor explainable by saving as such, but a distinct phenomenon calling for a distinct explanation. Nor is Hoarding (to be defined later) synonymous with saving.

The carrying into effect of the decision to acquire titles to income we shall call Investment. In the case of households we shall mainly think of the acquisition of shares and bonds (including mortgages and the like) and of land or buildings, if intended for business purposes. In the case of firms we shall, however, include spending on all kinds of producers' goods beyond replacement—neglecting the difficulties incident to the question of what constitutes replacement. Such acts of expenditure we will designate by the term Real Investment.

Older doctrine, being primarily concerned with fundamentals, has undoubtedly excluded a great mass of facts from its horizon by despising the monetary approach and by linking investment—in particular real investment, still more real investment in plant and equipment—much too closely to saving. Saving and investment, as here defined, are of course distinct events. The former exerts influence of its own independently of investment and the latter can be financed, as we shall see, from sources other than saving. One of them, of great importance for our subject, should be mentioned at once. Suppose that somebody who is in the

[1] The objection to the term deferment is not only that expenditure can be deferred for many reasons which characteristically differ in nature and effect, but that in no case does it express the social meaning of thrift. The saver himself does not defer but definitively renounces expenditure on consumers' goods of the sum saved, while the latter may be spent on consumers' goods by other people without any delay.

habit of buying a new motorcar every five years, assembles the necessary sum continuously on his checking account. The units of account earmarked for that purpose are not withdrawn from circulation. They "circulate" in the same sense that any others do, only they do so with a longer period (lower "velocity," to be defined later) than others. The modern money market offering the facility, our man may decide to buy, say, treasury certificates as his motorcar fund grows and to sell them when the time has arrived to buy the car. He does not save. His behavior toward consumption or his intention to spend on consumers' goods has not changed. Yet he invests. The money leads a sort of double existence, serving all the purposes of a cash item earmarked for a certain purpose and at the same time all the purposes of the borrower. We call this Temporary Investment, and will carefully bear in mind its obvious peculiarities.

Moreover, saving, even if invested, need not issue into real investment as readily as the reasoning of older authors seems to imply. Not only can the saver invest by financing other people's consumption, but his money may serve to finance producers' deficits or to pay debts. Even if it does not, it need not be applied in such a way as to entail increase of the national stock of durable producers' goods, although it is obvious that, inasmuch as increased saving means rates of interest lower than they otherwise would be, there always will be a tendency in that direction. In addition, the reader is welcome to insert here a whole chapter on the innumerable incidents and accidents, errors, frictions, and lags, by which savings may be lost or stopped on their way or misdirected or dissaved again and which will account for imperfect coordination between saving and investment. But it is vital to realize clearly that any want of coordination which we may observe is not simply due to the absence of an equilibrating mechanism; for, though different acts and very often the acts of different people, saving and investment are interdependent and correspective so as to shape each other.

Saving, as defined, implying intention to acquire titles to income, the decision to save is taken with reference to given or expected investment opportunities and the prospect of income they offer. Moreover, it can be currently revised as they change: the case of savers is not analogous to that of farmers who have to make decisions which will take effect but one year later and then take effect for all of them simultaneously. It might be said, however, that in the case in which saving issues in real investment there is a lag between decision to effect the latter and the emergence of the corresponding equipment goods. This lag gives room for the ordinary chapter of accidents to unfold itself but not for a special kind of maladjustment, since the rate of interest is free to react at once. It will be apparent from the argument which follows, finally, that even

if saving, say, becomes a habit and outruns its rationale—a qualification which must be added to any proposition about economic behavior—maladjustment does not necessarily ensue because, whether savers save rationally or not, their action in any case influences investment opportunity, which in turn tends as much to adapt itself to the amount and the rate of saving as it tends to influence that amount and rate. Of course, there is very little meaning in an application of Marshallian demand and supply curves to this case. They do not illustrate but rather obscure the nature of the relation between saving, investment, and the rate of interest. Since this relation is the net result of the interaction of all the variables of the system, it can be expressed only in terms of the Walrasian apparatus. From the attempt to do so by means of two independent single-value functions of the rate of interest nothing but caricature can result.

Actually, of course, we find that that equilibrating mechanism very often does not work. But sound diagnosis cannot be expected from denying its existence or from setting up such entities as "optimism," "pessimism," "saving instinct," or from simply asserting that people elect to act in such a way that maladjustment will ensue and that saving and investment can each go its own way indefinitely. In order to make headway, we must locate the sources of the trouble. They will be found in the business situations incident to the process of economic change we are about to describe, and link up with notspending and with variations in real investment rather than with saving. At the moment, however, it is desirable, since the ground is so fertile in misconceptions, to make quite sure that the saving-investment mechanism, as such, does not produce anything that could qualify for the role of an explanation of crises or depressions.[1]

[1] If, given our definitions, the reader should think this obvious, so much the better. If he should think, in particular, that our rigorous distinction between saving and notspending begs the question, this would precisely imply granting the point which the writer wishes to make. There are many economists, however, who do use the simple saving-investment mechanism for the purpose above alluded to, and it is they whom the reader should blame for what the writer agrees are very trivial considerations. It should be observed that, while the argument presented above runs substantially on very familiar lines—it would be possible to quote in support, besides Walras, Mill, Boehm-Bawerk, Hayek, Hansen (for the latter's views see his criticism of Foster and Catchings in Business-cycle Theory, for instance, p. 57)—agreement ceases beyond it. For, barring many individual points which cannot be insisted on since this is no place for a full development of the theory of saving, there is a fundamental difference which must be kept in view: all those authors attribute to saving a role which is denied to it here. And all of them look upon the argument to be presented, or a similar one, as a satisfactory theory of saving, to which not more than a general proviso about frictions and disturbances from outside has to be added in order to make it applicable to the explanation of reality. This is not so, however. For us, the stationary assumptions we are going to make have importance only for the

For this purpose we will envisage a society, stationary in every respect except in that it displays a positive rate of saving. Production functions are invariant and external disturbances are absent. There is a positive rate of interest. We exclude—but this is only for the sake of convenience and brevity—all investment opportunities except lending to firms (this merely excludes consumers' credit) and assume that saving is the only source of supply of such monetary means as these firms may wish to have in addition to their current receipts (this assumption excludes credit creation: money consists, say, of a fixed number of gold coins which must be actually handed over to effect a transaction). Obviously, this model will display only the effects of saving and investment as such. We start from competitive equilibrium, although extension to the imperfectly competitive case would not present any difficulties. Now, that equilibrium is incessantly disturbed by the flow of new savings which are being offered to the firms. If, however, the system is adapted to the actual rate of savings—an assumption which is not only reasonable under the circumstances of this model, but also much nearer the truth in reality than devotees of oversaving theories are in the habit of admitting—this disturbance will be currently absorbed; for, as long as saving goes on at all, each installment will depress the rate of interest to the extent required to create its own investment opportunity. No other price, either of consumers' or of producers' goods will be affected at this stage. As to consumers' goods, the question whether saving in general reduces their prices is irrelevant here, since in any case they have been produced in quantities, decision about which already took account of that rate of saving. As to producers' goods, the analogous question—*i.e.*, whether investment increases their prices—is irrelevant for the same reason. And the new producers' goods are sure to find their buyers because the previous combination of factors of production is, owing to the fall in rate of interest, no longer optimal and the combination which is optimal now requires an increase in the more durable elements, let us call them machinery, such as will exactly equal the additional savings offered both in value and in cost, which is what we mean by saving creating its own demand. It is readily seen that, in this case, what above has been described as a caricature, works satisfactorily, because we have by our assumptions paralyzed everything else that could vary. The result would, in fact, be a steady growth of the system's industrial outfit by the steady addition to it of new units of plant and machinery, which, however, must be of the same types as those which are already in use or would be

purpose of preliminary clarification and are admitted from the outset to yield an inadequate picture which, taken by itself, could only mislead. Reference should be made to Professor Bresciani-Turroni's paper on the Theory of Saving, *Economica* for February and May 1936, and Mr. Robertson's on Saving and Hoarding, *Economic Journal* for September 1933.

in use but for lumpiness, in order to exclude a new and different element which would otherwise intrude.[1]

The fundamental meaning or "social function" of saving and investment, as interpreted by classical doctrine, stands out clearly and need not detain us. But it is important to notice that since no losses are incurred by producers of consumers' goods owing to the failure of the households to spend their whole income for purposes of consumption, there is no reason for any producer to refuse additional "capital" on the ground that, because of such losses, he wants to contract rather than to expand operations. Nor will there be any "glut" when the products of the new machines reach the markets for the consumers' goods. Prices will now fall but this does not spell losses, because it will necessarily be compensated for by the corresponding fall in costs per unit of finished product. There may be difficulties, of course, such as the impossibility of adjusting old loan contracts quickly, but they belong to the class of frictions. Unless interest falls to zero—and then saving in our sense stops, though, for example, "saving for the rainy day" may continue—this process can go on indefinitely, without of itself creating any problem, along constant production functions. The continuity of the latter is in this case no more serious a restriction than it is in others. It is worth while noticing, however, that such addition to the stock of durable producers' goods can be injurious to the interests of the working class. Whether it is or not depends on the elasticity of substitution between labor and those goods.[2] But this is not relevant to our argument.

If, however, the system is, at any time, not adapted to the saving actually done, analysis becomes more complicated. We will assume that savers suddenly and unexpectedly take to saving, say, double the sum per

[1] It is not necessary that every single firm should always add only such units as it already used before. For reasons of indivisibility, the additional machines may differ from those used before because, with expanding output, other types may become the most profitable ones. But they must be within the existing production functions. See what has been said on the subject of the latter in Chap. II.

[2] For that concept see Mrs. Robinson's Economics of Imperfect Competition, Mr. Hicks' Theory of Wages, various discussions in the *Review of Economic Studies*, particularly J. R. Hicks, Distribution and Economic Progress, 1936, and the articles, by Professor Pigou in the *Economic Journal* for June 1934, and by Mr. Champernowne and Mr. Kahn, *ibid.*, June 1935. There is a tendency to discount the value of the concept, principally because it works with reasonable efficiency only in the case of two factors of production and becomes unmanageable as soon as there are more of them. This is true. But it is submitted that the above instance, nevertheless, proves its utility. That question has been the subject of controversies for over a century; yet the concept of elasticity of substitution enables us, for the special case of invariant production functions, to answer it in one line by means of the theorem due to Mrs. Robinson: The demand price of labor (in money) increases (decreases) as a result of a fall in interest if the elasticity of demand for "capital" is greater (smaller) than the elasticity of substitution between "capital" and labor.

unit of time they used to save hitherto. It should be observed at once that the violent fluctuations usually associated with thrift are variations in the rate of spending.[1] Our problem is, therefore, little more than an exercise in pure theory, for long time changes in the rate of saving come about by truly infinitesimal steps, and although its fluctuations in the business cycle are considerable, owing to the great variability of the profit component, it must be borne in mind that these are a consequence of the cyclical situations, while here we are primarily concerned with the question whether saving would of itself produce depressions. Autonomously, abrupt changes in the rate of saving hardly ever occur. At least, the writer does not know of any instances, outside of the cases of "wild" inflation.

But assuming that such changes do occur, disturbance of the sort which always attends sudden changes in the channels of trade will in most cases ensue. Its precise nature, as well as the ultimate outcome, now depends on a great many variables, and also on other properties of the process and of the system, such as the number and sequence of the steps in the saving-investment process (the "periodicities"; here degree of vertical integration of industry becomes relevant[2]). We will simplify matters by again excluding bank credit and assuming that savers offer their additional savings to firms which, having been in competitive equilibrium at the previous point of time, have no use for them at the previous rate of interest and, at a suitably reduced rate, no other use than to add new units to their existing stock of machinery.

Now it is easy to construct a case in which the sudden withdrawal of the savers' demand from the market of the consumers' goods which they used to buy before their decision to double their rate of saving, causes catastrophe. This withdrawal on the one hand enforces emergency borrowing by the firms which produced those goods that they are now unable to sell and, on the other hand, deters all firms from committing themselves

[1] This will become clear later on. Meanwhile, it is useful to insist again on the consequences, for analysis and policy, the confusion between those two things, which are different in nature and in behavior, must have. Most of what writers who are above primitive error attribute to thrift really applies to non-spending—in particular, most of what is true in the talk about "saving financing the losses which it creates" and "saving helping to destroy rather than to increase the stock of society's real capital." Hence, though it is no doubt regrettable that it is impossible to present a definition of saving which will make it less refractory to statistical evaluation, we have yet no choice. Statistical measurability is no advantage if the measurable thing is devoid of meaning, or carries another meaning.

[2] If we were dealing with the problem of the effects of saving in its full extent, we should have to mention the reactions of cash holdings and of bank credit and, what is most important of all, much more so than anything connected with the behavior of monetary aggregates, the purposes which are financed by saving and the degree of success that attends them.

to new real investment. If savers go on after this, we can even, by properly choosing sequences, arrive at the result that all values will after a time asymptotically approach zero.

It is not less easy to construct a case in which there will be no fall at all in prices of consumers' goods because, the additional savings having been offered and accepted and work on the new machines having started before those prices had time to fall, demand from the increased incomes in the machine industries steps into the place of the demand discontinued by savers, so that nothing can happen except possibly a shift within the sphere of consumers' goods. This case is but a paraphrase, in monetary terms, of the idea that saving and investing fundamentally consist in handing one's claims to consumers' goods to laborers and other suppliers of productive services in order to set them to work on, say, intermediate products. It does not, as far as this goes, make any difference whether these services were previously employed or not: saving is not "abortive" if they were previously employed. But then their employment in the machine industry will temporarily reduce the supply of consumers' goods, so that in this case there will be a period during which saving and investment produce an increase in their prices.[1]

The best that can be said for both constructions is that, though they are absurdly overdrawn pictures of possible variants of an impossible case, they nevertheless may serve in the role of magnifying glasses with which to look for otherwise invisible traits of reality. The second is perhaps more apt to bring out fundamental truth that is not obvious to the layman, but for our purpose we are particularly interested in the first. In itself it is trivial, for all it teaches is that a violent change in the rate of saving causes trouble which, if we allow suitable expectations to play around it, may go on intensifying itself so that the new rate of saving and the new rate of investment may diverge for a considerable time. But the interesting point about it is that such a violent change, coming about autonomously, yields the only case in which saving could possibly have anything to do with the causation of business depressions in the sense that it could create them by itself. Moreover, these changes would have to recur periodically.

We now return to our argument. We do not, of course, exclude Saving and Accumulation from the internal factors making for economic change; for, unlike variations in population, they certainly are a purely economic phenomenon. But we do exclude them from the fundamental contour lines of our analytic model. This decision may well look strange. To many it may seem to exclude the very essence of the mat-

[1] In any case it is useful to observe that the sum total of incomes in the income-tax sense is always increased by savings which reappear in other people's incomes within the period of account.

ter.[1] A little reflection will, however, quickly dispel that impression. As soon as we realize the necessity of starting our analysis of economic change from a stationary state in perfect equilibrium, exclusion of savings as a major factor in bringing about that change follows logically, for whatever the definition of saving the reader adopts, it is clear that most of its sources, as well as most of the motives for it, would be absent in a stationary state. If we take up any of the familiar attempts at estimating statistically the amount of saving done in any country at any time, we see immediately that the bulk of it, whether done within the sphere of business or the sphere of households, flows from revenues or elements of revenues which would not exist at all in a stationary state, namely from profits, or from other incomes created or swelled by previous economic change.

As to motives, it is equally obvious that most of them arise out of situations incident to economic change. It does not matter now, whether we define the stationary state so rigorously as to exclude all saving or not. What matters is the fact that its quantitative importance would be exceedingly small, at any rate very much smaller than it actually is, if the economic process in any way approximated the equilibrium picture: Saving would be a "trickle" and by virtue of this fact alone could not give rise to any troubles. This is, in fact, the reason why "primitive" countries find it so difficult to finance the beginnings of capitalist industry themselves. It follows that, if we included savings as a major factor initiating economic change, we would be including in our premises part of what we are attempting to explain. Hence, it seems advisable as a matter of analytic neatness to construct a model which does not contain it among the fundamental constituents. By this we may hope to get much better insight into the nature and role of saving than if, trying prematurely to be realistic, we carried it with us from the start.

To sum up, we shall designate by the term (positive or negative) Growth changes in population (strictly also changes in age distribution) and in the sum total of savings plus accumulations corrected for variation in the purchasing power (to be defined later) of the monetary unit. That term is to emphasize not only that variation in both those variables is continuous in the mathematical sense—*i.e.*, that if we look upon, say, population as a function of time, then for any point of time that function has a certain finite value which is equal to the limit it approaches as the time variable approaches the chosen point—but also that it occurs at a rate which changes but slowly and is per se incapable of producing those fluctuations in industry and trade which interest us here. This does not

[1] The element of saving will, however, be reintroduced and the reader will then be in a position to judge whether or not the position assigned to it does or does not do justice to its actual importance.

mean that it cannot cause any fluctuations: it obviously can. Nor do we mean, that this factor of change is irrelevant to those fluctuations which are our subject, or that it is quantitatively insignificant. Within fifty or sixty, or even nine years—which, as we shall see, are for us important periods—the cumulative change due to Growth will assert itself in many of our figures. All it means is that the effects of Growth are, as we have put it, capable of being currently absorbed—in the sense that any disequilibrium created by every newcomer in the labor market or every dollar newly saved in the money market could under ordinary circumstances be corrected without giving rise to any visible disturbance —hence, cannot by themselves create the alternation of booms and depressions we observe. Moreover, Growth, but especially saving, owes its actual quantitative importance to another factor of change without which its modus operandi in the capitalist world cannot be understood. To be sure, there is interaction and interdependence and actual results are the product both of Growth and that other factor. But the modus operandi of the latter does account for booms and depressions and can be understood without Growth, which, therefore, we will relegate until we must call it up again in order to complete our survey.

3. By changes in the methods of supplying commodities we mean a range of events much broader than the phrase covers in its literal acceptance. We include the introduction of new commodities which may even serve as the standard case. Technological change in the production of commodities already in use, the opening up of new markets or of new sources of supply, Taylorization of work, improved handling of material, the setting up of new business organizations such as department stores—in short, any "doing things differently" in the realm of economic life—all these are instances of what we shall refer to by the term Innovation. It should be noticed at once that that concept is not synonymous with "invention" (see Chap. I, Sec. B). Whatever the latter term may mean, it has but a distant relation to ours. Moreover, it carries misleading associations.

First, it suggests a limitation which is most unfortunate because it tends to veil the true contours of the phenomenon. It is entirely immaterial whether an innovation implies scientific novelty or not. Although most innovations can be traced to some conquest in the realm of either theoretical or practical knowledge that has occurred in the immediate or the remote past, there are many which cannot. Innovation is possible without anything we should identify as invention and invention does not necessarily induce innovation, but produces of itself, as has been pointed out in the first chapter, no economically relevant effect at all. The economic phenomena which we observe in the special case in which

innovation and invention coincide do not differ from those we observe in cases in which preexisting knowledge is made use of. Stressing the element of invention or defining innovation by invention would, therefore, not only mean stressing an element without importance to economic analysis, but it would also narrow down the relevant phenomenon to what really is but a part of it.

Second, even where innovation consists in giving effect, by business action, to a particular invention which has either emerged autonomously or has been made specially with a view to a given business purpose and in response to a given business situation,[1] the making of the invention and the carrying out of the corresponding innovation are, economically and sociologically, two entirely different things. They may, and often have been, performed by the same person; but this is merely a chance coincidence which does not affect the validity of the distinction. Personal aptitudes—primarily intellectual in the case of the inventor, primarily volitional in the case of the businessman who turns the invention into an

[1] In many important cases, invention and innovation are the result of conscious efforts to cope with a problem independently presented by an economic situation or certain features of it, such as, for example, the shortage of timber in England in the sixteenth, seventeenth, and eighteenth centuries. Sometimes *innovation* is so conditioned, whereas the corresponding *invention* occurred independently of any practical need. This is necessarily so whenever innovation makes use of an invention or a discovery due to a happy accident, but also in other cases. It might be thought that innovation can never be anything else but an effort to cope with a given economic situation. In a sense this is true. For a given innovation to become possible, there must always be some "objective needs" to be satisfied and certain "objective conditions"; but they rarely, if ever, uniquely determine what kind of innovation will satisfy them, and as a rule they can be satisfied in many different ways. Most important of all, they may remain unsatisfied for an indefinite time, which shows that they are not in themselves sufficient to produce an innovation. The rise of the motorcar industry may serve as an example. The sense in which it may be true that motorcars emerged when conditions called for them is not relevant to an economic inquiry. For any "need" for them that may have existed was certainly subconscious and not an element in the then existing system of economic values. The "need," as far as economically relevant, was created by the industry, and people could obviously have gone on without any motorcars. Therefore, it seems reasonable, on the one hand, when everybody calls for a certain innovation and everybody endeavors to effect it, to recognize this fact and, on the other hand, not to insist on seeing it when it is not there. The problem of determining how far "necessity is the mother of invention" is a difficult one. Its solution may well read differently for different purposes of analysis. We shall have to emphasize this more than once. Meanwhile, it should be pointed out that we may accept a theory of invention as presented, for example, by Mr. S. C. Gilfillan in his Sociology of Invention—the present writer, as a matter of fact, substantially does—and yet adopt another point of view for our purposes. We take the opportunity to refer to Professor A. P. Usher's History of Mechanical Inventions, 1929, from which work the present writer has derived much help, and R. K. Merton, Fluctuations in the Rate of Industrial Inventions, *Quarterly Journal of Economics* for May 1935. The writer wishes to acknowledge his obligation, in the matter of invention, to a report made for him by Mr. Gilfillan.

tion to make the facts of innovation the basis of our model of the process of economic change. Nothing but success in showing that the processes incident to innovation do account for the phenomena we want to understand can justify that intention. But the reader is invited to observe how very natural it is. The worst that could befall the analytic schema presented in this book would be an impression to the effect that it is ingenious or farfetched. Surely, nothing can be more plain or even more trite[1] common sense than the proposition that innovation, as conceived by us, is at the center of practically all the phenomena, difficulties, and problems of economic life in capitalist society and that they, as well as the extreme sensitiveness of capitalism to disturbance, would be absent if productive resources flowed—either in unvarying or continuously increasing quantities—every year through substantially the same channels toward substantially the same goals, or were prevented from doing so only by external influences. And however difficult it may turn out to be to develop that simple idea so as to fit it for the task of coping with all the complex patterns with which it will have to be confronted, and however completely it may lose its simplicity on the way before us, it should never be forgotten that at the outset all we need to say to anyone who doubts is: Look around you!

B. The Theory of Innovation.—We will now define innovation more rigorously by means of the production function previously introduced. As we know, this function describes the way in which quantity of product varies if quantities of factors vary. If, instead of quantities of factors, we vary the form of the function, we have an innovation.[2] But this not only limits us, at first blush at least, to the case in which the innovation consists in producing the same kind of product that had been produced before by the same kind of means of production that had been used before, but also raises more delicate questions. Therefore, we will simply define innovation as the setting up of a new production function. This covers the case of a new commodity, as well as those of a new form of organization such as a merger, of the opening up of new markets, and so on. Recalling that production in the economic sense is nothing but

[1] The triteness the writer wishes to stress, becomes particularly obvious if the proposition be put into the form: Economic change is due to External Factors, Growth, Innovation. But it should be observed that even in this form, and stripped of any implication as to the relative importance of these three types of factors of change, the proposition is not the tautological consequence of our definitions.

[2] Readers versed in economic theory can easily translate the above into the language of isoquants. They will also perceive that the difficulties noticed in the following sentence of the text are not altogether insurmountable. But it would lead too far astray to go fully into the matter. Be it repeated again, that the above definition does not make innovation equivalent with "change in method" or "change in technique" of production. Such changes may also occur in response to changes in relative prices of factors.

combining productive services, we may express the same thing by saying that innovation combines factors in a new way, or that it consists in carrying out New Combinations, although, taken literally, the latter phrase would also include what we do not now mean to include—namely, those current adaptations of the coefficients of production (see Chap. II) which are part and parcel of the most ordinary run of economic routine within given production functions.

For cases in which innovation is of the technological kind we could have defined it directly with reference to the so-called laws of physical returns. Barring indivisibility or lumpiness, the physical marginal productivity of every factor (for definition see Chap. II, Sec. B) must, in the absence of innovation, monotonically decrease. Innovation breaks off any such "curve" and replaces it by another which, again except for indivisibility, displays higher increments of product throughout,[1] although, of course, it also decreases monotonically. Or if we take the Ricardian law of decreasing returns and generalize it to cover industry as well, we can say—as, in fact, Ricardo himself said in the case of agriculture—that innovation interrupts its action, which again means that it replaces the law that had so far described the effects of additional doses of resources by another one. In both cases transition is made by a jump from the old to the new curve, which now applies throughout *and not only beyond that output which had been produced before by the old method.*

We can define innovation also with reference to money cost. Total costs to individual firms must, in the absence of innovation and with constant prices of factors, monotonically increase in function of their output.[2] Whenever at any time a given quantity of output costs less to produce than the same or a smaller quantity did cost or would have cost

[1] This does not mean that unless there be innovation every *coefficient of production* necessarily increases in function of output, or that every coefficient of production is necessarily decreased by innovation. This bars us from measuring innovation by the behavior of these coefficients. Still less admissible is it to try to measure it by the change in one of them, for instance man-hours per unit of product or the reciprocal. The danger of such mistakes as that of comparing, say, the hours of work *on the farm* that went to produce a bushel of wheat in 1700 and 1900 and of overlooking that at the former date much more of the total work that ultimately issues into a bushel of wheat was done on the farm than at the later date, is the least of all that beset this path. The presence of other factors, and particularly of substitutable factors, makes any such measure all but meaningless. However, innovation must certainly reduce *some* coefficients, and if we are content with what amounts to almost heroic roughness, we may use product per man-hour for some purposes as an Index of Rationalization with respect to labor.

[2] As intended, the above proposition is self-evident. Compare, for instance, Henry Schultz, Statistical Laws of Demand and Supply, p. 104. A possible objection on the score of external economies will be cleared up as we proceed. Internal economies, also to be discussed presently, obviously cannot avail to reduce total cost of producing a quantity below total cost of producing a smaller quantity, unless they imply innovation.

before, we may be sure, if prices of factors have not fallen, that there has been innovation somewhere.[1] It follows that it would be incorrect to say that in this case innovation produces falling long-run marginal cost curves or makes, in certain intervals, marginal cost negative. What should be said is that the old total or marginal cost curve is destroyed and a new one put in its place each time there is an innovation. If there are indivisibilities and the innovation becomes possible only beyond a certain quantity of output, while below it the old method remains superior and would promptly be resorted to again, should output fall sufficiently, we may indeed draw one cost curve to combine costs with the old method in one interval and costs with the new method in another interval. But this is possible only when the new method has become familiar and the whole system is adapted to it, which means that it enters the production functions—*i.e.*, the practical range of choice open to all—and is no longer an innovation.

If prices of factors are not constant but change independently of the action of the firm, the effect on its cost curves—total, average, and marginal—is exactly analogous to the effect of innovation: they break off and new ones emerge instead. It is easy to see that we cannot construct a theoretical—as distinguished from a historical—cost curve that would in one stretch refer to, say, a given wage rate and, in another stretch, to a different one. The analogy may, hence, serve to illustrate still more clearly the impossibility of representing marginal costs in function of output as falling (whether continuously or not) and total costs as falling or rising less than they otherwise would, under the influence of successive innovations. If prices of factors change in function of the action of the firm—the same applies, *mutatis mutandis*, to industrial curves—it is no longer so, and cost curves have to take account of such changes. But, in general, prices of factors could then, unless there is lumpiness[2] or innovation in their production or supply, change only in the same direction as the quantity of the product, so that we need not apprehend that any fall along cost curves arises from this source.

[1] It need not necessarily have occurred in the industry under observation, which may only be applying, or benefiting from, an innovation that has occurred in another. On the other hand, that criterion may be extended to apply to new commodities, if we compare the revenue that can be derived from a certain outlay in the new line with the revenue that can be derived from the same outlay in the most advantageous of the old lines. It should be observed that, unless we bar indivisibilities, the criterion is only sufficient, but need not hold for every quantity of output.

[2] In particular, if a small firm gets some raw material at a lower price if it takes more of it, this can be due only to some lumpy factor in the cost combination of the supplier of it. This may also happen in the case of a big firm and of an industry, but here other elements are likely to enter. The fact that a big firm may obtain a certain quantity cheaper than a number of small competing firms could obtain the same quantity, may of course be

This helps to clear up some much-discussed points about the theory of cost which are of considerable importance for our subject. For the sake of brevity, we shall consider total cost per unit (average cost) only and define the so-called Law of Increasing Cost (not quite correctly) with reference to it. It readily follows from the above that in the long run—that is to say, when overhead may be treated as variable in function of output—average cost curves can be falling only because of the presence of lumpy factors, while all other causes that may bring about fall in average cost do not produce fall along these curves, but a downward shift of them. Hence, they can never be falling throughout, but only in intervals the length of which is determined by the nature of the lumpy factor or factors, and after which they must rise again. Now, disregarding the effects of lumpiness or smoothing them out by drawing a monotonic curve through the alternating stretches of rising and falling average costs, we should, strictly speaking, get a curve which would for a small individual firm, be parallel to the quantity axis, *i.e.*, constant unit costs. A Law of Increasing Cost comes in, however, if we admit that some factor is in absolutely inelastic supply even in the long run—the factor management for instance. For an industry or a big firm we may, in addition, get increasing total unit costs if factor prices rise against it as it increases output. This not only disposes, in the realm of fundamental principles, of the difficulties that have been raised[1] about competitive equilibrium under conditions of decreasing cost, but also enables us to take care, by means of the concept of innovation, of a multitude of industrial patterns which seem recalcitrant to those principles.

In fact, since decreasing total unit costs are mere interruptions, of necessarily limited extent, of the fundamental property of any given total unit cost curve either to rise or to be horizontal, increasing and decreasing costs are not coordinated alternatives. Only the former is a genuine "law"; the latter expresses but a modification of it by an accidental technical circumstance, which while it acts will indeed prevent perfectly competitive equilibrium from emerging but cannot do so indefinitely, because it must ultimately surrender. There is, hence, no Law of Decreasing Cost to parallel the Law of Increasing Cost on equal terms and there is no warrant for the monotonically descending cost curves that are sometimes drawn. At the same time, however, we recognize first, that in some cases lumpy factors may be so big—a railroad track

due to a monopoloid or a monopsonoid situation, and then has nothing to do with the argument.

[1] See, for instance, the Symposium on Increasing Returns, *Economic Journal* for March 1930, an echo of the important article by Mr. P. Sraffa on Laws of Return, *ibid.*, December 1926.

for instance—that for a very long time ahead the whole of the useful range of total unit cost lies within the falling interval, and second, that in practically all cases there is an important falling interval, owing to fixity of overhead, on short-run total unit cost curves within which firms may be moving for years together. In cases of "building ahead of demand" and with imperfect competition, in particular in the presence of oligopolistic struggles (compare Chap. II, Sec. F), the latter situation will be much in evidence—firms may possibly even move within the descending interval of their marginal cost curves—and account for many instances of "overproduction" and "overcapacity."

But what dominates the picture of capitalistic life and is more than anything else responsible for our impression of a prevalence of decreasing cost, causing disequilibria, cutthroat competition and so on, is innovation, the intrusion into the system of new production functions which incessantly shift existing cost curves. Thus, having been led by other reasons to question the validity of the analysis which rests upon the concept of monotonically descending cost curves, we also see that we do not need it, for the concept of cost curves that shift under the impact of innovation gives us all we want in order to handle the mass of facts for the sake of which those descending cost curves were devised.[1] Even the cases above alluded to, in which decreasing cost actually does constitute an important element of a business situation—of those "cramped" situations in which everybody tries to contract while everybody could expand sometimes even at falling prime costs per unit—find their proper setting and their interpretation within this analysis, which, as pointed out before, gives to Short-time Analysis and to the Theory of Imperfect Competition what seems to the writer to be their true significance. The impression that firms moving in intervals of decreasing costs are often in the center of the vicissitudes of industrial life is not wrong. But this links up with innovation, because the firms which, rushing down along such intervals, are upsetting existing industrial structure and, as it sometimes seems, heading toward monopoly, are in general precisely those which have set up new production functions and which are struggling to conquer their

[1] This is the reply to Mr. Robertson's remark (*Economic Journal* for March 1930, p. 84) that the present writer's rejection of descending long-period supply curves (the relation of these to the corresponding total unit cost curves need not detain us) is "a counsel of despair, which Marshall considered and rejected." The reason for Mr. Robertson's opinion and for the course taken by Marshall is precisely that they believed descending long-period supply curves to be indispensable for the treatment of that vast mass of facts which seemed to call for them. We see, however, that this is not so and that we can take care of those facts more naturally by another method. Mr. Robertson's solution of the difficulties surrounding those supply curves looks to us much more like a counsel of despair than does our own. Those difficulties are, in themselves, a symptom of something being wrong about descending supply curves, for inadequate analysis will generally be productive of pseudo-problems.

market. If it were not for this, the space that decreasing costs fill in the economists' thought would rapidly dwindle to very modest proportions.

Before going on, it will be well to repeat the same argument in terms of the two familiar concepts due to Marshall,[1] Internal and External Economies. As to the former, it may seem strange to say that economies of scale internal to the individual firm, if they are to explain the shape of a cost curve, necessarily reduce to effects of lumpiness. Yet it is so, not only in the case exemplified by costly machinery, but also in the cases of more rational division of labor or, more generally, better "organization" of factors which is held to occur when output expands. For if, for instance, a small tailor decides to employ a specialist in sewing on buttons because, and only because, his business expands, and if he would have taken that decision from the outset had his output been from the outset what it now is—if this is not so then, to repeat, this decision spells innovation and has nothing to do with negative inclination of cost curves: we must try to divest ourselves of the idea that innovation necessarily means something spectacularly important—then the only possible reason why he did not take that decision sooner is that, in his modest circumstances, labor is a lumpy factor. If internal economies are meant to designate the outstanding industrial fact we actually think of when referring to large-scale industry, they are due to innovation and cannot be expressed as a simple function of output even if they should historically be conditioned by an increase in the latter. In neither case does any difficulty arise about decreasing costs being incompatible with competitive equilibrium or about explaining the disequilibria we actually observe.

External economies are reductions in unit costs that are due to favorable circumstances incident to the growth of an industry,[2] notably to its growth in a certain locality. As pointed out by Professor Pigou (*Economic Journal* for June 1928), they are not always easy to distinguish from internal economies and there are many intermediate cases. This, however, we will disregard. Much more important is it that "external economies must usually take their ultimate origin in the internal economies of some subsidiary industry" (R. F. Kahn, *Economic Journal* for

[1] Readers not familiar with them should refer to Marshall's Principles, Book IV. No actual mistake is here imputed to Marshall in his handling of those concepts, nor is it the writer's intention to deny either the historical merit which was implied in introducing them, or the usefulness they perhaps retain for some purposes.

[2] We need not consider separately the case of external economies which arise not from the growth of any individual industry but of the industrial environment as a whole. What we are about to say in the text can easily be applied to this case. Nor is it necessary for us to enter into a discussion of the use made (with indifferent success) of the concept of the Representative Firm which seems to the writer to be one more of the devices used to hide the fundamental problem of economic change.

March 1935, p. 11). If an industry grows, some firm may specialize in the production of machinery needed by that industry and no other, or somebody may set up a broker's business to provide it with raw material or start a trade journal. Cases of this type arise either from lumpiness—the journal's overhead, including, say, an owner-manager, requires a minimum of readers and advertisers in order to pay for itself—or else they constitute innovations: the journal may very well be one. Neither alternative puts external economies on a par with external diseconomies or, at all events, their most important instance, which consists in the rise of the price of factors in response to increase in the demand for them. Nor would discussion of other cases alter the result. Take the instance of the growth of a supply of workmen specially skilled in the work of an industry. Lack of it is indeed one of the major difficulties which innovation frequently meets. It is overcome as the industry develops and reaches maturity, which means that it becomes adapted in size to its environment. While this process lasts, the industrial as well as the individual cost curves are incessantly shifting and no single cost curve describing this process can have any but a historical meaning. When it is over, this source of external economies ceases to flow. In fact, it would be hard to find any instance of the phenomenon in question except in connection with new industries. Therefore, no monotonically declining cost curves can be deduced from external economies. The term is still useful in order to denote some of the effects on one industry of innovations in another, which are, of course, a most important piece of the mechanism of economic evolution in our sense. But it must not be allowed to act as a screen to hide the innovations behind it, or be represented as a factor distinct from them.

We return to our argument. In order to bring out strongly the *modus operandi* of innovation, we will now promote to the rank of assumptions a few facts of common observation which present themselves in connection with our analysis of costs.

First, we observe that major innovations and also many minor ones entail construction of New Plant (and equipment)—or the rebuilding of old plant—requiring nonnegligible time and outlay. We shall reason on the assumption that they always do. If they did not, a great part of the theoretical schema which we are going to use would have to be modified. But these modifications, while of great theoretical interest, would be practically important only if the innovations that can be carried out instantaneously and without appreciable expense were themselves important. Experience seems to teach, however, that as a matter of fact they are not, that is to say, that our assumption fails to conform to fact only in the case of innovations which are of such small importance that we can safely neglect them although, there being no logical necessity for this, we

must always be prepared to meet cases which cannot be thus disposed of. Therefore, we shall impose a restriction on our concept of innovation and henceforth understand by an innovation *a change in some production function which is of the first and not of the second or a still higher order of magnitude.* A number of the propositions which will be read in this book are true only of innovation in this restricted sense.

Of course the reverse would not be true: not every new plant embodies an innovation; some are mere additions to the existing apparatus of an industry[1] bearing either no relation to innovation or no other relation than is implied in their being built in response to an increase in demand ultimately traceable to the effects of innovations that have occurred elsewhere. The relative importance of these cases varies, of course, and is extremely difficult to estimate. In fact, we meet here one of the most serious statistical difficulties of our subject. In a system in which the process of evolution goes on strongly, it is presumably not very far from the truth to say that practically all new plant that is being constructed beyond replacement, and much of what is being constructed by way of replacement, either embodies some innovation or is a response to situations traceable to some innovation.

Second, we shall in general argue as if every innovation—as now defined—were embodied in a New Firm founded for the purpose. There is obviously no lack of realism about this assumption.[2] The one significant exception will, together with the reason for it, be noticed under the next heading. Even the reverse proposition would be much more nearly true than it appears to be at first sight: Most new firms are founded with an idea and for a definite purpose.[3] The life goes out of them when that idea or purpose has been fulfilled or has become obsolete or even if, without having become obsolete, it has ceased to be new. That is the funda-

[1] Such cases are, of course, particularly frequent in industries that are established and highly standardized, such as the shoe industry: one can order a shoe factory almost as easily as one can order a pair of shoes.

[2] It is most instructively exemplified by Professor McGregor's essay on Enterprise and the Trade Cycle, in Enterprise, Purpose and Profit, 1934. He shows very convincingly that entrepreneurial activity as reflected by the formation of new concerns is the decisive influence in starting prosperities, less convincingly, that failures initiate downward movements.

[3] It is true that many people take up small retail businesses—retailing milk or running gasoline stations—for no other reason than that they do not know what to do with themselves, or as a temporary occupation during unemployment. In other cases, particularly in the artisan strata in some European countries, a man establishes a business of his own as a matter of course when he has reached a certain age and acquired a certain amount of experience. No particular idea or purpose, in the sense of a perception of a definite new opportunity and of a decision to exploit it, enters here. Even outside of the sphere of small business this happens sometimes. But this does not substantially affect the statements in our text.

mental reason why firms do not exist forever.[1] Many of them are, of course, failures from the start. Like human beings, firms are constantly being born that cannot live. Others may meet what is akin, in the case of men, to death from accident or illness. Still others die a "natural" death, as men die of old age. And the "natural" cause, in the case of firms, is precisely their inability to keep up the pace in innovating which they themselves had been instrumental in setting in the time of their vigor. No firm which is merely run on established lines, however conscientious the management of its routine business may be, remains in capitalist society a source of profit, and the day comes for each when it ceases to pay interest and even depreciation. Everyone who looks around knows the type of firm we are thinking of—living on the name, connections, quasi-rent, and reserves acquired in their youth, decorously dropping into the background, lingering in the fatally deepening dusk of respectable decay.[2] Analytically, our assumption is a device to bring within the reach of theory an important feature of capitalist reality in general and a material element in the causation of economic fluctuations. We visualize new production functions as intruding into the system through the action of new firms founded for the purpose, while the existing or "old" firms for a time work on as before, and then react—with various characteristic lags and in various characteristic ways—adaptively to the new state of things under the pressure of competition from downward

[1] Quantitative information about the life span of individual firms and analysis explanatory of their careers and their age distribution are among our most urgent desiderata. They would be important for many other purposes besides the study of business fluctuations, and throw a flood of light on the structure and working of capitalism, now obscured by so much empty phraseology and preconceptions of a pseudotheoretical nature. In particular, it would do away, the writer believes, with the prejudice deeply ingrained in traditional theory that an assemblage of durable producers' goods is in itself a source of—on principle—permanent surpluses. Some information exists, but it is too fragmentary to be conclusive. Difficult questions arise in connection with those companies which, though they reach legal existence, never get so far as to begin operations, and again with those which are but shells of changing purposes. An investigation on these lines has been carried out by J. Alfter, Das Lebensschicksal der Aktiengesellschaft, Bonner Staatswissenschaftliche Untersuchungen, 1932, who had however, to deal with a very small sample. The writer gleaned a similar impression from the story of 50 American corporations which were listed for him by Mr. G. B. Roberts of the National City Bank of New York as having at one time been leading in their branches. The list, however, only included concerns of 10 million capital or more which actually failed or were liquidated or reconstructed. It should be mentioned that throughout his Principles, Marshall shows himself to have been keenly alive to the point we are trying to make, although he did not make it central to his analysis.

[2] There is also an obvious connection between innovation and the rise of new industries, although, of course, innovation may also rejuvenate old ones. That is why, as Adam Smith observed, new industries are as a rule more profitable than old ones. They will, of course, give us the most telling illustrations of our theory of innovation. But we do not insist on this here.

shifting cost curves. This arrangement accurately describes, so it seems to the writer, the situations and struggles that we actually observe in surveying capitalist evolution, and in particular the nature of its disequilibria and fluctuations. It also describes that process of incessant rise and decay of firms and industries which is the central—though much neglected—fact about the capitalist machine.

Third, we will assume that innovations are always associated with the rise to leadership of New Men. Again, there is no lack of realism about this assumption, which but formulates a fundamental truth of the sociology of industrial society.[1] Verifications abound and may be gleaned from any textbook on, say, the industrial revolution, although the full extent and importance of the fact will not be realized until we know more than we do at present about what may be termed the personal history of industry. The main reason for introducing this assumption into a purely economic argument not primarily concerned with the structure of society, is that it provides the rationale for the preceding assumption. In fact, it explains why new production functions do not typically grow out of old businesses—if a new man takes hold of an old firm, they may—and hence, why their insertion proceeds by competing the old ones out of existence or by enforcing the transformation of them. Since this is part of our model and will be used to explain features characteristic of the process which is the subject of this book, we must notice the case of big, particularly of "giant," concerns which often are but shells within which an ever-changing personnel may go from innovation to innovation. They are, thus, no exceptions to our third assumption, but they may be exceptions to the second, because with such concerns innovation may and, in fact frequently does, come about within one and the same firm which coordinates it with its existing apparatus, and therefore need not assert itself in the industry by way of a distinct process of competition.

In order to take care of this case, which in future may steadily gain in importance, we introduce the concept Trustified Capitalism, in distinction from Competitive Capitalism. Economic evolution or "progress" would differ substantially from the picture we are about to draw, if that form of organization prevailed throughout the economic organism. Giant concerns still have to react to each other's innovations, of course, but they do so in other and less predictable ways than firms which are drops in a competitive sea, and many details—in some points, more than details—would then have to be altered in our model. We have to recognize, in this as in other respects, that we are dealing with a process subject to institutional change and therefore must, for every historical period, see

[1] A very inadequate remark only will, in passing, be offered in explanation of this in the next section. For a more elaborate statement, the writer refers to his Theory of Economic Development.

whether or not our model, however faithfully copied from the history of other periods, still fits facts. However, the sector of concerns which are "big," not only in the usual sense of the writers who figure out what percentage of the total national capital of the United States is controlled by the 200 biggest concerns, but in the sense required by the present argument, is as yet not great enough to dominate the picture in any country. Even in the world of giant firms, new ones rise and others fall into the background. Innovations still emerge primarily with the "young" ones, and the "old" ones display as a rule symptoms of what is euphemistically called conservatism. On the whole, the exception seems, therefore, to reduce to modifications to be dealt with on the merits of each practical case.

Our third assumption, then, inserts into our model of economic life a class of facts of the behavioristic type. It helps to localize, as well as to interpret, the sources and effects of those downward shifts of cost curves which we saw were inadequately described by the device of monotonically descending curves, and to describe the way in which the system reacts to them. In particular, it explains why innovations are not carried into effect simultaneously and as a matter of course, either by all firms or, if they involve the use of lumpy factors, by all firms beyond a certain size,[1] in the same manner as all firms will, other things being equal, try to employ more labor if it becomes cheaper. If this were so, all major innovations would still create disequilibria. But if action in order to carry them out were equally open to all as soon as they became technically and commercially possible, those disequilibria would not be different from, and not more serious than, those which arise currently from changes in data and are currently absorbed without very great difficulties and without "revolutions" or upheavals—which, in the political sphere also, would not occur in the way in which they actually do occur, if all people accepted new political facts with equal promptitude.[2] Innovations which may be thought of as becoming "objectively" possible in a continuous stream, would then induce a current and continuous process of absorption, save in exceptional cases which should not display any regularity. However, the disequilibria which we observe are of a different nature.

[1] This is, in fact, often implied in traditional analysis. There would then be some justification for treating innovations—excepting, perhaps, "revolutionary" ones—as a function of the size of firms (possibly, as measured by output) and for arriving at a descending cost curve after all which would include such changes of the production function as presuppose a certain size and are easier to carry into effect for big firms. But we see now that this means stressing a secondary element and obscuring the essential one.

[2] That is more than an illustrative analogy. The writer believes, although he cannot stay to show, that the theory here expounded is but a special case, adapted to the economic sphere, of a much larger theory which applies to change in all spheres of social life, science and art included.

Their characteristic feature is precisely that they recur with some regularity and that they can be absorbed, not currently and smoothly, but only by means of a distinct and painful process. This is because only some firms carry out innovations and then act along new cost curves, while the others cannot and have merely to adapt themselves, in many cases by dying. This fact, in turn, forces upon us recognition of the element formulated by our third assumption.

What we are doing amounts to this: we do not attack traditional theory, Walrasian or Marshallian, on its own ground. In particular, we do not take offense at its fundamental assumptions about business behavior—at the picture of prompt recognition of the data of a situation and of rational action in response to them. We know, of course, that these assumptions are very far from reality; but we hold that the logical schema of that theory is yet right "in principle" and that deviations from it can be adequately taken care of by introducing friction, lags, and so on, and that they are, in fact, being taken care of, with increasing success, by recent work developing from the traditional bases. We also hold, however, that this model covers less ground than is commonly supposed and that the whole economic process cannot be adequately described by it or in terms of (secondary) deviations from it. This is satisfactory only if the process to be analyzed is either stationary or "steadily growing" in the sense of our definition of the term Growth: any external disturbances may enter, of course, provided adaptation to them is passive. And this is equivalent to saying that the assumption that business behavior is ideally rational and prompt, and also that in principle it is the same with all firms, works tolerably well only within the precincts of tried experience and familiar motive. It breaks down as soon as we leave those precincts and allow the business community under study to be faced by—not simply new situations, which also occur as soon as external factors unexpectedly intrude but by—new possibilities of business action which are as yet untried and about which the most complete command of routine teaches nothing. Those differences[1] in the behavior of different people which within those precincts account for secondary phenomena only, become essential in the sense that they now account for the outstanding features of reality and that a picture drawn on the Walras-Marshallian lines ceases to be true—even in the qualified sense in which it is true of stationary and growing processes: it misses those features, and becomes wrong in the endeavor to account by means of its own analysis for phe-

[1] Those differences belong, as a special case, to the class of facts usually dealt with under the heading of Leadership. Sir Francis Galton's South African oxen that differed so characteristically in behavior are a good illustration of this point. Some of them went on as serenely when at the head of a team as they did when at the tail of other oxen. The majority simply would not move at all when at the head.

nomena which the assumptions of that analysis exclude. The reasonable thing for us to do, therefore, seems to be to confine the traditional analysis to the ground on which we find it useful, and to adopt other assumptions —the above three—for the purpose of describing a class of facts which lies beyond that ground. In the analysis of the process dominated by these facts traditional theory, of course, still retains its place: it will describe the responses to innovation by those firms which are not innovating themselves.

We may formulate the same point by means of the concept of Horizon. This we define as that range of choice within which a businessman moves freely and within which his decision for a course of action can be described exclusively in terms of profitability and foresight.[1] It differs widely with different types and individuals. But within a stationary or a growing process, we may assume that the management of each firm commands that horizon which enables it to transact its current business and to handle ordinary emergencies. Outside of such processes however, horizons of different people differ according to the criterion that the horizons of some are and the horizons of others are not confined to the range of possibilities tried out in business practice. This ability to decide in favor of untried possibilities or to choose not only between tried but also between tried and untried ones, may, however, be distributed in the population according to the Gaussian—though more plausibly a skew—law, and should not be thought of as confined to a few exceptional cases.

We neither can nor, for our purpose, need go fully into this matter, but will be content to point to the common-sense justification of our emphasis on this difference in behavior that we hold is productive of phenomena which without it would not be understandable. Everyone knows, of course, that to do something new is very much more difficult than to do something that belongs to the realm of routine, and that the two tasks differ qualitatively and not only in degree. This is due to

[1] It will be seen that foresight, or anticipation, and horizon are not made synonymous. A trivial example may serve to elucidate one of the differences. Tire trouble is nowadays so rare an event that any given case cannot be said to be foreseen. But, provided a motorist knows perfectly well how to manage the situation if the case arises, it is still within his horizon. Foresight is, of course, more difficult in an environment disturbed by innovation and, as soon as we have independently explained the situations, in which it becomes more difficult from this cause, we are within our rights if we in turn explain secondary features by lack of foresight, without laying ourselves open to the charge of thoughtlessly appealing to a *deus ex machina*. But such lack is not primarily linked to innovation and emphasizing it with respect to innovation would be emphasizing the wrong spot. Also, differences in foresight are undoubtedly the source of many phenomena relevant to the study of business cycles. But differences in foresight are not coterminous with differences in the ability to "walk alone" and to act on ground untried by experience.

many reasons, which we may group in three classes. First, in the case of something new being attempted, the environment resists while it looks on with—at least—benevolent neutrality at repetition of familiar acts. Resistance may consist in simple disapproval—of machine-made products, for instance—in prevention—prohibition of the use of new machinery—or aggression—smashing new machinery. Second, for the repetition of acts of routine the environment offers the prerequisites, in the case of new things it sometimes lacks, sometimes refuses, them: lenders readily lend for routine purposes; labor of the right type is available for them in the right place; customers buy freely what they understand. Third (this must be kept distinct from points one and two), most people feel an inhibition when the possibility of treading a new path offers itself. This may, in part, have rational foundation: it makes, in fact, a great difference whether the items entering our calculations derive from facts of daily experience or entirely from estimation. Even familiar data vary, of course, and their behavior may often be difficult to foresee, but within a familiar frame the average businessman knows how to manage them. If a new frame is to be constructed, the task changes its character. In order to see this, we need only visualize the situation of a man who would, at the present time, consider the possibility of setting up a new plant for the production of cheap aeroplanes which would pay only if all people who now drive motorcars could be induced to fly. The major elements in such an undertaking simply cannot be known. The situation is, proportions guarded, not different in the case of a new perfume. But also, irrational inhibitions enter. Neither error nor risk expresses adequately what we mean.

Considerations of this type entail the consequence that whenever a new production function has been set up successfully and the trade beholds the new thing done and its major problems solved, it becomes much easier for other people to do the same thing and even to improve upon it. In fact, they are driven to copying it if they can, and some people will do so forthwith. It should be observed that it becomes easier not only to do the same thing, but also to do similar things in similar lines—either subsidiary or competitive ones—while certain innovations, such as the steam engine, directly affect a wide variety of industries. This seems to offer perfectly simple and realistic interpretations of two outstanding facts of observation: First, that innovations do not remain isolated events, and are not evenly distributed in time, but that on the contrary they tend to cluster, to come about in bunches, simply because first some, and then most, firms follow in the wake of successful innovation; second, that innovations are not at any time distributed over the whole economic system at random, but tend to concentrate in certain

sectors and their surroundings.[1] Neither observation can be new to anyone. The point we wish to make is that both follow from our premises and find their place within our analytic schema, instead of remaining outside of it in the class of deviations or modifying circumstances. The first puts into its proper light our former statement, that disturbances of equilibrium arising from innovation cannot be currently and smoothly absorbed. In fact, it is now easy to realize that those disturbances must necessarily be "big," in the sense that they will disrupt the existing system and *enforce a distinct process of adaptation* which should show up as such in any time series material. This is independent either of the size of the innovating firm or firms or of the importance of the immediate effects their action would in itself entail. What we see at first glance may well be a multitude of reactions not easily traceable to any definite innovation behind them. But in many cases comprising historically important types, individual innovations imply, by virtue of their nature, a "big" step and a "big" change. A railroad through new country, *i.e.*, country not yet served by railroads, as soon as it gets into working order upsets all conditions of location, all cost calculations, all production functions within its radius of influence; and hardly any "ways of doing things" which have been optimal before remain so afterward. The case may be put still more forcibly if we consider the railroadization and the electrification of the whole world as single processes. There is, however, some danger in overstressing such obvious instances, because this may easily lead to the familiar attitude of confining the phenomenon to this class and overlooking it in all the others—hence, to missing its true dimensions.[2]

The second observation, the explanation of which follows naturally from our general schema, is no less obvious. Industrial change is never harmonious advance with all elements of the system actually moving, or tending to move, in step. At any given time, some industries move on, others stay behind; and the discrepancies arising from this are an essential

[1] Both observations primarily rest on the objective situations incident to the process of innovation. It is neither necessary nor desirable to stress the psychological aspect beyond a few common-sense comments. We do not appeal either to the psychology of imitation or to any other psychology. To this point, which might give rise to misunderstandings of the drift of our argument, we shall later return.

[2] As stated before, this is our fundamental reason (apart from our objections to the term Invention) for doubting the value of the concept of Revolutionary Inventions (opposite: Minor Inventions) if it is to suggest that they or their effects differ qualitatively, or in a way relevant to the theory of the subject, from others. We shall not use the concept of Autonomous Inventions either, although this seems to carry a connotation more relevant to our argument. But the concept Induced Innovations we shall occasionally use in order to denote those additional improvements which present themselves in the process of copying the first innovators in a field and of adaptation by existing firms to their doings.

element in the situations that develop. Progress—in the industrial as well as in any other sector of social or cultural life—not only proceeds by jerks and rushes but also by one-sided rushes productive of consequences other than those which would ensue in the case of coordinated rushes. In every span of historic time it is easy to locate the ignition of the process and to associate it with certain industries and, within these industries, with certain firms, from which the disturbances then spread over the system.

It has been stated above that the facts which our three assumptions are the means of introducing into our analytic model explain not secondary phenomena only but the essential features of the process of economic —or, as the writer believes, any other—evolution in our sense of the term. We shall meet with many examples of this, as in the theory of profit to be outlined in the next section. Here we will notice one only, namely, their bearing upon our general conception of progress. Evidently, we must cease to think of it as by nature smooth and harmonious in the sense that rough passages and disharmonies present phenomena foreign to its mechanism and require special explanations by facts not embodied in its pure model. On the contrary, we must recognize that evolution is lopsided, discontinuous, disharmonious by nature—that the disharmony is inherent in the very *modus operandi* of the factors of progress. Surely, this is not out of keeping with observation: the history of capitalism is studded with violent bursts and catastrophes which do not accord well with the alternative hypothesis we herewith discard, and the reader may well find that we have taken unnecessary trouble to come to the conclusion that evolution is a disturbance of existing structures and more like a series of explosions than a gentle, though incessant, transformation.

C. The Entrepreneur and His Profit.—For actions which consist in carrying out innovations we reserve the term Enterprise; the individuals who carry them out we call Entrepreneurs. This terminological decision is based on a historical fact and a theoretical proposition, namely, that carrying out innovations is the only function which is fundamental in history and essential in theory to the type usually designated by that term. The distinction between the entrepreneur and the mere head or manager of a firm who runs it on established lines or, as both functions will understandably often coincide in one and the same person, between the entrepreneurial and the managerial function, is no more difficult than the distinction between a workman and a landowner, who may also happen to form a composite economic personality called (in America) a farmer. And surely it is but common sense to recognize that the economic function of deciding how much wool to buy for one's process of production and the function of introducing a new process of production do not stand on the same footing, either in practice or in logic.

The outlines of an economic and sociological analysis of both types and both functions have been given elsewhere.[1] We will briefly note the points that are most important for our purpose.

1. It is not always easy to tell who the entrepreneur is in a given case. This is not, however, due to any lack of precision in our definition of the entrepreneurial function, but simply to the difficulty of finding out what person actually fills it. Nobody ever is an entrepreneur all the time, and nobody can ever be only an entrepreneur. This follows from the nature of the function, which must always be combined with, and lead to, others. A man who carries out a "new combination" will unavoidably have to perform current nonentrepreneurial work in the course of doing so, and successful enterprise in our sense will normally lead to an industrial position which thenceforth involves no other functions than those of managing an old firm. Nevertheless, we have little difficulty in identifying entrepreneurship in the times of competitive capitalism. The entrepreneur will there be found among the heads of firms, mostly among the owners. Generally, he will be the founder of a firm and of an industrial family as well. In the times of giant concerns the question is often as difficult to answer as, in the case of a modern army, the question who is the leading man or who really won a given battle. The leading man may, but need not, hold or acquire the position that is officially the leading one. He may be the manager or some other salaried employee. Sometimes, he is the owner of a controlling parcel of shares without appearing on the list of responsible executives at all. Although company promoters are not as a rule entrepreneurs, a promoter may fill that function occasionally and then come near to presenting the only instance there is of a type which is entrepreneur by profession and nothing else.

2. But it should be easy to distinguish our function from those others which, though often found in combination with it, are yet not essential to it. We have already seen that the entrepreneur may, but need not, be the "inventor" of the good or process he introduces. Also, the entrepreneur may, but need not, be the person who furnishes the capital. This is a very important point. In the institutional pattern of capitalism there is machinery, the presence of which forms an essential characteristic of it, which makes it possible for people to function as entrepreneurs without having previously acquired the necessary means. It is leadership rather than ownership that matters. The failure to see this and, as a consequence, to visualize clearly entrepreneurial activity as a distinct function *sui generis*, is the common fault of both the economic and the sociological

[1] See the writer's Theory of Economic Development, notably Chaps. II and IV. Compare, also, the historical sketch in the writer's article Unternehmer in the Handwörterbuch der Staatswissenschaften.

analysis of the classics and of Karl Marx. It is partly explained by the fact that previous ownership of the requisite producers' goods or of assets that may serve as collateral, or of money, makes it easier to become an entrepreneur, and the additional fact, alluded to above, that successful entrepreneurship leads to a capitalist position for the entrepreneur and, normally, his descendants, so that we do, as a matter of fact, find successful entrepreneurs very soon in possession of a plant and the other paraphernalia of a going concern. Two consequences follow, one of which is of an economic, the other of a sociological, nature.

First, risk bearing is no part of the entrepreneurial function.[1] It is the capitalist who bears the risk. The entrepreneur does so only to the extent to which, besides being an entrepreneur, he is also a capitalist, but qua entrepreneur he loses other people's money. Second, entrepreneurs as such do not form a social class. Although, in case of success, they or their descendants rise into the capitalist class, they do not from the outset belong to it or to any other definite class. As a matter of historical fact, entrepreneurs come from all classes which at the time of their emergence happen to exist. Their genealogies display most varied origins—the working class, the aristocracy, the professional groups, peasants and farmers, and the artisan class, all have contributed to what is sociologically not a uniform type. We cannot stay to show that a fundamental piece of the sociology of capitalism and of bourgeois society is contained in those statements, nor how economic theory and sociology should combine to account for their institutional patterns.[2]

The above implies what it may nevertheless not be superfluous to state explicitly, that although entrepreneurs may be or become stockholders in their firms, mere holding of stock does not, any more than would mere ownership, make an entrepreneur. The only realistic definition of stockholders is that they are creditors (capitalists) who forego part of the legal protection usually extended to creditors, in exchange for the right to participate in profits. To the economist, the legal construction of an equity in this case is but a lawyer's fiction that almost caricatures the real situation.

3. Let us visualize an entrepreneur who, in a perfectly competitive society, carries out an innovation which consists in producing a com-

[1] Risk, nevertheless, enters into the pattern in which enterpreneurs work. But it does so indirectly and at one remove: riskiness—and every new thing is risky in a sense in which no routine action is—makes it more difficult to obtain the necessary capital and thus forms one of the obstacles entrepreneurs have to overcome and one of the instances of resistance of the environment which explain why innovations are not carried out smoothly and as a matter of course.

[2] The principles underlying the above are, of course, applicable to all types of society. Compare the writer's Die sozialen Klassen im ethnisch homogenen Milieu, *Archiv für Sozialwissenschaft*, 1927.

modity already in common use at a total cost per unit lower than that of any existing firm because his new method uses a smaller amount of some or all factors per unit of product. In this case, he will buy the producers' goods he needs at the prevailing prices which are adjusted to the conditions under which "old" firms work, and he will sell his product at the prevailing price adjusted to the costs of those "old" firms. It follows that his receipts will exceed his costs. The difference we shall call Entrepreneurs' Profit, or simply Profit. It is the premium put upon successful innovation in capitalist society[1] and is temporary by nature: it will vanish in the subsequent process of competition and adaptation. There is no tendency toward equalization of these temporary premia. Although we have thus deduced profit only for one particular case of innovation and only for conditions of perfect competition, the argument can readily be extended to cover all other cases and conditions. In any case, it is evident that, though temporary, profit is a net gain, *i.e.*, that it is not absorbed by the value of any cost factor through a process of Imputation.[2] It should be observed, however, that for profits to emerge it is essential that the "suicidal stimulus of profits" should not act instantaneously. In the preceding section we have seen the reasons why, as a rule, it does not. But cases are thinkable, occasionally occur, and may in the future be expected to occur more frequently (compare *infra*, sub 5), in which it does. We then get innovation without profit, or almost without it, and thus realize the possibility of what, anticipating later argument, we may term Profitless Prosperities.[3]

Of course, in a stationary economy, even if disturbed by action of external factors, both the entrepreneurial function and the entrepreneurial profit would be absent, and so would the bulk of what is in common parlance described as profits. For, although there would be rents and quasi-rents of factors owned by firms, also, in the case of a manager-proprietor, his "earnings of management" or wages, to which we may for the sake of argument add various interest items, and although there may be monopoly gains and (if we admit external disturbances) also windfalls and possibly speculative gains, it will be readily seen that all these items would, in the conditions of a stationary or even of a growing economy, sum up to much smaller totals than they do in reality. Innovation is not only the most important immediate source of gains, but also indirectly produces, through the process it sets going, most of those situations

[1] The increment of value which in that form of society becomes profit would, of course, also emerge in a socialist society in the moment of transition to a new process of production.

[2] That problem and other theoretical matters relating to it have been fully dealt with in the writer's book to which reference has been made.

[3] This possible case should not be confused with another possible case previously noticed displaying no period of expenditure on plant or period of gestation.

from which windfall gains and losses arise and in which speculative operations acquire significant scope.

It follows that the bulk of private fortunes is, in capitalist society, directly or indirectly the result of the process of which innovation is the "prime mover." Speculative maneuvers which are responsible for some, are evidently incidents to the process of economic evolution in our sense, and so are largely the unearned increments reaped by owners of natural resources—urban land, for instance—which account for others. Saving, consistently carried on through generations,[1] could not have been nearly so successful as it was if there had not been surpluses, due to innovation, from which to save. But the position of the typical industrial or commercial or financial family directly originates in some act, or some series of acts, of innovation. When their period of entrepreneurship is past, those families live, it is true, on quasi-rents, often supported by monopoloid situations, or, if they entirely sever their connection with business, on interest. But a new production function practically always emerges if we follow up those quasi-rents or monopoloid gains or monetary capitals to their sources. Of this we shall see many examples in our historical survey, which the writer believes to be sufficient, in spite of its fragmentary character, to establish the main points of this analysis beyond reasonable doubt.

4. Profit, in our sense, is a functional return—its peculiarities and especially its temporary character constitute a justifiable reason for hesitating to call it an income—but it would not always be safe to locate the entrepreneurial function according to the criterion of accrual. Whether it accrues to entrepreneurs or not is a matter of institutional pattern. It does so most completely in that form of organization which is characterized by the prevalence of the family firm. It is there that it has most regularly served (together with gains from speculation and from monopoloid positions) as the economic basis of industrial dynasties, by being reinvested or simply embodied in the ownership of a plant. In corporate industry profits accrue to the firm as such, and their distribution ceases to be automatic and becomes a matter of policy—shareholders, executives (whether entrepreneurs or not), and employees receiving, in the most varied forms (bonuses, tantièmes, and so on) indeterminate shares in it or contractual equivalents for shares in it. Attempts by entrepreneurs to recover elements of profits to which there is no legal claim, account in part for a number of familiar practices *praeter legem* or *contra legem*.

Such struggles for a share in profits that have been made are, however, less important for our subject than the struggles to conserve the stream of

[1] Marx called that a tale for children (*Kinderfibel*). So it is if used as a general theory of private wealth. But we should not, on that account, overlook the very real instances of it and the very real "abstinence" associated with them.

profit itself. Secrecy regarding processes, patents,[1] judicious differentiation of products, advertising, and the like, occasionally also aggression directed against actual and would-be competitors, are instances of a familiar strategy, which in the public, as well as in the professional, mind have done much to veil the source and nature of profits in our sense, especially because that strategy may be resorted to in other cases as well. We realize at once that these devices are the same as those which play a role in cases of monopolistic competition and that the fact that they are met with in our case is precisely due to the other fact that an enterprise in our sense almost necessarily finds itself in an "imperfect" situation, even if the system be otherwise a perfectly competitive one. This is one of the reasons why we so persistently stress the relation between evolution and imperfection of competition. It follows that profits might, as far as this goes, be also included in the category of monopoloid gains. This, however, would blur the specific character of our case: not every generalization is profitable to the analyst[2]—any more than every innovation is to the innovator. Moreover, profits change their character in the course of such struggles.

Not only is practically every enterprise threatened and put on the defensive as soon as it comes into existence, but it also threatens the existing structure of its industry or sector almost as unavoidably as it

[1] Patent legislation is one of the few instances of legal recognition of the social functions of profit in capitalist society. Patents may, of course, keep profits alive longer than would be required for those functions to be fulfilled and then become similar in nature to less approved practices. We intend neither social criticism nor social apologetics but it may be useful to state that these practices are responsible for a view frequently met in popular arguments for social reform, according to which profit is necessarily the outcome of antisocial activities and there is necessarily antagonism between receivers of profits and, say, consumers' or workmen's interests. In such propositions, the meaning of which greatly varies, profits is in general used in a sense different from ours. But the above shows that there is a range of phenomena, within which profits in our sense are all but indistinguishable from surpluses, to which such indictments do apply.

[2] For an analogous reason we do not include profits among wages, although the former are returns to personal exertions and although we do define the latter as returns to personal services. In an as yet unpublished Note on Profits, Mr. P. M. Sweezy argues that, profits being for these reasons undistinguishable from monopoloid gains, there is no point in speaking of pure profits in our sense at all. It is readily admitted that amount of profit is no measure of social service which, whatever its definition, is often much greater or much smaller than profits would indicate. But it is nonetheless important to point out this source, as distinguished from others, of monopoloid surpluses. Moreover, the fact that a return has something to do with monopoly does not affect its economic nature. There is probably a large monopoloid element in the income of a leading tenor, yet this income is nevertheless a wage. Any strong labor union secures monopoly gains. Its members earn efficiency wages all the same. The nature of a "service" is one thing. The method of pricing which is being applied to that service is another thing. For similar reasons, we do not include profit among frictional gains, although frictional resistance to instantaneous adaptation is essential for the emergence of profit: if we did, we would still have to emphasize the peculiarity and the peculiar role of this particular kind of friction.

creates unemployment somewhere or other. An innovation sometimes may do so by its mere possibility and even before it is embodied in an enterprise. That structure, being a living organism and not merely the congeries of rational billiard balls that theory represents it to be, resents the threat and perceives possibilities of defense other than adaptation by a competitive struggle which generally means death for many of its units. Situations ensue which produce the paradox that industry sometimes tries to sabotage that "progress," which it inexorably evolves by virtue of the very law of its own life. There is no contradiction in this. It is submitted, however, that our general schema derives some support from the fact that it resolves that paradox so easily and shows us how and why industrial "progress" comes to the majority of firms existing at a given time as an attack from outside.[1] Taking industry as a whole, there is always an innovating sphere warring with an "old" sphere, which sometimes tries to secure prohibition of the new ways of doing things—as the artisans' congresses did in Europe as late as the eighties of the nineteenth century—or to discredit them—the "machine-made product," for instance—or to buy them off—which is sometimes the real rationale of cartelization—or to penalize them, by fiscal legislation or in other ways, including public "planning" of the type sometimes resorted to in depressions.

5. It has been stated above that our assumption about New Firms carrying the new things into effect against resisting strata of old firms, which was to embody the characteristically different behavior in the face of new possibilities, may occasionally fail us. For the past it is obviously very realistic. Even in the present the writer is not aware of important instances which would prove it to be contrary to fact. But several minor ones he has observed. It is interesting to note that such absence of friction does not always make the path of progress smoother. In the country X, for example, all firms existing in the industry Y took at exactly the same time, about 15 years ago, to producing the article Z according to a new and much cheaper method. A deadlock ensued, very quickly remedied by an agreement which deprived that innovation of any effect beyond a surplus, unemployment, and some excess capacity.[2] There is some reason to expect that such cases will increase in importance: on the one hand, technological research becomes increasingly mechanized and organized; on the other hand, resistance to new ways weakens. Any

[1] Sociologically, the case is, of course, not different from the case of a new scientific principle—or, for that matter, of a new way of seeing nature in the case of painting—which also comes as a hostile shock both to existing habits of scientific thinking—or of painting—and to those who expound or practice them.

[2] The "statesman" who successfully exerted himself to bring that agreement about took great pride in this piece of planning.

technological improvement which is becoming "objectively possible," tends to be carried into effect as a matter of course. This must affect the phenomenon which is the subject of this book. It must also affect the importance of the social function, and in consequence the economic and social position, of that stratum of capitalist society which exists by entrepreneurial achievement as the knights of the Middle Ages existed by virtue of a certain technique of warfare.

Already, the volitional aptitudes that made the successful entrepreneur of old are much less necessary and have much less scope than they used to have. It is no chance coincidence that the epoch in which this decrease in importance of the entrepreneurial function first asserted itself is also the epoch in which the social and political position of the *bourgeoisie* first began to display obvious symptoms of weakness and to be attacked with success. However, it would be as great a mistake to overrate the length to which the process has as yet gone as it would be to ignore it. For our theme, it will be seen not to have proceeded far enough to matter for general contours, even in the postwar period.

D. The Role of Money and Banking in the Process of Evolution.—This subject will be more fully discussed, on the one hand, in the historical survey (Chaps. VI and VII) and, on the other hand, in the discussion of relevant time series (Chaps. XI–XIV), where the complex structure of credit will come into its own as far as that is possible within the limits of this work. In this section we will merely try to unravel its logical, as distinguished from its historical, roots and in so doing move on the same level of abstraction as we do throughout this chapter. Results cannot fail to look extremely unrealistic and, in this case more than in others, utterly contrary to facts. It is in no case easy to discern the element of innovation under the mass of induced, derivative, and adventitious phenomena that overlies it. But in the sphere of money and credit the layer is so thick and the surface so entirely at variance with the processes below, that the first impression of the reader may well be fatal. It is submitted, however, that the proof of the analytic pudding is in the eating, and that the monetary part of our model is nothing but a device to get hold of those very facts to which the reader may feel inclined to point in refutation.[1]

[1] The theoretical background of the analysis of credit to be presented in this section will be developed in the writer's treatise on money. That analysis was first published in his Theory of Economic Development (first German ed., 1911). At that time, criticism was mainly directed against certain points about credit creation which have become commonplace by now. The really controversial proposition which turns on the relation of credit creation to innovation was then not discussed at all. Nor has it really been discussed since, for the arguments from the classical theory of banking to the effect that what banks finance is precisely not innovation but current commodity transactions, miss the salient point entirely.

1. We will discard, on the understanding that they will be introduced later, consumers' borrowing, both public and private, on the one hand, and saving and accumulation, on the other. Discarding the first, in a discussion of fundamental principle, will presumably not meet with insuperable objection. It is merely a measure of simplification and does not mean that consumers' borrowing is held to be of no importance in the cyclical process. The contrary is obvious: consumers' borrowing is one of the most conspicuous danger points in the secondary phenomena of prosperity, and consumers' debts are among the most conspicuous weak spots in recession and depression. Discarding the second is more than a measure of simplification. It implies the view that financing innovation from funds that have been saved or accumulated, presupposes previous profits, hence previous waves of evolution, and therefore has no claim to a place on the ground floor, as it were, of a model that is to display logical essentials. This follows from the argument in sec. A of this chapter, and does not imply anything about the role which financing of innovation by (the entrepreneur's own or other people's) savings plays in any actual historical situation. In later discussions we shall assign to it all the importance we conceive it to have, and also develop its *modus operandi*, although the writer thinks the importance to be smaller than, and the *modus operandi* different from, what it is commonly believed to be.

In accordance with our conception of New Men setting up New Firms, we also assume that would-be entrepreneurs do not already happen to own part or the whole of the assemblage of producers' goods which they need in order to carry out their plans, or any assets which they could exchange for what they need. There will always be such cases, although they can become as frequent as we know them to be only when the evolutionary process is in full swing and when it has brought into existence a machinery for selling assets which we cannot assume now.[1] But they present no problem beyond those which we have dealt with in the preceding sections. Nor does a distinct problem of financing arise with the "old" firms in the stationary process from which we start. They have their plant and equipment, and their current expenditure—including repairs and replacement—can be financed from current receipts. Assuming, finally, that they are so financed, we arrive at the following three propositions, which sound strange but are tautologically true for an economic world embodying our assumptions: Entrepreneurs borrow all the "funds" they need both for creating and for operating their plants—*i.e.*, for acquiring both their fixed and their working capital. Nobody else borrows. Those "funds" consist in means of payment created *ad*

[1] This instance illustrates well one of the source of objections to our model: we behold a fully developed industrial and financial system, and are prone to introduce the features of the building into a discussion of the scaffolding.

hoc. But although in themselves these propositions are nothing but pieces of analytic scaffolding, to be removed when they have served their purpose, the logical relation which they embody, between what is called "credit creation by banks" and innovation, will not be lost again. This relation, which is fundamental to the understanding of the capitalist engine, is at the bottom of all the problems of money and credit, at least as far as they are not simply problems of public finance.

2. Before going on, we will try to clarify the meaning of "credit creation" *considered as the monetary complement of innovation*, by a comparison with what would correspond to it in a socialist society. Since the central authority of the socialist state controls all existing means of production, all it has to do in case it decides to set up new production functions is simply to issue orders to those in charge of the productive resources to withdraw part of them from the employments in which they are engaged, and to apply the quantities so withdrawn to the new purposes envisaged. We may think of a kind of Gosplan as an illustration. In capitalist society the means of production required must also be withdrawn from their employments—the case of unemployed resources can easily be taken into account—and directed into the new ones; but, being privately owned, they must be bought in their respective markets. The issue to the entrepreneurs of new means of payments created *ad hoc* is, since our entrepreneurs have no means of their own and since there are—so far—no savings, what corresponds in capitalist society to the order issued by the central bureau in the socialist state.

In both cases, the carrying into effect of an innovation involves, not primarily an increase in existing factors of production, but the shifting of existing factors from old to new uses.[1] There is, however, this difference between the two methods of shifting the factors: in the case of the socialist community the new order to those in charge of the factors cancels the old one. If innovation were—and as far as it is—financed by savings, the capitalist method would be—or is—analogous, for the way in which saving and lending to entrepreneurs effects a shifting of factors through a shifting of means of payment may, indeed, be likened to the canceling of an old and the issuing of a new "order" to the owners of factors. But if innovation is financed by credit creation, the shifting of the factors is effected not by the withdrawal of funds—"canceling the old order"—

[1] Even with respect to those quantities of factors which currently accrue, say, in an increasing population, and can be used for the new purposes without having previously served any old ones, it is more correct to say that they are shifted from the uses they would have served had the new purposes not been decided on, than simply to say that they go to the new uses directly. The point is of some importance, because in the traditional model it was increase in factors, rather than the shifting of factors, that was made the chief vehicle of economic progress. But essential phenomena of the cyclical process depend on that shifting of factors.

from the old firms, but by the reduction of the purchasing power of existing funds which are left with the old firms while newly created funds are put at the disposal of entrepreneurs:[1] the new "order to the factors" comes, as it were, on top of the old one, which is not thereby canceled. It will be shown later, but really is obvious, that and how this will affect prices and values and produce a string of important consequences which are responsible for many characteristic features of the capitalist process. This side of credit creation may also be clarified by means of the analogy with the issue of government fiat, although in all other respects the differences are much more important than the similarities.

Now, suppose that our socialist community finds it convenient to rule that the executive submit every innovation it wishes to carry out to another body, which passes upon it and may grant or withhold assent. In case it sanctions the plan, it countersigns and issues the orders to the factors to form the new combination. This is the function which in capitalist society is filled by banks which, in providing entrepreneurs with means to buy factors of production or their services, do something akin to issuing such orders. We now introduce this new kind of firms into our model. They are nothing but establishments for the manufacture of means of payment. We distinguish *member banks*, which keep the accounts of, and manufacture balances for, firms and households (so far, for entrepreneurs only), and *bankers' banks*—or, if there is but one of them in each country, *central banks*—which keep the accounts of, and manufacture balances for, member banks. For the sake of convenience we will assume, in matters of general principle, that bankers' banks have no other customers but banks and that no member bank fills bankers'

[1] Since the effect is still that entrepreneurs acquire command over producers' goods and services as they would if some savers had lent them an equivalent (not equal) amount of savings, many economists (the present writer included) have tried to elucidate the matter by speaking of "forced savings" (Mr. Robertson used the expression "imposed lacking"). But it is better to avoid a phrase which, while stressing one important similarity, may be misleading in other respects. It not only tends to hide the important differences, in mechanism and effects, of the two phenomena, but also suggests ideas that are definitely wrong. It fails, moreover, to emphasize the important fact, that it is primarily the purchasing power of other *firms* that is reduced in order to make room for the requirements of entrepreneurs, and that the reduction of the "real" purchasing power of some *households* is a secondary phenomenon which, moreover, is compensated in part by the increase in the real purchasing power of others.

It is not superfluous to note in passing that voluntary saving may so superimpose itself on credit creation as to neutralize some of the effects of the latter: if, for example, a bank creates balances for an entrepreneur which the latter spends, and if the recipients of this increase in money income save it, and lend it to the entrepreneur who, in turn, repays his loan, then there has been both "real investment" (a machine, for example, having been added to equipment) and voluntary saving, and the deposit figure is back to what it was. This case is, of course, comprised in our propositions about the role of saving to be introduced at a later stage of our argument.

banks' functions, although in discussions of actual situations we must take account of the facts that many bankers' banks also bank for firms and households and that many member banks also bank for other member banks: there are cases, the outstanding one being that of the banking system of the United States until 1914, in which central bank functions are entirely discharged by some members of the system and, perhaps, some government department, such as the United States Treasury. It is important to bear in mind that what directly matters for business is the amount of credit creation by member banks. Credit creation by bankers' banks stands at one remove from this and the two are not additive. Interbank deposits, existence of which implies that member banks are rendering central bank service to each other, should always be dealt with separately and excluded from the sum total of effective deposits.

3. By confining the manufacture of credit to banks, we are roughly conforming to fact. But this restriction is not necessary. In various ways, firms may create means of payments themselves. A bill of exchange or a note is not, in itself, such a means. On the contrary, it generally requires financing and thus figures on the demand rather than the supply side of the money market. If, however, it circulates in such a way as to effect (economically, though not in the legal sense) payments, it becomes an addition to the circulating medium. Historically, this has occurred repeatedly. An example is afforded by the practice which prevailed in the Lancashire cotton industry until at least the middle of the nineteenth century. Manufacturers and traders drew bills on each other which, after acceptance, were used for the settlement of debts due to other manufacturers and traders, much as bank notes would be. This should be taken into account in any estimate of the quantity of credit creation but will here be neglected throughout, because the statistical questions involved are entirely beyond us. The case is a special one and must not be confused with others, such as the cases of finance bills or notes that are offered for short-time investment and, although they may also circulate, never directly pay for commodities.

Government fiat might also serve the purpose of financing enterprise. There have been cases in which it did. The Brazilian government, for instance, financed coffee plantations by this method in the seventies. More frequently, however, this method was advocated without being actually resorted to. Friedrich List for instance—proving thereby how well he knew how to generalize from American experience—wished to see railroad construction (*sic!*) financed in this way. We insisted above on the differences between the issue of government fiat and credit creation by banks, not because of the difference between the creating agencies but because of the difference in the purposes usually associated with the two, which is what accounts for the difference in effects. For it must

never be forgotten that the theory of credit creation as, for that matter, the theory of saving, entirely turns on the purpose for which the created—or saved—means of payment are used and on the success which attends that purpose. The quantity-theory aspect or, as we might also say, the aggregative aspect of the practice is entirely secondary. The trouble with John Law was not that he created means of payment *in vacuo*, but that he used them for purposes which failed to succeed. This will have to be emphasized again and again. We now exclude government fiat because of its historical association with consumptive expenditure, and are thus left with "credit creation by banks."

Anticipating discussion in subsequent chapters, we may at once free our theory of banking from part of its apparent unreality. Financing of enterprise has been assigned logical priority in the sense that this is the only case in which lending and the *ad hoc* creation of means of payment are essential elements of an economic process the model of which would be logically incomplete without them. But the familiar picture of banking business as it is can easily be developed from that element. The loans to entrepreneurs need not—not entirely, at least—be repaid, but can be, and often are, renewed in such a way as to make the corresponding amount of means of payment permanently, or at all events indefinitely, part of the circulating medium. In the disequilibria caused by innovation other firms will have to undertake investments which cannot be financed from current receipts, and hence become borrowers also. It is easy to understand that, whenever the evolutionary process is in full swing,[1] the bulk of bank credit outstanding at any time finances what has become current business and has lost its original contact with innovation or with the adaptive operations induced by innovations, although the history of every loan must lead back to the one or the other.[2] If, finally, we insert consumers' borrowing on the one hand, and saving on the other, we have before us not only all the elements of which the practice of a bank actually consists, but also the explanation of the fact that current, or "regular," business has been emphasized to the point of giving rise to a theory of banking which recognizes nothing else but the financing of current commodity trade and the lending of surplus funds to the stock exchange, and to a canon of the morals of banking by which the function to which we assign logical priority is almost excluded from the things a banker might properly do. We shall see however, that this does not invalidate our view and that credit creation for the purpose of innovation

[1] It should be repeated that that statement does not imply anything about historical sequences. See Chap. VI, Sec. B.

[2] The above proposition will be qualified later on, when account will be taken of the case of financing business losses.

asserts itself and supplies the chief motive power for the variations in credit outstanding, all the same.

The latter assertion will have to justify itself in our analysis of monetary time series. But it is necessary to advert at once to its bearing on the modern controversy—it is really the modern form of a very old controversy—about the commercial *vs.* the investment theory of banking. By commercial, or classical, theory we mean the one alluded to in the preceding paragraph. Investment theory—there is no established word for it—we call the theory which defines the function of the banking system, not in terms of any specific type of transaction, but in terms of the amount of deposits which results from all the possible transactions a bank can embark upon. The term *investment theory* has been chosen because investment, in the sense of the purchase of assets, bonds in particular, is the transaction which banks can most nearly effect on their own initiative and in which they are less than in any other dependent on the initiative of their customers. Now, it is extremely difficult to convey a correctly balanced impression of the relative merits of these two "theories" and of the reasons why we have to disagree with both. This difficulty is due not only to the fact that neither is a scientific theory —both aim at giving practical advice about how bankers should behave or be made to behave—but also to the fact that the propositions held by, or implied in, both of them are not simply contradictory or right or wrong all along the line.

The commercial theory may be, and with older writers often has been, associated with a denial of the fact of credit creation, sometimes expressed in the phrase: Bankers can lend only what has been entrusted to them by depositors. Apart from this misconception of what deposit banking means, there is no definite error in what it holds and plenty of wisdom in what it advocates.[1] In particular, it should be clearly realized that no argument follows from our theory against banks' specializing in the current business of discounting commercial paper or against the proposition, largely though not wholly true, that this business, together with lending surplus funds on the stock exchange, will produce that amount of deposits which will equally avoid "inflationary" and "deflationary" impulses being imparted to the system. Our objection to the commercial theory

[1] Recognition of this has been obscured by a secondary controversy about the value, practical or otherwise, of eligibility requirements imposed or to be imposed on the paper or other assets which banks may discount or buy. These requirements (whether imposed by law or banking practice) have worked well in some countries and not at all in others. The question is important, of course, but it has nothing to do with the question of principle, with which we are concerned. Moreover it is only blurred by stressing the number of signatures which should be on a bill.

rests on its failure to reach down to the sources to the process of which it describes part of the surface, and to diagnose correctly the nature of credit creation for other purposes than that of financing current commodity trade. This also obscures the relation which even "classical" credit creation for short-time purposes bears to innovation—best exemplified by loans to the stock exchange, which help to carry new issues—and leads to a narrow view about the function of finance bills and of credits in current account. Thus the theory contributes, through the phraseology which it has been instrumental in creating, to what may be described as the mimicry of credit creation, especially of credit creation for the purpose of innovation which tends to hide behind credit creation for the purposes of current trade. In this respect the investment theory is superior. But it assigns to the "regulation of the flow of funds by banks" a causal role in the economic process which does not belong to it and, by its insistence on quantity of credit outstanding, entirely loses sight of the essential element of purpose.[1]

It should be observed how important it is for the functioning of the system of which we are trying to construct a model, that the banker should know, and be able to judge, what his credit is used for and that he should be an independent agent. To realize this is to understand what banking means. To have stressed it, at least by implication, is one of the chief merits of the commercial theory of banking, just as it is one of the chief demerits of the investment theory—which is a typical outsider's idea and could never, like its rival, have grown out of practical banking experience—to have overlooked it and to have made banking a mechanical function which might just as well, if not better, be filled by some government department. Even if he confines himself to the most regular of commodity bills and looks with aversion on any paper that displays a suspiciously round figure, the banker must not only know what the transaction is which he is asked to finance and how it is likely to turn out, but he must also know the customer, his business, and even his private habits, and get, by frequently "talking things over with him," a clear picture of his situation. But if banks, whether technically so called or not, finance innovation, all this becomes immeasurably more important. It has been denied that such knowledge is possible. The reply is that all bankers who at all answer to type, have it and act upon it. The giant

[1] The element of "purpose" sometimes underlies the phrase "quality of assets." This is a fertile source of misunderstanding. Quality is, of course, in all cases very relevant to sound practice and a main defense against catastrophes and swindling. But that is not what is meant when "quality" is pitted against "quantity." What is meant seems to point in the wrong direction, although the type of assets (or of collateral) often bears some relation to purpose, so that the view which stresses "quality" in this sense may occasionally bring in the really relevant element by a backdoor.

banking concerns of England have their organs or subsidiaries which enable them to carry on that old tradition: the necessity of looking after customers and constantly feeling their pulse is, for instance, one of the reasons for the division of labor between the big banks and the discount houses in the London money market. However, at the same time it is clear that this is not only highly skilled work, proficiency in which cannot be acquired in any school except that of experience, but also work which requires intellectual and moral qualities not present in all people who take to the banking profession. Hence, deviations from the theoretical type must be expected to be much more frequent than in those sectors of economic reality in which we need not require more than the ordinary intellectual and moral aptitudes of the "economic man." This difficulty is not peculiar to our model. It is met by anyone who tries to describe the way in which the capitalist machine is being run. Whatever our theories, we must all recognize—although we may draw different practical conclusions from it—that the leading functions are not simple matters which people can be expected to perform as effectively as they can be expected to leave an employment that offers a lower for one that offers a higher wage, or to produce beans instead of peas if it pays better; but that they are difficult to fulfill, so much so that many of those who attempt to fill them are hopelessly below the mark in a sense in which even the subaverage workman, craftsman, farmer is not. This is, of course, so with entrepreneurs. But in their case we take account of it by recognizing from the start that a majority of would-be entrepreneurs never get their projects under sail and that, of those who do, nine out of ten fail to make a success of them. In the case of bankers, however, failure to be up to what is a very high mark interferes with the working of the system as a whole. Moreover, bankers may, at some times and in some countries, fail to be up to the mark *corporatively:* that is to say, tradition and standards may be absent to such a degree that practically anyone, however lacking in aptitude and training, can drift into the banking business, find customers, and deal with them according to his own ideas. In such countries or times, wildcat banking—incidentally, also wildcat theory about banking—develops. This in itself—whatever the legal rules about collateral and so on may be—is sufficient to turn the history of capitalist evolution into a history of catastrophes. One of the results of our historical sketch will, in fact, be that the failure of the banking community to function in the way required by the structure of the capitalist machine accounts for most of the events which the majority of observers would call "catastrophes." It is but natural that since such failure primarily shows in dealing with novel propositions—where judgment is most difficult and temptation strongest—an association has developed between financing innovation and miscarriage or mis-

conduct which, however understandable, does not make analysis any easier.

Not less important for the functioning of the capitalist machine is it that banks should be independent agents. If they are to fulfill the function which has above been illustrated by the analogy with that socialist board which examines and passes upon the innovations envisaged by the executive, they must first be independent of the entrepreneurs whose plans they are to sanction or to refuse. This means, practically speaking, that banks and their officers must[1] not have any stake in the gains of enterprise beyond what is implied by the loan contract. This independence, most nearly realized in English banking, has always been threatened by attempts of entrepreneurs to gain control over banks and by attempts of banks or their officers to gain control over industry. We shall see later how far these attempts have been successful and how far they have interfered with the working of the system. But another kind of independence must be added to the list of requirements: banks must also be independent of politics. Subservience to government or to public opinion would obviously paralyze the function of that socialist board. It also paralyzes a banking system. This fact is so serious because the banker's function is essentially a critical, checking, admonitory one. Alike in this respect to economists, bankers are worth their salt only if they make themselves thoroughly unpopular with governments, politicians, and the public. This did not matter in the times of intact capitalism. In the times of decadent capitalism this piece of machinery is likely to be put out of gear by legislation. The motive, as well as the justification, for speaking in such cases of a theoretical type and a deviating reality lies in the diagnostic value of this distinction, and will be exemplified in our historical survey.

4. There are many ways in which banks may manufacture means of payment in fulfillment of their promises to lend.[2] Only two of them interest us here—the issue of bank notes and the creation of balances, misleadingly and insincerely called *deposits*. There is no difference between them, except one of technique (which is responsible for difficulties concerning the interpretation of statistics), the note being a balance embodied in a perfectly negotiable paper and the balance being a note which is transferable, not bodily but by check. Since the former has

[1] "Must" here is no moral imperative, but simply indicates the fact that, unless that requirement be fulfilled, an important element of the capitalist engine is put out of operation and that certain consequences will follow from this.

[2] It will be seen that, deviating from current practice, we stress loans (which term is to include discounts) rather than the investments of banks. The theoretical reason for this will become obvious later on, but few students of banking will deny that as far as prewar banking practice is concerned, emphasis would in any case have to be on loans rather than on investments.

undergone, from the forties of the nineteenth century on, a change in function which has rapidly deprived it of its role as a vehicle of industrial and commercial member-bank credit, we will in general think of the latter only, except when discussing patterns in which the bank note actually filled that role.

In a formal sense, all balances are of course "created." But we confine this term to balances the creation of which increases the sum of existing means of payment. These are not necessarily "borrowed," but may also result from sales of assets to a bank. In this case the customer acquires an "owned" balance, as he does when he deposits legal-tender money or newly mined or imported monetary metal—thus acquiring balances which are owned but not created—the only cases in which the term *deposit* (in the sense of *depositum irregulare*) is appropriate. If we use the word *deposit* instead of the word *balance*, we will distinguish these cases by the term *original deposits* from *created deposits*. Although these deposits do not increase the means of payment, the newly mined or imported monetary metal itself does, and it is worth noticing that, opportunely timed, such additions to the stock of legal tender may replace credit creation that would otherwise have come about. Depositing "old" legal tender which circulated before, also increases deposits, but not the sum of existing means of payment. During the growth of deposit banking, which in America, England, and Germany was substantially, though not wholly, completed before the World War, legal-tender money which had previously circulated outside of the banking sphere kept on streaming into banks. As long as this process played any significant role, there was a special trend in the figure of total deposits, and a number of propositions usually made about deposits require qualification for countries and periods in which that was the case. Mostly we shall consider a perfectly developed system of deposit banking in which legal tender, while moving into and out of banks, both in the ordinary course of current business and under the influence of panics, never enters into banks for the first time unless newly issued. But it should be borne in mind that by doing so on principle we would leave out of account a fact which may be very important. For instance, the answer to the question how far the fall in gold production which occurred after 1873 can have had any effect on prices, largely depends on our estimate of the immigration of legal tender into banks which coincided with it.

If payments are made out of a "borrowed" balance, the payee acquires what for him is an "owned" deposit, although for our purpose it is preferable to say that the "borrowed" balance has been simply transferred without losing that character. We may do so because, in any case, the increase in the balance of the payee is compensated by the decrease in the balance of the borrower. Where we distinguish between time and

demand deposits, transfer from demand to time account, or vice versa, causes uncompensated variation in both, but there is still compensation within the sum total of all deposits. If an original deposit of "old" legal tender be made, there is compensation within the total amount of means of payment. No new "spending power" emerges. Nor does any "spending power" vanish if a customer cashes a check. But there may be compensation in still another sense. In the case which is the ideal one from the standpoint of the commercial theory of banking, balances are, say, by discounting commercial bills, created against commodities—raw materials, for instance—which have just come into existence and are about to start on their career through the system. Those balances are uncompensated ones in any of the above meanings of the term. But they may be said to be compensated in the sense that the effect on prices of the increase in the stream of money is compensated by a simultaneous increase in the stream of goods, as it also may be whenever there are underemployed resources. This proposition is not above criticism on various counts. But it still expresses a rough common-sense truth and may serve to characterize the difference between the classic case of credit creation and the cases of credit creation for the financing of innovation on the one hand, and credit creation for the financing of consumption (*e.g.*, government fiat) on the other. The balances created in the latter cases are not compensated in any sense. But their effects will be more than compensated in the case of innovation when the new products are released. Their effects will never be compensated—and can be eliminated only by a distinct and painful operation—in the case of government inflation.

For the purpose of describing prewar patterns it will be convenient to reason in general on what, from the standpoint of the theory of money, is a very special case, namely, the case of perfect gold monometallism, and to treat all other cases—gold-exchange standard, bimetallism, government paper money, and so on—as deviations from it. But it should be clearly understood that this is done for convenience only, and not because any logical priority is attributed to that case: we do not, of course, mean to hold that it is essential for legal-tender money to consist of, or to be covered by, gold. On this understanding we will, in general, assume that there is, in the domain under consideration, actual circulation of gold coins and of bank notes of the central as well as of some other banks, that those coins may be lawfully melted or exported, that gold is coined for any private party without charge or loss of interest, that member banks must on demand redeem their deposits (or notes) in gold or notes of the bankers' bank, which acts as clearing house for them and must redeem its notes in gold.

The obligation to redeem balances or notes in legal tender or, in fact, in anything which exists independently of the action of banks, obviously

restricts their power to create them. In the system now envisaged, in which redemption must be effected in a money that at the same time serves in the role of small cash for the current transactions of business and private life, it means for each individual bank, on the one hand, the necessity of holding a stock of till money with which to meet the ordinary and extraordinary cash requirements of customers, and on the other hand, the necessity of keeping adverse clearing-house balances within the limits set by the practice of the bankers' bank. For the banking system as a whole the limit may be defined by the necessity of keeping the unit of account at par with the unit of legal tender, *i.e.*, in our case, a certain quantity of gold. We need not go into the various attempts which have been made to figure out, for a given system, the numerical value of that limit;[1] but the following remarks suggest themselves.

First, redeemability is a restriction on credit creation that is not implied in, but additional to, the other rules of "classical banking" and will, in general, exclude transactions which, but for considerations of redeemability, would be sanctioned by even the most conservative principles. It is the safety brake which gold monometallism automatically inserts into the engine. If, in such a monetary system, law or usage imposes further restrictions, they cannot have any other meaning except to strengthen that brake and to make sure that it functions. Those attempts to evaluate the limit of credit creation are usually concerned with the effects of such legal restrictions only and hardly ever posit the fundamental problem.

Second, it would in fact be difficult, if not impossible, to indicate, in the absence of further legal or customary rules, the numerical value of that limit. This value depends, for the individual member bank, on the kind of customers it has and on the kind of business these customers do, on the amount of internal compensation which is effected on its books—with the giant concerns of England and Germany, a very considerable part of the sum total of checks is drawn by customers in payment to other customers of the same bank—on how great a risk it is willing to run, how far it is willing to lean on the bankers' bank, and on the attitude of the latter.

Third, the limit is, particularly over time, extremely elastic. A bank does not expand its credits singlehanded. It does so when others do the same. Hence, adverse clearing-house balances are not so likely to arise as they would be if the other banks stayed behind. Customers can be educated and to a certain extent educate themselves to use less and less actual cash in their transactions. The nonbanking sphere of circulation

[1] Such attempts are frequently, though not necessarily, associated with the assumption that banks will actually expand up to that limit. In this case we get a modernized form of the old quantity theory which bids fair to repeat all the old errors with a vengeance.

may be conquered. Technique may lend its aid: whenever arrangements about overdrafts take the place of crediting customers' accounts with the whole amount of loans, only the amounts actually drawn will contribute to the sum total of deposits. In Germany acceptance credit, which does not directly swell demand liabilities, was very popular also for purposes other than financing international trade. The shifting of cash between banks can be regulated so as to make it support a heavier superstructure of deposits. Thus there are many devices by which reserve requirements might be almost indefinitely reduced, some of which are operative even in the case of statutory restrictions. Finally, law and usage are themselves but modes of expression—though possibly very faulty ones—of the factors which determine our limit, and change in response to change in those factors *cf.*, the successive increases of the legal maximum amount of the notes of the Banque de France. If they do not so change, they are evaded; witness the development of the American trust companies alongside of the banks which were subject to stricter regulations.[1]

Nothing, therefore, is so likely to give a wrong impression of the operation of credit as taking a mechanistic and static view of it and neglecting the fact that our process, by virtue of its own working, widens the limits which, *ex visu* of a given point of time, seem to be rigid fetters. If that fact be called inflation, then inflation has been going on practically all the time, nowhere more than in this country, while deflationary influence originating in the monetary system—shortage of gold and the like—is a myth. This may, according to one's standpoint, be virtue or vice. It may also be good in principle and work out badly in practice, or vice versa. It may be a reason for or a reason against monetary management or, in general, planned economy. But it is a fact which we must never lose sight of, if we are to understand capitalist evolution. How it has actually worked out we shall see in our historical discussion. What it means for business fluctuations will be considered in Chaps. VI, VII, and XI–XIII.

To the question how great a quantity of commodities and services will be withdrawn (Real Levy) from its previous uses by a given quantity of newly created credit, there is also no general answer. We must know

[1] The ultimate or absolute limit, beyond which in a closed domain the banking system could not go without violating the condition of parity of its unit of account with gold, is theoretically given by the value of the latter in the arts into which all monetary gold would in the end emigrate. But this would, of course, imply so great a fall in this value that that limit would indeed be wide. Before it be reached, expansive tendencies could have their way and for reasons alluded to it would not be correct to say that since every individual bank cannot expand without endangering its solvency with its customers or at the clearing house, therefore the system as a whole cannot expand. Each bank can exert a little pull, even if unsupported by the action of others, and in most cases all pull together. The falling trends in the relation between cash and deposits and between money in circulation and deposits, both of which we observe in all countries, is enough to illustrate the process.

the whole business situation on which the creation impinges, in order to frame an expectation as to how it will act, in this respect as in others; and that business situation will not only determine the effects of any given amount of balances created but also that amount itself. The problem not being immediately relevant to our argument, we will dismiss it with a reference to Professor Pigou's treatment (Industrial Fluctuations, Chap. XIV). Even the amount of credit creation in terms of money is exceedingly difficult to measure, still more the net amount, *i.e.*, the sum which member banks' credit creation adds to the sum which business would use in the absence of such creation. The difficulty arises not only from the interference of credit creation with saving and the fact that created balances are used for other purposes besides productive ventures, but also from the facts that what credit business actually uses, or would use, is different from the amount of facilities put at its disposal, and that in the absence of credit creation not only price levels but also sectional relations of prices would be different from what they are.

E. Interest[1] **(Money Market; Capital).**—From what has been said about entrepreneurs' profits on the one hand, and the role of money and credit on the other, we derive certain propositions on interest as an element of the economic process which we are trying to describe, or of the model which we are trying to construct. Whichever of the many explanations of the phenomenon of interest we may hold, all of us will agree to the following definition, although some of us may think it very superficial: Interest is a premium on present over future means of payment, or, as we will say *a potiori*, balances. Interest—more correctly, the capital sum plus interest—is, to use our turn of phrase, the price paid by borrowers for a social permit to acquire commodities and services without having previously fulfilled the condition which in the institutional pattern of capitalism is normally set on the issue of such a social permit, *i.e.*, without having previously contributed other commodities and services to the social stream.

For a positive premium to emerge, it is necessary (though not sufficient; but this does not matter here) that at least some people should estimate a present dollar more highly than a future dollar. This may

[1] The theory of interest presented in this section has also, like the theory of credit, been first published, in the writer's Theory of Economic Development in 1911. The many adverse criticisms it met have failed to convince him. But since he naturally wishes to minimize avoidable differences of opinion, he has endeavored throughout to formulate the propositions in this book in such a way as to make them, wherever possible, acceptable also to those who differ from him in their views as to their nature of interest. This also applies to this section, most of the propositions of which could be couched in terms of any theory of interest. On the relation between interest and the quantity of money, also see the writer's Zinsfuss und Geldverfassung, Jahrbuch der Gesellschaft der Oesterreichischen Volkswirte, 1913.

result from many circumstances. A man may expect, for example, while being a student, to have a larger income in the future than he has now, a government may similarly count on an increase in its revenue, or it may find itself in an emergency—as may any private individual too, of course—or all of us may systematically underestimate future wants as compared with present wants of the same rank. If we believe that there is such a thing as a schedule or curve of marginal utility of income, we may express cases of the first kind by saying that we expect to stand in future at a lower point of an invariant curve of marginal utility of income, and cases of the second kind by saying that we have one curve of marginal utility of income for present and another and lower one for future income. Business will pay a positive interest if a present sum can be so used in commerce and industry as to yield a greater sum in future, zero interest if the most lucrative operation within the horizon of businessmen is expected to yield, all costs counted, no more than the sum required to carry it out, and negative interest if, as is sometimes the case, nothing they can do will cover costs. Surely there is nothing paradoxical in that.

We may go one step further without touching controversial ground. It is obvious that borrowing by consumers, particularly governments, is of itself sufficient to enforce a positive rate of interest also for industry and trade, and the writer has no wish to exclude such cases or to minimize the quantitative importance of consumers' credit. But it is equally obvious that, in the sphere of business, innovation is the pillar of interest, both because the profit it yields to the successful entrepreneur is the typical reason for a readiness to pay interest—for looking upon present dollars as a means of getting more dollars in the future—and because, as we have seen, borrowing is, in the situation of an entrepreneur, the typical means of getting those present dollars. The relation of this to credit creation follows from our previous argument.

All the more controversial is the proposition that entrepreneurs' profits and related gains which arise in the disequilibria caused by the impact of innovation are, *as far as the business process itself is concerned and apart from consumers' borrowing*, the only source of interest payments and the only "cause" of the fact that positive rates of interest rule in the markets of capitalist society. This means that in perfect equilibrium interest would be zero in the sense that it would not be a necessary element of the process of production and distribution, or that pure interest tends to vanish as the system approaches perfect equilibrium. Proof of this proposition is very laborious,[1] because it involves showing why all the theories which lead to a different result are logically unsatisfactory. Happily, it is not necessary to enter upon it, because we shall not have to use that proposition except in very few instances. All that the writer

[1] See Theory of Economic Development, Chap. V.

has to ask is that the reader assent to the modest statement of the preceding paragraph, while reserving his rights as to the nature of interest and retaining some kind of rate of interest in his picture of the state of perfect equilibrium. We may, then, confine ourselves to a few remarks and pass on. First, the thesis that the capitalist class lives on a return which, except for the financing of consumption, derives from innovation or processes directly induced by innovation, and would, hence, disappear if economic evolution ceased, is of some importance for what may be termed the economic sociology of capitalism. Second, although it is possible to deny that innovation is the only "cause" of interest within the realm of production and commerce, it is not possible to deny that this "cause" is sufficient to produce it in the absence of any other, or that a premium on present balances follows from our model of the evolutionary process in a way which is not open to any of those logical objections that have been raised against other theories of interest. Whoever dissents from the writer's view, would have still to admit that cause into his picture of reality, and to expect it to assert itself in the variations of the rate of interest.[1] Third, although government borrowing, changing premiums for risk bearing, currency troubles, extra-economic pressure, and varying organization of the markets for loans cannot fail to distort the picture, facts are, as we shall see, more favorable to that theory than theorists have been so far—so much so that there is, if we accept the ordinary rules of scientific procedure, no reason to use any other.

There is, however, one point which presupposes a controversial theorem and on which it is less easy to compromise in such a way as to make it possible for the reader to accept the main argument. Interest has been defined above in monetary terms, but now it is necessary to insist that interest actually is, not only on the surface but essentially, a monetary phenomenon and that we lose it if we try to pierce that surface. It is a payment for balances with which to acquire commodities and services, not for the commodities and services themselves that may be bought with those balances. It is to this fact alone that interest owes its character as a—potentially—permanent income, for profits in our sense are an essentially temporary phenomenon and do not stay permanently with any process of production and trade or any collection of producers' goods ("real capital") that may be embodied in a firm. But the lender may still secure a permanent income by shifting his money from opportunity to opportunity as each of them arises. Some of them are, no doubt, very much more durable than others and there are concerns within which innovation goes on for generations. Besides, this necessity

[1] Hence, the concession usually made to the writer's theory of interest, that entrepreneurs' "demand for capital" is normally the most important single factor in the behavior of interest, concedes much more than it is meant to concede.

of shifting does not apply to lenders who lend to consumers of indefinite span of life, such as governments or municipalities. But no business venture yields eternal surpluses, as any lender is bound to find out to his cost who too confidently acts upon a belief in any of those theories of which the abstinence theory is a typical example, or simply upon a naïve conviction that interest is a price of some productive service in the same sense in which wages are a price of the services of labor.

The theory of interest thus hastily sketched does away with many spurious problems which, here as everywhere else, are the consequence of logical strains in an unsatisfactory analytic structure. It also allows of a much more natural interpretation than can be derived from others, of the relations interest obviously bears to other monetary magnitudes and of its peculiar sensitiveness to monetary policy; and it seems particularly appropriate in a study of industrial fluctuations if we look upon them as deviations from a state of equilibrium. Interest or, if the reader prefer, its deviation from what he believes would be its equilibrium value, then appears, because of its central position, as a kind of *coefficient of tension in the system*, which more nearly than any other single figure expresses the degree of disequilibrium present in the latter.

The premium on present, as against future, balances is settled by borrowers—mainly governments and (industrial and commercial non-banking) firms—and lenders—mainly banks and their satellites—who together form what is known as the Money Market. There, every bank has a sector of its own (whence it follows that we have before us another case of imperfect competition), consisting of its stock of more or less permanent customers, while transactions that cut across these sectors make up the Open Market. Behind this and, as we have seen, at one remove from it, is the Central Market, consisting of the transactions between the bankers' banks and their banking customers, which but indirectly influence the money market proper, except for any operations that the former may undertake in the open market.

Now, interpretation of money-market events by means of that theory of interest unavoidably runs on lines which differ substantially from those of both older and more recent doctrine. The necessity of reconciling a nonmonetary theory with obvious facts of the sphere of money and credit is, in particular, responsible for the idea that there are two kinds of interest rates, a "natural" or "real" one which would also exist in a barter economy and which represents the essence of the phenemenon, a permanent net return from physical means of production, and a monetary one, which fundamentally is but the former's reflex in the monetary sphere. The two may, nevertheless, differ of course or be made to differ by monetary policy or by an expansion or contraction of bank credit, but this constitutes a disturbance from which a definite string of con-

sequences, among them the business cycle itself, has been deduced. The roots of this idea reach very far into the past and are clearly discernible in the English monetary discussions of the fourth and fifth decades of the nineteenth century. Its role in the thought of our own time is due to the teaching of Knut Wicksell and to the work of a brilliant group of Swedish and Austrian economists. For us, however, there is no such thing as a real rate of interest, except in the same sense in which we speak of real wages[1]: translating both the interest and the capital items of any loan transaction into real terms by means of the expected variations in an index of prices, we may derive an expected and, by performing the same operation *ex post*, an actual rate of interest in terms of "command over commodities." But nominal and real rates in this sense are only different measurements of the same thing or, if we prefer to speak of different things even in this case, it is the monetary rate which represents the fundamental phenomenon, and the real rate which represents the derived phenomenon. Hence, the money market with all that happens in it acquires for us a much deeper significance than can be attributed to it from the standpoint just glanced at. It becomes the heart, although it never becomes the brain, of the capitalist organism.[2]

It is not difficult to see, however, that most of the problems traditionally dealt with under the heading of interest will also present themselves to our approach, and that many relations between interest and other elements of the system will have to be formulated in a manner not so far removed from the usual one as might be expected. Of this we can convince ourselves at once. We have just denied the very existence of what has been called the natural rate of interest and do not intend to put another imaginary entity in its place. But it does not follow that all the relations must necessarily vanish from our analysis which have been asserted to hold between it and the monetary rate. For, as far as profits are the basic fact about interest and both its source and its "cause," they will, although no permanent returns[3] and although not behaving exactly

[1] See Irving Fisher, Appreciation and Interest, 1896.

[2] In Mr. Keynes' General Theory of Employment, Interest and Money, 1935, the reader finds also a monetary theory of interest which in some points agrees with the one above submitted and in others differs from it. Comparison is invited, but it should be deferred until the reader has perused Chap. XII. For reasons mentioned in the preface, however, no attempt has been made by the writer himself to relate his theory to that of Mr. Keynes, and the reader should be on his guard against both surface similarities and surface differences. The mere idea that interest is a price of money is, of course, older than anything that can be called scientific analysis, and figures in the list of what 20 years ago would have been called prescientific errors; *vide* Montesquieu, who was duly lectured for it by Adam Smith.

[3] Moreover, profits in our sense display no tendency toward equalization. This and the essentially temporary character of profits in our sense should be sufficient to make it quite clear that both our distinction between profit and interest and the relation between them is not identical with an old distinction between normal business profits and contractual

as that natural rate is supposed to behave, play a similar role in our schema, and those relations between natural and monetary interest will in many, although not in all, respects be replaced by relations between profits and interest not *toto coelo* different from them. Nor should the fact that interest is here defined as a monetary phenomenon and hence must have something to do with the "quantity of the circulating medium"[1] raise exaggerated hopes or fears, as the case may be, to the effect that the writer is going to launch out into strikingly unorthodox conclusions. For about the immediate effects of a change in the amounts of customers' balances, existing or potential, there cannot be much difference of opinion in any case; and anything beyond immediate effects must unavoidably bear a relation to what the balances lent or borrowed mean in terms of all or of certain classes of commodities, hence to the values, and the expected and actual changes in the values, of the general and of sectional price levels. This necessity is not less obvious in the case of zero changes—which are likely to occur in the presence of underutilized resources—as in any others. Or, to put it differently, it is never the amount of actual and potential "funds" in the market which is relevant to the rate of interest but the proportion—which is a variable, of course—of these funds to the total of balances actually in circulation. As soon as this is realized, the gulf narrows that separates our approach from others which are more familiar.

Finally, while the theory presented in this section excludes facts which are basic to others from the explanation of the nature of interest, it is not intended to exclude them—as far as they are facts—from all arguments about interest. Abstinence affords an instance. The fact that saving does—or at least may—imply a sacrifice is held to be no more sufficient or necessary to account for the existence of interest than disutility of labor is to account for the existence of wages. The writer also thinks that neither abstinence nor disutility contributes very much to our understanding of the behavior of interest or wages. But it is not held either that abstinence or disutility are nonexistent or that they are irrelevant to interest or wages. Whenever any part of funds available for lending are provided by saving, that part and its variations must in the long run bear some—though not a simple—relation to the abstinence involved; and this relation, whatever it is, can of course be expressed by a marginal condi-

interest. However much the writer welcomes anything that will link his teaching to older doctrine, he must point out, first, that normal profits and interest are, according to this view, still the same thing—exactly as contractual and directly earned rent of natural agents is—which he thinks erroneous, and, second, that the analytic problem which he undertook to solve by his theory of interest was precisely to show how it is possible that a theoretically permanent income flows from essentially transient sources and that it should not disappear as a net return through a process of imputation.

[1] It will be pointed out in chapter XI, section A that that "quantity" is a very doubtful one. But the above suffices for the purpose in hand.

tion. Another instance is consumers' time preference. Whatever its causes and whether it is a datum—as it is if we assume that people have different utility schedules for present and future incomes—or, in part, a cyclical variable—as it is in so far as it turns on expectations of future increase in income—it will always contribute to the determination of the rate of interest: if the latter is not to display a tendency to change, it must in strict theory equal any marginal rate of such time preference as may exist.[1]

To this monetary theory of interest corresponds a monetary theory of capital, which views it, on the one hand, as an accounting concept—as measuring in terms of money the resources entrusted to a firm[2]—and, on the other hand, as a monetary quantity. It is, perhaps, best to avoid altogether a term which has been the source of so much confusion and to replace it by what it means in every case—equipment or intermediate goods and so on—and this we shall do, except in cases in which no misunderstanding is likely to arise. But it is suggested that those two monetary concepts open a serviceable door by which to introduce the element of money into general theory. Only the second is, however, relevant here. Capital in this sense is not goods but balances, not a factor of production but a distinct agent which stands between the entrepreneur and the factors. It can be created by banks because balances can. Its increase and decrease are not the same as increase and decrease of commodities or any particular class of commodities. Its market is simply the money market, and there is no other capital market. No realistic meaning attaches to the statement that, in the latter, "capital" (= some kind or other of producers' goods) is being "lent in the form of money." But again as in the case of interest it is necessary to add that the introduction into our analysis of this concept of capital does not do away with the problems of what is traditionally referred to as real capital—on the contrary, they reappear though in a new garb—and that results arrived at by means of a monetary theory of capital not always invalidate, but in many cases only reformulate, the propositions of "real" theories of capital. If our understanding of the processes of capitalist society hinges in important respects on realizing the fact that monetary capital is a distinct agent, it also hinges in not less important respects on realizing how it is related to the world of commodities.

[1] Nor is there any objection to Professor Irving Fisher's concept of the Marginal Rate of Return over Cost, the usefulness of which is, on the contrary, fully recognized by the present writer, although his interpretation of it would differ from that of Professor Fisher. See the latter's Theory of Interest, pp. 155 *et seq.* The principle is implied in Walras's theory of interest.

[2] Capital in this sense includes all debts, whether owed to a bank or to other firms or to bondholders. This is in accordance with the principles of accounting, according to which capital in the usual sense figures along with all debts on the liability side of the balance sheet.

CHAPTER IV

The Contours of Economic Evolution

A. The Working of the Model; First Approximation.—It will be useful to assemble the analytic tools so far described and to display the resulting skeleton—a sort of chassis of our model. Experience teaches that there is danger in doing this, and another appeal to the reader is in order, to reserve judgment and to grant provisionally all simplifications, in particular, the assumptions of perfect competition (with the possible exception of isolated monopoly positions) and of a state of perfect equilibrium from which to start. There is no saving, population is constant, and everything else is as we assume it to be in a state that conforms to the idea of the Theoretical Norm. We know (this, however, is no assumption) that, in the institutional pattern of capitalist society, there will always be possibilities of New Combinations (in the absence of all others, there would be those due to the steady increase of knowledge), and always some people able and willing to carry them out; and we know the reasons why this is so. To repeat again a point which has often been misunderstood, these people are by no means looked upon as particularly rare birds. All we postulate is that that ability is distributed as unequally as others are and all we hold is that this fact has an important influence on the mechanism of economic change—a statement which is no bolder and, if anything, more realistic than any of the set of assumptions familiar to every theorist. Motivation is supplied by the prospect of profit in our sense (mixed as the reader pleases with other stimuli) *which does not, be it remembered, presuppose either an actual or an expected rise in prices and expenditure.* What follows implies, besides institutional and technological assumptions that are essential, others of merely expository significance. In order to make the principle stand out clearly, we wish in particular to assume, in the first instance, absence of certain elements which in reality are very important—notably, errors in diagnosis or prognosis and other mistakes.

Some people, then, conceive and work out with varying promptness plans for innovations associated with varying (and ideally correct) anticipations of profits, and set about struggling with the obstacles incident to doing a new and unfamiliar thing—obstacles which have been discussed

in the preceding chapter. We look upon ability to take the lead as a part of the entrepreneurial aptitude, and this enables us, for our present purpose, to identify one man (as we could identify the tallest individual in a population) who is the first, for example, to decide on the production of a new consumers' good. The reason why he did not do so before is in disturbances which we assume to have preceded the equilibrium from which we start. Conforming to previous considerations, we suppose that he founds a new firm, constructs a new plant, and orders new equipment from existing firms. The requisite funds—his entrance ticket to the social store of means of production—he borrows from a bank. On the balance acquired by so doing he draws, either in order to hand the checks to other people who furnish him with goods and services, or in order to get currency with which to pay for these supplies. Under our assumptions he withdraws, by his bids for producers' goods, the quantities of them he needs from the uses which they served before.

Then other entrepreneurs follow, after them still others in increasing number, in the path of innovation, which becomes progressively smoothed for successors by accumulating experience and vanishing obstacles. We know the reasons why this is likely to happen in the same field or in—technologically, as well as economically—related fields: although in some respects a successful innovation will make other innovations easier to carry out in any field, it primarily facilitates them in the lines in which it may be directly copied as a whole or in part or for which it opens up new opportunities. Consequences begin to make themselves felt all over the system in perfectly logical concatenation. They are almost too obvious to describe. We will merely note, first, that our entrepreneurs may, under the circumstances envisaged, be relied on to spend their deposits promptly, excepting a minimum reserve. It is—again, in the circumstances of our case—safe to say that if we multiply the amount of created balances by the velocity figure that obtained in the previous equilibrium, in the crudest quantity-theory style, we shall get a fair approximation to the total by which the volume of payments will be increased by this kind of expenditure alone, since nobody of all those who receive payments from entrepreneurs, has any debts to repay or any motive to increase his cash reserve beyond its previous proportion to his transactions, and since we are considering a closed domain.[1]

Second, there being no unemployed resources to start with, prices of factors of production will rise, and so will money incomes and the rate of interest (or, as the writer thinks it would be more correct to say, a positive rate of interest will emerge). Costs will rise against "old" firms as well as against entrepreneurs. But third, their receipts will also rise

[1] Later we shall see reason for assuming that the effect will be greater than stated above, but now we do not wish to complicate matters.

correspondingly to the expenditures of entrepreneurs on producers' goods, of the workmen and so on, now employed by them at higher wages, and of the recipients of all those increased payments. How individual firms or industries or sectors of the industrial organism will fare in this process depends on the shifts in demand that will occur in consequence. It is easy to see that there will be both gains and losses. In spite of the losses in some industries which must, under such circumstances, be expected to be a feature of the situation, all old firms taken together will, of course, show a net surplus. Of this we can satisfy ourselves if, disregarding everything except the first two steps—*i.e.*, disbursements by entrepreneurs and again the next disbursement by income receivers—we assume that labor is the only factor, wages are the only cost. Then old firms will, obviously, have to pay but a part of the increase in the sum total of incomes that has occurred, *i.e.*, the increase in the income of those workmen whom they still retain while they will, at the second turn of the wheel and before the new products reach their markets, receive the whole of it. However unrealistic, this case brings out the principle free from all complications and independent of any reactions of marginal cost in physical terms. In any case, this is the process by which the effects of the entrepreneurial activity spread (under our present assumptions they would spread very quickly) over the whole system, dislocating values, disrupting the equilibrium that existed before. The term Windfall correctly expresses the character of both these gains and losses.

Fourth, under our assumptions there could, in general, be no net increase in total output. Owing to the difficulties inherent in the latter concept, this proposition may justifiably be questioned. What we mean is simply that it is impossible for all industries to increase their output under the circumstances assumed. All those who make gains will, indeed, try to do so; but if we remember, on the one hand, that in the preceding perfect equilibrium of perfect competition they all produced their optimum output, utilizing in particular their plants up to the point at which total unit cost was a minimum, and, on the other hand, that quantities of factors of production previously used by them have been withdrawn, we shall conclude that if there were only one single consumers' good, less of it would be produced now than had been produced in the preceding state of equilibrium. Instead, more producers' goods will be produced. These, together with part of the others which used to be produced for the old firms, will be taken by our entrepreneurs. If there are many consumers' goods, and if the production of some of them increases, then the production of others must decrease in such a way as to set free more productive resources than are engaged in bringing about the expansion in the former. If we include in total output the intermediate results of the current work of building up the new plants, then total output would, in

the sense alluded to, be constant. If we do not include them, it would be smaller. The output of consumers' goods will fall in any case unless there is no period of gestation at all. It should be observed, however, that demand in terms of money for consumers' goods has not decreased. On the contrary, it has increased. The reader is urgently invited to develop this picture, the elements of which will soon be seen to be of fundamental importance for the argument of this book.

This is all that happens, under our present assumptions, until the first entrepreneur's plant gets into working order. Then the scene begins to change and a new business situation emerges, characteristically differing from the one we glanced at, but not less easy to understand. The new commodities—let us say, new consumers' goods—flow into the market. They are, since everything turns out according to expectation, readily taken up at exactly those prices at which the entrepreneur expected to sell them. We will also assume that from that moment onward the new firm will go on pouring out an unchanging stream of consumers' goods without any further change in its production function. A stream of receipts will hence flow into the entrepreneur's account, at a rate sufficient to repay, during the lifetime of the plant and equipment originally acquired, the total debt incurred plus interest, and to leave a profit for the entrepreneur. Let us imagine a strong case and assume what, of course, happens only in very exceptional instances, that at the end of a period not longer than the time that elapsed between the entrepreneur's first act of borrowing and the completion of his plant, things have so worked out that, the entrepreneur having currently made all necessary replacements out of receipts and having discharged all his debts to the bank, thereby annihilating all the balances newly created in his favor, is left with plant and equipment perfectly unencumbered and in perfect working order, and also with a surplus balance sufficient to serve him as "working capital." If the same applies in the case of the other entrepreneurs that followed in the wake of the first and are just now, for argument's sake, assumed to have been similar prodigies of foresight, then the following situation arises: the new firms, getting successively into working order and throwing their products into the market of consumers' goods, increase the total output of consumers' goods which had been previously reduced. In a certain sense it may be held that under our assumptions output will eventually be increased by "more" than it had fallen during the period of gestation. That is to say, if we compare the elements which constitute total output of consumers' goods at the point of time when the new firms have all begun to produce, with total output as it was in the preceding neighborhood of equilibrium, and if we cancel all items which appear in both composites, we are left with a list of plus and minus items such that, evaluated at the prices that ruled in that neighborhood, the sum of

the former would necessarily be greater than the sum of the latter. If there were only one consumers' good, and if the innovation had consisted in the introduction of a novel method of producing it, the physical quantity per unit of time of the new total output would be greater than that of the old one.

These new commodities intrude into the economic world that existed before at a rate which will, for reasons given in the preceding chapter, be too great for smooth absorption. They intrude, nevertheless, gradually: the first entrepreneur's supply will not, in general, cause visible disturbance or be sufficient to alter the complexion of the business situation as a whole, although those firms may be immediately affected with the products of which the new commodities or the commodities produced by new methods are directly competitive. But, as the process gathers momentum, these effects steadily gain in importance and disequilibrium, enforcing a process of adaptation, begins to show. It is important that the reader should master the mechanism before we go on to insert any further elements into it.

The nature of the effects on the "old" firms is easy to understand. It superimposes itself on the disequilibrium caused by the setting up of the new plant and equipment and the expenditure incident thereto. But while the effects of this were, even in those cases in which they spelled net losses, softened by the flow of that expenditure, the new disequilibrium enforces much more obviously difficult adaptations. They proceed not exclusively under the stimulus of loss. For some of the "old" firms new opportunities for expansion open up: the new methods or commodities create New Economic Space. But for others the emergence of the new methods means economic death; for still others, contraction and drifting into the background. Finally, there are firms and industries which are forced to undergo a difficult and painful process of modernization, rationalization and reconstruction. It should be observed that these vital parts of the mechanism of economic evolution, which are readily seen to dominate many business situations and to produce results of fundamental importance, can never be revealed statistically by measuring variation in an index of production, or analyzed theoretically in terms of total output. Such an index would display nothing except increase. But mere increase in total output would not produce those effects. It is disharmonious or one-sided increase and shifts *within* the aggregative quantity which matter. Aggregative analysis, here, as elsewhere, not only does not tell the whole tale but necessarily obliterates the main (and the only interesting) point of the tale.

As long, however, as new entreprises continue to emerge and to pour their stream of expenditure into the system, all those effects may be overcompensated. The "turn" *need* not come, *i.e.*, the situation

described before *need* not give way to the situation we are trying to characterize now, until entrepreneurial activity slackens and eventually stops. Hence, it is essential to visualize clearly the reasons why entrepreneurial activity in fact slackens and stops at a point which can be theoretically determined. In actual life so many accidents and incidents combine to produce this result that we are never lacking plausible reasons with which to explain that stoppage in any given case. But this obscures the question of principle with which we are now concerned—whether the mechanism described would in the absence of such incidents and accidents run on forever (on a "prosperity plateau") or come to a stop from reasons inherent in it and by virtue of its own effects and of the business situations it creates.

First, since entrepreneurial activity characteristically starts off in a definite direction and does not distribute itself equally all over the industrial field—since it aims typically at production of a given commodity or group of commodities—its possibilities are, in every instance and in any given state of the economic body, definitely limited. The results of innovation act directly on certain individual prices, and therefore set definite limits on further advance in that direction or related directions. Anxious as we are just now to work out only the pure logic of our subject, and to avoid anything of a consequential or incidental character, however important it may be in practice, we will even retain, for the moment, the heroic assumption that not only the full increase in the new product, which will be brought about by more and more firms taking up production, and the incident fall in its price have been perfectly correctly foreseen by the first in the field, but also that those who came later also foresaw correctly what possibilities were left to them. It is easy to see that a point will be reached at which our new commodity will be produced at minimum unit cost equal to the price at which it will sell. Profits will be eliminated, the impulse of innovation will, for the time being, have spent itself.

But second, since entrepreneurial activity upsets the equilibrium of the system and since the release of the new products, in particular, brings disequilibration to a head, a revision of values of all the elements of the system becomes necessary and this, for a period of time, means fluctuations and successive attempts at adaptation to changing temporary situations. This, in turn, means the impossibility of calculating costs and receipts in a satisfactory way, even if necessary margins are not altogether absent while that goes on. Hence, the difficulty of planning new things and the risk of failure are greatly increased. In order to carry out additional innovations, it is as necessary to wait until things settle down as it was in the beginning to wait for an equilibrium to be established before embarking upon the innovations the effects of which we are now

discussing.[1] Therefore, along with new products streaming into markets, and with repayments increasing in quantitative importance, entrepreneurial activity tends to slacken, until finally it ceases entirely.

The reader is invited to work out the details of the picture and to form an opinion about the behavior in this process of the factors and indicators of business situations listed in the first chapter, before he turns to our discussion of time series, which will again take up these matters. Two things only call for notice. First, the outstanding conductor that spreads effects all over the system (although its causal importance can easily be exaggerated and although its way of functioning is still more open to misinterpretation) is entrepreneurs' expenditure, and this expenditure is now being reduced. This proposition is not quite symmetrical to the analogous one in the case of the situation characteristic of the period of gestation since there, the element of "crowding out the old" being absent, all effects reached the system through that one channel. But as far as it may be allowed to pass muster, it should be observed that while mere stoppage of additional borrowing (remember that so far nobody borrows but entrepreneurs) would be sufficient under the circumstances to bring discomfiture to many firms and, in particular, to depress the price level,[2] yet this is not all that happens. Repayment of bank loans by entrepreneurs, annihilating balances, comes in to accentuate effects. This process we shall, in order to distinguish it from other cases of shrinkage of deposits, designate by the term Autodeflation. It occurs without any initiative on the part of banks and would occur even if nobody ever went bankrupt or restricted operations, and if no bank ever called or refused a loan. We are not concerned with the questions

[1] Although we are now concentrating on the task of carpentering our logical schema, it may be well to point to the "factual" justification of this. The English boom at the end of the seventeenth century did not start before 1688, the spurt in economic activity in the United States at the end of the sixties of the nineteenth century, not before the end of the Civil War. Such examples could, of course, be readily multiplied. But if the reader admit that this is not more than self-evident in the case of external disturbance, it follows that it will equally hold true for disturbance of relative values through any other—*i.e.*, internal—cause. Professor Machlup, in an address to the writer's class on business cycles, seems to have expressed the matter felicitously (though from a somewhat different standpoint) by saying that entrepreneurial risk of failure is at a minimum in equilibrium and slowly rises as prosperity develops. Entrepreneurial activity stops at a point at which that risk is a maximum. It will be seen that such an argument is not, as it at first sight seems, incompatible with our proposition that risk bearing is no part of the entrepreneurial function.

[2] No firm could however, under our present assumptions, be submerged merely by a fall in price level that would otherwise have survived. This is a truism considering we now assume absence of fixed debt-charges and of "stickiness" in any cost elements, yet worth remembering. It suffices to dispel some of the errors surrounding that subject. That is why the reader should supply formal proof.

whether a different and less passive reaction of the monetary mechanism would either intensify or soften the phenomena under consideration, and what monetary policy "should" be followed under the circumstances. All we are interested in at the moment is that money and credit do react in a definite way, that their behavior is nothing but adaptation to an underlying economic process by which that behavior, as well as the behavior of *all* aggregative quantities, is explained, while the reverse is not true.

Second, the sum total of the phenomena we are surveying forms a connected whole which has a definite meaning and, if such teleology is permissible, may be said to have a definite function. It constitutes the response by the system to the results of entrepreneurial activity—adaptation to the new things created, including the elimination of what is incapable of adaptation, resorption of the results of innovation into the system, reorganization of economic life so as to make it conform to the data as altered by enterprise, remodeling of the system of values, liquidation of indebtedness. It is readily seen that, under our assumptions and with but minor qualifications, that sequence of phenomena leads up to a new neighborhood of equilibrium, in which enterprise will start again. This new neighborhood of equilibrium is characterized, as compared to the one that preceded it, by a "greater" social product of a different pattern, new production functions, equal sum total of money incomes, a minimum (strictly zero) rate of interest, zero profits, zero loans, a different system of prices and a lower level of prices, the fundamental expression of the fact that all the lasting achievements of the particular spurt of innovation have been handed to consumers in the shape of increased real incomes. Thus, as soon as the entrepreneurial impulse ceases to act which propelled it away from its previous neighborhood, the system embarks upon a struggle toward a new one, under the influence of forces[1] which should now be perfectly clear and which are sure, barring occurrence of external disturbances, to land it there eventually. The process takes time and may display oscillations and relapses. But it is at the bottom of all those apparently irregular movements during which losses seem to be strewn at random over the whole of economic life, and under present assumptions cannot cease until, through however many rearrangements that are disavowed by the next day, it has accomplished the task.

It is a long way from this schema to the point of junction with historical fact. Innumerable layers of secondary, incidental, accidental, and "external" fact and reactions among all of them and reactions to reactions cover that skeleton of economic life, sometimes so as to hide it entirely.

[1] There is, of course, nothing allegorical about that term: the "forces" consist, to use Spiethoff's telling phrase, in "the candy of gain and the whip of losses," and their eventual success can be established by formal proof of the type alluded to in the second chapter.

But the writer must have been sadly lacking in expository skill if the reader does not recognize the common sense and the realistic counterpart of this theoretical world, every element of which links up with a fact of everyday experience. We shall refer to this construction as the Pure Model or the First Approximation.

B. Looking at the Skeleton.—When we look at the skeleton, we behold the picture of a distinct process in time which displays functional relations between its constituent parts and is logically self-contained.[1] This process of economic change or evolution, moreover, goes on in units separated from each other by neighborhoods of equilibrium. Each of those units, in turn, consists of two distinct phases, during the first of which the system, under the impulse of entrepreneurial activity, draws away from an equilibrium position, and during the second of which it draws toward another equilibrium position.

Each of those two phases is characterized by a definite succession of phenomena. The reader need only recall what they are in order to make the discovery that they are precisely the phenomenon which he associates with "prosperity" and "recession": our model reproduces, by its mere working, that very sequence of events which *we observe in the course of those fluctuations in economic life which have come to be called business cycles* and which, translated into the language of diagrams, present the picture of an undulating or wavelike movement in absolute figures or rates of change. It is worth while to pause in order to comment on this fact.

First, it is by no means farfetched or paradoxical to say that "progress" unstabilizes the economic world, or that it is by virtue of its mechanism *a cyclical process*. A theory of economic fluctuations running in terms of external factors plus innovations might be considered self-evident and only another way of stating that there would be no cycles in an undisturbed stationary, or growing, flow. The reader should keep this in mind in the midst of the complications which must inevitably follow and in the face of the fact that theory as well as public opinion have steadfastly refused to take that common-sense view of the matter and persisted in tacitly assuming that "progress" is one thing (and naturally smooth) while fluctuations are another thing, differing from it, perhaps inimical to it. It is, after all, only common sense to realize that, but for the fact that economic life is in a process of incessant *internal* change, the business cycle, as we know it, would not exist. Hence, it is just as well to try to link so obviously important an element systematically

[1] It is, in logic and discarding the influence of external factors and of growth, as self-contained as is the stationary circuit flow. Time enters, indeed, in a different sense, but it is still theoretic time, *i.e.*, a time which serves as an axis for a logical (and not merely historical) sequence of events. The reader should, however, bear in mind what has been said in the preceding chapter about the possibility of profitless and of prosperityless cycles.

to any explanation of the capitalist economy in general and of business cycles in particular. Our proof that the few fundamental facts so far included in our model suffice to produce a "wave" pervading economic life, must in any case be of diagnostic value and shed some light on such fluctuations as we observe.

Second, the fact that innovation would suffice to produce alternating prosperities and depressions does not establish, of course, that these cycles are actually the ones which we historically designate as business cycles. Even if we make the reservation, obviously necessary, as to external factors, there may be other "causes." Our proposition that innovation—again, when seen in its true extent and not confined to some part or form of what we mean by it—is actually the dominant element which accounts for those historical and statistical phenomena, is so far only a working hypothesis, which will be on trial throughout this book. Moreover, our hypothesis is not yet in a shape to serve at all and it remains to be seen how much matter unconnected with its present content will have to be added to it.

But, third, starting out from an impression, drawn from economic history, that it will in fact work well, we are encouraged not only by the rough agreement of the symptoms which our model produces with the symptoms which we actually observe in the course of business cycles, but also by the ease with which certain elements, so far banished from our picture, fit into it and can be given their due without condemning us to any eclecticism. They seem, indeed, to acquire their true place and significance only with reference to it. A few examples will show this.

Most students of the business cycle have been impressed by the logic with which one cyclical situation produces the next. This was really the discovery which ushered in the scientific studies of the cyclical mechanism and has more recently been stressed by Professor Wesley Mitchell. But if we stop there, our situation is obviously unsatisfactory, for the process then lacks motive power and looks very much like a *perpetuum mobile.* That difficulty vanishes and, in particular, the crucial question of what causes the turn from prosperity into recession finds a very natural answer if we accept our schema. We acquire the right to look upon recession as the reaction to prosperity in the way first clearly recognized by Juglar, without having in turn to explain prosperity by preceding recession.[1]

[1] With Juglar's formula that prosperity is the *cause unique* of depression practically all "theories" agree. But the self-generating theories also claim that the causation of prosperity lies in the conditions of easy money, low stocks, cheap labor and raw materials found in depression periods, and that prosperity is merely an outgrowth of these. This line of reasoning may perhaps serve (although there is some doubt about that) in order to account for revival up to normal, but obviously cannot serve beyond that. So far, we have not dealt with any "depression" that leads below normal, and prosperity is therefore seen to be explainable without it. The subject will be taken up later on.

Again, most people will link up recessions with errors of judgment, excesses (overdoing), and misconduct. This is no explanation at all; for it is not error, etc., as such but only a cluster of errors which could possibly account for widespread depressive effects. Any "theory" that rests content with this must assume that people err periodically in the way most convenient to the economist. Our model, by showing the emergence of situations in which it is understandable that mistakes of all sorts should be more frequent than usual (*i.e.*, when untried things are being put into practice and adaptation to a state of things becomes necessary, the contours of which have not yet appeared) does away with this and shows the place of the element of error in the various phases of the process, without having to introduce it as an independent, still less as a necessary, element.[1]

Another such *deus ex machina*, closely related to error, is "anticipation." It has been pointed out in the second chapter that the introduction of this element constitutes a material improvement of our technique, but also that expectations cannot be used as part of our ultimate data in the same way as taste for tobacco can. Unless we know why people expect what they expect, any argument is completely valueless which appeals to them as *causae efficientes*. Such appeals enter into the class of pseudo-explanations which already amused Molière.[2] But if we under-

[1] It is believed that our arrangement assigns its proper place, not only to errors of various types, but also to other kinds of aberration of economic action, and makes them analytically workable. The actual quantitative importance of the element of error is, however, a different question. The writer has not been able to answer it to his own satisfaction. So much depends here on personal observation which can only cover infinitesimal segments of reality, and so little value attaches in this matter to newspaper wisdom, that opinions must be arrived at on a very inadequate basis of fact and should be presented with becoming diffidence. There is no lack, of course, in the history of the events which led to the great crises that everyone knows, of glaring instances of all possible kinds of both error and misconduct. But for the span of time to which his own observations refer, the writer confesses to a feeling that the causal importance of both is likely to be exaggerated. There is a routine procedure for dealing with new business propositions which does not make it very easy to "get away" with either a foolish or a fraudulent scheme. Technological feasability and conditions of commercial success, actual or potential competition included, are examined, as a rule, with considerable care and by several independent sets of experts, some of whom have an interest in, and a habit of, giving advice that leans to caution. They may all be wrong, of course, as they all may be corrupt, but to the writer that does not seem to be an occurrence so frequent that mere pointing to it would, by itself, constitute adequate explanation. A definite reason other than error and misconduct is, as a rule, necessary to account for failure. But then the writer himself may well be wrong and too much influenced by cases that were exceptional in the amount of care and study bestowed on them. At any rate, this opinion of his, right or wrong, must be distinguished from his opinion about the way in which the element of error should be treated, no matter how important or unimportant it may be.

[2] His examiner asks the question: *Quare opium facit dormire?* And his candidate answers: *Quia est in eo virtus dormitiva cuius est natura assopire.* Theorists whose analytic

stand independently how the situations come about in which, for example, windfall gains, rising prices, and so on produce waves of optimism, we are free to use the fact that this optimism will feed upon itself and crystallize so as to become an element of the mechanism of cyclical events and the "cause" of secondary phenomena. Professor Pigou does not seem to hold an optimism-pessimism theory of cycles in any other sense. His exposition, therefore, is not open to the objection of principle alluded to. But there still remains the question of fact, how important, even within their rightful domain, businessmen's optimisms and pessimisms actually are. There is some danger in generalizing from familiar facts about stock exchange or land speculation—observation of which, however, also clearly teaches that its moods are not independent causes but consequential phenomena. Industry and trade are much less given to being swayed by moods. Moreover, the writer confesses that he sometimes wonders in what world those theorists live who do not doubt for a moment the efficacy of "depressed states of mind"—to be mended, as an eminent author seems to think, by "ballyhoo"—in accentuating (let alone independently causing) depressions. His experience is to the effect that the average businessman always hopes against hope, always thinks he sees recovery "around the corner," always tries to prepare for it, and that he is forced back each time by hard objective fact which as long as possible he doggedly tries to ignore. The history of the recent world crisis could almost be written in terms of ineffectual attempts to stem the tide, undertaken in a belief, fostered in this case by all the prophets, that business would be "humming" in a few months. This does not mean that businessmen are always optimistic. Far from it. What it does mean is that waves of both optimism and pessimism are not the obvious realities they seem to be to observers who judge from manias.

Other examples of how much-emphasized facts fit into our schema abound. We have, for instance, nothing to offer in defense of the so-called overproduction and underconsumption theories. But it is readily seen how our process may produce situations which, to the untrained mind, lend color to those primitive attempts at explanation. As regards the facts that underlie the various theories which attribute business cycles to overinvestment in durable producers' goods or to investment in wrong directions (malinvestment), it is easily seen, first, that variations in real investment are, as a matter of fact, intimately connected with the causation and the mechanism of cycles; second, that in

apparatus drives them back upon "psychology" are always in danger of drifting into this type of argument. It is, therefore, of some importance that the reader should satisfy himself that the analytic schema here presented is not a psychological theory in this sense, although the behavior of the entrepreneur is amenable to description in psychological terms.

the course of our process cases of both overinvestment and malinvestment will understandably occur; and, third, that in other cases an appearance of overinvestment will be created.

Still other examples will be met as we go along. But one more point should be mentioned here. The analytic schema presented in this book evidently does not belong to the family of monetary theories of business cycles. It does presuppose a certain behavior of money and credit, many features of which are essential for it; but if this were enough to constitute a monetary theory of cycles, there would be no nonmonetary ones, since every theory does this either explicitly or implicitly. If we wish to make that designation distinctive, we must follow Mr. Hawtrey and define a monetary theory by the criterion that it looks upon cycles as "purely monetary phenomena" in the sense that peculiarities of the sphere of money and credit account for their existence and that but for those peculiarities they would not exist at all. It should be clear by now and will become still more so later on, that the writer believes those theories to be wrong and, in their practical implications, misleading. But all the facts, and in particular all the relations of monetary time series to others, on which those theories draw, find their place and interpretation in our schema. It must be realized, however, that the fundamental logic of the cyclical process of evolution is entirely independent of all those accessories which, however important they may be, make after all poor cornerstones. We return to our argument.

Fourth, there is a point at which the picture of the working of our model presents features that seem to differ from widely accepted, though not unanimous, opinion. It does not give to prosperity and recession, relatively to each other, the welfare connotations which public opinion attaches to them. Commonly, prosperity is associated with social well-being, and recession with a falling standard of life. In our picture they are not, and there is even an implication to the contrary. This is partly due to certain facts which have not been introduced as yet, and which to some extent justify popular opinion. But we do not wish that feature of our present picture to be lost. It contains an important truth. Prosperity in our sense is, in fact, very far from being synonymous with welfare—witness, for example, the "hungry forties." And times of prolonged "depression" are very far from being synonymous with misery —witness, for example, the progress in the standard of life of the working classes, 1873–1897. Our model supplies the explanation of this, and we shall repeatedly have to insist upon it.

The socialist form of organization has the virtue of bringing out the economic nature of things much more clearly than capitalism. In a socialist community it would, for instance, be evident to everyone that what a nation gains from international trade consists of the imports

and that exports are what it sacrifices in order to secure them. Similarly, it would be obvious that times of innovation—witness the Gosplan—are times of effort and sacrifice, of work for the future, while the harvest comes after. This is so also in capitalist society; and that the harvest is gathered under recessive symptoms and with more anxiety than rejoicing is easily accounted for and does not alter the principle.[1] We may note, again, that recession, besides being a time of harvesting the results of preceding innovation, is also a time of harvesting its indirect effects. The new methods are being copied and improved; adaptation to them or to the impact of the new commodities consists in part in "induced inventions"; some industries expand into new investment opportunities created by the achievements of entrepreneurs; others respond by rationalization of their technological and commercial processes under pressure; much dead wood disappears. There is, thus, a good deal of truth in the popular saying that "there is more brain in business" at large during recession than there is during prosperity, an observation which is, at the same time, seen not to contradict any inference that may be drawn from our model.

Fifth, there is nothing in the working of our model to point to periodicity in the cyclical process of economic evolution if that term is taken to mean a constant period. And there is no rhythm or cycle if we choose to define either of them with reference to periodicity in that sense. But both rhythm and cycles are present in a much more relevant sense. For there is a process which systematically produces alternating phases of prosperity and depression through the working of a definite mechanism set into motion by a definite "force" or "cause." All we can thus far say about the duration of the units of that process and of each of their two phases is that it will depend on the nature of the particular innovations that carry a given cycle, the actual structure of the industrial organism that responds to them, and the financial conditions and habits prevailing in the business community in each case. But that is enough and it seems entirely unjustified to deny the existence of a phenomenon because it fails to conform to certain arbitrary standards of regularity.[2]

[1] Needless to say, the above "evaluation" of the recessive phase does not carry any laisser-faire connotations. To begin with, policy is not primarily concerned with recessions but with depressions, which we have not yet encountered. Besides, it does not imply that recessive symptoms could not be managed as such and as distinct from the process of adaptation which gives rise to them. It bears, however, upon the question of policy in two ways. First, in that it shows that recession is a process that fills a function and not simply a misfortune; second, in that it shows that the recessive symptoms which people dislike are part of the mechanism of that process and not accidental to it and that hence any management of them which is not prepared to injure the process must be an extremely delicate task.

[2] Professor Irving Fisher, for example, argues in his paper in the *Journal of the American Statistical Association*, 1923, that plus and minus deviations in time series do not reveal

We take the opportunity of recalling the self-explanatory concept of Internal Irregularity—to contrast with the concept of External Irregularities due to action of external factors.

Sixth, one aspect of the relation between variations of social aggregates and variations of the quantities and values in individual industries and concerns deserves to be noted. From the standpoint of aggregative theory, it is in the nature of a paradox to say that partial disequilibria—innovation and response to innovation create in the first instance nothing else—produce what obviously is a general disequilibrium in the system as a whole (see Chap. II, sec. D, particularly the quotation from Mr. Harrod). But we realize now in what sense that is so, how it comes about, and how aggregative quantities are thereby changed. Perhaps it is only common sense to recognize that, in order to produce effects on aggregates, a factor or event need not itself be an aggregate or directly act on an aggregate. It follows on the one hand that, relations between aggregates being entirely inadequate to teach us anything about the nature of the processes which shape their variations, aggregative theories of the business cycle must be inadequate, too; and on the other hand, that it is not a valid objection against an analysis of business cycles that it deals "only" with partial situations. This applies, of course, to many "theories" such as, for example, the harvest theory: the mere fact that it locates causes in one sector of the system only, should not be recorded against it, whatever its other shortcomings may be.

Seventh, it should be emphasized once more that our model and its working is, of course, strongly institutional in character. It presupposes the presence, not only of the general features of capitalist society, but also of several others which we, no doubt, hold to be actually verified but which are not logically implied in the concepts either of economic action or of capitalism. Our argument rests on (abstractions from) historical facts which may turn out to belong to an epoch that is rapidly passing. In this sense the analysis presented has, in fact, itself been called historical. There is no objection to this. Any application must in each case wait upon the proof that the conditions assumed actually did exist, or may reasonably be expected to have existed, at the time envisaged. We assume not only private property and private initiative but a definite type of both; not only money, banks, and banking credit but also a certain attitude, moral code, business tradition, and "usage" of the banking community; above all, a spirit of the industrial *bourgeoisie* and

---

characteristic phases and do not recur. This is true (and even understandable) only from the standpoint of such arbitrary standards. In every other sense "deviations" do recur and indeed characterize phases. The writer here entirely agrees with Professor Mitchell, who unhesitatingly recognizes "recurrence" without "strict periodicity." The question both of principle and of fact will, however, be taken up later on.

a schema of motivation which within the world of giant concerns—the pattern which we have called Trustified Capitalism—and within modern attitudes of the public mind is rapidly losing both its scope and its meaning. This is why in our discussion of postwar events we shall put the question whether and how far the process still persists. But the writer is quite content to shed light, such as it is, on a piece of economic history and to leave to the reader the decision whether or not he will consider it relevant to practical problems or not. The deep-reaching question whether it is the process of capitalistic evolution itself that creates the social situations in which it dies out will only peripherically be touched upon.

C. The Secondary Wave; Second Approximation.—We have seen that if innovations are being embodied in new plant and equipment, additional consumers' spending will result practically as quickly as additional producers' spending. Both together will spread from the point or points in the system on which they first impinge, and create that complexion of business situations which we call prosperity. Two things are then practically sure to happen. First, old firms will react to this situation and, second, many of them will "speculate" on this situation. A new factory in a village, for example, means better business for the local grocers, who will accordingly place bigger orders with wholesalers, who in turn will do the same with manufacturers, and these will expand production or try to do so, and so on. But in doing this many people will act on the assumption that the rates of change they observe will continue indefinitely, and enter into transactions which will result in losses as soon as facts fail to verify that assumption. Speculation in the narrower sense of the word will take the hint and start on its familiar course or rather, anticipating all this, stage a boom even before prosperity in business has had time to develop. New borrowing will then no longer be confined to entrepreneurs, and "deposits" will be created to finance general expansion, each loan tending to induce another loan, each rise in prices another rise. Here those transactions enter into our picture which *presuppose* an actual or expected rise in prices in order to become possible.[1] Our analysis adds nothing to this well-known piece of mechanism except the ignition of it and the means of distinguishing it from the more fundamental process which sets it in motion. This is what we will call—retaining a perhaps questionable term introduced in the writer's book of 1911—the Secondary Wave, which superimposes its effects on those of the Primary Wave.

[1] While, as we have seen, no such rise is, on principle, necessary to call forth innovations and while they are, in the Pure Model, profitable without it, there may and generally will be some which show profit only if rising prices are anticipated. These belong here and not to the igniting mechanism.

There is no need to emphasize how great a mass of fact now enters our picture. Indeed, the phenomena of this secondary wave may be and generally are quantitatively more important than those of the primary wave. Covering as they do a much wider surface, they are also much easier to observe; in fact they are what strikes the eye first, while it may be difficult, especially if the innovations are individually small, to find the torch responsible for the conflagration. This is one reason why the element of innovation has been so much neglected by the traditional analysis of the business cycle: it hides behind, and is sometimes entirely overlaid by, the phenomena of what appears at first glance to be simply a general prosperity, which is conspicuous in many branches and strata and apparently unconnected with any activity that could in any way be called innovating, let alone "inventing." It seems only natural to think that for this general prosperity some equally general—*e.g.*, monetary—explanation should be found and that both it and the reaction to it should be looked upon, as they actually are by many fellow workers, as meaningless and functionless disturbances of economic life and of the march of progress.

The cyclical clusters of errors, excesses of optimism and pessimism and the like are, as we have seen, not necessarily inherent in the primary process—which process would produce ups and downs and, be it particularly remembered, also losses without any errors—although they can be adequately motivated by it. But now they acquire additional importance. Part of the phenomena of the secondary wave consists, in fact, of nothing else. Among the logically nonessential, but practically most important facts we now mean to insert, one, though mentioned above, may deserve a further remark. We will discuss it in terms of Professor Irving Fisher's Debt-Deflation Theory not of cycles—the existence of which he denies—but of Great Depressions.[1] Of all the "starters" of debt "the most common appears to be *new opportunities to invest at a big prospective profit* [Professor Fisher's italics] as compared with ordinary profits and interest, such as through new inventions, new industries, development of new resources, opening of new lands or new markets"

[1] See the paper under that title in *Econometrica* for October 1933 or Booms and Depressions, 1932. Since Professor Fisher recognizes that overindebtedness must have its starters and since, among those starters, he stresses facts that come within our concept of innovation (the Erie Canal, railroads, cotton developments) while others are what we call external factors, there is obviously considerable affinity between that interpretation and the one presented in this book. Moreover, the present writer agrees entirely with some of the "49 articles" by which, in that paper, Professor Fisher formulates his "creed." As to debt-deflation as a *basis* for a theory of booms and depressions, the writer can only repeat what he urged in a conversation he had on the subject with that eminent economist: "If a man dies of consumption, I say he dies of consumption and not of the fever which is one of the concomitants of the process."

(*op. cit.*, p. 348). This is so. But we have seen that if the borrowers are entrepreneurs and everything is as it was assumed to be in our Pure Model, no dire consequences need, autodeflation notwithstanding, follow from this. As far as that goes, we have only to add a qualification about entrepreneurial miscalculations. Whenever loans are used in ways which will decrease costs per unit of product, the same may apply to the borrowing of nonentrepreneurs, even of old firms which borrow in order to carry out adaptations that prove sufficiently successful. Professor Fisher, therefore, rightly emphasizes *over*indebtedness induced, primarily, by easy money. But he does not define overindebtedness. Nor is it easy to do so. The only way which the writer can think of is precisely by reference to "productivity." And the processes of the secondary wave, in fact, supply us with plenty of instances of unproductive loans. Once a prosperity has got under sail, households will borrow for purposes of consumption, in the expectation that actual incomes will permanently be what they are or that they will still increase; business will borrow merely to expand on old lines, on the expectation that this demand will persist or still increase; farms will be bought at prices at which they could pay only if the prices of agricultural products kept their level or increased.[1] In these cases there is no increase in productivity at all, and it is this fact and this fact alone which is responsible for a fall in prices sometimes spelling disaster, even without speculation in the narrower sense of the word, which however never fails to add to the structure of debt. "Evidently debt and deflation go far toward explaining a great mass of phenomena in a very simple logical way" (p. 342).

The reader will see how easy it is to jump from this to misleading conclusions. The only conclusion that really follows is that the credit machine is so designed as to serve the improvement of the productive apparatus and to punish any other use. However, this turn of phrase must not be interpreted to mean that that design cannot be altered. Of course it can and also the existing machine can be made to work in any one of many different ways. Professor Fisher's suggestions about "reflation" by open-market operations, which illustrate very instructively how many questions besides those of the efficacy of the measure proposed and of its ulterior consequences enter into any such recommendation, and how completely they are ignored by so eminent a monetary planner, do not now concern us. But although recommendations are no part of the task

[1] This may be expressed by saying that in prosperity present earnings which are ephemeral and future earnings which are imaginary, are capitalized. Excessive borrowing is facilitated thereby. A subsequent fall in prices then impairs these values and may enforce liquidation even before, and independently of, any default in interest payments. This point has been emphasized by Professor Hytten in his Presidential Address to Section G of the Australian and New Zealand Association for the Advancement of Science, 1937.

of this book, it should be pointed out that distinction between debts according to purpose, however difficult to carry out, is always relevant to diagnosis and may be relevant to preventive policy.

The break in secondary prosperity is similarly induced by the turn of the underlying process. The latter supplies the only adequate explanation of the former, which in fact constitutes the great crux of those theories of the cycle that attempt to deal with it by itself.[1] Again, we will not stay to describe the details of a pattern that is familiar to everyone. Any prosperity, however ideally confined to essential or primary processes, induces a period of liquidation which, besides eliminating firms that have become obsolete beyond the possibility of adaptation, also involves a painful process of readjustment of prices, quantities, and values as the contours of the new equilibrium system emerge. But when we take account of the phenomena which constitute the secondary wave, we realize at once that there is much more to liquidate and to adjust. In the atmosphere of secondary prosperity there will also develop reckless, fraudulent, or otherwise unsuccessful enterprise, which cannot stand the tests administered by recession. The speculative position is likely to contain many untenable elements which the slightest impairment of the values of collateral will bring down. A considerable part of current and investment operations will show loss as soon as prices fall, as they will by virtue of the primary process. Part of the debt structure will crumble.

All this does not necessarily amount to panic or crisis—neither word, let us recall, is a technical term—but it easily induces panics or crises. If they occur, still another situation is created, than would otherwise prevail, and additional adjustments become necessary. But even if they do not, we readily see the two effects which define the Vicious Spiral. On the one hand, any fall in values which enforces liquidation, induces quite mechanically another fall in values. "Prices fall because they have fallen" (Marshall). Measures of defense, efforts made by firms or households to repay loans, or by banks to call them in order to improve liquidity, drive debtors in the well-known way toward the very rocks which those measures were taken to avoid. Freezing of credits, shrinkage of deposits, and all the rest follow in due course. On the other hand, not only we, the observers, but also the dramatis personae realize how much there is to liquidate, or even go into hysterics about it. Then pessimistic expectation may for a time acquire a causal role. But again it is necessary to warn against overrating its importance. The simplest appeal to experience should be sufficient to justify this warning.

[1] That is the case with most theories. Hence the embarrassment voiced by the question: Why should there be a break at all—what is it that puts an end to prosperity? This is but the natural consequence of the fact that what we call the phenomena of the secondary wave is all their authors see.

No great crisis has ever come about that was not fully explainable by the objective facts of the situation. Expectation not so conditioned never has produced more than short-lived spurts or breaks. And this is true not only for general business situations but for any particular market. No corner ever succeeded unless the course of events gave independent support. No amount of optimistic expectation could have kept up the price of copper in the twenties; no amount of pessimistic expectation could have kept it down if sources of supply as important as those which were added, had suddenly been exhausted.

Now that class of facts, whenever it is of sufficient quantitative significance, has an important bearing upon our schema. As long as we took no account of it, we had only two phases—Prosperity and Recession—in every unit of the cyclical process, but now we shall understand that under pressure of the breakdown of the secondary wave and of the bearish anticipation which will be induced by it, our process will generally, although not necessarily, outrun (as a rule, also miss) the neighborhood of equilibrium toward which it was heading and enter upon a new phase, absent in our first approximation, which will be characterized by what we shall refer to as Abnormal Liquidation, that is to say, by a downward revision of values and a shrinkage of operations that reduce them, often quite erratically, below their equilibrium amounts. While in recession a mechanism is at work to draw the system toward equilibrium, new disequilibrium develops now: the system again draws away from a neighborhood of equilibrium as it did during prosperity, but under the influence of a different impulse. For this phase we shall reserve the term Depression. But when depression has run its course (see, however, *infra*, sub 2), the system starts to feel its way back to a new neighborhood of equilibrium. This constitutes our fourth phase. We will call it Recovery or Revival. Expansion up to equilibrium amounts then sets in and yields temporary surplus gains or eliminates the losses incident to operation at the trough amounts. But even apart from imperfections, this new neighborhood[1] will not be the same as that which would have been reached without abnormal liquidation. For, first, abnormal liquidation destroys many things which could and would have survived without it (in particular, it often liquidates and weeds out firms which do not command adequate financial support, however sound their business may be, and it leaves unliquidated concerns which do command such support, although they may never be able to pay their way), and hence produces a pattern more or less different from that which the normal process would have

[1] The state of things in that, or any, neighborhood is not correctly described by saying that there is equilibrium of forces of displacement and forces of restoration. There are, in the ideal point, no forces of either kind: no displacement forces have as yet emerged and the forces of restoration have done their task and spent themselves.

evolved. Second, depression and the return of the system from the depressive excursion take time. They may take several years. During that time data change and what would have been a neighborhood of equilibrium when depression started is no longer one when all is over. We will refer to prosperity and revival as the positive phases of a cycle, to recession and depression as the negative phases.

It is again left to the reader to work out the picture of depression and revival.[1] We confine ourselves to the following comments:

1. We have seen that while recession and—if depression occurs—revival are necessary parts of the cyclical process of economic evolution, depression itself is not. We are able to make it understandable or plausible that from the business situations which necessarily obtain in recession, depression may easily develop, but in all its essential aspects the cyclical process would be logically complete without it. Whether it occurs or not is a question of fact and depends on accidental circumstances, such as the mentality and temper of the business community and the public, the prevalence of get-rich-quick morals, the way—conscientious or otherwise—in which credit is handled in prosperity, the ability of the public to form an opinion about the merits of propositions, the degree to which it is given to belief in phrases about prosperity plateaus and the wonders of monetary management and so on. Moreover, no *theoretical* expectation can be formed about the occurrence and severity of depressions. We may, in any given situation, try to appraise the extent of existing maladjustments, of the presence of fraudulent schemes, "unsound credit," and so on; but beyond such indications it is impossible to go. In a very difficult situation, aggravated, for instance, by serious external events, the business community may keep its nerves, while it may become frightened on much smaller provocation. A scare or panic, in particular, may occur almost anywhere in the course of a cycle, although, of course, it is much more likely to occur at certain junctures than at others. Such a panic may mean very little and yet violently send down values and even certain physical quantities. A lesson follows from this for the analysis of time series:

[1] If the reader really wishes to master the analytical schema presented, to learn how to use it and to reap the benefit, such as it is, which his economic thought may derive from the study of this book, he should on no account omit that exercise. He should first form expectations about the behavior of the dozen or two more important time series. We shall do this later on, when we take up the study of our statistical material, but it is very important that the reader should do it for himself and compare his results to what he will read. He will encounter such familiar phenomena as the decrease in velocity of deposits, which adds itself to their shrinkage. He will wonder how important in all this is the initiative of banks in calling in loans, or in giving support to tottering concerns. He will be able to insert into their proper places in the picture all the phenomena which everyday experience leads us to associate with depression and revival.

We must not trust our graphs implicitly. Both peaks and troughs may easily mislead and it is hardly an exaggeration to say that, as far as information about fundamental processes goes, they are precisely the most unreliable items in an array.[1]

2. Next, what may be termed the Problem of the Recovery Point now emerges in its proper setting. The much-debated questions whether or not the system stops of itself when once it has entered upon a negative phase, and whether it then starts of itself on a positive one, only arise in the case of four-phase cycles. For we know that and why the process of liquidation or absorption which constitutes recession in a two-phase cycle will, barring minor oscillations, die out when it has done its work. We also know that and why, as long as the capitalist mechanism and capitalist motivation are intact, entrepreneurial activity will then resume without any external stimulus. So far, our analysis leads us to agree with those authors who believe in the existence of "recuperative forces," and merely gives more precise meaning to this otherwise not very helpful phrase. But this is no longer so in the case of a four-phase cycle. Depression, as we have seen, has not simply a definite amount of work to do. On the contrary, it has a way of feeding upon itself and of setting into motion a mechanism which, considered in isolation, could in fact run on indefinitely under its own steam. We have indicated above what that "vicious spiral" consists in. Various models have been constructed in order to display it.[2] But proving from the properties of such a mechanism, the elements of which have been taken out of their setting in the economic organism, that the process will go on intensifying itself, does not amount to proving that its real counterpart will actually do so; else, we could equally well argue that, once we have a cough that

[1] To all this, however, there is a qualification the importance of which will become clear later on. What has just been said is true only so long as we keep to the hypothesis, presently to be discarded, that the cyclical process of evolution consists in a succession of units of one single type of wave. As soon as we drop it, a result more hopeful for diagnosis, and perhaps even for prognosis, presents itself. However, the fact still remains that only historical investigation can indicate whether in a given case depression has actually occurred or not.

[2] We will mention one only. Professor Ragnar Frisch in his paper on Circulation Planning, *Econometrica* for July 1934, has analyzed the phenomenon of Incapsulation, as he calls it, on the assumptions that prices remain constant and that people exchange their products at regular intervals in such a way that the dollar volume of everyone's purchases is a constant proportion of the dollar volume of his sales at the previous turn of the wheel. There is under these assumptions no difficulty in arriving at the result that the system will either "inflate" or "deflate" itself without any assignable limit. The model seems well devised to describe certain situations. But it is also a good instance for the argument to be presented above, because it eliminates, much more visibly than others do, all the organs of adaptation from the system, on the presence of which an opposite inference can be based.

irritates our throat and thus induces further coughing, we must go on coughing forever. The problem is to analyze a complex sequence of short-time situations in which the facts described by such theories of the spiral form only one of many components.

We will first distinguish between the course of events in industrial and commercial business, on the one hand, and the course of events in the stock exchange and other speculative markets, on the other hand. The latter is quite likely to conform to the spiral pattern. Traditional doctrine relies on three factors of recovery from a slump. First, bears will cover and thus provide a parachute. So they will from time to time, and this would rally the market if there were no objective reason for relapse. If there is, because distress selling goes on and prospects are black, each bear attack will be followed by a stronger one. Moreover, older doctrine seems in general to have exaggerated the regulative and smoothing effects of speculation, as we shall see later on. Second, "insiders" will quietly buy. This, in fact, is almost always done to some extent but in general not quantitatively sufficient to turn the tide. Third, the average investor's attitude will change because of the increasing inducement to invest which falling quotations seem to offer. This seems to the writer to be most unrealistic. The average investor in such cases thinks that Doom is at hand and the higher the returns the less he buys. The argument entirely overlooks the shift that occurs in the investor's demand curve and assumes that its position is invariant to cyclical phases. It is changing business prospects, that is to say, a fact external to these markets, which pulls them out of depression. However, if the reader should not agree, the following argument will but hold a fortiori.

As for industry and trade, the first step is to show that recovery will necessarily set in if the depressive process stops (in practice it is sufficient that it slackens perceptibly). This is easy. If there is a depression phase, then the trough is, as we have seen, no longer what it was in the two-phase cycle, namely a state of equilibrium.[1] And it will, on reflection, be realized that this proposition is in itself sufficient to prove the point without any resort to optimistic expectations which, however, will soon emerge to help. For saying that firms will not act in the way which will lead to recovery and eventually to a neighborhood of equilibrium, would be synonymous with saying that they will deliberately forego gains and incur losses which it is in their individual power to make or to avoid, and scrap plant and equipment which could be profitably used. It is sometimes objected that cramped lower-level equilibria may arise from which people will not of themselves move. This may be so in individual

[1] It should be sufficiently obvious, but we will repeat that peaks are never states of equilibrium. This is important because much faulty analysis centers in the opposite view. The reasons why that is so really contain the theory of the "prosperity plateau."

cases, particularly in imperfectly competitive situations. But the probability that this state of things should prevail all over the system, in all industries and with all concerns—for that would be necessary to justify the inference—is indistinguishable from zero. Therefore, our problem reduces to the question whether the depressive process does stop of itself short of, theoretically, universal starvation.

To this question, however, there is no general answer. It can indeed be proved that the pressure from the spiral produces reactions in the system which tend to stop it. On the one hand, there will be what we may term diffusion or dilution of effects. The spiral process sets in by a number of unfavorable individual events,[1] such as bankruptcies, breaks in individual markets, shutdowns. These induce similar events, but it is readily seen that each of them taken by itself loses momentum as its effects spread. The failure of a concern may cause the failures of other concerns, but part of its liabilities will be to firms which can stand the loss and which therefore act as buffers. Each addition to unemployment will cause further and further unemployment but, *taken individually*, at a decreasing rate. Individual contractions of output breed contraction all around, but the impact of each of them slackens and stops after having gone a certain way. No doubt we invariably observe a rapid deterioration of the business situation once the system has embarked upon a cumulative downward process. But this deterioration is not simply due to the fact that the spiral feeds upon itself but primarily to the other fact that it is fed from outside, *i.e.*, from breakdowns and contractions which occur independently of it. It will thus be seen that increase in total effects observed is perfectly compatible with the proposition that each individual effect tends to peter out, and that a case for believing that the spiral itself will peter out may be made on these lines.

On the other hand, there is what we may term depression business. This may be instanced by the case of the stoppage of a firm which induces unemployment that in turn causes the failure of a grocer whose customers the unemployed workmen were. This grocer's market is not completely annihilated, however, and if he disappears there will be some space for other grocers to expand into. To put the matter generally, the spiral process is a movement away from equilibrium, as we see from the increasing dispersion in prices and from the increasing deviation from equilib-

[1] In order to understand the mechanism of the spiral, it is necessary to start from events which affect firms, industries, sectors and not from the behavior of aggregates. The problem in hand affords a good example for how the macrodynamic approach may mislead. Price levels, totals of deposits and expenditure, net losses, and so on becoming the variables to be handled, the whole economic system in depression acquires the features of a losing concern whereas it is the essence of the process that the individual elements of those aggregates are differently affected.

rium relations between physical quantities. This spells not only actual and potential losses but also actual and potential gains. Hence it will, however great total net losses may be, not only induce contractions but also expansions, although these may for the time being not show statistically. It has often been held that it is the ensuing cheapness of cost factors, labor, money, raw materials, which eventually breaks the spiral. This formulation does not seem felicitous because it leaves out of account the downward shift of demand curves which might preclude production even if, say, steel and copper were to be had for nothing. But what can be said is that since demand and cost curves do not shift uniformly, opportunities arise for transactions which would not be possible otherwise and which will do something to counteract the ravages of the spiral. It is no doubt true that pessimistic expectations will prevent many transactions from materializing which are profitable on paper. But it is perfectly gratuitous to postulate that this is the general case. As has been said above, whatever the businessman's state of mind, he will take current business that offers itself. This is in fact one of the main differences in the functioning of an industrial and of a speculative market.

But though it may thus be shown that a restorative tendency will develop to work against the spiral, there is nothing to prove that it will prevail against it. As long as we keep our argument perfectly general, we must recognize the possibility of a system so conditioned and of a spiral so violent that that tendency may fight a loosing battle at any given moment and that, theoretically, the system may never conquer the breathing space in which it could recover of itself. This seems in fact to be the element of truth in the popular opinion that there must be help from outside of the business organism, from government action or some favorable chance event for instance, if there is to be recovery at all or, at any rate, recovery without a preceding period of complete disorganization and of indefinite length.

This result calls for a few additional remarks.

First, the above analysis does not make spirals identical with depressions. We might make them identical with what we shall sometimes call Deep Depressions. But the depression phases in our sense generally outlast any spiral processes which may occur in their course and are particularly likely to occur at their beginning. In general revival is from a trough in which the situation is no longer dominated by a cumulative downward process. Nevertheless the problem of the spiral is relevant to the problem of the recovery point because, as we have seen, revival will ensue when the depressive process stops and because the presence of a spiral affords the only reason for doubting that it does stop of itself.

Second, it should be noticed that the inconclusiveness of our result is due to our wish to face squarely a problem of general theory. A much

stronger case for believing that, in the absence of exceptionally unfavorable external factors, the system will recover "of itself" under almost any practically conceivable circumstances, can of course be made by relying on restrictive assumptions amply verified by common sense and historical fact. One of these has frequently been expressed by means of the observation that total income fluctuates less than total output, the item wages plus salaries less than total income, expenditure on consumers' goods less than wages plus salaries. This is broadly correct and partly accounted for by our theory of dilution of effects. But partly it also rests on the presence of incomes which are insensitive to depression and of social strata little affected by it, *i.e.*, on facts which are no part of the logic of the capitalist engine. It still remains true that the question whether or not a given recovery was "natural" must in every historical instance be answered anew in the face of all the difficulties which would beset such an investigation in any case, even if the parties to the discussion were not a priori resolved, the one to arrive always at an affirmative, the other to arrive always at a negative answer.

Third, it has been repeatedly emphasized that depression, unlike recession, is a pathological process to which no organic functions can be attributed. This proposition is indeed not quite true. In our schematic exposition, each phase is credited with what we conceive to be its most characteristic features and this never does justice to real life. On the one hand, much that could live according to the criterion afforded by the theory of equilibrium, may perish in an otherwise normal recession. On the other hand, much that according to the same criterion cannot live (and many maladjustments and rigidities) will not be eliminated by recession. Hence much work of reorganization and adaptation is also done in depression. But substantially our proposition holds. It follows that proof, even if it were more satisfactory than it is, that depressions will find a "natural" end, does not in itself constitute an argument for letting things take their course or trusting to "the restorative forces of nature." The case for government action in depression, especially of government action of certain types, remains, independently of humanitarian considerations, incomparably stronger than it is in recession, whatever we may think of that proof.

Fourth, the formal analogy of the theory of the lower, with the theory of the upper turning point should be borne in mind.

3. It follows that division of the units of the cyclical process of evolution into two or four phases is not a matter of descriptive convenience.[1]

[1] This is no peculiarity of our exposition. For practically all students, the two, three, four or five phases which are most frequently distinguished, mean different processes and different sets of characteristics, and the distinction embodies a good part of the results of their analysis. It is therefore not quite correct to speak of arbitrariness in the matter.

Each phase is a distinct composite phenomenon, not only distinguishable by a characteristic set of features, but also explainable in terms of the different "forces" which dominate it and produce those features. As we know, these "forces" consist in such concretely observable phenomena as innovation (entrepreneurs' expenditure), response of the system to the impact of the products of new plant (and autodeflation), the impetus of abnormal liquidation (and of depressive anticipation arising out of it) meeting with increasing resistance, response of the system to minus deviations from equilibrium (return to what now are normal quantities and values). The second and fourth phases, recession and revival, differ in the nature of the deviations they liquidate or absorb and in the signs of the latter. They are alike in the nature of the mechanism at work which in both cases consists of equilibrium relations between the elements of the economic system asserting themselves. The first and third phases, prosperity and depression, differ in the nature of the impulse that propels the system and of the deviations which develop. They are alike in that in each case the system draws away from equilibrium and into disequilibrium. In a two-phase cyclical movement a line through normals would form (erratic movements excepted) a boundary of all the items plotted on a chart, no points of our material lying above or none below it (according to the series plotted—price series would run above, unemployment series below the boundary line). The line or curve through normals in a four-phase cyclical movement, on the other hand, must cut through the graphs of series.

Since every cycle is a historical individual and not merely an arbitrary unit created by the observer, we are not at liberty to count cycles from any phase we please. The phenomenon becomes understandable only if we start with the neighborhood of equilibrium preceding prosperity and end up with the neighborhood of equilibrium following revival. The count from trough to trough or from peak to peak is, therefore, not only open to the objection already mentioned—that both troughs and peaks may prove very unreliable beacons—but it is never theoretically correct. It may be convenient at times, but it is likely to induce faulty analysis in several ways, one of which is of particular importance for us.

Revival is the last and not the first phase of a cycle. If we count from troughs we cut off this phase from the cycle to which it belongs and add it on to a cycle to which it does not belong. Counting in this way, we lose the fundamental distinction between revival and prosperity.

Opinion among all students who enter into statistical material at all thoroughly, displays a satisfactory tendency toward agreement. The schemata in particular of Spiethoff, the Berlin Institute, and the Harvard Committee display an obvious family likeness in spite of differences in detail. They *all* have four phases, for Spiethoff's fifth is the "crisis" which, as we have seen, has no title to be considered as a phase.

Although most authors recognize at least a distinction of degree and some also one of kind, they do not recognize the difference in the propelling factor. They see indices move up from the trough and eventually on to prosperity levels (which are mostly only quantitatively defined), and they conclude naturally enough that the same factors account for the whole rise. Hence, they search the processes of *revival* for "causes" of the entire rise and find nothing more than gradual elimination of the abnormalities then existing—low stocks, unused plant, unemployed labor, idle credit facilities—and in particular, they find nothing that looks like innovation. Therefore, they arrive at the result that innovation has nothing to do with initiating *prosperity*, even if they glance at this possibility, which most of them do not. Such analysis easily misses the pivotal point and drifts into *perpetuum-mobile* explanations, particularly of the monetary sort.[1]

4. Along with the phenomena of the secondary wave, we will introduce a few other facts, to complete our Second Approximation.

First, we must drop the assumption, made for convenience of exposition, that our wave is the first of its kind and that it not only starts from a neighborhood of equilibrium—through all qualifications we must hold on to this—but that it is entirely unaffected by the results of previous evolution. That is, we must take account of the fact that each neighborhood contains undigested elements of previous prosperities and depressions, innovations not yet completely worked out, results of faulty or otherwise imperfect adaptations, and so on. There is nothing in this to invalidate our model. On the contrary, these facts are but a consequence of the process described by it. But they greatly increase the difficulties of analysis and complicate the patterns of the business situations we have to deal with.

[1] We have here an instance both of the necessity of using the concept of equilibrium and of the consequences of a refusal to do so. What some of the authors in question do provide is a theory of the recovery point and of what follows next. What they fail to see is the need of a distinct theory of prosperity. But here we should notice a question which the writer has often been asked. If we admit the possibility that, under the influence of depressive factors "crystallizing" and gathering momentum, the system outruns a neighborhood of equilibrium on its downward path, why should it be less likely that the upward tendency in the recovery phase also crystallize and gather momentum so that the neighborhood be similarly outrun on the upward path? We believe this to be less likely, owing to the absence of a phenomenon similar to the breakdown of the secondary wave. No corresponding impulse toward optimistic excess exists in recovery. But even if that were not so and speculation developed merely on the strength of favorable rates of change so as to lift the system above equilibrium, relapse to it (perhaps somewhat below it with reaction to follow) would, in the absence of stimulus from innovation (or, of course, external factors), quickly follow. In other words, return to equilibrium may indeed be attended by fluctuations around equilibrium but they will soon subside. That type of fluctuation we shall discuss later on.

One point calls for special notice. Producers, becoming familiar with the recurrent shifts of demand in the course of the cyclical phases, learn to provide—a course which may and often is quite rational from the standpoint of maximization of profits, as well as from a wider one—for the peak demand of prosperity. Industries more subject than others to such fluctuations (for example, industries producing industrial equipment or materials for it), which we shall call Cyclical Industries, are particularly likely to do this. They will set up productive capacity which is intended to be fully used[1] only in times of prosperity. This tendency, which, it should be observed, practically always presupposes imperfect competition, will be strengthened by the fact that even replacement demand is strongly cyclical, sometimes quite irrationally so. Railroads, for instance, could be expected to know that depressions do not last forever, yet they often order new rails or new rolling stock late in revival or even in prosperity. A number of obviously important consequences follow. Output will much more readily expand in prosperity than we should expect from the Pure Model and costs and prices will rise less than they otherwise would. Also, a peculiar kind of unemployment, akin to seasonal unemployment, may ensue; for in many cases the men who are dismissed when prosperity demand ceases will be neither able nor willing to get other employment during what they know is but a temporary interruption, to which they are accustomed, but will simply "hang around." This is an important point to remember in any short-time theory of unemployment.

Second, we must insert growth. Saving, in particular, we cannot longer disregard, because sources and motives are supplied by our process strong enough to make it quantitatively significant. In fact, it would be possible, once the cyclical process is started, to construct a model the financial wheels of which would entirely consist of saving, and which would function differently. This we shall not do, since even a small amount of credit creation suffices to produce the phenomena we have been describing. But we must insert it in what we conceive to be its actual role. It will be convenient to defer this until we come to the discussion of the behavior of monetary time series. For the moment, it is enough to invite the reader to bear this element in mind and to form his own opinion of how the financing of innovation by saving, instead of by credit creation, will affect the contours of our waves, particularly in price levels.

[1] That case must be distinguished from building capacity "ahead of demand." But inasmuch as doing this rests on an expectation which, in turn, rests on familiarity with the results of evolution (much more so than of growth), this case should also be mentioned here. This is another reason why so many industries are, even in prosperity, to the "left of the optimum point."

On the other hand, third, we must recall that credit creation spreads from its "logical" source, financing of innovation, throughout the system. It intrudes by way of credit's being created for any kind of expansion that cannot be financed by existing funds and by way of entrepreneurs' not repaying what they borrow within the cycle and very often never repaying all of it or reborrowing regularly part of their working capital. On the surface, therefore, credit creation tends to lose its relation to innovation and, as pointed out before, becomes an instrument for financing business in general, and its amount will display variations not explainable by the Pure Model. For example, it may increase in recovery, when ordinary business resumes its proportions. It will also decrease less than the first approximation indicates—or not at all—in recession, because outlay for the purpose of adaptation of old firms and the expansion of some of them into the new economic space created by recent innovation will be financed by bank credit (Chap. XI).

Fourth, the effect of innovation in opening up new investment opportunities to industries which have not themselves reformed their method of production cannot be sufficiently emphasized. It is not confined to industries subsidiary to the innovating one. Nor is it confined simply to the opening up of possibilities best instanced by the building of American transcontinental railroads. New economic space is created also by the mere fact that additional production may call forth other production to pay for it: if there are in the closed domain only two industries producing equilibrium amounts, and if one of them introduces an innovation enabling it, for example, to produce a greater number of units with the same quantity of resources, the other industry may expand its production in response. That is what happens extensively in recession and then again in revival, depression—if sufficiently "panicky"—frequently, though not necessarily, interrupting the process.[1]

From these cases it is necessary to distinguish another which may produce similar results. Some industries are so sensitive to the rate of interest as to shape their course primarily with reference to it. In prewar Germany, for instance, apartment-house building—significantly enough, *not* factory building—could have been represented with satisfactory approximation as a function of the mortgage rate alone. And something of the kind is suggested by the fact that residential building in the United

[1] The Robertsonian concept of effort-elasticity may be useful in elucidating one aspect of the above argument, which should, however, be read with due regard to the functioning of the monetary mechanism. In any case, we meet again a reason to doubt the validity of the picture of recession, as usually drawn, which seems to overemphasize the cares and troubles of individual firms and households and the importance of the tears of speculators at the expense of the fact that the system then becomes richer than it was, in actual means of satisfying wants as well as in possibilities.

States precedes the Harvard barometer's curve *B* by a few months—which makes it in the short run roughly inverse to the money curve *C*. This is somewhat more significant than it looks because, apart from the influence of interest, we should, if anything, expect a lag. It would not, however, be safe to trust this relation too much.

Fifth, recalling what was said in Chap. II, sec. F, and Chap. III, sec. C, we will, for completeness' sake, repeat not only that the entrepreneurial impulse impinges upon an imperfectly competitive world but also that entrepreneurs and their satellites almost always find themselves in imperfectly competitive short-time situations even in an otherwise perfectly competitive world. In fact, evolution in our sense is the most powerful influence in creating such imperfections all round. Hence we now drop the assumption of perfect competition altogether, as well as the assumption, made at the threshold of this chapter, that there is perfect equilibrium at the start. We can assume, instead, that both competition and equilibrium are, independently of the effects of our process, imperfect from the start, or even that the system is inactive in the sense defined in the second chapter. We know what consequences this will entail: propositions and proofs will be less stringent, zones of indeterminateness will emerge, sequences of events will be less prompt, and buffers will be inserted between the parts of our mechanism so that its gears will be slower to mesh. There will be more room for individual strategy, moves and countermoves which may impede, although they may also facilitate, the system's struggle toward equilibrium. This will certainly produce many freakish patterns and the economist's engine for the production of paradoxa will be worked up to, and perhaps beyond, capacity. But this is all. An important point to bear in mind is the possibility, or even likelihood, of situations in which industries may, even in equilibrium, move within intervals of decreasing average costs.[1] In fact, theoretical expectation is, in all phases save prosperity, for this rather than for the opposite alternative, and it may well apply also to the beginning of the prosperity phase.

Since it has, with many economists, become a fashion to make the presence of unemployed resources—labor, in particular—a datum of the problem of cycles, to base their theories on it and to object to other theories on the ground that they neglect it and fail precisely because they neglect

[1] It should be clearly understood what this means and what it does not mean. We do not now retract our doubts about the U shape of the average cost curve, for these doubts referred to a long-run state of things independent of cyclical situations. And while we do mean that being "to the left of the point of optimum output" makes it easier to expand output at short notice, we do not mean to countenance the error that because overhead can be spread over a larger number of units of product, output will be increased in cases in which, without this, increase would not be rational. This, of course, is not true for overhead already in existence.

it, we will state once more where we stand concerning this matter. Imperfections of both competition and equilibrium, as well as external disturbances, may account for the presence of unemployed resources independently of the cyclical process of evolution. We have not introduced this fact into our pure model in order to relieve the latter of unessential and secondary elements; but it can now be inserted without difficulty and be taken account of in any given case which presents them. Besides, since our process itself produces both imperfections of competition and disequilibria which account for underemployment that may outlast the cyclical unit which produced it, we include, by recognizing that every cycle is heir to preceding cycles, also what this source may contribute to the total unemployment with which any given unit starts. This would have been circular reasoning in the Pure Model, but it meets with no objection now. It must be borne in mind, however, that as far as any part of total underemployment is due to imperfection of competition, *full employment ceases to be a property of equilibrium states and instead indicates—paradoxical though this may sound—disequilibrium of a certain type.* This is important because it supplies the answer to the argument of those economists who look for equilibrium in the cyclical peaks. In any case, it should be abundantly clear that the presence of unemployment at the beginning of prosperity (not only at the beginning of the upgrade, which presumably is what most of those economists think of) need not, for those who wish to stress it, be an obstacle to accepting our analysis. Difference of opinion, however, amounting in important cases to difference of diagnosis, arises only if it be held that unemployment of resources is (barring rigidities) compatible with perfect equilibrium in a perfectly competitive situation.

D. Many Simultaneous Cycles; Third Approximation.—So far we have implied that, barring the effects of external disturbance, there is in our material a single sequence of cycles, each of which is of the same type as all its predecessors and successors. Every individual cycle has been thought of as crippled or drawn out in duration, accentuated or reduced in amplitude by its historic setting (wars, crops, and so on), and as internally irregular besides; nevertheless, each was on a par with the others. But there is nothing in our theoretical schema to warrant this. There is no reason why the cyclical process of evolution should give rise to just one wavelike movement. On the contrary, there are many reasons to expect that it will set into motion an indefinite number of wavelike fluctuations which will roll on simultaneously and interfere with one another in the process. Nor does the impression we derive from any graph of economic time series lend support to a single-cycle hypothesis. On the contrary, the reader need only inspect any of the charts in this book in order to satisfy himself that it is much more natural to assume

the presence of many fluctuations, of different span and intensity, which seem to be superimposed on each other. In accepting that inference from theory and in recognizing this fact, we fall in with the general tendency in the study of business cycles.

Spectacular booms and spectacular breakdowns were what first attracted the attention of both economists and businessmen. The problem thus presented itself at the outset as the problem of "crises." These were primarily looked upon as individual catastrophes, interrupting an even flow or an expansion that did not by its own mechanism produce them. They were pathological incidents in a physiological process. Even with authors who saw more in them than isolated effects of excesses, misconduct, or misfortune, and who, recognizing their recurrence and family likeness, tried to describe them in terms general enough to apply to some or all of them, and to distinguish them from breakdowns of another type such as might be brought about by war, pestilence, famine, and so on, it was always "the crisis" as such, which constituted the phenomenon to be accounted for. Authors differed widely in their explanations. Most of the arguments which even today we are in the habit of listing as "theories of the cycle" were developed then, *i.e.*, in the last quarter of the eighteenth century and in, roughly, the first half of the nineteenth century—particularly, all the monetary theories and the various theories of overproduction, underconsumption, and so on. Some were valuable contributions to the analysis that was to develop, others as valueless as, although not worse than, many explanations that are offered today. But none of those authors felt any difficulty in telling when crises had actually occurred. The lists they drew up do indeed differ (for a careful consideration of these differences the reader should consult Professor Mitchell's work), but considering the imperfections of the material with which older authors had to work, such differences do not mean a great deal and particularly do not indicate any considerable difference of opinion as to what constitutes a crisis. Discussion of the facts of every case would probably have evolved a list on which a large majority of students would have agreed.[1] The great advance beyond this view of the subject came about as the result of the efforts of many authors, but is primarily associated with the name of Clément Juglar,[2] who was the first to have a clear

[1] The significant fact to stress seems to be the extent rather than the smallness of the ground which was common to all or most of the investigators. In support of this, a popular book may be quoted which is but an extract from the descriptive literature of the time and has no merit beyond having collected in a sensible way the most accessible facts about the crises of the nineteenth century: H. M. Hyndman, Commercial Crises in the Nineteenth Century, 1st ed., 1892. It lists 1815, 1825, 1836–1839, 1847, 1857, 1866, 1873, 1882, 1890 (for "Europe," but actually for the United States and Western and Central Europe). Few authors, in 1892, would have found much fault with this.

[2] The title of his book, nevertheless, reads: Des crises commerciales et leur retour

perception of how theory, statistics, and history ought to cooperate in our field. His great merit is that he pushed the crisis into the background and that he discovered below it another, much more fundamental, phenomenon, the mechanism of alternating prosperities and liquidations, the latter of which, as pointed out in another place, he interpreted to be a reaction of the economic system to the events of the former. Henceforth, although it took decades for this new view to prevail, the *wave* ousted the *crisis* from the role of protagonist of the play. But it was the exploration and interpretation of *the* wave to which students bent their energy then. For Juglar and his followers took it for granted that what they had discovered was a single wavelike movement and were not conscious of the fact that by assuming this they were really introducing a new, bold, and very unrealistic hypothesis.

But this hypothesis worked fairly well at first. Juglar's findings from his banking figures, interest rates, and prices, supported as they were by marriage rates and other evidence, fitted in satisfactorily enough with the dates of the big crises which had been recognized before him. Difficulties arose, indeed, with increasing accuracy of observation, and the workers in the field, deprived of the guidance of the spectacular symptoms of crises, and faced with a much gentler sweep, began to waver about duration and phases. But they still kept to the hypothesis of a single wave, although one would think that recognition of the presence of several waves would have been the natural remedy for part of the irregularities which now crowded upon them. This attitude of mind, asserting itself in a reluctance to drop a familiar instrument of analysis and in a disposition to deny the reality or existence of other wavelike movements which began to be offered for consideration, is highly interesting and could be paralleled by many instances from other sciences. It is by no means extinct even now. Presumably, it would be more correct to say that the majority of students has not yet succeeded in leaving those moorings. For others, however, the problem has again changed its complexion. It is no longer the problem of *the* wave. It is the problem of identifying and, if possible, isolating the many waves and of studying their interference one with each another. The present writer who, when starting work on the business cycle nearly 30 years ago, also accepted

---

périodique en France, en Angleterre, et aux États-Unis. 1st ed., 1860, 2d ed., 1889. His first findings, about cyclical variations in the marriage-, death- and birthrates in France, appeared in the *Journal des Économistes*, October–December, 1851, and January–June, 1852; his first study of the series of discounts of the Bank of France, in the *Annuaire de l'économie politique*, 1856, a fuller account in the *Journal des Économistes*, April–May, 1857, and a study of English figures in the same year and periodical. The reader should compare with what he reads above the appraisals by Mitchell, p. 452 *et passim*, and Spiethoff, *op. cit.*, p. 61.

the single-cycle hypothesis as a matter of course, considers that development to be a very important progress, but it is one of those progresses which at first create as many difficulties as they solve. And he would not be surprised if in the future economists would imitate astronomers in thinking it a matter of self-respect to have private periodicities of their own.

We will notice only those contributions to this line of advance which are directly relevant to our own work. They refer to a wavelike movement very much longer and to another wavelike movement very much shorter than the one described by Juglar.[1] Summing up earlier work of his, Professor A. Spiethoff showed in his monograph on cycles (Krisen in Handwörterbuch der Staatswissenschaften, 4th ed., 1923) that there are epochs in which prosperities, and other epochs in which depressions, are relatively more marked, and these epochs he considered as bigger units without, however, combining them into cycles containing an upgrade and a downgrade and also without going beyond a statement to the effect that they were probably due to other causes than what he was prepared to call *cycles*. Applying his criterion of iron consumption he found that for England the period from 1822 to 1842 constitutes such a span of (prevalence of) depression (*Stockungsspanne*) and that for Germany the years 1843 to 1873 and 1895 to 1913 make up spans of (prevalence of) prosperity (*Aufschwungsspanne*), while from 1874 to 1894 we have a span of depression. It was N. D. Kondratieff, however, who brought the phenomenon fully before the scientific community and who systematically analyzed all the material available to him on the assumption of the presence of a Long Wave, characteristic of the capitalist process.[2] He dates the first long wave covered by his material from the end of the eighties or the beginning of the nineties of the eighteenth century to 1844–1851; the second, from 1844–1851 to 1890–1896; and the third, from 1890–1896 onward.[3] Other students also presented evidence of the presence of movements of average period longer than that usually attributed to the

[1] For further references see Professor Mitchell's work, particularly pp. 227, 385.

[2] See his article presenting the results of earlier work Die langen Wellen der Konjunktur, *Archiv fur Sozialwissenschaft* for December 1926, translated into English by Mr. W. Stolper in an abridged form under the title: The Long Waves of Economic Life, *Review of Economic Statistics* for November 1935.

[3] Professor Mitchell (*op. cit.*, pp. 226 and 468) recognizes the "existence" (on the meaning of this, some remarks will presently be made) of such long movements, but calls them "merely empirical." If the present writer understands correctly, this qualification should be removed by what follows in our text, since reasons will be presented for believing that those movements are associated (to say the least) with definite historical processes in industry which are of the same nature and produce the same symptoms as those which are responsible for and produce the symptoms of cycles which are universally recognized as such.

Juglar cycle. We will mention Professor S. S. Kuznets (Secular Movements in Production and Prices, 1930) and Dr. C. A. R. Wardwell (An Investigation of Economic Data for Major Cycles, 1927), who found average periods of roughly 25 and 15 years, respectively.

In 1923 Professor W. L. Crum published the result of a periodogram analysis of monthly commercial paper rates in New York from 1866 to 1922, clearly showing the presence of a period of roughly 40 months in the series analyzed. This is the most successful application so far made of the periodogram analysis to economic data; but the importance of the contribution consists in the fact that it established, at least for one series and without any further comment, the existence of a cycle which can be observed in practically all time series and is really the most visible and most regular of all. Simultaneously, Mr. Joseph Kitchin, by a less rigorous but more pliable method, showed that cycle also in bank clearings and wholesale prices, as well as in interest rates, for both Great Britain and the United States, during the period 1890 to 1922, moreover contrasted it with the Juglar cycle and a longer swing which can be roughly identified with Spiethoff's spans and which he linked up with gold production.[1] "The 40-month-cycle," although at first none too favorably received, has since acquired citizenship which, as we shall see, cannot reasonably be questioned. Professor Mitchell's authority may, it seems, be appealed to for qualified support (*op. cit*, pp. 339 and 385), based upon analysis of five American systematic series (among them, two of clearings and one of deposits) for 1878–1923, which gives a mean duration (of cycles in general) of 42.05 months with a standard deviation of 12.37 months, while the median is 40 months. The high value of the standard deviation must not astonish us. Nothing more regular can be expected in material such as ours is. None of the variants of the periodogram method[2] will give unqualified satisfaction.

[1] Both studies were published in the *Review of Economic Statistics* for January 1923, preliminary vol. V, pp. 17 *et seq.* and p. 10 *et seq.* In fairness to Professor Crum it must be stated at once that he does not share the present writer's optimistic view about the importance of his findings. "The actual fit of the theoretical periodic curves to our data is not good, and we cannot be sure whether the lack of fit is due merely to chance irregular deviations or to a real modification of the period itself. In the absence of conclusive proof to the contrary, we believe that the economic period should not be assumed constant · · · the periodogram can assist in finding the average length, first if it is fairly typical · · · and, second, if the form of the cycle does not undergo great change" (p. 24). But less than that would, as the reader will see, be enough for us. A very interesting recent study should also be mentioned: C. E. Armstrong, The Short-term Business Cycle, *Review of Economic Statistics* for May 1936. Material: Axe-Houghton business index; method: "periodograph," a chained-average-difference process, in some respects more useful than the periodogram method; result: a sinusoid of 41 months' period.

[2] Both because the periodogram analysis—and results of it—will occasionally be mentioned in our argument and because it is gaining ground in economics, this opportunity may

Assertion or denial of the coexistence of several cyclical movements may, of course, mean many different things, and discussion stands to gain from a clear distinction among them in each case. An author who submits findings about what he holds to be a distinct cyclical movement, may simply claim to have established a statistical fact. He may, however, claim expressly or by implication either less or more. On the one hand, he may merely hold that assuming the existence of several cycles will prove to be a useful descriptive device. On the other hand, he may hold that his cycles correspond, each of them, to different economic processes and link up with different causes. There is such a variety of possible standpoints between and around these two, that there is hardly any sense in straight assertion or straight denial of anybody's cycles. We return to our argument, in order to make our own standpoint as clear as possible.

First, if innovations are at the root of cyclical fluctuations, these cannot be expected to form a single wavelike movement, because the periods of gestation and of absorption of effects by the economic system

---

be used for references and comments. H. L. Moore may be cited as a pioneer—in a sense as the patron saint—and Sir W. Beveridge (Wheat Prices and Rainfall in Western Europe, *Journal of the Royal Statistical Society*, 1922) as the sponsor of what was the first type of application. Professor Crum gives a little bibliography in the paper quoted and an introduction to the fundamental form of periodograms in his contribution to Rietz's Handbook. Introductory information and discussion of principles can also be found in a paper by Mr. B. Greenstein, to be quoted in a later footnote in this chapter, but especially in a periodogram analysis of Colonel Ayres' monthly index of American Business Activity from 1790 to the present time, expressly undertaken in order to throw light on the methodological issues involved, by which Professor E. B. Wilson has placed economists under heavy obligation (The Periodogram of American Business Activity, *Quarterly Journal of Economics* for May 1934). The result of the experiment was, according to formal tests (such as the Chi square test), negative and presents many discouraging features—for instance, considerable differences between the shapes of the periodograms for various subperiods and between each of them and the periodogram for the entire period. But Sir Arthur Schuster developed this method of finding hidden periodicities and of determining whether the results could be due to chance, for meteorological purposes, *i.e.*, for phenomena which more than ours conform to the urn schema, especially as to independence of observations. Irregularities and interferences between components need not be very great to upset everything and to raise questions of interpretation which throw the findings themselves entirely into the background. It might, therefore, be asked why the writer, thinking thus and, moreover, entirely unwilling to abide by the results the analysis gives, nevertheless attaches importance to periodograms. The answer is simply that they render service in exploring the material, even if results are negative or untrustworthy: some of our problems might be stated in terms of the periodograms we get. This importance is, however, primarily accorded to natural series or to series which, though the product of a statistical process, mean a definite thing—the commercial paper rate up to the war is an instance of the first, and the price level is an instance of the latter. A composite of the kind of Colonel Ayres' index contains too many elements, the movements of which will interfere with each other, to be quite convincing. The danger of spurious components is also enhanced thereby. A few other remarks will follow in the next chapter.

will not, in general, be equal for all the innovations that are undertaken at any time. There will be innovations of relatively long span, and along with them others will be undertaken which run their course, on the back of the wave created by the former, in shorter periods. This at once suggests both multiplicity of fluctuations and the kind of interference between them which we are to expect. When a wave of long span is in its prosperity phase, it will be easier for smaller waves—which, as a rule, will correspond to less important innovations—to rise, and as long as the "underlying" prosperity lasts there will be a cushion ready for them while, say, in the depression phase of the underlying wave it may be impossible for them to rise visibly at all, although they might still assert themselves by softening that depression through their prosperities and intensifying it through their depressions. The impression some of us have that seasonal fluctuations are particularly strong in times of prolonged depression may be due to that. Variations in expenditure within each class of cycle will accentuate or compensate the effects of variations in expenditure occurring in the course of all other contemporaneous cycles, and no variation will be what it would be in the absence of the others. These cycles will displace each other's peaks and troughs and between them produce contour lines that are completely ununderstandable without due recognition of the phases of the others into which the phase of any given cycle happens to fall. Behavior of time series that seems to disavow expectation can often be explained in this way.

Second, a statistical and historical picture of a movement displaying more than one cycle may result from the fact that successive cyclical units are not so independent of each other as we assumed, conveniently but unnecessarily, in constructing our model. When some innovation has been successfully carried into effect, the next wave is much more likely to start in the same or a neighboring field than anywhere else. Major innovations hardly ever emerge in their final form or cover in one throw the whole field that will ultimately be their own. The railroadization, the electrification, the motorization of the world are instances. One railroad or a few lines may be all, and more than all, that can be successfully built in a given environment at a given time. Reaction and absorption may have to follow before a new wave of railroad construction becomes possible. The motorcar would never have acquired its present importance and become so potent a reformer of life if it had remained what it was thirty years ago and if it had failed to shape the environmental conditions—roads, among them—for its own further development. In such cases, innovation is carried out in steps each of which constitutes a cycle. But these cycles may display a family likeness and a relation to one another which is easy to understand and which tends to weld them into a higher unit that will stand out as a historical individual. The case is entirely

different from the previous one. There we had a multiplicity of cycles each of which was an independent entity. Here we have a sequence of cycles of one type only, and the cycle of higher order is but a product or composite of these and has no existence of its own.

Third, a sequence of cycles, whether independent of one another or not, may be the result of processes which have also effects other than those which show in the cycles themselves. Railroadization may again serve as example. Expenditure on, and the opening of, a new line has some immediate effects on business in general, on competing means of transport, and on the relative position of centers of production. It requires more time to bring into use the opportunities of production newly created by the railroad and to annihilate others. And it takes still longer for population to shift, new cities to develop, other cities to decay, and, generally, the new face of the country to take shape that is adapted to the environment as altered by the railroadization. Another example is the process known as the Industrial Revolution. It consisted of a cluster of cycles of various span that were superimposed on each other. But these together wrought a fundamental change in the economic and social structure of society which in itself also had some obviously cyclical characteristics. It came about in phases in which prices, interest rates, employment, incomes, credit, and output behaved much as they did in the fluctuations universally recognized as cycles. And we should be losing an obvious opportunity of pushing our analysis deeper into the material of economic history if we refused to take account of this. Again, this kind of cycle, if cycle we call it, or rather this aspect of what it has become usual to call the Long Wave, is completely different from either the first or the second case. It differs from the latter in that it is a real phenomenon and not merely the statistical effect of a sequence of real phenomena having more in common with one another than with similar phenomena outside the sequence. It differs from the former in that it cannot be linked to a particular type of innovations as against other types carried out during the same epoch, but is the result of all industrial and commercial processes of that epoch.

We accept all those facts and we conclude, as stated in the first paragraph of this section, that there is a theoretically indefinite number of fluctuations present in our material at any time, the word *present* meaning that there are real factors at work to produce them and *not merely that the material may be decomposed into them by formal methods*, a distinction which will become clearer in the next chapter. Their duration (period) varies greatly—for we know that some of them are associated with effects of processes which run their course in a year or two, others with effects which are secular by nature—but might in a limiting case vary continuously. As a matter of fact, we shall not expect this, but rather that periods

will display finite differences clustering around certain averages. Some of these periods will be so close together as to be undistinguishable, or undiscoverable by formal methods such as the periodogram analysis, which then may show other than the true periods, *e.g.*, an intermediate one. Others will be so wide apart as to satisfy one of the requirements of the periodogram analysis almost ideally.

Nothing in this implies a hypothesis. All it has to do with hypotheses is that it implies the refusal to accept one, *viz.*, the single-cycle hypothesis. Nor are we going to make another hypothesis to take the place of the latter. But we are going to make a *decision*. For our purpose, as for many others, it would be highly inconvenient to leave matters at the above result and to attempt to work with an indefinite number of cycles or classes of cycles. Nor is there any necessity of doing so. It stands to reason that as we draw away from the single-cycle hypothesis we shall reap the bulk of the harvest to be hoped for at the first steps and that then these returns will be rapidly decreasing. Hence, we decide now to content ourselves, for the rough purposes of this volume, with three classes of cycles, to which we shall refer simply as Kondratieffs, Juglars and Kitchins, because the average spans by which we choose to identify the individuals belonging to each of our three classes approximately correspond to the spans of the cycles "discovered" by those three investigators,[1] respectively. Since this arrangement plays a considerable role in the exposition that is to follow and since any misunderstandings about it might easily impair the contribution to the study of business cycles, such as it is, which this book may be hoped to make, it is desirable to stay in order to comment upon it.

1. By saying that in adopting a three-cycle schema we are not making any hypothesis which is to replace the single-cycle hypothesis, but only a decision, we have waived any claims for that schema beyond those we are about to state. There are no particular virtues in the choice made of just three classes of cycles. Five would perhaps be better, although, after some experimenting, the writer came to the conclusion that the improvement in the picture would not warrant the increase in cumbersomeness. In particular, it cannot be emphasized too strongly that the three-cycle schema does not follow from our model—although multiplicity of cycles does—and that approval of it or objection to it does not add to or detract

[1] Since the present writer's decision to make the "40-month cycle" (which, of course, is not exactly or even modally just 40 months) an element of his schema, rests on considerations which Professor Crum's paper was primarily instrumental in crystallizing, he felt inclined to label the short cycles Crums instead of Kitchins. But Professor Crum's scholarly conscience is so averse to countenancing anything that may look like rash generalization (although our arrangement, as we mean it, does not really imply this) that the writer deemed it more correct to refrain, the more so because Mr. Kitchin actually intended to present evidence for an all-pervading movement, a true general cycle of that type.

from the value or otherwise of our fundamental idea, which would work equally well or ill with many other schemata of this kind. If we discuss the behavior of time series in terms of Kondratieffs, Juglars, and Kitchins, this will be done simply because the writer has found it useful in his own work and in marshaling his facts. So far, then, the three-cycle schema may be looked upon as a convenient descriptive device, and readers who so wish need never look upon it in any other light. As far as this goes, it follows that we are estopped from calling the single-cycle schema wrong: the only reproach we can cast upon it is that it is inconvenient.

2. But one motive of the decision made was to have as many classes or orders of cycles as are necessary in order to assure us that all of the three reasons for the multiplicity of cycles have the opportunity of coming into play, and not more.[1] Another was to have the families of long, medium, and short cycles represented. And, finally, it was thought reasonable to require that each of the cycles to be chosen should have definite historical and statistical meaning. This requirement accounts for the fact that our cycles are precisely those "discovered" by the authors by the name of whom we designate them, for whatever exception may be taken to their material and methods and however much room there may be for difference of opinion about the details of their findings, certain broad facts, often observed without any intention to discover any cycles, stand out to bear witness to the historical and statistical meaning of those three orders of cycles.

Historically, the first Kondratieff covered by our material means the industrial revolution, including the protracted process of its absorption. We date it from the eighties of the eighteenth century to 1842. The second stretches over what has been called the age of steam and steel. It runs its course between 1842 and 1897. And the third, the Kondratieff of electricity, chemistry, and motors, we date from 1898 on. These datings do not lack historical justification. Yet they are not only tentative, but also by nature merely approximate. A considerable zone of doubt surrounds most of them, as will be seen more clearly later on. Each Juglar not only has its "big" crisis—we do not attach much importance to this—but also can be associated with definite innovatory processes in industry and trade. Average duration is between nine and ten years. Historical association of that kind is most doubtful in the case of the Kitchins, partly because the writer has not been able to accomplish the

[1] Three turned out to be the minimum number satisfying that requirement; but this does not mean that we specifically associate each of our cycles with one of those reasons. Inasmuch as the second and third reasons refer to effects which must take a comparatively long time to assert themselves, the Kondratieff will bear a particular relation to them. Otherwise, it is merely a chance coincidence that, having seen three reasons for the multiplicity of cycles, we also chose to confine that multiplicity to three orders or classes.

heavy task of investigating each of them but had to be content with a survey of a few intervals. Results were not conclusive, and it is even necessary to leave open the possibility that Kitchins are merely fluctuations of the adaptive type (sec. E).[1] Whether or not the statistical evidence supports the historical to the extent necessary to make our schema a useful tool of analysis, will be for the reader to judge. All classes or orders of cycles show differently in different series and countries: in some series, such as pig-iron consumption and unemployment, Juglars show best; in others—the majority of the series is among them—the Kitchins. The latter stand out better, on the whole, in America than in England, Juglars better in Germany than in England.[2] All this also defines the sense in which we claim "real existence" for our three orders of cycles.

3. From the reasons given for expecting the simultaneous presence of cycles of different order, it follows that for us the problem that arises as soon as we recognize the presence of more than one cyclical movement,

[1] They might be cycles of the kind discussed by Professor Frisch, Propagation and Impulse Problems, Volume in Honor of Cassel, p. 190. He obtains 8½-year "primary" cycles, 3½-year "secondary," and (possibly) "tertiary" cycles of a period of a little more than 2 years, and envisages the possibility that the last two are of different nature, the secondary cycle having to do with investment and the tertiary being what in the next section will be called an oscillation. This would make the Kitchin a real cycle of the same nature as the Juglar; but it may also turn out to be of the nature of Professor Frisch's tertiary cycle.

[2] Very little will be said, as opportunities arise, about those differences. This makes it all the more important to emphasize here that they may in future prove to be very helpful clues to a wide variety of problems. Differences in the behavior of the same (or closely related) series in different countries may tell us a great deal about the economic structure of these countries, the peculiarities of their economic engines, and their economic relations to each other. Differences in the degree to which different cycles show in different series are full of potential information about the details of the cyclical mechanism and the character of the different cycles. It should be added that, while the fact that a given class of cycle is absent or very weakly marked in any single series is, for that reason, always very interesting, it must never be recorded against the "reality" of that class of cycle. For instance, Mr. B. Greenstein, in his periodogram study, which ranks very high on the list of contributions of this type (Periodogram Analysis with Special Application to Business Failures in the United States 1867–1932—data, relative number of failures from Dun's Review —*Econometrica* for April 1935) finds a cycle of a typical duration of 9.4 years, which the present writer (but the reader knows by now how easily satisfied he is) considers extremely satisfactory and, in fact, wishes to list as one of the major statistical testimonials for the Juglar cycle. There are also minor peaks but nothing whatever to indicate anything like the Kitchin cycle. This, however, is precisely what we should expect. Fluctuations the depression phases of which are as short and gentle as those of the Kitchins are not likely to drive any abnormal number of firms into bankruptcy or, more generally, failure, while the stronger swings, due to more deep-reaching industrial change, of the Juglars naturally will. In this respect the case is similar to those of unemployment percentage or pig-iron consumption mentioned above· variations of these cannot be great in the course of Kitchins.

is a problem of interference only and not—with the proviso just made as regards the Kitchin cycle—a problem of different causation. They are all to be explained in terms of the process of economic evolution as described by our model. Innovations, their immediate and ulterior effects and the response to them by the system, are the common "cause" of them all, although different types of innovations and different kinds of effects may play different roles in each. With this qualification and also another which will suggest itself in the next section (presence of fluctuations of different types), it is the same phenomenon and the same mechanism we observe in all of them. In particular, we have in all cases the same reasons for expecting two or four phases. Difference in duration alone suffices to alter many details in the pictures presented by cycles of different orders and in many cases expectations will have to be formulated separately for cycles of different span. But, in principle, our general propositions apply to all of them.

For the analysis of given patterns of reality this conception of the process of evolution producing a multiplicity of simultaneous waves is of considerable importance, although it does not, of course, touch upon any of those phenomena which are produced by external factors, because it allows us to see the economic process in the light of a single simple principle. Therefore, it seems to be worth while to use it as a schema of interpretation and to fit it for this service by investing it with some additional properties suggested by what we know about the mechanism of cycles and by analytical convenience. Representation of what, in reality, is indefinite multiplicity by three orders of cycles was the fundamental step. We now go on to postulate that each Kondratieff should contain an integral number of Juglars and each Juglar an integral number of Kitchins. The warrant for this is in the nature of the circumstances which give rise to multiplicity. If waves of innovations of shorter span play around a wave of a similar character but of longer span, the sequence of the phases of the latter will so determine the conditions under which the former rise and break as to make a higher unit out of them, even if the innovations which create them are entirely independent of the innovations which carry the longer wave. There will be a relation between the phases of each of the two movements which will tend to keep the shorter ones within the longer span. The analogous proposition for the second and third causes of multiplicity is obvious. The fact that the units of a cyclical movement of a certain order cannot be considered as independent —any more than the individual items in any time sequence—accounts for many difficulties encountered in analysis by means of formal statistical methods.

The units which fall within a unit of the next higher order will display certain relations to one another which separate them from others, and

the units of a cyclical movement of a certain order which happen to fall in the corresponding phases of successive units of a cyclical movement of next higher order will also have some characteristics in common which, in some respects, make a distinct universe of them. Moreover it follows that the sweep of each longer wave supplies neighborhoods of equilibrium for the wave of the next lower order. Since, of course, shorter waves must in most cases rise from a situation which is not a neighborhood of equilibrium but disturbed by the effects of the longer waves in progress at this time, we must now modify our previous proposition that the process of innovation starts from such neighborhoods only, as well as our concept of neighborhood of equilibrium itself. From the standpoint of the transactions which carry a fluctuation of short span, the sweep of the longer waves constitutes the long-time conditions of doing business, although full equilibrium could, even theoretically, exist only in the points in which all cycles pass their normals. This accords well with the attitude toward economic fluctuations of the business community. What the businessman sees, feels about, and takes account of are the relatively short waves. In our three-cycle schema they would be the Kitchins. Waves much longer than these he does not recognize as such, but only as good or bad times, new eras, and so on. He, therefore, acts as a rule on the conditions of a phase of longer cycles as if these conditions were permanent. This is obviously so in the case of the Kondratieff. The Juglar is in this, as in other respects, an intermediate case. We will express this by saying that for every time series the sweep of any cycle is the trend of the cycles of next lower order. No hypothesis about the precise form of the relation between cycles of different order is implied in this. In particular, we shall have to recognize repeatedly that their effects are not simply additive, although it may suffice for our rough purposes to assume that they are logarithmically additive. Even so, it is clear that the coincidence at any time of corresponding phases of all three cycles will always produce phenomena of unusual intensity, especially if the phases that coincide are those of prosperity or depression. The three deepest and longest "depressions" within the epoch covered by our material—1825–1830, 1873–1878, and 1929–1934—all display that characteristic.

As the reader sees, there is some rational justification for the two additional properties of the cyclical movement which we have now introduced. But there is no rational justification that the writer can see for assuming that the integral number of Kitchins in a Juglar or of Juglars in a Kondratieff should always be the same. Yet from the study of our time series we derive a rough impression that this is so. Barring very few cases in which difficulties arise, it is possible to count off, historically as well as statistically, six Juglars to a Kondratieff and three Kitchins to

a Juglar—not as an average but in every individual case. We shall make use of this fact in our exposition, but the writer is very anxious to make it quite clear, not only that no major result depends on this, but also that no part of his theoretical schema is tied up with it. There is nothing in it to warrant expectation of any such regularity. On the contrary, the logical expectation from the fundamental idea would be irregularity; for why innovations which differ so much in period of gestation and in the time it takes to absorb them into the system should always produce cycles of respectively somewhat less than 60 years, somewhat less than 10 years, and somewhat less than 40 months, is indeed difficult to see. We state the fact of what seems to us considerable regularity,[1] deviations from which are in every case easily accounted for by external disturbances, because we believe it to be a fact but not on account of any theoretical preconception in its favor. If the reader accept that fact, he ought to record it, not for, but against the analytical schema presented. If he refuse to accept it, such disagreement will not entail any consequences beyond complicating description. It should be added, however, that our observation is in rough accord with many well-known estimates of the duration of cycles and looks as strange as it does only because we combine estimates not usually presented together.

E. Other Fluctuations.—Obviously, the waves of which we have been trying to describe the mechanism and the causes are not the only economic fluctuations. The reader need only think of seasonal fluctuations in

[1] Of course, it is largely a matter of opinion—or of tests, the validity of which is a matter of opinion—how far we should recognize that fact at all. Having made it abundantly clear that cycles are an irregular phenomenon playing in an environment disturbed by additional irregularities, the writer would feel safe against any misunderstanding of the meaning of his schema if such misunderstandings had not frequently arisen. From standards which are clearly inapplicable to material such as ours, it is, of course, easy to argue that no regularity has been proved either by the present or any other writer and that, in particular, our three cycles are not adequately established by the evidence to be presented later. Therefore, it may not be superfluous to insist once more on the sense in which we are going to speak of, say, the Kitchin. We mean that there are fluctuations, shorter than those of the Juglar group, but which we nevertheless believe to be of similar nature and which we think to be tolerably represented by a typical duration somewhat exceeding three years. We do not mean that they are exactly 40 months—mostly, they are shorter. Nor do we believe that that "somewhat exceeding three years" represents a mean or mode that meets any formal dispersion test. The writer thinks that any such test would not have had much sense. That is why he left the duration so little determinate. He remembers that the most valued assistant he ever had once threw up his hands in holy horror when he expressed himself satisfied, in a certain case, with a "periodicity" of 48 months as showing the presence of the "40-month cycle." He frankly admits that this sounds absurd, but what he meant was not so at all. *Traces* of fluctuations substantially longer than 1 and substantially shorter than 9 years was all he felt justified in looking for. And these he always found, though often only in rates of change.

order to satisfy himself of this. Statistical and theoretical analysis reveals the presence in our material of very many other wavelike movements. Except for the purposes of the theory of static equilibrium, the economic process ought really to be thought of as an infinitely complex composite of many synchronous waves of different nature, quite apart from the class which interests us here. One of the most important tasks of the theory of the future lies in this direction.

The business cycles with which we are concerned are really not at all what one thinks of when using the terms Wave and Fluctuation. They are the result of a process which, indeed, produces upward and downward movements in our graphs, but these movements are not analogous to the oscillation of an elastic string or membrane—which, once set into motion, would, but for friction, go on indefinitely—because they are due to the intermittent action of the "force" of innovation, by which the action of the equilibrium "force" is each time brought into play. But there are other economic fluctuations which answer more nearly to the physical analogy.

1. Before discussing a few of these, however, it is necessary to point out again that our cycles are not even alone in their own class. Very many external factors will act so as to produce a sequence of phenomena which will look in many respects similar to a unit of the cyclical process. If they occur often enough, the graphs of the time series of a world in which they are the only ones to act on an otherwise stationary process may easily present the picture of a wavelike movement, even if there were no oscillations around it. War finance affords an instance. While war demand is being financed by inflationary methods, we shall observe many of the phenomena which we associate with the prosperity phases of our cycles. When the war demand ceases and budgets are balanced again, we shall have before us most of the surface phenomena of recession and depression—with secondary waves superimposed—after which a period will follow which should display many of the characteristics of a cyclical recovery. The shifts occurring during the process in the industrial organism, first from peace to war production and then again from war to peace production, will present further analogies. Causes and effects are all different, of course, but there will be "waves" nevertheless. In fact, many authors reason on the cyclical process in a way which would be much more appropriate in the case of such war waves than it is in the case of the former. And no inconsiderable part of what to us seems faulty analysis may be due to the analogy with the *modus operandi* of external disturbance. There would, hence, be some point in working out systematically both similarities and differences, particularly with reference to the behavior of the monetary mechanism, but we cannot stay to do this.

Another external factor which may be responsible for wavelike behavior of some or all of our series, is variation in gold production, strictly speaking variation in gold production as far as due to chance or "autonomous" discovery only. Since the theories which use it as a basis for the explanation of shorter cycles (such as our Juglar and Kitchin cycles) seem no longer to have adherents, the only question is whether the long wave can be explained by them. Such contributions to an answer as the present writer has to offer will be found in various places, especially in the historical chapters and those on prices and on central banks.[1] Here, risking repetition, we will merely state first, that whatever we may think about the value of those correlations which apparently lend support to such a theory of the long wave, and about the problem how far there has been, taking account of simultaneous changes in currency legislation and habits of payment and of keeping reserves, any net effect, we are not faced with an alternative explanation, acceptance of which would imply abandonment of the explanation presented in this book and vice versa. This is obvious as regards variations in gold production that may be thought of as induced by our process, but also true of autonomous discoveries. They simply alter some of the conditions of entrepreneurial activity: as we shall not tire of pointing out, it would be nothing short of absurd to say that Californian and Australian gold discoveries *called forth* railroad construction, or South African gold discoveries the "electrification" of the economic world, both of which had begun before, or that these events would have been impossible without them. Second, gold discoveries act on the system through interest rates and prices, and on interest rates wholly, on prices mainly, through the banking mechanism. Effects can, hence, never be read off directly from gold production—or variations in gold in monetary use, which is also a function of other variables than gold production—but embody the reaction of banks and their customers. But, third, it is perfectly obvious that prices and values will, in the long run, be different from what they would be if gold production were substantially different from what it is, provided gold plays any major role in monetary systems, although not in general to the extent one would expect on quantity-theory grounds. Many details of the picture of events will be traceable to its behavior. And since "levels" and "trends" of prices and values will also be influenced, we may in fact speak of a wave *sui generis*, due to the influence of gold, on which the waves of our process are (though not additively) superimposed.

Still more instructive is the "harvest cycle," because it is commonly spoken of as a cycle and because, as the reader knows, it has by some authors been made the basis of a theory of the (medium-length) general business cycle (W. St. Jevons and H. L. Moore). Here we have also an

[1] The writer hopes to deal more fully with that problem in his book on money.

intermittent force acting on the economic system.[1] We may waive the question whether it acts strictly periodically or quasi-periodically, since this would affect only the regularity of such cycles, which from our standpoint is of minor importance in any case. But the other question, just how harvests affect the general business situation, is less simple than we might think. In itself, the mere fact of autonomous variation of crops, that is to say, of deviation from the quantities to which the system is adapted at the moment, under the influence of weather, plagues, and so on only—and under the influence neither of innovation in agriculture nor of adaptive increase or decrease in acreage or intensity of cultivation, all of which comes within our schema—is more relevant to welfare than to prosperity or depression. What matters for the latter is only the influence on values and incomes which such an event will exert. There will be no great effect at all if the abnormal harvest sells for the same amount of money as a normal one would, though there will be some disturbance unless every individual household and firm spends the same amount on agrarian products which it spent before. If it sells for more or less, there will be a shift in incomes and expenditures, but in an isolated country prosperity or depression does not necessarily follow. For the prosperity or depression of the agrarian sector which does follow is compensated by conditions of opposite complexion in other sectors.

This conclusion cannot be evaded by an appeal to any effects of cheap or dear bread on wages—for this effect, asserted by classical doctrine, is, for England, Germany, and the United States at least, negligible since about the seventies of the nineteenth century and can, barring exceptional cases, never have been very important with reference to chance variations of crops, which are essentially short-run events—or by an appeal to effort elasticity, *i.e.*, a wish in the nonagrarian sector of the community to expand its output in order to buy a supernormal crop—for there is no obvious machinery to give effect to any such wish. If that conclusion seems to run counter to all experience and if, in particular, everybody in this country used to expect better business from a good harvest—this rule no longer holds—this is primarily due to the fact that, in most cases and especially if it coincided with poor harvests in Europe, it meant increase in value of exports, which directly acted on the system as a whole.

[1] For what follows compare Professor Pigou's treatment in his Industrial Fluctuations. We confine ourselves, here and elsewhere, to perfunctory remarks on a subject which, except for the interpretation of particular situations, is best treated by itself. We therefore shall not go into the technical problems involved, which begin at the very threshold by the question of what a bad harvest is. In Germany, for instance, precipitation and temperature which are bad for wheat are good for potatoes and even for countries of such comparatively modest extension as Germany or Yugoslavia, compensation within the territory of results for a single crop is not negligible while *regional* catastrophe might be quite sufficient to affect the general situation.

There are other possibilities, however. Expecting bigger receipts, farmers will borrow and spend promptly, beyond the requirements of harvesting and moving the crops (which if the harvest be supernormal will also, though not proportionately, be supernormal). We observe, in fact, increased banking activity in this country's agricultural districts in such cases. This, then, may enliven business all round. Moreover, many industries will on their own initiative prepare for meeting farmers' demand, and also borrow and expand, before any compensating fall in demand from other sectors has had time to show, which therefore may not show at all. But while we thus see that chance variations in crops will exert an influence on general business situations, even apart from their effects on values of exports, we also see that this influence mainly rests on the reaction of the credit structure—meaning thereby reaction of both borrowers and lenders—and is neither so dependable nor so strong as is commonly believed. It may mitigate or accentuate depressions or prosperities and thus often help to turn the tide. In other instances, it may even *seem* to turn it by itself, especially if we admit variable lags. But any claim that it explains the cyclical character of the economic process is, of course, disposed of by the proof that this process would display cycles of its own, even if no external factor ever acted upon it. The natural thing to do, therefore, is to recognize the recurrent fluctuations caused by fortuitous variations of crops as a special type of cycles (Special Cycles[1]) which will superimpose themselves—again, not additively—on the cycles which are the object of this study.[2] There is no

[1] Special cycles must not be confused with deviations of, say, the price or quantity of a commodity from some average of prices or quantities. It is not particular form of reaction but particular causation that constitutes a special cycle. Also, the concept has nothing to do with Professor Mitchell's concept of Specific Cycles.

[2] The above formulation coincides, it is believed, with Professor Mitchell's view. Also, it is not so far removed from the theory of V. P. Timoshenko (The Role of Agricultural Fluctuations in the Business Cycle, Michigan Business Studies, 1930) as from that of H. L. Moore, which issues into the statement that (Economic Cycles, 1914, p. 127) "the fundamental, persistent cause of the cycles in the activity of industry and of the cycles in general prices is the cyclical movement in the yield per acre of the crops," as represented by an index of yield of nine crops. This statement about causation would not follow, even if the correlation between the deviations from its linear trend of the crop index and the deviations from its linear trend of pig-iron production (lagged by two years) were more convincing than it is (on this and the instability of the lag see Timoshenko, p. 50). Dr. Timoshenko's statement is not only very much more guarded but also stresses primarily the cyclical importance of agrarian development in general. With this, of course, we have no quarrel: here we are, to repeat, dealing only with the influence of chance variations in crops and have no intention of minimizing the importance of the agrarian sector within our process. Nor is there any objection to S. A. Pervushin's analysis of Russian business fluctuations, which corrects Tugan-Baranowsky's underemphasis on fluctuations in agriculture (see Sonderheft 12 of the Vierteljahrshefte zur Konjunkturforschung). Some points bearing on the complex relation between agriculture and the business cycle will be discussed in the

theoretical presumption as to the relative importance of these special cycles. It varies obviously historically and geographically. At some times and in some countries they may dominate observed fluctuations. Russia to about 1900 affords an instance, though not a simple one.

It is, of course, a question of fact whether this is the only instance of a Special Cycle. If we answer in the affirmative, that only means that we do not know of any others. We have seen in the instance of building that what strongly looks like a very special movement can yet be brought within the schema of cyclical events and understood as a consequence of conditions which, in turn, can be traced to our process. The writer has not met with any case other than crops as influenced by weather in which that was impossible unless, indeed, we choose to include wars and autonomous gold discoveries.

2. We now pass on to consider fluctuations which more nearly fit the model of elastic (acoustic) waves. A general remark suggests itself at the outset. We have just had another instance—the mechanism of innovation being the outstanding one—of the fact that an all-pervading cycle may arise in the system from a particular or sectional cause, such as the chance variation of output in the agrarian sector. We have now to take notice of the further fact that, in order to produce wavelike movements, an impulse or "force" or factor—the responsible something, in short—need not itself act intermittently or in a wavelike fashion. Its graph need not display any fluctuations. One case of this sort we can visualize by means of the analogy with a vessel into which water flows at a perfectly steady rate, but which is so constructed that it releases the water by a valve each time a certain weight has been accumulated. Saving might afford an economic instance, although we do not believe it would act in this way independently of our process which opens and shuts the valve. For an illustration of another case we will fall back on the analogy with the elastic string which, in response to a single pull, continues ever after to oscillate—in the absence of friction. This case primarily interests us here. Both cases, however, arise obviously from the properties of the system on which our "something" acts and are largely independent of the nature of the latter. Economic waves of this kind constitute a distinct class. Professor Tinbergen even goes so far as to regard them as the only type of "endogenous" waves and as the main object of exact business-cycle analysis. The reasons why we do not follow him in this, and also the reasons why that type of wave plays but a subordinate role in this book, are clear from the design of our model. But in studying our material we must always look out for them and we must

---

historical and the postwar chapters. On "weather and harvest cycles" compare Sir William Beveridge's article in *Economic Journal* for December 1921.

now define their relation to our cycles. We shall refer to them as Waves of Adaptation or Oscillations.

Setting aside the nice question—which, as we know from the rudiments of a discussion in Chap. II, should be answered in the negative—whether an economic system can, without any particular "force" impinging upon it, work in a wavelike fashion merely by virtue of its structure, we will next notice the cognate possibility suggested by Professor E. Slutsky, that a great number of small random shocks so acts upon a process as to give it an undulatory character (Slutsky effect).[1] The model devised in order to display the phenomenon was this: Series consisting of purely random items, such as the last digits of the numbers drawn in Russian lotteries, were turned into series consisting of correlated items by the operation of moving summation of the nth order, so that in the latter "each of two adjacent items has one particular cause of its own and $n - 1$ causes in common with the other." And a strongly cyclical movement revealed itself at once, which, in the case of an unweighted 10-year moving summation, imitated the graph of Dr. Dorothy S. Thomas's quarterly index of British Business (trend eliminated) exceedingly well.

We cannot here enter into the economic, statistical, and epistemological questions raised by this most interesting result of the extension of the classical hypothesis about the distribution of random events to the distribution of their moving sums. Common sense tells us that cumulation of the effects of small disturbances will often be met with in economic life, although, owing to the presence of shock absorbers in the system, this fact should not be relied on, or linked with the Slutsky theorem, without previous exploration of the economics of each case. The possibility of undulatory movements solely due to this fact may be granted at once. But the manner in which Professor Slutsky posits the problem of application to the economic process suggests, first, that he thinks of it as a possible explanation of the business cycles of reality and, second, that he attaches some weight to the covariation of his series with that index of cycles. It is, hence, not superfluous to remark, concerning the first point, that a model of the economic process for which such explanation could be defended would have to be entirely unrealistic, and, concerning the latter point, that the elimination of trend by least squares or a method using similar assumptions will, of course, go far toward making deviations conform to the Slutsky model. Even if there is no trend to eliminate, any

[1] Compare E. Slutsky, Accumulation of Random Causes as the Source of Cyclical Fluctuations, 1927. Of this work, which is in Russian, the writer knows only the English abstract. But recently Professor Slutsky has published his theory in an English version enriched by important results that were, at any rate, not contained in that abstract. See *Econometrica* for April 1937.

series undulating with sufficient regularity will be amenable to approximate reproduction from any random series, provided the period be suitably chosen. Let us assume, for argument's sake, that all our series moved in regular sines. Then the proof that these sines may be produced by cumulation of random causes, however interesting in itself, is not only no proof, but even no reason to suspect, that they are so produced. Else all sinelike processes would have to be. But that proof did two things for us: first, it removed the argument that, since our series display obvious regularities, therefore their behavior cannot result from the impact of random causes; second, it opened an avenue to an important part of the economic mechanism, which has since been explored by R. Frisch in a powerful piece of work.[1]

That cumulation performed on a sequence of random figures can create "cyclical" fluctuations which may easily be made to depict the movements of economic time series, has also been discussed by Professors Bullock, Crum, and Persons in connection with Mr. K. G. Karsten's interpretation, in the light of his theory of quadrature, of the Harvard curves. No comment is necessary about either the economics or the statistics involved in that interpretation.[2] But it is necessary to insist on the fact that cumulation of effects is as obvious a reality in many economic processes as are acceleration, self-reinforcement, multiplication. All these phenomena, which everybody knows and which it is hence hardly necessary to define, belong to the oldest stock in trade of the usual type of historical reporting on booms and crises—in some cases they are the whole of it. The reason why their role in the mechanism of cycles has not throughout our exposition been emphasized more strongly is simply that it seemed to be sufficiently taken care of in various ways, particularly by such concepts as the Secondary Wave and the Vicious Spiral, which must be understood to include them and, embedded as they themselves are in the current of a definite process, to give them their proper setting and motivation.

We have now to add that these phenomena can, of course, be also produced by the impact of external factors, chance occurrences among them, and will, hence, reproduce part of the cyclical mechanism whenever such factors impinge on the system. There seems, however, some danger

[1] R. Frisch, Propagation and Impulse Problems, Economic Essays in Honour of G. Cassel, Sec. 5: Erratic shocks as a source of energy in maintaining oscillations. Although he quotes both Wicksell's and Slutsky's work as a starting point, his argument is really quite a different one. Witness his concept of Changing Harmonics. On this also see his article in *Skandinavisk Aktuarietidskrift*, 1928.

[2] The interested reader is referred to that article, *Review of Economic Statistics*, 1927, and to Professor Bresciani-Turroni's Considerazioni sui Barometri Economici, *Giornale degli Economisti* for January, May, and July, 1928. Mr. Karsten's interpretation is in the *Journal of the American Statistical Association* for December 1926.

of accepting them as such for an adequate explanation of the historical cycles. It has been remarked in the first chapter that an external-factor theory of business fluctuations would by no means be obviously absurd. These external factors would then work through cumulations, accelerations, and so on, and there would be no need for them to be important in order to create important ups and downs. It is, in particular, possible to argue that if some such event has once set into motion a self-reinforcing process of prosperity, this will go on of itself—each increase in demand for, say, consumers' goods increasing the demand for equipment goods, production of which increases again consumer's purchasing power, and so on—and thereby create increasingly precarious situations, so that the longer it lasts the smaller the influence will be which is required to bring about a crash when an equally self-reinforcing depressive process will set in. The inadequacy of such explanations does not rest with the fact that in the popular and semipopular literature on individual crises, in which they primarily occur, cumulation, acceleration, and so on are little more than words loosely connected with surface observations lacking in precision. It is, no doubt, possible to put up a better showing. Against this we urge, first, that in order to establish such a theory *as a fundamental explanation* satisfactory in logic, it would be necessary to show that, by means of the elements comprised under the heading self-reinforcement, a small disturbance could create a cycle from a strictly stationary process in which all the steadying forces and mechanisms of the system are perfectly intact and the burning cigarette falls upon moist grass. Failure successfully to meet this test, throws the theory back upon big disturbances, such as wars or serious social unrest or sudden changes in monetary or commercial policy, about which there cannot be any difference of opinion. Refusal to meet this test, on the ground that actual states are never stationary, amounts to evading the point at issue.[1] Second, we urge again, as we did when discussing the Vicious Spiral, that historically there never was a case in which any wave would have had to be explained like this. The proposition itself that small disturbances may induce larger ones, noticed by Johan Akerman (Det ekonomisk livets rytmik, 1928) is not entirely invalidated by these considerations.

[1] In one case, such a refusal would have to be accepted, although this would but open the door on a long discussion of principle. The refusal can be based on the denial of the existence of any equilibrium tendency or equilibrating mechanism or conservative forces in the system, the equations of which would then have no stationary solution at all. This would imply a picture of economic reality altogether different from the one we have been trying to draw throughout. Since both, however, are nothing but analytic schemata, choice between them, as far as not due to extrascientific preference, would have to turn on results. In a system that always reacts, and reacts to reaction, exclusively by acceleration until it meets catastrophe or, at the low point, an upward pull, explanation of fluctuations would indeed be easy. It would, in fact, be superfluous.

Waves that are simply the result of small disturbances magnified by self-reinforcement would not, however, be of the "elastic" type. But it is worth mentioning that we may also derive "elastic" waves from, say, acceleration. Let us take, as an instance, price level, which we will, for argument's sake, assume to be influenced by deposits Q. Consider its time shape, $P(t, Q)$ and its rate of change in time $\dot{P}$, which itself changes at the rate of $\ddot{P}$. Now let the facts of the case suggest the hypothesis (which is not believed to be true and which would have very little meaning in any case) that this acceleration in the price level series is proportional to the second partial derivative—also a sort of acceleration—of the price level with respect to Q, $\ddot{P} = c^2P''$, c^2 being a constant factor of proportionality. We turn to the regulation method of solving this partial differential equation—well known under the auspicious name of wave equation, though it does not necessarily represent a wave—by means of expressing P as the product of two functions, each of one of the two variables only, $P = f(Q) \cdot \varphi(t)$. In order to satisfy our differential equation it is necessary that

$$\frac{f''}{f} = \frac{\ddot{\varphi}}{c^2\varphi}$$

which can be the case only if both sides equal a constant, say $-K^2$, since they depend on different variables. This enables us to solve for each side separately and a general solution in terms of sines and cosines is readily derived,[1] on which we then would impose boundary conditions appropriate to our facts. No claim is made for this setup except that it illustrates a possibility which at first blush one might feel inclined to doubt.

3. The simplest case of Waves of Adaptation or Oscillations may be illustrated, as noticed in the second chapter, by any individual price which happens to be out of equilibrium. Even if no further disturbance occurs, we do not observe that it at once assumes its equilibrium value or that it makes straight for that value and stops there. As a rule, it will miss it or outrun it and turn back again. Equilibrium has to be found, as Walras put it, *par tâtonnement*. Most of our series will behave like this. Sometimes there are technical reasons for it. On the stock exchange, for instance, bulls and bears will from time to time consolidate their positions and cover before they go on. But this is not necessary. The graphs of our weekly, or even monthly, series reveal oscillations of this nature by the saw-tooth-like contour of their larger movements. We might call them Hesitations. If the change to which a series responds in

[1] R, S, T, U being constants, those general solutions are:

$$f(Q) = R \cos KQ + S \sin KQ$$
$$\varphi(t) = T \cos cKt + U \sin cKt$$

this way has not originated in it, but in another series—think, for example, of oscillations of this type possibly arising in interest rate by way of response to a given change in price level (see Mr. Zinn's article in *Review of Economic Statistics* for October 1927)—we speak of Vibrations.

Hesitations and vibrations are part and parcel of the cyclical mechanism, although in this book, which cannot adequately deal with anything except principles and the broadest of contours of facts, they will not show up as they should. But again, they are not confined to specifically cyclical disturbances. Any disturbance, whatever its nature, will produce them. The surface similarity between our cycles and other fluctuations will be intensified thereby and all the oscillations they start will interfere with each other. The same is true of those waves of adaptation which may (though they need not) result from the introduction of lags, or lags and time derivatives, or of the influence of past and (expected) future values of our variables.[1] Cases in which, say, the quantity of a commodity—as, for instance, in the cases which give rise to the spider-web problem—adapts itself with a lag or in which lags or velocities of adaptation differ in different parts of the system, thus creating intermediate situations which may be reacted to in such a manner that wave-like movements will ensue, have been met in Chap. II and will be met again in Chap. X. Their occurrence is perfectly easy to understand on obvious common-sense considerations. Their exact theory, a most important and hopeful contribution to the general theory of prices, is, with the exception of a few instances, beyond the scope of this book.[2] It is sufficient to repeat that, however much light it sheds on details of the mechanism both of the cyclical process and of other disturbances, it has to be coupled with other propositions in order to make of it a theory of the cyclical process. Unless this be done, that apparatus is compatible with any explanation and renders the same kind of service to each. The very catholic view taken of the cyclical problem by Dr. Roos in the paper quoted below is, from the standpoint of the task he set himself, both understandable and correct.

[1] Considerable progress has been made as to technique. Grateful acknowledgment from all students of economic fluctuations is due to Professor Evans and Mr. Roos in this, as in other respects. In particular, they (and Professor Tinbergen) were the first to realize what Vito Volterra's functional calculus can do for us. On the importance for economic analysis of functionals, see, for example, Tinbergen's article in *Econometrica* for January 1933. Professor Frisch has developed one of the most immediately useful techniques (*Econometrica* for April 1935).

[2] We will quote, however, Mr. J. B. S. Haldane's paper in the *Review of Economic Studies* for June 1934, and Mr. F. C. Roos's in the *Journal of Political Economy* for October 1930. The reader finds an excellent introduction to the subject in Professor Tinbergen's Survey, *Econometrica* for July 1935. See, in particular, Secs. 15 and 16 (on lag schemata and wave conditions).

By the same or similar methods, aggregative theory can be "dynamized" ("macrodynamics"). For instance, the oldest and most familiar proposition of aggregative theory, the equation of exchange ($MV = PT$) is, as it stands, simply an equilibrium condition. But it can easily be made dynamic by the introduction of lags and rates of change. Or we may simply assume that industrial output at a point of time is a function of the rate of change of price level at some earlier point of time, industry reacting to the stimulus with a lag. This model must be used with care, since such a two-variable relation always does violence to a process in which many more (even aggregative) quantities interact, but it is readily seen how wavelike time shapes of those variables might result from it. A lag between price level and output would not by itself produce them, unless we assume that industry behaves as hog-producing farmers are supposed to behave. If, however, industry reacts at any time to the rate at which the price level changed at an earlier moment, for instance to a positive rate by an increase in total output, then this increase will tend to produce a fall, *i.e.*, a negative rate of change in price level, whereupon output will shrink in due course, and so on—if we so please and choose to neglect everything except the relation this model isolates, this may even go on eternally and in an explosive fashion. Following a suggestion of Professor Irving Fisher which will be noticed elsewhere, Professor Luigi Amoroso worked out and extended this model so as to include all aggregative processes. Professor Felice Vinci's work constitutes a further step on similar lines.[1]

As another example, Mr. Kalecki's theory[2] may be mentioned. It follows well-established tradition in making investment pivotal in the description of cyclical sequences, but it does so in an original way. In order to derive cycles in investment which generate, instead of being

[1] See L. Amoroso, Contributo alla Teoria Matematica della Dinamica Economica, in *Nuova Collana di Economisti*, vol. V, 1932, and La Dinamica dei Prezzi, *Gruppo Universitario Fascista*, Rome, 1933 (mimeographed). Professor Vinci's theory has been published in *Econometrica* for April 1934, and is certainly a most interesting contribution. But the system of equations into which he puts it (p. 137), though it gives eight equations for eight unknowns, does not seem to the present writer very easy to handle (considering the form of equations III and IV). Professor Tinbergen, to whose criticism of this model in the Survey quoted before the reader is referred, seems to feel more confidence in the uniqueness of the solution and less confidence in the reasonableness of the economic assumptions embodied in it than does the present writer.

[2] The theory has been published repeatedly. The first exposition is in Polish, hence not known to the present writer. An English version has been published in *Econometrica* for July 1935 (comments thereon, showing among other things, how prices and wages implicitly enter the model, in *Econometrica* for October 1936), another in the *Review of Economic Studies* for February 1937. In the latter, the theory is compared to that of Mr. Keynes. Into the ramifications of the subject we cannot enter here. The fundamental idea and a remark on the principle involved are all that can be presented in this book.

generated by, the cyclical impulse, Mr. Kalecki introduces the period that must elapse between the order for an equipment good and its delivery, which for simplicity's sake he assumes to be constant (or nearly so) and the same for all investment goods. Now, we could try to make this lag produce a cycle, by generalizing the argument developed by Professor Tinbergen for the special case of shipbuilding which we will discuss in Chap. X, that is to say, we might make deliveries of new investment goods (minus those intended for replacement) directly depend on the amount of investment that existed at an earlier point of time. This Mr. Kalecki does not do. Instead, he introduces profits plus interest (= consumption of "capitalists" plus saving) explicitly,[1] and makes orders for equipment goods beyond replacement—replacement demand being assumed to be constant throughout the cycle—linearly depend on them and on the total volume of industrial equipment existing at the same time. Then he—this is the original turn—expresses both these items in terms of orders for new equipment. In order to make this clear, we will restate the argument. Let $I(t)$ be amount of orders given at time t, θ be the lag and A that part of the revenue of "capitalists" which they save (nobody else saves). By way of a simplification warranted by Mr. Kalecki's assumptions, we will neglect the amount these "capitalists" spend on consumers' goods so that A becomes—since Mr. Kalecki himself puts capitalists' revenue equal to consumption plus accumulation spent on equipment goods—the whole of capitalists' net revenue equal to the money equivalent (corrected for price level) of the production of equipment goods beyond replacement in the (small) unit of time. $A\theta$ is the amount of orders given, paid for, and taken in hand during the period of the lag. If $K(t)$ is the "volume" (= corrected value) of equipment existing at time t, then the "volume" of orders placed could be expressed as a linear function of the rate of profit and of the rate of interest. Following Mr. Kalecki, we choose, however, to consider as dependent variable, not the volume of orders I, but the relative volume I/K. Moreover, we throw out interest, on the ground that it is a single-valued *increasing* function of the rate of profit A/K. Thus we have

$$\frac{I}{K} = \varphi\left(\frac{A}{K}\right)$$

and since it has been decided that this function be linear,

$$\frac{I}{K} = m\frac{A}{K} - n,$$

[1] In Professor Tinbergen's model of the shipbuilding cycle, they are also present, of course, but only implicitly.

m and n being constants, or

$$I = mA - nK,$$

or, differentiating with respect to time,

$$\dot{I} = m\dot{A} - n\dot{K}$$

But $A\theta$ is equal to the integral of the orders placed in each unit of time during the period θ, hence A equal to this integral divided by θ. The increment of K in point of time t is equal to the orders placed θ units of time before, $I(t - \theta)$. This is the way in which the lag comes in, if now we express everything in terms of orders

$$\dot{I} = m\frac{I(t) - I(t - \theta)}{\theta} - nI(t - \theta)$$

or

$$\dot{I}\theta = mI(t) - (m + n\theta)I(t - \theta)$$

This is the mixed difference and differential equation we want in order to apply the technique which has been made familiar to economists by Professor Tinbergen and will be displayed in his shipbuilding case. Substitution of an exponential with a complex exponent easily reveals the possibility of a periodic process. Using American and German material, Mr. Kalecki has little difficulty in arriving at a major component that shows a 10-year period. This accounts for the business cycle which, according to this model, certainly requires a starting impulse—some trouble, for instance, having occurred in the apple-growing industry at the time Adam and Eve dwelt in Paradise—but then might go on forever. And this is so because "investment considered as capitalists' spending is the source of prosperity. . . . But at the same time investment is an addition to the capital equipment and, right from birth, it competes with the older generations of this equipment" (*Review of Economic Studies*, vol. IV, p. 96). In case the reader should think this a "paradox," Mr. Kalecki has the reply to offer, which has before him brought comfort to so many economists faced with impossible results of their own making, namely, that "it is not the theory which is paradoxical but its subject—the capitalist economy."

That this is inadequate and that investment in Mr. Kalecki's sense would, by itself and in the absence of other factors, not produce any waves or crises has been shown in the preceding chapter, sec. A, 2. But since Mr. Kalecki's type of argument is so frequently met with and so inexhaustible a source of paradoxes, it will not be superfluous to indicate explicitly the cause and nature of what at first sight appears to be an irreconcilable difference of principle. To begin with, such difference as

there is does not, as one might think, derive from a difference in the definition of saving or from a different view about its relation to what we termed *real investment.* On the contrary, in our discussion on saving in the third chapter, we assumed—what we do not otherwise hold to be the case anywhere in this book—that savings were turned into equipment precisely as promptly as Mr. Kalecki lets them produce orders for new equipment. It is true that he does not distinguish the two steps but fuses them into one and this, as will be seen presently, has something to do with the result he arrives at. But fundamentally there is no difference in this point. There is difference in that we have been discussing the case of a process stationary in every other respect. If we repeat that we did this in order to find out whether saving and investment, as such, will produce fluctuations, it might be replied that, since initial disturbance is in any case essential in order to set Mr. Kalecki's model into motion, our negative result, even if correct, is not relevant to a criticism of his. This is, however, not so. If our result be correct, it follows that, unless new disturbances occur, any waves of investment that might have been created by the initial one would have to die down, owing to the presence of an equilibrating mechanism *which works without lag.* This, in fact, affords the opportunity to recognize the contribution of Mr. Kalecki's construction: it adds one more item to the list of possible waves of adaptation or of the reasons to expect wavelikeness of contours within the cycle.

The essential point now comes into view. Mr. Kalecki eliminates that equilibrating mechanism—exactly as all such models, in one way or another, eliminate vital parts of some mechanism—by postulating that the money rate of interest varies in the same direction as A/K. Now, it should be noticed that objection to this postulate is not raised on the ground that it fails to be borne out by observation. On the contrary, it is fully admitted that, in a first approximation, that postulate does fit the facts. But this is a problem to be solved, not a datum to be accepted. For, as we have seen, saving itself reduces the rate of interest and thereby creates complementary investment opportunity, which is precisely the reason why we cannot expect the saving-investment process to produce, of itself, waves or any crises or difficulties. Hence, other factors, extraneous to the saving-investment process as such, are necessary to account for the shift of the demand schedule for loans, which overbears that tendency and causes the rate of interest to behave as it does. Such factors can no doubt be found. But then it is no longer investment per se, reacting upon itself, which can be appealed to for explanation.

For other schemata of a similar formal nature the reader is referred to Professor Tinbergen's writings.[1] The more their authors are aware of

[1] A study might conveniently begin by the pure lag schema presented in the Survey, p. 274.

their limitations, especially of the fact that they are nothing more than exact statements of possible aspects of repercussions within the adaptive apparatus of economic life ("propagations"), the less objectionable and the more useful they are likely to be. This applies particularly to the only additional instance we are going to notice, the elegant model devised by Professor Frisch in his Cassel essay previously quoted. It connects three elements by three simple relations. One of them $z(t)$ is formally analogous to Mr. Kalecki's $A(t)$ but simply expresses equipment in process of production, without tying it to saving in the way to which we found reason to object. The second element, $y(t)$, differs from Mr. Kalecki's $I(t)$ by taking account also of replacement demand—assumed to be proportional to the third element, consumers' goods sold, $x(t)$—and not only of demand for new investment, which is assumed to be proportional to $\dot{x}$. The latter, the rate of change of consumers' buying, is made linearly dependent upon cash holdings treated as a fraction of the money volume of transactions in the spheres of production and consumption. If this model had been associated by its author with a claim to representing the cyclical process, objections *mutatis mutandis* similar to those formulated above would again have to be urged. But since it is not intended to be another *perpetuum-mobile* theory of business cycles but the presentation of a piece of mechanism, we can not only enjoy its simplicity, but also use it to demonstrate the possibility of a distinct type of oscillation.

4. A few other matters may conveniently be disposed of here. *Replacement of industrial equipment* has been linked sporadically with business cycles ever since Marx's time, some authors coming near to making it the central element of causation. Into our analysis replacement enters in two ways. First, it is obvious that cyclical situations are not a matter of indifference for the decision to replace. Less obvious is the precise nature of their influence. Replacement becomes necessary, either because of wear and tear—for our purpose we can include in this the physical effect of mere lapse of time, irrespective of use—or because of obsolescence. Obsolete or obsolescent machinery is not typically replaced in prosperities. We find, rather, that the intense competition of the recession and depression periods will, with a qualification for the prostration and paralysis of deep depression, in general force firms to install the newest available types. The reverse, however, holds true, if we may trust the incomplete information we have, for the replacement of machinery that is wearing out. There is no doubt, for instance, that the American and the English cotton-textile industries renew their equipment when business is brisk, although there is some doubt as to the interpretation of this fact. The life of a building or a machine is, of course, not a purely technological, but an economic, variable. Barring obsolescence, it is rationally determined by the point of time from which on the unit of

product can be produced more cheaply by installing a new machine than by keeping the old one, and therefore a function of many quantities, actual and expected, rate of interest included. These quantities fluctuate cyclically and, particularly if the technological superiority of a new machine varies with the degree of utilization and if the price of the machine is inflexible, replacement may often figure out more advantageously in prosperity than in recession. But such considerations are hardly relevant, since in any case the lifetime of the average machine is very much longer than any but the longest cycles. Most of the common textile machinery remains fully efficient for from 30 to 40 years—mules that have been well treated, even longer than that.[1] Such statistics as we have do not, in fact, encourage a belief that either those or other rational considerations play a dominant role in the decision to replace, and in old-established industries with a (substantially) stationary technique, a considerable percentage of the machinery in use at any time is of greater age than experts' standards seem to justify. We need not however go into this. But that fact is beyond doubt, perhaps as the simple consequence of the other fact that, when prices fall, people are quite naïvely and a-rationally discouraged and so have to make up for deferred replacement when things look better again. It is clear that this is not an unimportant item in the list of secondary phenomena, but, of course, it presupposes the existence of a cyclical movement. Not even the theory of the "lower turning point" (recovery point) can safely be based upon it; for the situation is in practice never such that it would at a given time become necessary, under penalty of breakdown, to replace. It is, as we have seen before, only when recovery has set in for other reasons that this demand for equipment goods revives.

Second, there will be genuine replacement waves if the age distribution of an industry's equipment clusters around certain values. This will have to be explained in each individual case and cannot be appealed to *in abstracto* as an independent cause of fluctuations. But as a rule such reasons are not difficult to find. External factors will often supply them. If, for instance, the equipment of a district has been destroyed by an earthquake, and replaced in, say, the subsequent two or three years, we can, at the expense of assuming that the lifetimes of all elements of that equipment are rigidly fixed and equal and that all elements are actually replaced thereafter, derive what will look like an ideally regular wave rolling on forever. But it is clear how unreasonable such assumptions would be. Bulges of decreasing amplitude will, however, in most cases persist, and influence the behavior of our time series, for a while.

[1] The writer is at a loss to understand how Marx—who when speaking of capitalist industry, primarily meant textile manufactures—could have spoken of a "ten year life cycle" of the fixed "capital" of that industry.

Now our model supplies us with an "endogenous" instance: when innovators have ridden to success in some branch of industry and the new combination is spreading, we shall readily understand that new machinery will be installed in this and in complementary branches, often also in others, owing to the impulse imparted to business in general, at a velocity which will in fact produce the required (skew-bell-shaped) age distribution. This is part of our mechanism and contingent upon its working. But it is no new or independent cause of fluctuations, least of all of permanent ones: the effect will, as regards specialized machinery, tend to vanish from diffusion (different firms replacing at different times, some not replacing at all) though successive innovations in different fields will tend to keep it alive in the higher stages of nonspecialized semifinished metal products.

Wavelike bulges in the output of equipment and construction industries, for use in the explanation of ups and downs, have been derived in many other ways, one of which should be noticed. In its crudest form the argument may be put like this: let us assume, to bring out the essential point, that an industry uses one million units of a certain—strictly homogeneous—type of machinery which we will baptize *hobby horse* and which lives exactly 10 years, not more nor less. These hobby horses have been evenly installed—at a constant rate of 100,000 hobby horses a year—the industry using, and also the industry furnishing, the hobby horses has reached perfect equilibrium—100,000 hobby horses being produced and sold for replacement each year. This schema would not be substantially affected if we assumed further expansion at a constant rate known to all firms. But instead we assume now that "something" permanently but suddenly raises the demand for the product by 10 per cent. If hobby horses have been previously utilized to optimum point, 10 per cent more of them will be demanded now. Producers will, therefore, sell 200,000 hobby horses, say, next year; but after that demand will again drop to the 100,000 necessary for replacement until the new ones will themselves have to be replaced, when another bulge will show. Those producers are supposed to have doubled their capacity, and the firms in the higher stages above the hobby-horse producers, to have expanded correspondingly—this is the intensification or multiplication of effects—and the consequences are obvious.

Nobody, of course, has ever presented this argument in so grotesque a form, but reasoning not far removed from it keeps on turning up. It is, therefore, worth while to stay in order to realize the absurdity of it. "Something" is not an admissible cause. If it be made more concrete, it will be seen that such sudden jerks are not likely to occur except in consequence of innovation, and if the increase be *not* sudden many of the consequences will fail to follow for this reason alone. But even if demand

for the product increase suddenly, it does not follow that the producing firms will promptly demand proportionally more hobby horses. In practice, there will be the buffer of excess capacity. Even if perfect equilibrium of perfect competition should have prevailed, they will not all act equally promptly and in the same way—some, for instance, overworking their hobby horses or using them beyond their usual lifetime (for the rigid lifetime is, of course, a most unrealistic assumption). Granting, however, that they all order 10 per cent more hobby horses, this will not necessarily induce the manufacturers of the latter to increase plant capacity all at once to the full amount. They may equally well raise their prices or add to their unfilled orders. Owing to the presence of buffers at every step of the process and also to normal foresight, the impact, instead of gathering force at every step, will tend to spend itself. If it does not, this is no verification of the argument but merely a proof that there is another process at work. The neglect of all equilibrating influences amounts in this, as it does in all similar cases, to theoretical fault.

But what should be stressed more than this is the lack of realism displayed by the argument under discussion. No attempt at technical improvement—for instance, insertion of a considerable lag between the effect of the new expenditure for investment goods on the prices of consumers' goods and the effect of the consequent increase in the supply of investment goods—can do away with the fact that a picture of business behavior is being drawn, not from reality, but from the needs of the theorist. Moreover, there is no reason to believe that any such bulges would be sufficiently synchronized to matter. But again it must be observed that this criticism applies only if that argument is to stand by itself as a major contribution to the explanation of cycles. It is not denied that hobby-horse manufacturers, or some of them, may thus foolishly behave and that they are most likely to do so in the atmosphere of prosperity which, however, would then have to be independently explained.

CHAPTER V

Time Series and Their Normal

A. Introduction.—In this chapter we will assemble into one connected argument what for our purpose it seems necessary to say on questions of principle concerning statistical method. This is indeed but little. No exposition of technique can be attempted here and the reader unfamiliar with usual procedure should turn to some treatise on the subject.[1] The problem of the elimination of seasonal variations remains excluded. Our discussion thus reduces to analysis of time series which reflect economic growth and the cyclical process of evolution as distorted by the influence

[1] If the reader be a complete stranger to the theory of statistics it is indeed difficult to ask him to take the trouble involved. But nobody can, under present conditions of economic research, be a competent economist who has not mastered as much of it as is admirably presented in the textbook by Crum and Patton or in the book of F. C. Mills. A popular introduction into probability which, at the same time, has all the freshness of originality is: R. von Mises, Wahrscheinlichkeit, Statistik und Wahrheit, 2 ed., 1936. The reader who has a sufficient command of mathematics will find a polished presentation of principles in the treatise by G. Darmois (*Statistique Mathématique*). Most of the necessary tools are sufficiently explained in the Handbook edited by Rietz, but the theoretical fundaments necessary for a full understanding of the implications of techniques and the assumptions involved are not. The neglect of these is, however, the only explanation of the uses to which that technique is sometimes put and of the confidence with which large claims are made for its results. The wish to enable the reader to form an opinion about what a given method and a given result means and especially does not mean is the main motive of the advice submitted in this note. It is believed, however, that the comments of the text, superficial and unsystematic though they are, will do something toward this end. In this hope they have been framed as simply as the writer was able to frame them, and they can be perused, and their main import understood, even by those who do not understand every sentence. That is why the writer, on the one hand, cannot recommend skipping the chapter and why, on the other, he has thought it excusable to use, here and there, without explaining them, terms which will carry meaning only to the specialist. Reference should be made also to what was said on matters of statistical method and material in the first, and also in the fourth, chapter and to some books to be quoted later, particularly to that by O. Anderson. Finally, it is impossible not to mention the works of Tschuprow and R. A. Fisher. The writer feels much obliged to Dr. G. Tintner for criticism invariably helpful and stimulating, even where discussion did not lead to agreement. Some of his comments suggest the advisability of warning the reader that perusal of this chapter is not possible without a previous study of the preceding ones.

of external factors. At first (sec. C) we shall proceed, for the sake of convenience, on a single-cycle hypothesis, then (sec. D) we shall discuss the problems arising out of the presence of more than one cycle.

In order to put into relief the nature of time series and of the statistical problem they present, we will distinguish three types of variables, which we shall call *theoretical, random* or *stochastic,* and *historical variables.* If we have before us a system, *i.e.,* a set of quantities between which certain relations are known to exist, we may investigate these relations by allowing those quantities to vary "virtually." As a result we get theoretical "laws" with which to operate. Time, if it enters at all, has no reference to any particular date and serves only as one of the coordinates. The theoretical law, once established, is raised above the sphere of the actual findings from which it was gleaned, by the decision to rely on it until further notice. Of course, every law in this sense is relative to the general properties of the system. A variable thus related by a "law" to one or more or all variables within the general conditions of a system, we call a *theoretical variable.* Any quantity occurring in a proposition of classical mechanics will illustrate this. An economic instance of such a variable is the quantity of a commodity that is effectively demanded within a Walrasian world.

The logical counterpart of a theoretical is a stochastic variable.[1] It is not defined by a functional relation, known or supposed to be known, to another variable. On the contrary, the absence of any such relation is its outstanding characteristic. We do not "understand" its variations in the sense in which we "understand" the variations of a theoretical variable; they are mere experimental or observational facts. Instead, we note the relative frequency of the occurrence of different values of a quantity in the course of experiments or observations carried out under conditions under which a theoretical variable would display a constant value. We may think of those experiments as consisting of sets of drawings from an urn known to contain black and white balls in unchanging proportions, and base upon them certain measurements and (whatever the logic of this may be) mathematical expectations, everything in fact that centers around the unfortunate term Probability or the less objectionable one, Limiting Value of Relative Frequency. We need not follow Borel (Éléments de la Théorie des Probabilités) in tying statistical method to the urn schema, but we must bear in mind that it is the prerequisite of all reasoning about random variables that their values, actual and possible, should constitute a *universe* in the

[1] Tschuprow's definition—"a stochastic variable is a variable that can assume different values each associated with a different probability"—is too wide, because it would also include hybrid cases. Moreover, the property it uses as *definiens* follows from the nature of stochastic variables and does not give a good idea of what that nature is.

technical sense, and that we are on safe ground only when moving within the walls of this severely restrictive condition.

As soon as we step out of the world of theoretical schemata and try to link to actual fact any of the theoretical relations that hold within them, we get hybrid variables which are neither theoretical nor random but borrow characteristics from both categories. If, in particular, we wish to derive a form of some theoretical function more concrete than that which theory supplies—say, of a Marshallian demand function—we face all the difficulties of distinguishing between both classes of characteristics and, among other things, the danger, pointed out by Frisch, of being entirely misled by our inability to do so. Disregarding this, however, we may illustrate the difference between theoretic and stochastic variables and their simultaneous presence in the actual material as follows: suppose we know that a given set of price-quantity data represents a Marshallian demand curve which is ideally invariant in the interval of time covered by those data. Then, to every quantity within the interval corresponds one single "true" price which is a theoretical variable. Now, let the observations of the prices be subject to small random errors. We shall get either several price quotations for each quantity or else single quotations which deviate to an unknown extent from their "true" value. Each quotation, taken by itself, is therefore a stochastic variable and may be looked upon as an observation in the technical sense. If there are several prices to one quantity, they are all observations of the same thing, form (a sample of) a universe, and may be said to represent fragments of a frequency distribution. But obviously the whole set of prices cannot be so interpreted. In the graph of all of them the theoretical variation asserts itself. However, since in our case we know that the theoretical law is invariant we may be able to find it from the material by purely statistical methods;[1] but it is that knowledge and not the statistical logic per se that enables us to do so.

A historic variable is, in one sense, precisely that kind of hybrid. But it differs from the case just discussed by the fact that its theoretical law is in a process of change. We assume for simplicity's sake that the frequency distribution about each "true" point remains invariant. Let us start with an economy in perfect Walrasian equilibrium and fasten upon the price of any commodity the quality of which is to remain strictly the same. This price is, as everything else, at Theoretical Normal (now in the sense defined in the second chapter) and any varia-

[1] Success will in this case, as in the one discussed in sec. B, 2, depend on the "law of the movement" being sufficiently obvious for us to be able to hit it by the formula we choose. Both cases reduce to the schema of shots being fired at a target moving according to an unknown law. If the demand curve shifts, then the analogy would be with shots fired at a target moving according to an unknown law that changes in an unknown way.

tions we observe in quotations would (unless we allow small variations in quantity, which we do not just now) be due only to errors of observation or small chance events which can be treated as if they were errors of observation. Hence, it would reveal nothing except a frequency distribution. Let the system embark upon a prosperity excursion under entrepreneurial impulse. Both price and quantity of our commodity will change now, but the new values they assume cannot be directly used[1] for the derivation of its (Marshallian) demand curve, because they do not lie either on the original or any other single demand curve, but successively on different ones—which it is usual, though not quite correct, to express by saying that the demand curve shifts. The old Theoretical Normal has been destroyed without being replaced by another. We may, indeed, imagine that every price-quantity pair lies on a temporary demand curve, and interpret its values as the result of two components: a movement of, and a movement along, a demand curve. But, in general, we cannot distinguish between the two without further information or hypotheses.

This situation lasts throughout the cycle and until a new equilibrium is reached. Then we shall have again a Theoretical Normal as before, but a different one: price and quantity of our commodity will then be adapted to the conditions of a new Walrasian world in which new equilibrium values result from, and may—in strict logic, only virtually—vary along new demand, supply, cost functions, and so on. This property of belonging at different times to different systems, or of representing different Theoretical Normals, is the outstanding fact about historic variables which determines their nature. Among other things, it is that fact and that fact alone which brings in the axis of *historic* time and makes the actual dates of those variables or their actual location on that axis essential to their very meaning. Without it, dates would be irrelevant, and arraying items according to their dates would be nothing but a very inconvenient and unenlightening mode of presentation. Hence we may, for our purpose, define a historic variable as a variable, the Stochastic Normal of which changes owing to a change of its Theoretical Norm.[2] A sequence of values of such a variable we call

[1] This does not mean, of course, that we cannot do anything with them. We are here concerned with a principle only, which it is important to grasp, but which is not an absolute bar to progress in this direction. A theory of the mechanism of the cycle is one of the most powerful tools with which to make headway.

[2] The writer, having been told that the above is liable to be misunderstood, wishes to add an explanation, though he does not himself see the necessity of it. We assume that nothing disturbs the economic process except cyclical evolution in our sense. We observe a variable in two successive states of ideal Walrasian equilibrium, A and B. Its value is constant at equilibrium amount in A and in B, though differing as between A and B. In both cases we are supposed to be able to make many observations which are subject to

a *time sequence* or, slightly incorrectly, *series*. We may now also adopt the usual definition, which would not, taken by itself, convey our meaning: a sequence of values of a variable arrayed according to consecutive dates of occurrence.

Now, the only thing that is universally true about time series is that they do not fulfill probability requirements. We have to add that, since the evolutionary process reflected in every time series goes on in distinct cyclical units, the individual items within each unit are not independent of each other. Neither, strictly speaking, are the cycles themselves independent; but we may overlook this in a first approximation and make them our observational units. This, however, reduces the number of our observations to a dangerous degree. The fact is that only for what we have called the Kitchins our material covers a number of units at all sufficient for statistical treatment and the value even of this is much impaired by the possibility of systematic change during all that time. For most series, available Juglars are few. For no series are they "many" in the technical sense: from 12 to 14 are all we have, in the most favorable cases, for prewar times. And of Kondratieffs we have, up to 1914, a little more than $2\frac{1}{4}$. If, finally, we recall the external and internal irregularities to which our process is subject, we have before us the nature of the statistical task involved in Time-series Analysis.

That heading commonly denotes two problems. First, the problem of splitting up any individual time series into the components present in it. As a matter of common sense, we look upon it as a composite which we naturally would like to decompose by formal methods, *i.e.*, methods which involve as little theory as possible, because one of our main objects in doing so is precisely to confront results with theoretical propositions. Second, the problem of "correlation" of different time series with each other. Again as a matter of common sense, we look upon each series as one element of what we feel to be a process, which it is no less natural to try to explore by putting our time series in such a shape that they will display the relations between variations of economic quantities peculiar to that process. It is again very understandable that we should wish these relations to be derived by formal methods so as to make them

errors of measurement and form in both the same frequency distribution, say a symmetrical one. This distribution, of course, could change, but is for simplicity's sake assumed not to do so. By the Statistical Normal which does change we, of course, do not mean the function descriptive of the distribution but the values of the variable which in A and in B would turn out to be the "true" ones in the sense of the theory of errors of observation. Under our assumptions, these coincide with the values that are theoretically normal ones, and the reason why they are different as between A and B is that the theoretical or equilibrium value of the variable in A has been changed into the equilibrium value of the same variable in B by the process of evolution.

as independent as possible of theories. But as we have seen before from other standpoints, so we see now from the standpoint of statistical theory that neither problem is amenable to solution by formal methods or, indeed, has any sense if stated in terms of formal methods.

It is important for the reader to grasp clearly what that means and what it does not mean. Of course it is a well-known proposition that any material can be split into components—say of the sine-cosine type—in an infinite number of ways (see, for example, Lamb, article on Harmonic Analysis in the Encyclopaedia Britannica) and that even if the constants of the function that is to represent it are subject to restrictions sufficient to make the problem determinate, such as are implied in the Fourier analysis, no amount of closeness of fit proves in itself that the individual components have any meaning in the sense that distinct phenomena correspond to them. Therefore, there is, in a formal sense and in the absence of further information, no logical meaning to the question what components are "present" in any given material, and even periodicity that seems to stand out visually, as well as obvious absence of periodicity, may prove very misleading. Not only is it, for example, possible to approximate, to any desired degree, a straight line by a Fourier series, but a straight line may really be the resultant of two sine movements of equal period and amplitude and opposite phase. But our analysis leads us much beyond these and similarly familiar arguments. By formal methods we understand here methods deriving from, and making use of, probability schemata: and our point is that these schemata become, in strict logic, inapplicable under the conditions which give rise to time series as defined, and that application of methods based upon them may hence give spurious results. We must introduce further information or postulates in order to make them work at all. But even then they may work faultily. Hence, they cannot be relied on to discover and isolate any components and for this reason alone, even if there were no others, would also fail to solve the second problem of time-series analysis.

We do not however go so far as to say that they must work faultily and can never turn out results that are at least justifiable in the first approximation. To clear the ground in order to make room for judicious use of them, at least in some classes of cases, is on the contrary one of the objects of the above analysis, as it was one of the objects of many of the arrangements decided on in the fourth chapter.[1] We have, for

[1] What would happen to the probability foundations in case various tools of statistical theory should turn out to be applicable to our material, and how they would have to be transformed, is a problem into which we cannot enter in this book. Nor shall we systematically list and discuss the methods in use or suggested for dealing with time series. But it is easy to see what justification of the type of what, in French criminal procedure, are

instance, so chosen our three cycles as to make them significantly differ in period. This will open the door to several methods that would otherwise be excluded. Moreover, we have stressed that virtue of the three-cycle schema which consists in making it less absurd than it otherwise would be to assume approximate equality of periods for each class of cycles. This does not amount to justification, to be sure, and even if it did, would not suffice to render application of either Fourier or Schuster analysis plain sailing, but it certainly makes matters easier for both.[1] We have also pointed out, that each of our "higher" cycles may be plausibly assumed to span an integral number of the next lower ones. As the Fourier analysis consists of a fundamental term and its harmonics, this removes one of the difficulties its application encounters. In a sense, the mere fact that our analysis of the business cycle shows essential sameness of the process all along, both in nature and symptoms, goes some way toward discouraging that extreme scepticism which, at first sight, might seem to follow from the above considerations: to us, therefore, it does not seem correct to say that statisticians have, in their time-series analyses, been completely stepping on clouds.

The fundamental indictment, however, remains. We may express it in a nutshell by saying that statistical methods are not general in the sense in which our logic is and that, outside of the range of probability schemata, they must grow out of the theory of the patterns to which they are to apply. From knowledge about the phenomena to be handled, which is of course basically empirical but at the same time a priori with reference to each individual task in hand, we must try to form an idea about the properties of statistical contours and to devise statistical procedure appropriate to expressing those properties. This requirement we

called the *circonstances attenuantes* may from our argument be derived for, say, the method of moving averages, the area method and its affiliates (moving integration and the like), and others.

[1] Be it repeated again: there is no connection between our theory of the cyclical process of evolution and that assumption. However, if it were too wide from the facts, the Fourier method would become impossible, and so would the periodogram method. Hence, it is not superfluous to emphasize that the argument, "it is one of the very characteristics of business cycles that their length varies greatly even over short periods" (comment by Dr. Tintner on above passage), is not as convincing as it seems, as soon as we give up the single-cycle hypothesis. In this connection arises the question whether suitable reforms in both the practice and the theory of those methods might not improve their value. One example may suffice. We sometimes observe (compare E. B. Wilson's chart on page 399, (*op. cit.*) particularly the top curve) that while the ordinates of the periodogram nowhere reach heights significant within the meaning of the usual tests, there is a tendency for relatively high ones to cluster together. The writer speaks with diffidence on a matter which belongs to the realm of the specialist in statistical method. But it seems to him, that these clusters are not without significance and should be taken notice of, independently of mere height.

call the Principle of Economic Meaning.[1] The whole of the argument of this book may be looked upon as an attempt to provide material with which to satisfy it.

B. Various Meanings of the Term Trend.—The strong impression which all but compels us to distinguish trends and cycles may be embodied in quite noncommittal definitions. We may say that a series displays a *trend* if it is possible to divide the whole time interval covered by it into subintervals such that the mean values of the time integrals over these subintervals are monotonically increasing or decreasing in function of time, or that they display recurrence of the same figures once only. By the term *cycle* we designate the fact, that a given series corrected for seasonal displays recurrence of values either in its items or in its first or higher time derivatives more than once. Inasmuch as these fluctuations do not occur independently in individual series but display either instantaneous or lagged association with fluctuations in others, we may define the concept of cycle so as to cover this additional fact. Series which do not display such cycles we call Clean Trend Series; series which do not display a trend in the sense defined, Clean Cyclical Series. As these purely formal definitions do not involve any restriction as to the length of the interval to be studied, there are, of course, instances of both. For those intervals, however, which we consider in this book there are no instances of clean trend series, and only two major ones of clean cyclical series: unemployment percentage and interest rate.

Before we go on to develop our own view about the precise nature of trends in economic quantities and the methods of isolating them, we will in this section discuss some of the more important meanings of that overworked term in the hope that this will contribute toward a clarification of the issues involved.[2] In doing this we shall try to give to each meaning its operational complement, that is to say, to indicate which method of trend determination logically corresponds to it or is implied in it. We disregard two groups of meanings, both of which make the term serve as a substitute for the word *tendency*, which seems to have gone out of fashion. The first may be instanced by the proposition that prices have, on a certain day, displayed a downward "trend": this has, of course, nothing to do with what we are here concerned with. The

[1] The Cumulation Method and some of its applications afford good illustrations of that principle as well as of the consequences its neglect may entail. See Editorial on the Harvard Index of Business Conditions, *Review of Economic Statistics*, 1927, p. 80.

[2] The writer wishes to call attention to Professor E. Frickey's paper on the Problem of Secular Trend in the *Review of Economic Statistics* for October 1934, which presents a view in many respects similar to the argument of this section. See, also, Ellen Quittner-Bertolasi, Das Verhaltnis von Trend und Konjunkturzyklen als mathematisch-okonomisches Problem, 1933.

second could be instanced by quotations from any one of that host of popular writers or speakers who seem to derive satisfaction from writing or talking about "trends and forces" in a nontechnical and nonquantitative way.

1. Our understandable wish to survey the behavior of any economic quantity during any length of time without being bothered by all the ripples or dents in the graph, or to have before us the "general slope" or the "underlying movement" of that quantity during that time will, as a rule, require some economic analysis, however crude; for it is obviously not a matter of indifference what it is which that smooth slope excludes. We may, however, also gratify that wish in a purely formal way by the application of some method of smoothing or graduation.[1] It is most completely gratified by fitting to the material a simple curve, such as a straight line, a parabola, a Gomperz, a logistic, or one of many others. If, for instance, we are interested in the average rate of change a quantity displayed during a certain period of historic time, the exponential $y = cr^t$, where c is a constant and r expresses that average rate, will serve well, even if the fit be not good according to some formal test. For an example of its application the reader is referred to Professor Mills, Behavior of Prices, p. 66. Curves or functions that aim at representation of time series in some such simplified form and at nothing else we shall call Descriptive Trends.

No objection is being raised against them, provided it be clearly realized that they are nothing but a piece of economic history in the form of a curve or the most radical of all smoothing devices. Considerations of adequacy of representation or goodness of fit, on the one hand, and of calculatory convenience or expense, on the other, may legitimately enter. The highly subjective character of these is, to be sure, in striking contrast with the apparent exactness and objectivity of the results, indeed almost amusingly so. But this is the natural consequence of the indefiniteness of the purpose. The problem is essentially one of reasonable compromise. A simple curve with few constants is easy to calculate but may be a poor representation. A high-degree parabola is expensive to calculate and may pick up too much of the fluctuations we wish to discard. Use of orthogonal functions carries among other advantages also the practical one that, each constant being independent of the degree of the function, it is possible to proceed to higher approximations simply by adding new items, without having to do all calculations over again.[2]

[1] For a very good discussion of principles and methods compare, for example, F. R. Macaulay, The Smoothing of Time Series, 1931.

[2] As far as the writer knows, the case for orthogonal functions has been first presented and the theory of their application first worked out by P. Lorenz in his monograph on Trend, Special Number 9 of the Vierteljahrshefte für Konjunkturforschung. Dr. Tintner has

Such considerations cannot be made determinate, but this is no reason to condemn them. Even such practices as "leaving out clearly abnormal points" and recognizing "breaks in trend"—which means fitting different simple functions, say, straight lines, to subintervals—have their place, although they imply an exercise of judgment which must be justified in each case.

The difficulties adverted to in the preceding section arise, however, as soon as we try to put descriptive trends to any other use than that of expressing quantitatively the rough contours of our material. To begin with, there is no warrant whatsoever for extrapolation. Moreover, it must not be taken for granted that such trends describe a real—still less a smooth—process, distinct from the process which gives rise to the fluctuations, and that by eliminating such a trend from our material we are eliminating certain factors and isolating the effects of others, thus performing a piece of economic analysis. To make this quite clear, let us visualize the particular case of fitting by the method of least squares (or moments). There is, as we have seen, because of the obvious absence from the material of the properties that justify application of the probability schema—these properties are zero correlation, uniform variance, normal frequency distribution of deviations—no basis for that method in strict logic.[1] But as long as we confine ourselves to the meaning we have attributed to descriptive trends, this does not greatly matter, since there is no particularly convincing justification for any trend line of that nature. It does matter, however, as soon as we give analytic meaning to the operation and expect it to effect separation of distinct processes. The trend we decide on will determine what the fluctuations will be. But irregularities and cylical fluctuations will, in turn, determine the trend. It follows that no progress toward analysis is possible on these lines and, also, that correlation of remainders, *i.e.*, of series thus "corrected for trend," is almost, though of course not quite, as objectionable as correlation of uncorrected values would be.[2]

---

pointed out to the writer that they were used in physics before. R. A. Fisher's Analysis of Variance and the test it provides ("Z" test) undoubtedly rationalizes our behavior with respect to number of constants. But it does not seem to the writer to affect the above argument.

[1] That proposition is not dependent on the way in which Gauss originally deduced the method of least squares. The assumptions which create the difficulty are all still present in more modern expositions.

[2] Bobroff's moving correlation, while still open to some of the objections alluded to, certainly improves the situation. Further progress has been made by Zinn, A General Theory of the Correlation of Time Series, *Review of Economic Statistics* for October 1927. Compare, also, O. Anderson, Korrelationsrechnung in der Konjunkturforschung, 1929, and, for procedures which avoid probability considerations entirely, Professor Frickey's and Professor Mitchell's methods, noticed in the first chapter.

Once more, as in the preceding section, we have to add not only that this criticism does not touch the use of descriptive trends for the purpose of provisionally exploring our material, but also that trend analysis by means both of smoothing and of fitting may, from additional theoretical and historical information, derive a right to existence not naturally or generally its own. In illustration of this we may point to a result of Professor Frickey's study on the Problem of Secular Trend quoted before. He shows (see tables on pp. 204 and 206, *Review of Economic Statistics* for October 1934), or rather intends to show, that almost any cycles can be derived by means of fitting different functions to different intervals of our series or by means of calculating moving averages for periods of different length. But, while applauding the main drift of his argument, the present writer yet wishes to point out that the wholly pessimistic inference drawn from this by Professor Frickey does not quite follow. For we get not only meaningless cycles but also cycles which can be justified by historical analysis. The reason for this, and the method by which we may hope to distinguish the latter from the former, had better be discussed in the setting of a somewhat different argument.

2. The situation would be completely changed if it were possible to assume that our material reflects, *as a matter of economic fact*, first a smooth and steady movement, and second fluctuations around it which are due to random shocks or disturbances that behave as if they were random shocks. This would supply the missing warrant for the application of probability schemata and our task would reduce to finding the precise form of the "empirical law" of that movement, for which purpose use of the method of least squares could, barring the "big" disturbances, be defended on principle. The Harvard method proceeds, in fact, from such an assumption, as we may conclude from the comments of its inventors and from the use of the phrase Secular Trend which seems to point in that direction.

However, this implies a definite theory of economic evolution. It is not difficult to say which it is: the Marshall-Moore theory of organic growth. Since we believe that theory to be unsatisfactory and the picture of a steady march of progress to be misleading, we are estopped from following the road which it seems to open. But, besides shedding some light on the relation between statistical method and economic theory and on the working of the postulate of "freedom from theoretical preconceptions," this case may again serve to show that results of methods unacceptable on principle need not, therefore, be valueless. If the cyclical process of evolution, as we conceive it, is at all clearly marked, there is some likelihood that the results arrived at from the assumption under discussion will have the value of first approximations to the trend we shall define in the next section, for properly chosen intervals. It is a

significant fact, to which we shall have to advert again, that the Harvard method gave satisfaction in the sense that it brought out obviously plausible fluctuations about an equally plausible trend line when tried out on material covering 1896–1914 and that difficulties arose when the same treatment was applied to the whole stretch from 1875 to 1914. In terms which will later on acquire their full significance, we may formulate this by saying that in the first instance the least square trend[1] did, and in the second it did not, approximately hit upon the line between the normals of the shorter cycles, because in the first instance it did, and in the latter it did not, roughly follow the sweep of a Kondratieff phase. Whenever it does, Professor Frickey's indictment requires a qualification, which, however, does not impair its validity in strict logic.

We shall use the term Real Trend to denote a trend which embodies the contour of a real process, distinct from whatever causes cycles, such as a least-square-trend line would describe if the above conditions were fulfilled, *i.e.*, if the Marshallian picture were sufficiently lifelike. The effects of Growth in our sense afford an instance. Their presence undoubtedly accounts for a real trend which, however, is so much overlaid by the effects of other and more important external and internal factors that it cannot be found by any process of curve fitting. There is no reason why a curve descriptive of our Growth should go midway through the graph of observed values or display any definite, let alone invariant, relation to them. Real trends will never do this unless the factor which they express so dominates the given material that the effects of all the others may safely be treated as "minor" deviations.

3. Economists who share our doubts about the validity of fitted trends, and also some who do not, sometimes analyze a given time series by referring it to another of wider or more fundamental significance. Thus, a series representing variations in the price of an individual commodity may be referred to, or corrected by, an index of general

[1] Dr. Tintner having objected to the above passage on the grounds that the term Least Square Trend is ambiguous as long as the function to be fitted is not defined, and that it is not the method of fitting but the form of that function which follows from the economic assumptions, the writer wishes to restate his meaning: What follows from the economic assumption that there is a factor or set of factors making for even growth and distinct from random factors which produce the cycles is precisely that the particular method of fitting by least squares (or moments) now becomes defensible on probability considerations. Its application is not on that account plain sailing—this follows from our analogy with the moving target—but there is not in this case any logical objection to it. The choice of the function to be fitted will, of course, also have to be justified on the lines of the Principle of Economic Meaning. But this is another matter, with which we are not now concerned. It may have to be a "law of organic growth" in the sense of a simple exponential or a logistic, but whatever it is has nothing to do with the point we are trying to make. That is why, leaving the form of the function indeterminate, we have used the term Least Square Trend, in order to designate any function fitted by that method.

prices. Professor Bresciani-Turroni, who has as far as the writer knows, been the first to suggest this procedure as a substitute for formal methods of trend analysis, took total output as a reference quantity in a study of exports. Professor Warren Persons gave another lead in this direction by comparing short money rates with bond yields. Such trends might be called Reference Trends Their meaning and the correctness of the idea that underlies them are not in question. They certainly express fundamental movements of a particular series in a much richer sense than descriptive trends do. But they do not directly help us to isolate cycles. In fact, they unavoidably contain all the elements which it is the aim of trend analysis to separate.

4. Some factor unconnected with the cyclical process of evolution may exert steady influence on some particular element or elements of the economic system which it may be desirable to study in isolation or to eliminate. If it directly acts on the system as a whole, its effects on our figures would constitute a real trend. If it acts on parts of it only—and but indirectly on the whole system—we will speak of a Special Trend. Autonomous changes in taste, such as occurred with respect to alcoholic drinks or heavy foods, afford examples. Such trends may or may not conform to our general idea of what a trend should be, but can in no case be found by formal methods. It should also be observed that phenomena which according to our analysis are essentially elements of the cyclical process of evolution will, in very many cases, look like special trends. Output of a new commodity may easily trace out a Verhulst curve which many students will have no hesitation in interpreting as a trend special to that commodity and distinct from any cycles that may run their course during the same period. From our standpoint, of course, this is never strictly correct, although it may, for the purposes of partial analysis, be convenient to express oneself so, particularly in dealing with the problems of the shortest cycles.

5. We will, finally, recall again that, the Kondratieffs not being recognized as cycles by the majority of students, many of those long and slow movements upward and downward which are cyclical for us will be treated by others as properly belonging in the class of trends, which results in differences of theoretical analysis on a number of important points. But this view, which implies that those movements are non-cyclical in nature, should not be confused with the proposition of sec. D of this chapter, that every cycle of higher order may be considered as the trend of the cycle of the next lower order.

C. A Single Cyclical Movement.—We return to the principle of economic meaning and our definition of time series. In order to facilitate exposition, we will in this section assume not only that seasonal variation and growth (in our sense) are absent or have been successfully eliminated,

but also that the process of economic evolution embodied in our model works in such a way as to produce one cyclical movement only. Of course, these assumptions already constitute "additional knowledge." We know, further, the nature of the process that any time series fulfilling those requirements would reflect. Each item of such a series indicates, in a way appropriate to the nature of the element represented by the series, a stage in that process which, as we know, sometimes propels the system away from, and at other times draws the system toward, a neighborhood of equilibrium. It follows, even without formal proof, that there must exist on the graph discrete points or, slightly more realistically, discrete intervals in which the series passes through neighborhoods of equilibrium or comes, at all events, as near to such neighborhoods as it will go and as its inactivity, rigidity, or sloppiness allows. This is a fact of fundamental importance for us. It supplies the link between what we have called the Theoretical Normal and its statistical shadow, the Statistical Normal. This term, as we shall henceforth use it, has nothing to do with frequency distributions. Its meaning is analogous to what the business services mean when they say that business is above or below normal. In fact, what we are trying to do is merely to offer a more precise definition and a somewhat different interpretation of this very idea, so familiar to business practice.

To locate the points on our graphs which correspond to points of equilibrium, or the intervals on our graphs which correspond to neighborhoods of equilibrium, therefore, is from our standpoint the first and foremost task of time-series analysis. For the state of the economic system in those neighborhoods sums up and presents, however roughly, the net result of the preceding spurts of evolution as shaped and absorbed by the response of the system. They mark the path of economic evolution as steppingstones mark the path across a brook. They are the most relevant items of a series, most pregnant with information and most important as reference points for the rest. A line or curve through those points, or a band or narrow zone through those neighborhoods, supplies a trend that really has economic significance. We shall use the term primarily in this sense. We know from the analysis in the second and fourth chapters that this trend does not describe a phenomenon distinct from the cycle. On the contrary, since evolution is essentially a process which moves in cycles, the trend is nothing but the result of the cyclical process or a property of it. In order to express this, we will call our trend the trend of results or Result Trend. Moreover, we also know that it carries realistic meaning only in discrete points or intervals. If we connect them by straight lines or fit a smooth curve to them, it must be borne in mind that the stretches between the neighborhoods are

nothing but a visual help and devoid of realistic meaning. No facts correspond to them. Real is only the cycle itself.[1]

Just as statement of the problem was possible only from the economics of the case, so methods for its solution cannot be derived from anything else: they are but a translation into statistical tools of such information as we may be able to command. But we will emphasize once more that historical information about each individual case is the only means by which to reduce to bearable proportions the influence of external factors and that study and discussion of each situation which seems to have some claim to being called a neighborhood of equilibrium, and unavoidably rough estimates will be the surest way to reliable results, at least for some time to come. It is this method on which the writer has chiefly relied and it is in order to illustrate principles rather than for the sake of the use we make in our work on time series (some experiments, of course, have been made) that we now attack the question of the purely statistical procedure.

In the case of two-phase cycles solution would be easy. First, we should have to establish the fact that a given cycle displays two phases only, and to make sure that the points between cycles are really normal and not freakish—for there could obviously be cases in which some or all symptoms outrun equilibrium, but rebound so quickly that there is practically no depression and consequently no recovery. Second, having satisfied ourselves on those points, all we have to do is to mark the highest or the lowest points, as the case may be, according to the nature of each series. A smooth curve connecting those points will then give the trends which, as already stated, in this case do not go through the material but trace lines bordering on it in certain places and deviating from it in others. Of course, external factors must be expected to produce at least dents—but, as a rule, fluctuations also—which will upset the cyclical schema unless historically diagnosed. That they may, and certainly often will, deflect the whole series for good must be recognized. What we get is, hence, never a trend resulting from or produced by the cyclical process alone, but by the cyclical process as distorted by external factors.

In the case of a four-phase cycle the problem and the principle of its solution are the same, but practical difficulties arise. The price level,

[1] The above paragraph merely restates conclusions arrived at in the three preceding chapters and should be read in the light of what was said there. It will then be clear, first, why the concept of a moving equilibrium of the type indicated by Moore, while useful for other purposes, would not suit ours and, second, in what sense we are entitled to say that the cycle is a "real" phenomenon, while the trend is not: the latter is not a product of a distinct set of causes (except insofar as it reflects growth).

for instance, would in strict theory rise both in prosperity and recovery and fall both in recession and depression. But even if in fact it always behaved like this, the neighborhood of equilibrium might still lie anywhere between the peaks and troughs and there is obviously no prima-facie warrant for assuming that it should lie, for example, midway. Hence, our only hope of identifying neighborhoods from time series themselves reduces to the possibility that their graphs display some characteristic behavior in or around those neighborhoods. This might, of course, consist simply in their assuming a particular numerical value, which, however, is obviously out of the question. But equilibrium positions might also be betrayed by more general properties of the graph. Consideration of this opening imposes on us, it is true, a big toll at the outset. For unless we rest content with a visual impression (which may be the wisest and most straightforward thing to do, the more so since any result, however arrived at, will have to be tested in the light of historical information), we will first have to perform a smoothing operation in order to get rid of oscillations, vibrations, hesitations, and also of some of the effects of some of the external factors.[1] As soon, however, as this toll is paid, we reap all the advantages incident to being able to deal with differential properties of the smooth curve only, *i.e.*, with rates of change (and higher derivatives; although, owing to cumulation of errors, it is dangerous to go very far) at every point.

This idea is due to Ragnar Frisch.[2] In order to illustrate his Method of Normal Points, we will follow him in first considering the case of an

[1] Smoothing, if it be done in the course of an analysis that is to reveal fundamental forms of the phenomena under study, is a much more serious operation than some of our fellow workers seem to realize. In particular, it may, besides displacing points the precise location of which is of importance, suggest properties of the material which do not really exist in it. But smoothing (or, for that matter, curve fitting) also may yield a much truer picture of the essential features of the phenomenon than the graph of the raw figures themselves. Which it does is a quaestio facti and cannot be settled by formal criteria. In material like ours the best fit may tell the biggest lie. *Any* fitting or smoothing involves a number of assumptions about the behavior of the material, the reasonableness of which should be tested in each case.

[2] First published in a mimeographed essay entitled The Analysis of Statistical Time Series, 1927, which should always be referred to in preference to later publications, because it contains the only full presentation of the mathematical background of the method (sec. 3 and 4) and the only full discussion of the nature and degree of approximation to be reached by it. A condensed statement embodying the results of later work was published in the *Skandinavisk Aktuarie Tidskrift*, 1928, a short note (A Method of Decomposing an Empirical Series into Its Cyclical and Progressive Components) in the *Journal of the American Statistical Association*, supplement, March 1931. To the present writer, the method has always seemed to be a stroke of genius and an excellent illustration of how, according to the Principle of Economic Meaning, statistical method should grow out of our knowledge of the particular phenomenon to which it is to be applied—that knowledge being embodied in two postulates, to be noticed in the text, which are, however in some

economic time series, the smoothed graph of which can be represented by a sine curve on an axis that displays, say, a positive gradient. Of course, in this case there would be no objection to ordinary Fourier analysis and a number of other methods. But it also serves to show that the curve would, in fact, display characteristic behavior, namely, points of inflection, whenever it passes a neighborhood—in this case, a point—of equilibrium: the second derivatives would vanish in those points, since sine $n\pi = 0$ ($n = 0, 1, 2 \cdots$). In order to get at the economic meaning of this, let us choose, say, a series of employment figures cleared of seasonal, and free from accidental, fluctuations, that moves in a four-phase cycle. Obviously, it is not unreasonable to expect that employment will increase at a slackening rate during prosperity, that it will decrease at an accelerating rate during recession, that the rate of decrease will be at a maximum when the system embarks upon depression and that employment will then go on decreasing at a rate which gradually decreases until recovery point is reached, after which it will increase, haltingly at first and then more and more decidedly as the processes of recovery get the upper hand, until equilibrium is reached. All this is highly schematized, of course, and very far from being the picture of any actual process, but it is not absurd. At any rate, it shows how economic factors which we know to be at work *could* produce a behavior of our graphs that would not only characteristically differ as between the phases but also indicate neighborhoods themselves. There is nothing in the logic of the process to bar advance on these lines, although there are plenty of other obstacles in the way.

Economic meaning not being wanting, we might even go so far (we shall not be so bold) as to use that particular shape as a schema with which to express essential features (in German the writer would use the word *Wesensform*) of the phenomena and to compare actual behavior. If, to keep to our example, employment, at the beginning of what can historically be proved to be a true prosperity, should not increase at all and afterward for a time increase at an increasing rate, there surely would be some justification for suspecting that this behavior was due to an external factor and for starting to hunt for it. If presence of such a factor could be satisfactorily established, we might have the same right to bridge the cavity by a stretch of sine form that the archaeologist has to reconstruct the "true" form of an ancient temple from the ruins plus his knowledge about what a temple is. This sounds absurd only as long as we disregard historical evidence, which, of course, has to supply the warrant in each case.

---

respects more, in others less, general than is our theory. The other method developed by Professor Frisch (method of moving differences) will not be discussed here.

Professor Frisch had no difficulty in doing away with what are most obviously unacceptable properties of that schema, namely, the constant period,[1] equality of excursions to both sides of normal, and equal length of phases. If in the differential equation, $y'' + cy = 0$, of which the solution is the sine curve, we replace the constant c by a function of time $F(t)$, assumed to be regular and always positive, we get the general form of a differential equation of the second order $y'' + F(t)y = 0$. And this makes it possible to take care of very many patterns which are much nearer to reality. In particular, we need no longer assume that intensity of the action of equilibrium ligamina is proportional to the distance. Deviations "above" and "below" may stand in any relation to each other as to duration and amount. However, no less than in the case of the sine curve, the trend is assumed to be the gravitational axis of the smoothed curve, *i.e.*, the latter will always have to turn its concave side toward that trend. Again, there is a perfectly sound economic meaning to this. From the standpoint of our model we shall, indeed, think it highly plausible[2] that the action of equilibrium ligamina should be the stronger (gains and losses incident to disequilibrium the greater), the farther away from equilibrium the system is: as far as that goes there would be little objection even to straight proportionality. Only, this formulates but one *tendency*. However well established and expressed, it will not prevail in reality or in the graph, unless all the other tendencies which also are reflected in it—in particular, the entrepreneurial impulse and factors responsible for external and internal irregularities—act in a certain way. The method, hence, implies certain additional assumptions about that. Consider, for instance, a function as little freakish as $y\ (t)$ =

[1] C. A. R. Wardwell in An Investigation of Economic Data for Major Cycles, privately printed 1927, used, however, a moving average of periods which varies with the length of each cycle. An analogous idea is implied in the National Bureau method.

[2] In strict theory, that postulate is more than merely plausible. It might even be held—although the writer confesses to some doubts about this—that it is no postulate at all but a consequence of the fundamental properties of the system. This would not, however, exclude that it fit facts but ill. To illustrate this by an analogy: an elastic string will break if exposed to tension greater than a characteristic constant. Moreover, it may cease to act without breaking or act with lesser force beyond a certain point, if exposed to tension either recurrently or for a sufficient period at a time. There are some suggestions for further analysis in this. But this apart, there are, of course, other hypotheses besides the one discussed in the text which may help us to get on to the facts of our case. One that seems very promising has been suggested by M. Le Corbeiller (compare his article on Les Systèmes Autoentretenus et les Oscillations de Relaxation, *Econometrica* for July 1933). It is embodied in the Van der Pol equation $y'' - \epsilon(1 - y^2)y' + y = 0$ (compare B. Van der Pol, Oscillations sinusoïdales et de relaxation, *L'Onde Electrique* for June–July 1930) which, if ϵ be great, describes a process of accumulation of energy followed by a quick release. In this book we shall not, however, follow up this clue. The use of "skewed sines" has been suggested by Professor Crum in a paper quoted below.

$t^3(t^2 - a^2)$. The graph (the reader should draw it) presents the picture of a clean cycle, astride on $t = 0$. But not only are inflection points absent where they should be present (for $t = a$ and $t = -a$), but there are three of them within the cycle, of which two (the one at $t = 0$ is all right) may be very misleading in more complex cases.

The example is merely intended to show how very easily the fundamental postulate may fail to be fulfilled. In many cases, alluded to above, the curve will be convex to the axis for considerable stretches of prosperity and recession—owing, for instance, to speculation's feeding upon itself in the first and covering in the second case. In other cases, inflection points may not occur in their "true" places or may be difficult to locate. This is independent of the additional difficulty that smoothing may produce spurious and hide real inflections. That is why our exposition will not issue in a general recommendation to adopt this method, for the present at least, in practical work. Although it is successful and of practical value in many cases,[1] we see its main impor-

[1] The reader who wishes to have an infallible method that will mechanically turn out results, will unavoidably be disappointed and feel it difficult to understand the admiration the writer feels, nevertheless, for that method most objections against which seem to him to rest on misunderstandings. The writer is unable to sympathize with that mentality. Although he greatly dislikes the word *impossible*, he believes it safe to say that, for the present, our material being what it is, no formal method can replace common sense and experience with both theory and material. To call for such a method is as reasonable as it would be to call for a machine which will automatically perform surgical operations in an ideally foolproof way. And to smile in contempt on freehand methods is as reasonable as it would be to scorn the subjective judgment of the surgeon or the inexact working of his hand. It is, therefore, not derogatory to the Frisch method to say that it will issue, in very many cases, into freehand procedure, which alone can bring to bear on our work all we know historically and otherwise and which alone can, to some extent, cope with the fact that our material is distorted by external factors besides being internally irregular. This is clearly brought out by the paper by L. A. Maverick on time-series analysis by successive smoothings (*Econometrica* for July 1933), with which, however, the writer does not entirely agree (see, in particular, the considerable role accorded to the midway line). But in many respects Professor Frisch's method compares favorably with others, even from the standpoint of practical application. Its great virtue—the working by local instead of total properties of the curves—prevents for example erratic items from directly (*i.e.*, by their presence, not, of course, by their effect on other items) influencing the trend, unless the irregularity happens to occur in the neighborhood of equilibrium. It also excludes influence of peaks and troughs, which is as it should be, apart even from the likelihood of their being erratic. Hence, it is not correct to say that the Frisch method does not help at all toward elimination of random fluctuations, which is the reason why some students prefer Professor Anderson's method advocated in the work quoted before. In no case do other methods gain by comparison. There is no sense in holding that we ought to think any better of them because they are more sure-footed in application than Frisch's method is. For, inasmuch as they are wrong in principle, this is only another reason for discarding them. There is little compliment in saying that they turn out error in a perfectly objective and exact way.

tance in the rationale and criterion it provides for all efforts in the field of time-series analysis.

D. Many Simultaneous Waves.—The above analysis only served to illustrate a principle and to lead up to the really relevant case of a complex cyclical movement. We will, for the sake of simplicity, let it consist of our Kondratieffs, Juglars, and Kitchins only, and disregard all the other types of fluctuations noticed in sec. E of the preceding chapter. Since we have nothing to add to what was previously said about effects of external disturbances and the possibility of eliminating them, it will also be convenient to assume their absence as well as absence of, or successful correction for, Seasonals and Growth. Although, of course, we do not, as a matter of principle, postulate either internal regularity or sine form, there is some use in presenting (Chart I) the graph of the sum of three sine curves the amplitudes of which are proportional to their duration and (Chart II) the graph of the first differences of the composite curve. There is, however, no trend: the cyclical movements represented are, in our terminology, "clean." Barring this, we may look upon the charts as an illustration of all the boldest assumptions which it is possible, and to some extent permissible, to make in order to simplify description and to construct an ideal schema with which to compare observations. In particular, all cycles have four phases of equal length, amplitudes of plus and minus excursions are equal and constant, periods are also constant, and each of the two higher cycles consists of an integral and constant number of units of the next lower movement. For the stranger to statistical technique the fact alone that extreme regularity of but three components may result in so very irregular-looking a composite should be instructive. But these pictures may also help us to form an idea about how near to, or far from, reality those assumptions are which some statistical methods impose.[1]

We recall that many methods which would be available for the analysis of such a composite and are not, in strict logic, applicable to the economic time series we meet with in practice, may yet produce results which historical analysis permits us to accept as approximations. This fact again suggests that our material satisfies certain conditions of regularity, in particular those required by the Fourier and the Schuster analysis, more nearly than we should expect on theoretical grounds.[2] It also gives

[1] Professor Irving Fisher has, in his contribution to Economische Opstellen, aangeboden aan Professor Dr. C. A. Verrijn Stuart (1931), used the harmonic components of an organ-pipe tone to convey a similar idea. We wish to draw the reader's attention to that contribution, which formulates the views of its author in a way much less distant from ours than other publications of his.

[2] Professor W. L. Crum points out (The Resemblance between the Ordinate of the Periodogram and the Correlation Coefficient, *Quarterly Publication of the American Statis-*

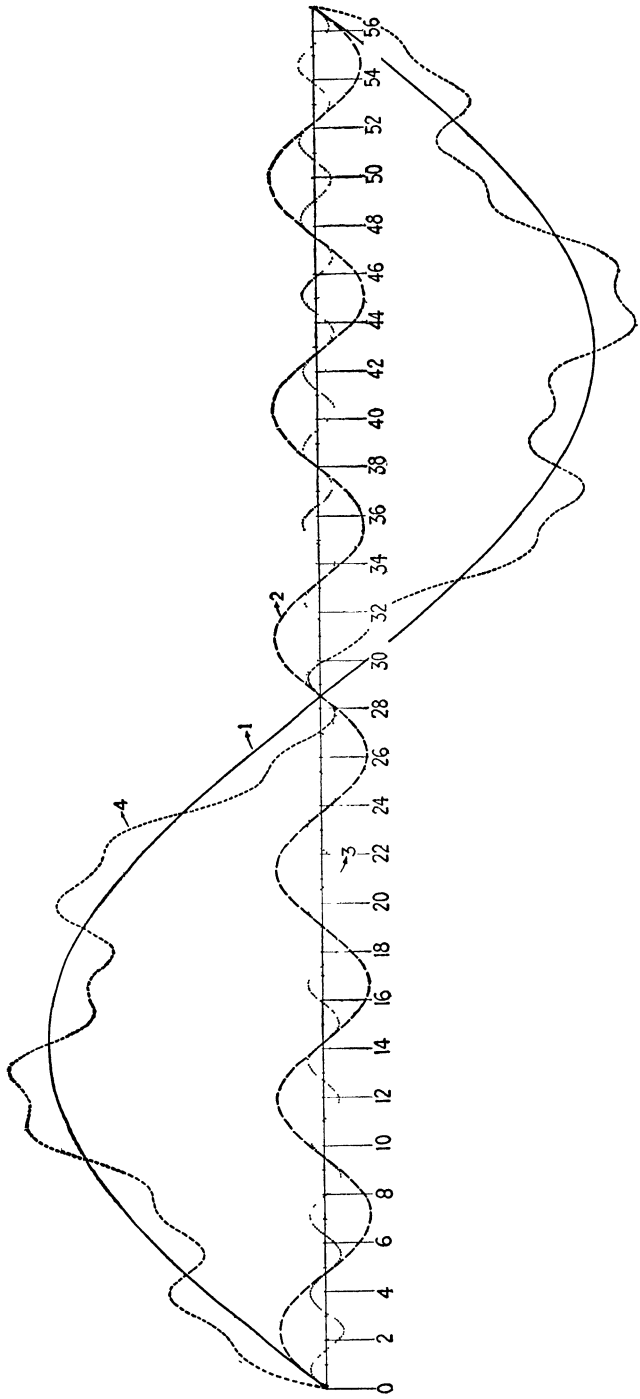

CHART I.—Curve 1, long cycle; curve 2, intermediate cycle; curve 3, short cycle; curve 4, sum of 1–3 (see Appendix, page 1051).

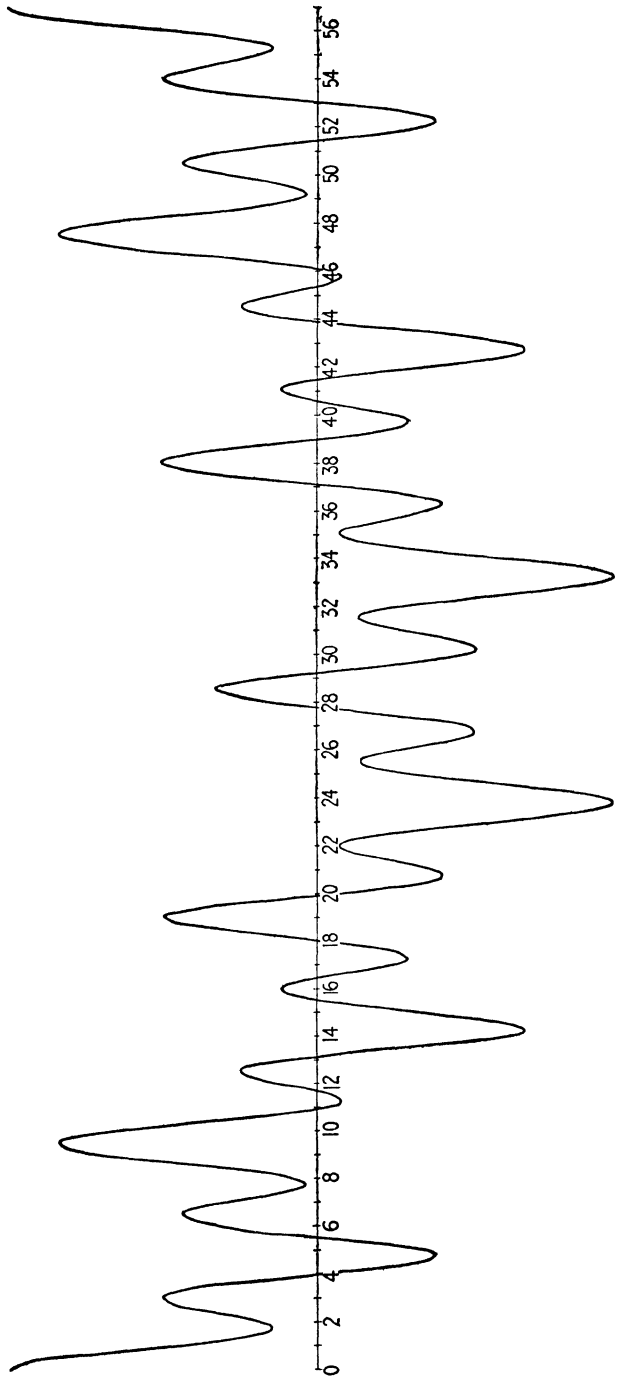

CHART II.—(See Appendix, page 1051.)

additional importance, for our field, to an elegant method due to Dr. N. S. Georgescu, which has been used in the analysis of one of our series (Chart XXIV), although it consists in fitting sine curves according to a probability test—the most probable values of the unknown periods of a known number of sinelike fluctuations[1] being found under the assumption that "errors" are distributed according to the Gaussian law.[2] And the same fact also lends some support to quite primitive methods of proceeding by inspection—simply counting off what we see—or by means of average periods that hardly ever get very seriously out of step with observations except in cases which we may reasonably explain on the score of external disturbance. The success which Mr. Kitchin (Cycles and Trends in Economic Factors, quoted above) undoubtedly achieved simply by counting off his short cycles, observing that two or three of them seem to form higher units and that there is a sort of ground swell below both, illustrates the point very well.[3]

But we shall here confine ourselves to Professor Frisch's method of Normal Points.[4] The present problem is fundamentally the same as in the case of the single cycle: we have again to locate statistical normals which are to be interpreted as neighborhoods of equilibrium and to be indicated by inflection points. This means that we continue to postulate that each cycle is a solution of an equation of the form $y_n'' + F_n(t)y_n = 0$. The first thing to understand is that the method does not now become open to the same charge as the Fourier analysis, namely, that it may

---

tical Association for September 1923) that the periodogram method will work satisfactorily only if fluctuations do not depart too much from the sine form (p. 892). His own success with the periodogram analysis of the short rate of interest, therefore, proves that the fluctuations, in this series at all events and in the period studied (p. 898), actually did conform to it fairly closely. That paper is rich in suggestions on a number of other important points; compare, for instance, p. 896.

[1] It should be observed, however, that the method cannot handle more than three of them.

[2] See Académie des Sciences, séance du 7 juillet, 1930, Sur un problème de calcul des probabilités avec application à la recherche des périodes inconnues d'un phénomène cyclique. Note de M. N.S. Georgescu, présentée par M. Émile Borel, which gives the fundamental idea.

[3] The "method" of moving averages, which is severely judged by some of the best of statisticians, also derives some support from considerations on those lines. We shall often treat series in this manner.

[4] A method which also works with points of inflection has been independently developed by Professor Walter A. Baude of the University of Cincinnati, who used a third-degree parabola for trend and analyzed the B.L.S. index of wholesale prices and two synthetic composites, among them one consisting of schematic Kondratieffs, Juglars, and Kitchins. Results were distinctly encouraging, although a high-degree trend, entailing more than two differentiations, creates difficulties on the score of cumulation of errors. The method was communicated to the Econometric Society at its New York meeting, 1936. See *Econometrica* for April 1936, p. 183.

yield spurious components. This danger is practically avoided by the differential character of the method, which rests upon independent study of the behavior of the material in the vicinities of each point on the (smoothed) curve. It is obvious that any cyclical movement which, nevertheless, shows up at all persistently, is extremely unlikely to be meaningless.[1] But beyond this, the application of the principle now meets with several difficulties.

We have previously noticed that there is no warrant for assuming that our three cycles, or any cycles of different order, are additively superimposed to each other. While by the use of logarithms multiplicative relations can also be taken care of, the general case cannot be satisfactorily handled so far. This, however, does not greatly matter in the present state of our knowledge of the phenomenon. It seems at first sight to be more serious that the method, giving only discrete points on every cycle, does not inform us about the shape of the higher cycles between neighborhoods. But from the standpoint of our theory it may be replied that the distinction between simultaneous cycles mainly turns on the neighborhoods and that in the intervals between them there is not the same kind of "realism" about it, while our trends have *no* realistic meaning in those intervals. From the standpoint of the particular method under discussion, it may be urged that even if we discard as unreliable the neighborhood of each cycle that occurs on downgrades, we have three Kitchin neighborhoods to every Juglar and six Juglar neighborhoods to every Kondratieff, and that if we fit through these—taking into account, on the one hand, the possibility of two-phase cycles and, on the other hand, our postulates about smoothness and curvature—we are not likely to deviate very much from reality, although we may sometimes feel doubtful about the precise values of relative amplitudes.

To the writer this difficulty does not seem so grave as the question of the reliability of the points of inflection, which has been noticed in the case of a single cycle and now reappears with a vengeance. But a still more fundamental point emerges behind it. Except in the cases in which the normals of the cycles of all orders coincide, the points of inflection of the cycles of lower order obviously cannot lie exactly on a curve which is to represent the sweep of the cycles of higher order. Hence, a curve derived by interpolation between those points would not trace the underlying cycle, even under ideal conditions, and the line through the inflections of the composite does not go through the normals of the cycle of lowest order. Our decision made in the previous chapter—to look upon each "underlying" cycle as the "trend" of the next one

[1] It may still happen, of course, that a fluctuation of a given order is "generated" by a fluctuation of a different order. About this no method of decomposing can tell us anything. But the generated fluctuation would still be a real and significant movement and not a product of the method.

of lower order in the sense of locus of the normal points of the latter—seems to involve contradiction. It will be seen, however, that this does not amount to more than that the method now becomes essentially one of approximation, and this is as valid a defense of the statistical as it is of the theoretical point in question. Whether the approximation be satisfactory must, indeed, be judged on the merits of each case and cannot be decided once for all. If the surface movement of the composite is dominated by the shortest cycle, and then again, the contour that would emerge after elimination of the latter, is dominated by the cycle of next higher order, and so on, lines through the inflections of the composite and then through the inflections of successive remainders will each of them indicate, although not give, the location of states which are, relatively to each cyclical movement, neighborhoods of imperfect equilibria. This hypothesis will undoubtedly fail in many cases, but these cases can be seen in the graph and interpreted from industrial history. Delicate questions of interference arise here, into which, however, we need not enter for the purposes of this book.

If besides our cycles there are also other fluctuations in the material, the Frisch method will show them all, including seasonal ones, hesitations, and so on. As stated above, it will do so more reliably than the periodogram analysis, both in the sense that it is because of its flexibility less likely to suppress real (though irregular) fluctuations and in the sense that it will not produce meaningless ones. If durations of component fluctuations are sufficiently different, a very simple graphical procedure will give good provisional results. Chart III presents an example[1] displaying seasonal and Kitchin fluctuations. The only other example of the application of the Frisch method contained in this book will be met with in our discussion of the cyclical behavior of the level of prices.

While the method thus helps us in exploring our material and, in doing so, shows up to advantage, it cannot, of course, pick out from all the movements it reveals those which are cycles in our sense, the Kitchins, Juglars, and Kondratieffs.[2] This can be done only by further economic analysis, both of the theoretical and the historical type. In this respect, the method has indeed the virtue of harnessing the concept of equilibrium and a few properties of the cyclical process to statistical use, but still remains formal beyond that. Nor does it reveal any component as it actually acts, but only as it *shows* as distorted by other factors. Whenever we are in a position to construct the "true" form of a component

[1] The series of Average Weekly Cars of Revenue Freight Loaded was analyzed by Mr. S. N. Whitney in the seminar conducted by Professor Frisch at Yale University in 1930–1931. The writer is much indebted to Professor Frisch for his permission to use it, as well as for the trouble he generously took, by advice and criticism, in the work on the price-level series referred to in the text.

[2] We have seen, however, that it does something toward eliminating the direct effects of individual disturbances.

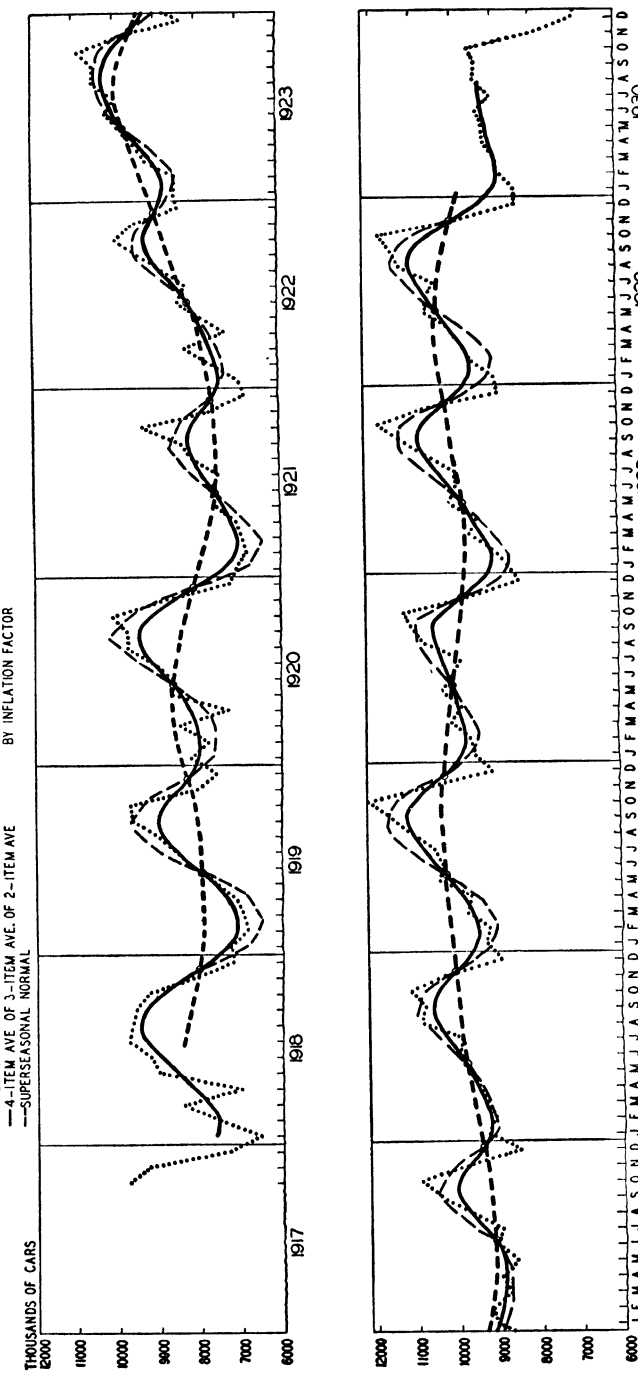

CHART III.—(See Appendix, page 1051.)

from additional knowledge of the case—fluctuations due to the structure of the adaptive apparatus, such as hogcycles, are at present nearest to that goal—it must be discarded in favor of other methods. But even in such cases it may serve as a starting point of advance on this line, which may eventually lead far beyond our present horizons.

The principle of Economic Meaning becomes still more important when we approach the problem of comparing Time Series. What the Frisch method does for us is to enable us, first, to piece together mosaics of neighborhoods of equilibrium by indicating the values of each time variable which lie within them and, second, to study their behavior, relatively to each other, during the phases or movements toward and away from equilibrium which it similarly indicates. Again, it is the linking of the concepts of the economic and the statistical normal which makes this possible, but further factual and theoretical material is required in order to make headway beyond this.[1] Illustration from individual, as distinguished from aggregative or systematic, series is particularly telling, because the former will, as a rule, present more complex relations than the latter. If, then, by means of the Frisch method we analyze, for instance, the behavior, relatively to each other, of price and quantity sold of an individual commodity, we get gross relations, within each cyclical component, which result from "movements along demand curves" and cyclical and other "shifts of demand curves." Various parameters which we know, from additional information, to be relevant, say, to cyclical shifts will then have to be introduced into the familiar relations proffered by traditional theory. At this point our problem merges into a much more general one which seems to loom in the future.[2]

[1] This is not to say that formal methods are valueless. Mr. Zinn's paper in the *Review of Economic Statistics* for October 1927, previously referred to, affords an instance of an important partial success achieved by purely formal considerations. If we have a time-variable, y_t, which we consider as dependent on the values of another time-variable at the same and preceding times, $f(x_t, x_{t-1}, x_{t-2} \cdots)$, and if we develop the relation into a power series, neglecting second and higher powers, we arrive at a linear expression $y_t = A + Y_o x_t + Y_1 x_{t-1} \cdots$, where the constants $Y_o \cdots Y_n$, represented by Y_i, may be built into a function of i, characteristic of the relation between x and y and very suggestively called by Mr. Zinn the *system factor*. If the function Y_i is the same for different divisions of the two series, we conclude that Y_i is independent of x_t, hence dependent upon the "system," the properties of which we thus explore. Application to the relation between interest rate and wholesale price index, as carried out by Mr. Zinn, is a very interesting contribution to the theory of vibrations or of propagation waves.

[2] Much work has been done and is being done on such problems, which could be usefully related both to our theory and to the method discussed above. Multiple curvilinear correlation is a particularly important case in point, in spite of the difficulties that surround the idea of correlation in the case of time series. This whole range of problems, however, touches the argument of this book peripherally only and will come up for but a brief discussion in Chap. X.

CHAPTER VI

Historical Outlines

I. Introduction; 1786–1842

A. The Fundamental Importance of the Historical Approach to the Problems of the Cyclical Process of Evolution.—The importance of such an approach has been emphasized from the outset. Since what we are trying to understand is economic change in historic time, there is little exaggeration in saying that the ultimate goal is simply a reasoned (=conceptually clarified) history, not of crises only, nor of cycles or waves, but of the economic process in all its aspects and bearings to which theory merely supplies some tools and schemata, and statistics merely part of the material. It is obvious that only detailed historic knowledge can definitively answer most of the questions of individual causation and mechanism and that without it the study of time series must remain inconclusive, and theoretical analysis empty. It should be equally clear that contemporaneous facts or even historic facts covering the last quarter or half of a century are perfectly inadequate. For no phenomenon of an essentially historic nature can be expected to reveal itself unless it is studied over a long interval. An intensive study of the process in the last quarter of the seventeenth and in the eighteenth century is hence a most urgent task, for a quantitative and carefully dated account of a period of 250 years may be called the minimum of existence of the student of business cycles.

Of course, this is being increasingly realized. Histories of "crises"[1] and detailed descriptions of individual crises have been written from the beginning of the nineteenth century. That literature is richer than appears at first sight because it includes all the descriptions of particular aspects, as well as those written from particular standpoints—notably, most of the attempts to analyze the working of the monetary mechanism and of speculation, with both of which the phenomenon of

[1] The histories by Wirth, Tugan-Baranowsky and Bouniatian and the condensed but excellent sketch in Spiethoff's article Krisen in the Handwörterbuch der Staatswissenschaften may be mentioned as the peak achievements in that line. Of the large literature on individual crises the writer wishes only to mention what seems to him one of the best performances: Dunbar's essay on the crisis of 1857, which will be cited later on.

crises has been linked up from the first. But that is not what we mean. Since the development generated by the economic system is "cyclical" by nature, the task to be accomplished grows far beyond mere description of spectacular breakdowns, on the one hand, and of the behavior of aggregative quantities, on the other, into the formidable one of describing in detail the industrial processes behind them. Historians of crises primarily talk about stock exchange events, banking, price level, failures, unemployment, total production, and so on—all of which are readily recognized as surface phenomena or as compounds which sum up underlying processes in such a way as to hide their real features. Hence, the value of that kind of historical work is not only impaired by the fact that much of it is not up to minimum requirements of scholarship, often vitiated, moreover, by prescientific theories, but also by the still more important fact that, except incidentally, it did not touch upon the essential things at all. The same objection applies to more recent attempts, very meritorious in themselves, to follow up changing business situations year by year so as to supply us with business annals. With due respect and gratitude for what has been done in that line[1] and what undoubtedly was all that could be done with available means and sources, it must still be pointed out that the mere labeling of each year according to the general temperature of the business community as revealed by the press, with short additions about the state of the money market, employment, harvests, foreign trade, and so on and about external factors, such as political events, does not carry us much beyond the evidence of the time series themselves. The annals, flowing from a source partly independent of the sources of time-series material, provide a useful check. But they may easily mislead by overstressing those aspects which are primarily reflected in commercial and financial journals, and because, as far as they really are independent of what goes into time series, they mostly lack precise criteria for the diagnoses they give. Moreover, the information they convey is, except on rare occasions, entirely of the aggregative type.

What we really need we are more likely to find in general economic histories: they bring us much nearer to the process which produces the waves we observe in our time series. But much more important are the innumerable monographs on individual industries. Although not aiming at our range of problems[2] and withholding, almost tantalizingly some-

[1] Mainly in the annual surveys and supplements of the economic weeklies of all countries, also of the daily press. The writer wishes, however, to acknowledge the help derived from the Business Annals by Mr. W. L. Thorp (National Bureau of Economic Research, 1926) as well as from Professor Mitchell's introductory essay to that volume.

[2] The one exception is the series of monographs, Beiträge zur Erforschung der Wechsellagen, edited by Professor Spiethoff which gives, for several German industries, exactly the kind of information we need.

times, the information and the exact dating required for our purpose, they mostly indicate, all the same, how an industry arises, how it is absorbed into the economic organism, how it affects that organism and how it is reacted upon, and what its cyclical behavior is. In fact, they largely agree in what they consider relevant or interesting, and a general schema could readily be sketched which would fit the large majority of them and could easily be improved upon. Coordination and systematization of this kind of work would be extremely useful and is perhaps not too much to hope for. Furthermore, we have an increasing number of monographs on individual concerns and entrepreneurs, jubilee volumes, biographies, and so on which, whatever their shortcomings, are a storehouse of relevant material.[1] The growing interest in the genealogy of nonaristocratic families opens up further possibilities. Additional raw material for the annals of the future is, of course, in the archives of banks and concerns, trade associations, public departments that have to do with industrial questions, and also in the information to be derived from the daily and weekly press and from trade journals. The history of technology, of trade routes, of individual towns and industrial districts gives in some instances even now what we want.

Compared with this vast program, the following comments or sketches, though the result of more labor than a first impression would indicate, are of course pitifully inadequate. What can be presented within the limits of this chapter and the next are mere illustrations and indications which it is hoped, however, will go some way toward filling the bloodless theoretical schemata and statistical contour lines with live fact and toward making our meaning clearer and more vivid. But even the urgent task of locating cycles historically has been not more than broached. Moreover, no satisfactory history of capitalism can, of course, be written without taking account of Dutch and Italian "origins" and of the later developments in France. Yet it has not only proved impossible to present Dutch, Italian, and French material, but the writer has also been unable to work it up for himself beyond the most common general treatises and the most outstanding monographs. Finally, American, English, and German economic history has been more intensively analyzed only from about 1780 on, and even in this restricted field there are many lacunae, not only in the following exposition, but also in the knowledge of its author. Details, although the core of the matter is precisely in the details, can come in only by way of example and in order to teach application of our theoretical schema. To save space, quota-

[1] The writer has to thank Dr. Fritz Redlich for a reference which shows that that literature has grown to the stage of bibliography. See Hermann Corsten: Hundert Jahre Deutscher Wirtschaft, eine Bibliographie zur Firmen-und Wirtschaftsgeschichte, Verlag Kurt Schroeder, Köln, first installment, January 1936.

tions have been restricted to works to which the writer feels particularly indebted and to cases in which responsibility for a given statement must be definitely located.[1]

B. Questions of Principle.—A few questions of principle must be disposed of first.

1. Excluding as we do noncapitalist change, we have to define that word which good economists always try to avoid: capitalism is that form of private property economy in which innovations are carried out by means of borrowed money, which in general, though not by logical necessity, implies credit creation. A society, the economic life of which is characterized by private property and controlled by private initiative, is according to this definition not necessarily capitalist, even if there are, for instance, privately owned factories, salaried workers, and free exchange of goods and services, either in kind or through the medium of money. The entrepreneurial function itself is not confined to capitalist society, since such economic leadership as it implies would be present, though in other forms, even in a primitive tribe or in a socialist community.

If by this definition we merely meant to exercise our logical right of terminological freedom, no more would have to be said about it. With some authors, prominent among whom is Boehm-Bawerk, defining capital, capitalist production, and capitalism does, in fact, not mean more than this. With others—Marx or Sombart may be quoted as instances—the definitions which they give or which can be gleaned from their texts, imply a statement of fact, namely, that the defining characteristic gives the essence of a definite historical phenomenon. But also definitions of the latter type may legitimately differ according to point of view and purpose, and such differences need not, although they often do, imply difference of opinion as to the nature of the phenomenon. Our definition belongs to this class. It undoubtedly appears strange at a first reading, but a little reflection will satisfy the reader that most of the features which are commonly associated with the concept of capitalism would be absent from the economic and from the cultural

[1] Practically none but published material—books, articles, government reports, newspapers, and so on—has been used. Most of the facts as well as the sources are familiar to all students and can be easily checked. The interpretations are, with the exceptions indicated, the writer's own. He, therefore, thinks it his duty to point out that he is no more a historian than he is a mathematician. Although in his youth he had some training in history and its auxiliary sciences, and some experience with archive work, and although he may, therefore, hope that he knows what a historical record is, he has never acquired, still less kept up, that wide knowledge of historical fact that would really be necessary to substantiate some of the views submitted, which, although all reasonable care has been taken about individual facts, may therefore well be wrong. It has been thought desirable to say this in order to warn the reader—not, of course, in order to reduce responsibility.

process of a society without credit creation. Our characteristic is not, however, intended to imply causal connotation. It should also be observed that, like most other definitions of capitalism, ours is institutional. But of course the institutions which, with very rare exceptions, we treat as data throughout, are themselves the results of and elements in the process we wish to study. The only thing that could be controversial about this is our proposition that the economic process of capitalist society is identical with the sequence of events that gives rise to the business cycle.

Therefore, we shall date capitalism as far back as the element of credit creation. And this, in turn, at least as far back as negotiable credit instruments, the presence of which gives the practical, if not the logical, certainty of the presence of credit creation—in the same sense as the discovery of arms in some prehistoric deposit gives the practical certainty of the presence of the practice of fighting. But we must go further than this to the non-negotiable instrument which precedes the imperfectly negotiable one, and to the possibility of transferring, by however clumsy a method, deposits lodged with banks. This, of course, has not in itself anything to do with credit creation; but such information as we have strongly suggests that the practice of credit creation is as old as deposit banking. For Southern Europe this would carry us to the close of the twelfth and the beginning of the thirteenth century.

2. This should help in answering the question how far back we have a right to label fluctuations which are otherwise eligible as cycles, *i.e.*, as the kind of phenomena which we now designate by that term. The reader is presumably familiar with the controversy or difference of opinion on this point. Many students of the cycle, notably Professors Mitchell and Spiethoff, display a strong aversion to admitting that we may speak of cycles in that sense before the end of the eighteenth century, while others, historians among them, do not hesitate to go far beyond that.[1] Now, it must be granted, of course, that proper scholarly reserve prohibits stating as a fact what, owing to lack of data, we cannot fully prove. But the question is whether there is any warrant to use the schema of the cyclical process as a heuristic hypothesis farther back—for we shall never find what we do not look out for—and to interpret provisionally our incomplete material, price series for instance, in that sense. It must also be granted that the smaller the capitalist sector embedded in an otherwise precapitalist world, the less the fluctuations characteristic of the capitalist process will assert themselves and the

[1] The writer may, perhaps, be permitted to quote Professor Gay as an authority who seems to agree with him in the view to be presented, without, however, using the criterion indicated in 1.

more other causes of fluctuations, in our terminology external factors will dominate. In this sense it is not only true but obvious that before and even during the eighteenth century crops, wars, plagues, and so on were absolutely and relatively very much more important. The impact of innovation will evidently be felt differently in a small capitalist milieu which is surrounded by a noncapitalist world of much greater quantitative importance,[1] little affected by what happens in the former and acting as a cushion. We may expect some of our phenomena but not others, and even those which we do observe may be difficult to perceive and to link up with our process. Suffering and discontent among the crafts, for example, and, as a consequence, social struggles within them, neither actors nor observers would have readily traced to that source, although what we call economic progress most undoubtedly was a major cause of the decline of which those struggles were the symptom. But beyond this the attitude of the students referred to is difficult to understand, especially with reference to such events as the bursting of the South Sea Bubble, which bears so striking a resemblance (possibly quite superficial, to be sure) to 1873 or 1929. While proof must wait upon future research, there is certainly no reason to expect that those "crises" will eventually turn out to have been anything else but incidents of a cyclical movement, distorted no doubt by the action of external factors, exactly as they are today. All evidence from such material as we have points in our direction, certainly as far back as the sixteenth century, down to details of financial practice.[2]

But in the countries around the Mediterranean we find deposit banking at a much earlier time. Possibly it was but a continuation or a revival of the practices of the Roman bancarii, tabularii, and argentarii,

[1] Some care should be taken about this, however, for it was not only the capitalist sector that was smaller. The 100,000 men who were said to be employed in mining in the German Empire at the time of Charles V's famous decree (mandatum, 1525) would not be negligible even now and were far from being negligible at that time. And so was a value of mining output of two million Goldgulden. Nothing is known to the writer about the reliability of Charles V's statistics. It may be mentioned, however, by way of comparison, that the whole (ordinary) income of the House of Hapsburg from its German and "Burgundian" possessions was at that time 580,000 Goldgulden a year.

[2] All that the writer knows about the Dutch crisis of 1565 is from Ehrenberg's familiar book on the epoch of the Fuggers. The evidence there presented is, to be sure, inconclusive. More important is the information about methods of trade and finance, which will be briefly mentioned in the next section. It undoubtedly makes us visualize the very sort of thing which would produce capitalist fluctuations of the type described by our model. For an earlier period there is interesting material about the Florentine textile (wool) trade (see, for example, Davidson's monumental work), also about the contemporaneous evolution of textile machinery. The most striking instance of material giving a very "modern" impression is afforded by Professor Earl Hamilton's time series (see Money, Prices and Wages in Valencia, Aragon and Navarre 1351–1500, 1936).

or the Greek trapezitai.[1] "The non-negotiable bill of exchange which came into extensive use in the second half of the fourteenth century, was an important factor in the credit business of banks,"[2] and during the fifteenth we gather from prohibitions of the practice that negotiability was, in various forms, steadily paving its way into recognition, though the latter may not have been formally granted (as we learn from Freundt, Wechselrecht der Postglossatoren, 1899 and 1909, and Wertpapiere, 1910), before the seventeenth. The use of the check was prohibited in Venice as late as 1526 (see Usher, *op. cit.*) in a futile attempt to curb credit expansion. This development of the "current account subject to check" is as interesting and as relevant to our purpose as the gradual elimination of the prohibition of interest. We will, however, not go into the subject and also, in what follows, refrain from dealing, except incidentally, with banking developments as such. The main contour lines must be assumed to be known to the reader.

3. Finally, a point properly pertaining to the realm of general methodology must be touched upon in order to eliminate an apparent contradiction between our way of looking at economic or, generally, social change and the principle of historic continuity which tends to assert itself in historical analysis *pari passu* with increasing material and improving methods of research. Our theory of the mechanism of change stresses discontinuity. It takes the view that, as we may put it, evolution proceeds by successive revolutions, or that there are in the process jerks or jumps which account for many of its features. As soon, however, as we survey the history of society or of any particular sector of

[1] The question whether the general features of capitalist life, and in particular fluctuations similar to those we today observe in it, were present in the antique world, we will pass by with one reference: Heichelheim, Wirtschaftliche Schwankungen der Zeit von Alexander bis Augustus, 1930. There cannot be any doubt but that the view which prevailed for some time, that the Greek Oikos was in principle a self-sufficient organism essentially anterior to capitalist forms of organization is entirely wrong. We know little about the Greek and Roman worlds of banking and finance. But what we know looks strikingly modern. So does the attitude of the politician, as is known to everyone who has perused Cicero's letters and observed the role played by the *societates publicanorum*. The rise of the *depositum irregulare* and the *foenus nauticum* (see Chap. XII, A) are other indications; for capitalist enterprise, of course, mainly (though by no means wholly) consisted of seaborne commerce.

[2] Compare A. P. Usher, The Origins of Banking, *Economic History Review*, 1933, to which paper as well as to Professor Usher's oral teaching the writer is much indebted in this and in other points. The paper also mentions part of the literature and may thus serve as an introduction to further reading on the subject. The writer would like to add a reference to the contributions of Sayous. Discussion of evidence and a sociological and economic interpretation will be presented in the writer's treatise on Money. Compare also R. D. Richards, The Pioneers of Banking in England, *Economic History* (Supplement to *Economic Journal* for January 1929) for the statement that the assigning of mercantile debts by means of the bill of exchange was practiced in England in the fourteenth century.

social life, we become aware of a fact which seems, at first sight, to be incompatible with that view: every change seems to consist in the accumulation of many small influences and events and comes about precisely by steps so small as to make any exact dating and any sharp distinction of epochs almost meaningless. Evolution of productive technique may serve as an example. What we designate as a big invention hardly ever springs out of the current of events as Athene did from the head of Zeus, and practically every exception we might think of vanishes on closer investigation. Cooperation of many minds and many small experiences acting on a given objective situation and coordinated by it slowly evolve what appears as really new only if we leave out intermediate steps and compare types distant in time or space. The decisive step in bringing about a new thing or ultimate practical success is, in most cases, only the last straw and often relatively insignificant in itself. Needless to say, this holds true also of the process of change in social institutions and so on. What is technically called a revolution never can be understood from itself, *i.e.*, without reference to the developments that led up to it; it sums up rather than initiates. Now, it is important to note that there is no contradiction whatever between our theory and a theory of history which bases itself on these facts. What difference there is, is a difference of purpose and method only. This becomes evident if we reflect that any given industrial development, for instance the electrification of the household, may involve many discontinuities incident to the setting up of new production functions when looked at from the standpoint of individual firms and yet appear, when looked at from other standpoints, as a continuous process proceeding steadily from roots centuries back. By one of the many roughnesses or even superficialities forced upon us by the nature of the task which this volume is to fulfill, we may characterize this as a difference between microscopic and macroscopic points of view: there is as little contradiction between them as there is between calling the contour of a forest discontinuous for some and smooth for other purposes.

Not only have we no fault to find with the historic theory that stresses continuity, but on the contrary we consider it one of the most promising features of modern historic analysis.[1] We will immediately

[1] Professor A. P. Usher's History of Mechanical Inventions, as well as his earlier volume on the Industrial History of England seem to the writer to mark important stages on that way. The first two chapters of the former book are a sketch of the sociology of technological change which would serve as an admirable starting point, could we enter into the matter.

Compare also S. C. Gilfillan, The Sociology of Invention, to which the writer wishes to refer as an excellent introduction to that range of problems. The first of what the author calls "the social principles of inventions" (p. 5) reads as follows: "What is called an important invention is a perpetual accretion of little details probably having neither beginning,

avail ourselves of it in order to notice, though by way of example only, certain spurious problems the existence of which is due to neglect of the principle of continuity and which disappear as soon as that principle is properly made use of. The first is the problem which goes by the caption of Rise of Capitalism. Observing, for instance, Western European economic life in the sixteenth century and comparing it with the economic conditions that obtained in the same area in the tenth, we are easily led to the conclusion that everything had altered fundamentally, and hence to the problem how the capitalist process had come into existence. But closer analysis reveals the presence even in the tenth century of rudimentary forms of capitalist existence (in Venice they were more than rudimentary) and our information, inadequate as it is, makes it perfectly possible to see step by step how they gathered force and increased in importance, so that we nowhere meet a distinct and logically autonomous problem of the birth of capitalism or of any outburst of economic activity of a new type.

Hence, second, there is no need to speak, as Sombart and others did, of a new "spirit" (*Geist*) having come about somewhere in the stretch between 1400 and 1600 to make people think and behave differently, or of the rise of a new economic system fundamentally different from the preceding one. In particular there is no need to trace what that group of authors entirely unrealistically considers as a new rationalism on the one hand and as a new attitude toward profits on the other hand, to religious changes (M. Weber)—which is a way of arguing hardly superior to the economic interpretation of history which it was intended to improve or to replace. The historical sequence of the forms of enterprise, in particular, appears in a different and much more promising light as soon as we drop the attempt to look at each of them as a world of its own, incompatible with all other such worlds. The type of medieval artisans, their organization and behavior, are fully accounted for by the conditions of their environment and particularly of their market. The way in which they succumbed to what then was a commercially superior method, the putting-out system, whilst, as will be seen, illustrating well what we mean by the process of new things "competing old ones out of existence," does not stand in need of any extraneous principle of explanation. Certainly,[1] establishing a wholesale or, at all events, a large-scale

completion nor definable limits." The present writer does not agree with all the results of that work, but all that matters just now is to make sure that the reader realizes the absence of incompatibility between the two views referred to in the text, and reconsiders the impression derived from our exposition in an earlier chapter in the light of what has just been said.

[1] The range of problems alluded to above is relevant to our subject in more points than one. The writer begs to refer to his article "Unternehmer" in the Handwoerterbuch der Staatswissenschaften. Those problems owe much to Schmoller, who must also be credited

trade on the basis of a small-scale production which also had to be provided with raw materials is a typical illustration of our concept of innovation. It was, therefore, not an adaptive but a creative response to a changing environment. It was not uniquely determined by it and might have failed to come about. All this is within the general mechanism of economic life as described by our model. But no new social, cultural, spiritual world had to emerge in order to make it possible. Similarly the fact that, on the whole, commercial enterprise precedes the factory and, up to the sixteenth century, predominates over industrial enterprise, as well as the consequent facts that in very many instances the latter was induced and financed by the profits of the former, are all accounted for satisfactorily by the circumstances that in the environment of that time difficulties of transportation—and generally of trade at a distance—constituted the main problem to be solved, while, within the limits of what could be successfully transported, improvement of productive method was a secondary consideration. Therefore, the entrepreneur of the commercial type imperceptibly shades off into the entrepreneur of the industrial type and the transition of the one to the other does not constitute a problem *sui generis*.

Third, it is evident that what is called the problem of Original Accumulation, also, solves itself as soon as we deal with it by means of the principle of continuity. That problem presented itself first to those authors, chiefly to Marx and the Marxists, who held an exploitation theory of interest and had, therefore, to face the question how exploiters secured control of an initial stock of "capital" (however defined) with which to exploit—a question which that theory per se is incapable of answering and which may obviously be answered in a manner highly uncongenial to the idea of exploitation. But also other authors, chiefly belonging to the German historical school, met it on their way for the same reason which created for them the problem of the emergence of a Spirit of Capitalism.[1] Without going into the various explanations

---

with having been one of the first students of economic history to realize fundamental identities under widely different cultural forms. This, of course, would not be any high tribute if he had been one of those philosophers of history who ride rough-shod over historical facts and seem but to live in generalizations, but such was not Schmoller's case. On the contrary, he was a careful student of historical detail and such achievements as for instance his identification of German merchants guilds of the thirteenth century with modern cartels, arose out of his "factual" work and derive their significance from this circumstance. See next note.

[1] Again, M. Weber and W. Sombart are the authors to be mentioned. There is much less of that kind of thing in Schmoller, whose sober realism prevented him from kicking up the dust of spurious problems. Although G. v. Below, the leading representative of professionally historical criticism of the work of the historical School of German Economists, was much more severe in his criticisms of Schmoller than of Sombart, it is certain

that have been offered, we will note a few facts which point to the conclusion that there is no such problem at all, and which will go some way toward preparing later discussions of the financing of enterprise at various times.

It should be understood how this question is related to our theory of the function of credit creation. Since logical and historical "origins" of institutional patterns are two entirely different things, that theory does neither bind us to, nor even suggest, any particular explanation of what we might call Primitive Financing. For it is an error to believe that the logical essentials of a phenomenon must necessarily reveal themselves at its historical beginnings. We do hold that credit creation goes back very far, quite as far as capitalism does according to any definition, but we neither need nor do hold, that it played a decisive role from the outset. To begin with, the amount of means of production required for many primitive enterprises was quite small. This even applies, in some cases, to such things as a mine or a ship, but it applies much more to the cases of many industrial ventures. The shed and "equipment" required, many an entrepreneur could put up by the work of his hands, or with the help of such factors as he happened to possess—the latter particularly if he was a feudal lord. There is, thus, some historical justification for the view of some classical writers who traced the origins of "capital" to "industry" rather than to "parsimony." But it does not follow that the opposite view is wrong. Saving took—in fact, very frequently—the form of accumulation of cash, which it was in any case necessary to hold in relatively high amounts. Hence, there was to a much greater degree than later the possibility of financing one's venture with ready cash, either one's own or, by means of a partnership, somebody else's. Moreover, with absolutely and relatively small requirements and, in many cases, short periods of gestation, the initial stages of an enterprise could be negotiated by many temporary shifts which seem, indeed, to be very different in nature from the huge modern machine for the manufacture of credit, but which served the same purpose. If success attended the beginnings, profits became available to finance further steps in the same or other directions. Finally, if a prince financed expenditure by the debasement of coinage, he did something very similar to what modern governments do when borrowing from banks on deficiency bills. This entailed windfall profits which enabled the business community to meet the requirements of enterprise as well as it could have done by borrowing. In this way, the monetary disorders of one kind or another which prevailed during all those centuries

---

that in all essentials Schmoller's work comes much nearer to displaying the true spirit of historical research and presents a much better grasp of its scope and use in economics.

did what, in their absence, would presumably have been done by a quicker development of the various methods of credit creation.

C. Conditions and Processes in the 300 Years Preceding the Epoch Usually Studied for the Purpose of Business-cycle Analysis.—In this section we will, by way of sketching a background and illustrating a few points that are important for our model,[1] present a handful of facts about these conditions and processes. First of all, it is necessary to reduce to reasonable proportions the exaggerated idea many of us have formed as to the causal importance, for the economic development in that epoch, of the influx of precious metals from America, which, after an insignificant beginning early in the sixteenth century (which, however, coincided with an increase of the production of European mines, on the one hand, and various forms of government and commercial inflation in some places, on the other) set in with the opening of the Potosi mines and continued in undiminished force until about 1630. The process which, of course, first impinged upon Spain has been recently elucidated much beyond what we knew before by the researches of Professor Earl J. Hamilton.

Increase in the supply of monetary metals does not, any more than autonomous increase in the quantity of any other kind of money, produce any economically determined effects. It is obvious that these will be entirely contingent upon the use to which the new quantities are applied, and the way they take through the economic organisms. Even as far as they enter the channels of trade merely through commercial agencies and as far, a still more special case, as they increase credit facilities, it is not determined by that fact alone whether they finance primarily consumption or production, whether they serve purposes which will increase the social product or purposes which will not and, if they serve the former,

[1] We confine these comments mainly to England and do not touch upon the economic history of the United States in the colonial period. The reader finds all that it is necessary for our purpose to know about the latter in the first volume of V. S. Clark's History of Manufacture in the United States. English and German economic history are comparable only up to 1618 and then ceases to be so until the second half of the nineteenth century. What lies between is the Thirty Years' War and its consequences. It cannot be stressed too strongly what a complete break that event caused in the evolution of German life in all its aspects. This was, of course, due to the amount of physical destruction which made literally a desert of large tracts of country and in places reduced population to a few per cent of what it had been before. The whole of German history and many features even of modern German civilization cannot be made understandable without that fact. Economic as well as political and cultural history took a different course because of, and must be interpreted with reference to, that terrible experience. It is all the more regrettable that considerations of space compelled the writer to confine this section to the English case, because, at least to the end of the fifteenth century, German material is much more interesting and instructive, reflecting as it does an almost fully fledged capitalism and all the problems of High Finance and Big Business.

in what direction enterprise will move. In the case of an inflow of precious metals it is perfectly conceivable that they disappear in hoards, or are worked into objects of use and adornment by the order and for the benefit of an aristocracy or a feudal court. This consideration alone would, even if there were no other, negative all money-quantity theories of the rise of capitalism. Moreover, economic as well as—if, recalling our theory of innovation, the reader will forgive such an expression—*cultural* enterprise of the sixteenth century only continued what was achieved or in the making in the fifteenth. The first thing to be observed is that, as far as Spain herself is concerned, the new wealth in great part directly—but practically all of it indirectly—served to finance the Hapsburg policy. Presumably it was that influx which made it possible for Charles V and Philip II to remain, in the midst of all their financial vicissitudes (which during the latter's reign occasionally produced tragicomic situations in the royal household), the sound-money men they actually were. The influx provided, therefore, an alternative to the debasement of currency to which it otherwise would have been necessary to resort much earlier, and thus became the instrument of war inflation and the vehicle of the familiar process of impoverishment and social disorganization incident thereto. The spectacular rise in prices which ensued was a no less familiar link in that chain of events. It disturbed settlements in terms of money, particularly in the agrarian world, probably spurred religious dissension, and induced those phenomena of coarsening and decay which we observe in spite of the promises of the preceding century.

In all these respects, the evolution of capitalism was indeed influenced, but in the end retarded rather than quickened, by that expansion of the circulating medium. Profiteering of a certain type was certainly facilitated and big business found many things easier than they otherwise would have been for it. But below the glitter of the surface serious enterprise was thwarted by the dislocation of values and by social unrest. To satisfy himself of this, all the reader has to do is to recall the experiences, economic and other, of the World War. The cases of France and England were different but only because effects were more diluted. The booty of privateers, which took the form of effective treasure, was, of course, welcome to Queen Elizabeth and may have relieved many an embarrassment, while the injuries to the social organism were less pronounced. Fundamentally, however, it was the same story. All the durable achievements of English industry and commerce can be accounted for without reference to the plethora of precious metals, to which, however, we need not deny the modest role alluded to at the end of the preceding section. Since this interpretation differs so widely from a view that is once more—as it was centuries ago—commonly

accepted, restatement of, and comment on, our thesis will be given in the note below.[1]

A similar operation would, if space permitted, have to be performed on another idea that has been stereotyped. Yielding to our habit of speaking in terms of pure types and of philosophies with which we cloak

[1] We hold three things: first, that the effects of the plenty or scarcity of monetary metals has been and is being exaggerated. The error underlying such exaggerations is as old as it is common. There were authors who attributed the fall of the Roman Empire to a growing scarcity of gold, a theory which seems to have originated already in ancient Rome, for Pliny bemoans gold exports to extraimperial Asia in terms that would befit a protectionist American senator. Common sense should be sufficient to condemn this view and to teach us that the effects of additional gold depend on what is done with it and that the occurrence, simultaneously with increase in the supply of precious metals, of spectacular events does not prove causal relation, even if that increase helps in financing them. To reduce the social processes of the third and the sixteenth centuries to monetary processes, bears the stamp of monetary monomania and should readily be recognized as ridiculous. We hold, second, that the influence exerted was not in the direction of initiating new—economic, political, artistic, and so on—creations. This can be strictly proved, and any opinion to the contrary can only be due to the curse of aggregative thinking which never goes step by step, as it is necessary to do, into actual causation. The question how the new things were conditioned and precisely how they came about yields not only a conclusive answer but also a canon by which to separate what, for example in the religious movements of the time, may, and what cannot, be attributed to the atmosphere of inflation. Third, we hold that the inflationary influence—which the writer thinks, as a matter of both history and theory, has been exaggerated, but which he does not deny—was almost wholly destructive. How and in what sense inflation injures the mechanism of evolution should be abundantly clear and will become still clearer through the examples, great and small, to be presented. Of course, any such poor formula as "cumulation of maladjustments" does not express satisfactorily even part of the truth. But it is little short of a misfortune that eminent historians uncritically yield to the current slogans of economists. Mr. G. N. Clark, for instance, in an otherwise very suggestive paper on early capitalism (*Economic History Review* for April 1936) which has the merit of realizing the importance of the element of technological change, not only fails to see that aspect of inflation, but actually speaks of the "rising tide of American silver" which made it possible to introduce new and expensive processes. As regards the course of events in other sectors of social life, our thesis seems to imply (negative) valuation of the achievements of baroque religion, art, and so on. This is not so. The catholic revival undoubtedly developed during the period of inflation and so did other things. It is not held that inflation annihilated cultural achievement. But the writer finds it easier to connect with it peasants' wars and the spread of syphilis than the Council of Trent and the Covarrubias. Agrarian unrest in Germany should not be entirely attributed to it: this would be one more monetary superficiality. But it is clear that inflation had much to do with the discontent among German peasants. Their feudal obligations to the lords had been to a great extent commuted into money in the thirteenth and fourteenth centuries. The rise in prices that set in (as stated above, already before the influx of American silver) expropriated the lords, who thereupon (though also for other reasons) attempted to increase those payments. And this was, though not the only one, yet a major cause of the troubles which induced the peasants to take up arms in order to fight for the Old Law (*Altes Recht* or, in the Slavic regions, *stara pravda*). How good these and similar things must have been for economic and cultural progress, the reader is invited to judge for himself.

them, rather than of the practical necessities of the changing social situations, we have constructed a historic entity called Mercantilism and endowed it with a set of consistent principles, condemned by one subsequent epoch and eulogized by another. But the policies of the so-called mercantilist age are not peculiar to it, and the impression that a "system" evolved, say in Cromwellian or Colbertian times, or earlier, in the times of Henry VIII or those of Sully, is completely wrong. Nor does mercantilist policy embody any set of definite economic aims or principles. Like all policy, it was swayed by the forces of the hour and it tried to manage as best it could the series of vicissitudes which it had to cope with and which it largely produced itself. Mercantilist governments sometimes removed and sometimes imposed regulations, restrictions, and incentives. In England, for instance, the policy of price regulation came into disuse under the otherwise mercantilist Protectorate. In some respects they worked toward freer trade—Henry VIII, for example, took several measures in that direction, Colbert loosened many fetters—in others, toward protection and national autarky. They at some times created monopolies, at others fought them. They tried to foster innovation and often prohibited it. All this is perfectly understandable if we interpret it in the light of individual historic situations. But it does not make a consistent philosophy either of economic life or of the role of the state in it.

Moreover, the importance of individual measures is often greatly exaggerated. It is, for example, difficult to share a historian's enthusiasm for the Navigation Act of 1489, when it is realized that this act was not in general enforced, that on the few occasions on which it was, it immediately led to complications and retaliations, that the way in which it was handled strongly suggests the suspicion that from the first it was intended to become a source of revenue from licenses of exemption, and that parliament, in repealing it in 1559, declared it to have been a failure.[1] But our objection to the historical construction in question does not rest on this class of argument. Nor is it intended to minimize the significance of the economic activity that emanated from the rising National States in their formative period and after, or from the principalities in Germany and Italy. In Germany, in particular, the prince and his bureaucracy became for centuries the dominant factor in economic life. The work of reconstruction after the Thirty Years' War was, in some territories, almost exclusively accomplished, and all the foundations of later development laid, by them.

[1] Nor should we, for that matter, take at face value the testimony of Sir Thomas Gresham as to the excellence of his own methods of managing foreign exchange. He is quite in the same boat in that respect with some of his more recent successors. On the other hand, he is fairly entitled to the statement that his theory is not any worse than theirs.

The question arises how this activity stands to our schema. Was it not—again, in Germany—the state rather than the entrepreneur which initiated modern industry? The answer is—though with a qualification to the effect that it was the Thirty Years' War that created the situation in which activity of the state was almost everything—in the affirmative; and, with the dosing appropriate to each case, similar answers would have to be returned for other countries. The German principality in many cases, of which a few instances will be glanced at later on, directly filled the entrepreneurial function, particularly in mining. Beyond that it *conditioned* enterprise by reshaping the institutional framework (legal reforms and so on) and improving the environment (canal and road building and the like), and by fostering it in various ways, some of which in fact come within what we usually understand by mercantilist policy. This gives us the opportunity of protecting our general schema from a very natural misunderstanding. We are dealing with a particular range of problems and our schema has been devised to serve it. What in it appears as "cause" and "effect" need not be cause and effect on other planes of analysis and within other ranges of problems. It is not held that the entrepreneur is the *primum mobile* of things social. The very question how far he is lies outside our task. For other purposes, it may be much more correct to stress other factors, statecraft among them. At the same time, statecraft—mercantilist or other—does not enter, on our plane, as a distinct and coordinated factor: it is, for us, either a particular kind of entrepreneurship or else a power that shapes data. This may be difficult to accept, but it must be understood.

In one respect, however, the same conclusion applies as in the case of precious metals, namely, in respect to the expenditure of kings, popes, and princes as a factor in the evolution of early capitalism. With the one major exception of England—there are minor ones, the most important of which is Hungary—the prince had subjected to his sway the masses (peasants), the aristocracy and gentry, and the bourgeoisie (not necessarily in this order). With all of them he made his peace, fitting them into the organon of his state. The masses found some measure of protection, though one that varied greatly between different times and countries, and a régime of regulated exploitation was administered to them. The aristocracy and gentry had to submit, but were fed and employed. The bourgeoisie was scientifically exploited and protected—like game in a well-ordered park—in such a way as to be properly subdued and content. This wonderful organon was made to serve the splendor of the prince, the court, and the army, by means of a maximum of surplus being sucked up to finance one great center of expenditure. (*This* is what Colbertism means).

Now the theory which for our purposes it is necessary to notice is that that expenditure was a positive force in capitalist "progress," first because of the demand for consumers' goods it provided; second, because of the financial positions and methods it created. As to the first argument, it is—whatever excuse there may be for primitive error about the benefits from excesses in consumers' expenditure at a time when everybody has before his eyes a huge apparatus of production that has just emerged from a crisis—unpardonable to think that in the absence of the extravagance of courts there would not have been equivalent demand for consumption and equipment goods from the peasants and the bourgeois from whom the corresponding means were taken. As to the second argument, it is, of course, true that demand for loans—and for that form of society big revenues meant still bigger debts—will tend to develop the credit-manufacturing engine, and that Jacques Coeur, Agostino Chigi, Jacob Fugger, and other princes of finance owed much of their success—by no means, however, all of it—to that demand.[1] But there seems some lack of sense of proportion involved in pitting this detail against all the destruction wrought and all the paralysis of economic activity spread, both by the methods of raising that revenue and by the uses it financed. As far as this goes, that expenditure acted much as the influx of precious metals, though extra-economically the case may be different. It has been noticed by historians—among them, the late G. Unwin—that the success of capitalist activity in the sixteenth century was not followed up in the seventeenth, and that what seems to the observer a natural continuation was deferred by about two centuries. Monetary theorists of history will attribute this to the exhaustion of the supply of silver. Obviously, it is more reasonable to speak of the exhaustion of the economic, by that social, system.

Turning to a few of the well-known[2] features of the evolution of English capitalism which, for one reason or another, it is necessary to

[1] Lending to a court was, in spite of the exorbitant interest usually promised, very rarely a good business in itself. But precisely because such loans could, as a rule, not be repaid, they led to the acquisition of privileges and concessions in the field of commerce and industry which were the great business of the time: a loan to the Pope, for instance, even if secured on the papal tiara, was not an attractive proposition, but when the Pope had got the money and his creditor thereupon asked for a concession to exploit the papal alum works, the Pope was hardly in a position to refuse. Besides, the granting of the concession was probably the only way for the Pope to draw any revenue. The rise of the Fuggers to a position never again equaled by any financial house has, similarly, much to do with Charles V's embarrassments.

[2] We have no choice but to assume them to be well known. Be it repeated that real understanding of the nature of the cyclical process of evolution, even in its most modern aspects, is without some knowledge of even medieval economic history, no more possible than it is without some knowledge of statistical method or of theory. It should be added that the fragments to be presented have been chosen with respect to a theoretical purpose

mention for our purpose, we must, of course, bear in mind both the smallness and the agrarian character of the economic organism. Even in England where industrial development had, by the end of the Stuart period, probably outstripped industrial development anywhere else, at least three-quarters of a population numbering about 5½ millions, lived by agricultural pursuits, if we may trust Gregory King's data about the numbers of yeomen, tenant farmers, and "servants in husbandry." With the exception of London, towns were small—which fact is not, of course, intended to convey an idea about the relative importance of industry which to a considerable extent dwelt in the country—even Bristol and Norwich having hardly 30,000 inhabitants.

1. Agriculture, then, was the leading branch of production and, taking the period from about 1500 to about 1780 as a whole, the most important field of extracommercial entrepreneurial activity. The latter statement sounds strange, no doubt, and the reader will be still more reluctant to follow if he be invited to look upon what happened in post-medieval agriculture as analogous to such a process as, for instance, the rise of the electrical industry in the course of our third Kondratieff. Yet it is necessary for us to become familiar with this view and to learn how to pierce all the differences in garb—institutional and other—in order to get at the essential sameness of the basic economic process. Results may, by way of example, be characterized by the fact that wheat yield per acre seems to have about doubled between, roughly, 1500 and 1785.[1] This can be due only to innovation, unless we assume a favorable change of climate. But the effects of innovation must have been considerably greater (apart from the possibility of choosing an estimate higher than the one we have adopted), because it is impossible to assume that there was *no* decreasing-return influence (defined with respect to given production functions and invariant fertility of soil) to overcome. Even greater success attended the improvements in sheep

and not with respect to their general importance. A picture of that social process, taken from them alone, would be utterly misleading.

[1] We accept Mr. M. K. Bennett's "Generalized curve of British wheat yield," see the Economic History Supplement of the *Economic Journal*, February 1935, p. 12, *et seq.*, rather than Mr. M. Whitney's, see *Science*, October 1926, and also most of his argument. As regards the question of soil exhaustion in medieval England, which is but distantly relevant to the above argument, the writer, without claiming any competence in the matter, follows R. Lennard, The Alleged Exhaustion of the Soil in Medieval England, *Economic Journal*, March 1922, p. 22. For other aspects see Usher, Soil Fertility, Soil Exhaustion and their Historical Significance, *Quarterly Journal of Economics*, May 1923. The writer has no first-hand knowledge about English methods of estimating yield per acre in those times, but for those continental countries, for which he has such knowledge, any numerical statement of this kind would be of very doubtful meaning, at least up to about 1700. Slow (long-time) increase of yield ever since 1200 seems, however, to be, as Mr. Bennett has shown, the most reasonable guess.

breeding and in the breeding and fattening of cattle. About all this there was very little "invention" and the case well illustrates the reason for the writer's aversion to the use of that concept which so limits our outlook. It was simply a matter of recognizing existing possibilities of profitable improvement and getting the thing done.

In those, as distinguished from later times (the middle of the eighteenth century approximately, when governments and associations began to interest themselves systematically in agricultural improvement), the modus procedendi was quite according to our theoretical schema. Individuals, proceeding of their own accord or accepting the teaching of some advocate of improvement, went ahead and set up new production functions, the success of which induced others to follow—first few, then many. This was first the case in the matter of enclosures, which in themselves implied no other innovation than one in organization—as did the simple exchange of inconveniently dispersed strips of land—but quickly led on to others. The movement began under the Tudors, about 3 per cent of manorial land being enclosed, according to Professor Gay (*Quarterly Journal of Economics*, vol. XVII, p. 576, *et seq.*), between 1455 and 1607—a small-scale operation that caused a quite disproportionate outcry and understandably met with government and general resistance: the entrepreneurial act in this case mainly consisted in overcoming this resistance of the environment. The great wave of enclosures, meeting with no resistance from government or parliament, although with plenty of disapproval—see "The Deserted Village"—came in the eighteenth century, especially after 1760, when it linked up with, and partly conditioned, the processes of the so-called industrial revolution, exactly as it was itself conditioned by similar processes of an earlier time.

The way in which innovations in different fields (and countries: both wool and wheat were for the greater part of this period important articles of export) condition each other, is well exemplified by our case, which also serves to elucidate the distinction, so fundamental for our method of analysis, between conditions of entrepreneurial activity and this activity itself. Possibility or profitability of enclosures—which is but another name for what we call *conditions*—can be easily analyzed in terms of such facts as institutional changes in land tenure making for increasing freedom in the use of land, increase and agglomeration of the population, increasing (real) purchasing power, improving means of transportation. There is no necessity to fall back upon soil exhaustion due to medieval methods of agriculture, nor any proof that it played a role,[1] but if it did, it would have to be listed among those conditions.

[1] See preceding note. The behavior of the price of wheat does not in itself lend any support to such a hypothesis. Prohibitions of export of grain (as early as 1361) do show, however, a certain stringency as compared with a growing demand.

Now, from the standpoint of the individual who decided on an operation of enclosure or the group of individuals who did so at any time, all those conditions were objectively and independently given. But they were not on that account independent of entrepreneurial activity in general, as we are led to believe if we use such general phrases as the Widening of the Market, or External Economies, which suggest the idea of some environmental change that goes on outside and independently of the mechanism we are studying. Again, conditions, whatever their nature, do not by themselves produce the results we observe. For the purposes of general history it may be sufficient to list those factors and to take it for granted that they account for an enclosure movement. That is not so, however. What the conditions could be said to bring about automatically is an attempt to produce more within the old frame and a tendency to take land into cultivation which it had not before paid to cultivate. Neither of these was absent, but the enclosure movement means more than either or both. It could have failed to come about at all, or the reorganization of agriculture could have come about in any one of many different ways.

The economist who directly connects enclosures with the conditioning factors either implies that these by themselves uniquely determine the observed result—in which case he is wrong—or leaves out a link which accounts for this and no other result having come about in this and no other way, and is fundamental from the standpoint of an analysis primarily interested in economic mechanisms and results. Finally, it should be added once more that, if we leave the precincts of a narrowly economic analysis—within which we move in this book—it becomes still less possible to reason in terms of conditions taken as independent variables. Within the whole of that social process that simultaneously produced free ownership of land, increase of population, agrarian and industrial revolutions, and, as an element of all this, enclosures, there is nothing but interaction. No argument that uses the words "depends upon" can have any meaning except for the most restricted purposes.

The agrarian world of Elizabethan England affords a series of instances of other entrepreneurial activities, which in fact almost exhaust the list of theoretically possible types of innovations. There was doing old things in a new way—for instance, better crop rotation—producing commodities that were new or not produced in England before—clover, turnips, flax, potatoes—taking up production of others on a scale unknown before—hops, fruit, vegetables. Investment opportunity was thereby greatly increased, of course, and adaptive reaction was clearly present although, owing to the peculiarities either of agricultural production in general or of agricultural production under the circumstances of the times, other features of our schema were not. Still others,

notably the elimination of inadaptable "firms" and the incident submersion of their owners or managers, were no doubt present but so complicated by the individual peculiarities of the case that it becomes difficult to recognize them. Whether or not the process displayed cycles and what they were, we have no means of telling. Its pace certainly quickened in the eighteenth century, as it did in the matters of enclosures and of sheep and cattle rearing, and there was an agricultural crisis around 1770. But most of the things we read of in the literature of a later time, in which agricultural as every other improvement had become fashionable, do not seem particularly novel. Popularizers and advocates of improvement undoubtedly developed, sometimes rediscovered, preexisting practice. Systematic experiment definitely established and spread such things as continuous rotation, deep ploughing, drilling seed. Industry furnished better tools. But the big new things that were to come later, agricultural machinery and chemistry, did not amount to anything before the nineteenth century. This does not mean, however, that there was no innovation; it only illustrates our meaning of that term. Particularly in the sphere of the agrarian community, innovation may mean doing, or doing over again, something that has been known and even locally practiced for centuries, our criterion being, as will be remembered, whether or not a method is at the time and place a part of ordinary routine or, what comes to the same thing, within the existing production functions of the mass of producers.

2. Woolen textiles, being the chief English industry and the mainstay of export in the sixteenth century, may serve as an instance of a first type of entrepreneurial action in nonagrarian fields. Industry carried on according to the logic of small-scale production in a numerically small milieu was incapable of coping successfully with the problems incident to sale at a distance and to producing for a market of an indefinite number of individually unknown customers. Entrepreneurial activity, in this as in all other cases, consisting in attacking tasks which, while "objectively possible," are insoluble for the milieu existing at the moment and beyond the reach of the vast majority of its members, then turned to the task of overcoming distance in space and time without at first interfering with methods of production at all. The entrepreneur had to act outside of the organizations of small masters—to leave them if he was one of them—often also to move out of the towns controlled by them into country districts, where he found cheap labor, in order to finance and to carry out the commercial tasks involved. He had to overcome resistance and to "fix things" with local authorities—the implications of the latter expression suggesting well one side of the innovating activity of entrepreneurs at all times. We neither can nor need stay to describe these familiar things. What matters is that the

reader should learn to see them in the light of our model and, in turn, to interpret that model in terms of such live facts. In particular, we see clearly that the "new things" do not develop harmoniously from the old milieu but place themselves alongside of it and compete it out of existence. How this was done in this case could be shown in all economic, social, and cultural details, but we must go on.

3. At the same time we observe a development of a different type that was to crush both the small master and the putting-out system and to revolutionize production, if revolution is the word for a process which extends from the thirteenth to the twentieth century. Although we are comparatively well informed by a number of well-known monographs about the more important branches, the history of English industrialization, the rise of production in the factory to quantitative importance, which came about in the second half of the sixteenth and the first half of the seventeenth century, is still a series of fragments. Its nature and mechanism, however, stand out well enough. What invention there was came largely from abroad and English innovation consisted primarily in transplanting things that were common practice in foreign countries into an as yet uncongenial environment, in breaking down resistance, and in achieving commercial success the conditions for which had to be created. It was a process of a new native industry's conquering and developing the home market previously supplied by foreigners. It was not a case of the markets widening first and carrying the development of industry with it in a semiautomatic way.[1] This is as true of the introduction of different methods into old industries as it is of the introduction of new industries. In both cases we see the figure of the entrepreneur in our sense, stepping in from outside the existing industrial organism to upset the equilibrium, to induce imitation, and to enforce adaptation, thereby creating new demand and new economic space for further ventures and underselling the inadaptable elements of the environment.

[1] The old-established woolen and worsted industries, which continued until the middle of the eighteenth century to provide the chief article of export, and the chief object of political attention (though Macaulay perhaps exaggerates a little if he says that worthy politicians thought the prohibition of the export of wool second in importance only to the hanging of Sir Robert Walpole), showed less improvement during the sixteenth century than others did.—Because of this conquest of the home market (practically achieved during the first Kondratieff we are going to discuss) Tonnage of the Merchant Fleet and Shipping Cleared are inadequate indicators of the increase in total output. For the same reason, it is perhaps not quite correct to say that ships constituted the bulk of the durable capital of the time, though they may well have been the most important item. The few figures for the last quarter of the sixteenth century show, however, considerable activity, though the great upswing is between 1660 and 1760. See A. P. Usher, Growth of English Shipping, *Quarterly Journal of Economics*, May 1928.

We will note a few examples. In the textiles (apart from the entrepreneurial activity of drapers, clothiers, "master combers," and merchants, mentioned above) fulling mills (themselves much older) began to mechanize their process and to use water power ("tucking mills," "gig mills"). The knitting frame and other machines worked by treadle appeared. In mining, medieval adits for draining mines were improved by German methods and by new pumping and hauling machinery. Shafts and pits, ventilation and so on came in very slowly, and the average mine of sixteenth-century England was, technologically, as yet little more than a quarry. German and Dutch technique transformed the iron and steel industry, larger furnaces coming in and various other improvements—still mainly within the direct process—being achieved by the end of the sixteenth century. Coal does not seem to have been used to any great extent for industrial purposes until the eighteenth century, though in the glass industry it began to replace wood in the beginning of the seventeenth. "Sea coal" from Tyne pits transported by barge were an important innovation in domestic fueling under James I, but the charcoal furnaces of Sussex, the forest of Dean, and the Kentish Weald still provided the raw material for the growing hardware trade of Warwickshire and Staffordshire. The latter development had by that time created a scarcity of timber that entailed high and rising prices and elicited various measures for the protection of forests. This is the only major case known to the writer in which a raw material had time to approach exhaustion[1] before being replaced by something else. Production on a large scale of standardized intermediate goods, such as ingots, sheets, rods, and wire for a finishing industry which still remained in the hands of small masters, is a particularly instructive example of one of the ways in which our mechanism works. Copper mining and brass making were new industries in the Elizabethan era. Cannon foundries, alum houses, potteries, sugar refineries (from Brazilian raw material), glass, soap, and gunpowder factories, and salt-boiling establishments supply instances of other types. An Elizabethan paper mill driven by water wheels, technologically not particularly novel, is an example of an innovation which primarily aimed at the economies of large-scale production. The use of water power spread rapidly and meant—relatively—as much as steam did later. It remained expensive, however, owing to the necessity of using the overshot wheel.

[1] Even that is, however, true only for the time under discussion, for which the timber situation provides a good example of a bottleneck. In the United States of today there is a timber problem of the opposite kind. In the seventeenth century scarcity of timber may be listed as a factor of retardation and as a condition of entrepreneurial success in devising alternatives. But this was only one of many conditions since both the use of coal and the use of iron instead of wood would have been profitable without it.

Now it is this industrialization (with its agrarian complement) more than anything else that transformed the England of the Tudors and Stuarts through the change it wrought in production functions. The argument from comparatively small quantitative importance of innovation fails because it visualizes "inventions" only, and neglects a wide class of activities which, if included as they ought to be, were not unimportant relatively to the environment. And it is readily seen that the process perfectly fits into our schema. Nothing is absent, not the characteristic feature of disharmonious advance in particular directions entailing the consequence that the new products became relatively cheaper and thus created their market and changed the patterns of consumption, nor the element of the resistance of the environment.

4. We will briefly mention the more important forms of that resistance. The ways of entrepreneurs would have been difficult without it. New products or methods of production were then, still more than now, likely to be unsatisfactory. In many cases the machine-made product was an inferior product. This difficulty is for various reasons of so much smaller importance in our day (although not absent) that economists almost overlook it in their analyses of the entrepreneurial role. It created, however, a distrust in machine-made products that persists to this day. Competitors need not have decried the brittleness of cast brass buckles—they actually were brittle. But apart from that, there was traditionalistic resistance of consumers. It was not enough to produce satisfactory soap, it was also necessary to induce people to wash—a social function of advertisement that is often inadequately appreciated. Then there was the resistance induced by what is designated in our schema as the world of old firms which was represented in this case mainly, though not exclusively, by craft guilds. Reaction against innovation (sometimes joining forces with the hostility to monopolies and "projectors") was occasionally so drastic as to bring out what we mean much more clearly than later examples can. Entrepreneurs were not necessarily strangled[1] but they were not infrequently in danger of their lives. Equally hostile was the attitude of the workmen. Acts of violence which for example made it impossible in 1663 to operate the new sawing mills then erected, arose at first from unemployment or the fear of unemployment in the strata working the old methods, but machine-wrecking practices of the factory workmen themselves became common in the eighteenth century.

[1] The above refers to the story of the inventor of a loom for weaving ribbon having been strangled by order of the Danzig municipal authority in 1579. The source is not a document but a literary report by an Italian written in the seventeenth century. The present writer does not know whether there is any serious foundation for this report; but—*se non è vero è ben trovato.*

The craft guilds also tried to use their medieval powers to restrain both members and outsiders from using methods with which the old-fashioned producer could not compete (thereby occasionally driving new industries away from their towns) and sometimes petitioned the government or parliament either for general regulation of a nature calculated to make the factory impossible (which in Central Europe artisans tried to do as late as the eighties of the nineteenth century) or for specific prohibition of a mechanical device. The outstanding example of attempts to secure regulations with which large-scale industry could not comply is the Weaver's Act of 1555, an instance of specific prohibitions is the Royal proclamation which in 1624 directed that a new machine for the manufacture of needles be destroyed. The political world wavered in its attitude and motivation but substantially followed the course of events and finally, about at the end of the seventeenth century (refusal to grant a petition for the prohibition of the skey then coming into use in the production of serges, may serve as an illustration[1]), dropped all systematic hostility to innovation. So did public opinion and the scribes. All the difficulties which define the role, and all the features which characterize a certain type, of the industrial entrepreneur are dramatized with unsurpassable vividness in the career of Dudley.[2] But modern parallels both in attitude and argument are not so hard to find as one would be inclined to think.

5. The monopoly problem of that time did not arise primarily in connection with industrial enterprise. Of course, "projectors" tried to secure patents not only for the same purposes that patents are applied for now (the patent in the modern sense, for the protection of new processes, was what evolved during the seventeenth century, along with the patents granted to Chartered Companies, from the struggle about monopoly), but also in order to acquire for their undertakings the definite legal status they lacked—as far as this goes, monopoly was only a form, appropriate to the spirit of semifeudal government, of legal recognition. But the practice soon ceased to be a matter of course and presented itself in another light, which is much more obvious in the monopolies granted in the fiscal interest or as favors on the one hand, and to combinations of traders on the other. It would be with reference to these that we should have to discuss the problem, could we enter into it. We must, however, confine ourselves to pointing out that acquisition of a

[1] This illustration is taken from Hoskins, Industry, Trade, People in Exeter, 1934. A mine of information about motives, phraseologies, attitudes is the collection of Tudor and Stuart proclamations (edited by Steele and Crawford). Of course, what we behold are rationalizations, mostly running in terms of welfare and of social security.

[2] For that often-told tale see, for example, the summary in Usher's Industrial History of England, p. 320.

monopoly position was under the circumstances part of the entrepreneurial achievement and in some cases constituted the whole of it, particularly if the "entrepreneur" was of the type of the Earl of Leicester, of Elizabethan fame.[1]

6. Commercial and colonial enterprise is the third type to the development of which we must devote a few remarks. Since individual venture was, under the circumstances of the time (not before Cromwell did the king's ships protect trade even in the Channel), hardly possible in maritime trade, and since even activity of interlopers presupposed, and fed on, the existing organizations and facilities provided by them, medieval forms of organization which largely offered what was needed not only survived but, changing in function and meaning under a decorously conservative surface as so many things changed and change in England, experienced a new impulse and became themselves the vehicles of new developments. The Companies, whether "regulated" or not, were, of course, not at first enterprises in our sense but corporations in the sense of the modern *Stato Corporativo, viz.*, organizations that supplied the legal frame within which enterprise went on. They aimed at the creation of communities, of a spirit of community (with moral and religious implications, regular prayers included), of legal and physical protection, while entrepreneurial or current business was left to the members or such associations as these might freely form among themselves.[2] Funds with which to finance this enterprise were raised by partnerships and frequently by temporary associations. The company itself had no capital at all and needed funds—raised by assessment of members—only

[1] As is obvious from the above, the "monopoly" of that time did not constitute just one homogeneous problem. Each of the four categories mentioned in the text included cases that widely differed in nature, and both contemporaneous clamor and later historical and economic discussion confused things by throwing them together. Besides, the craft guilds and other organizations which dated from the Middle Ages formed a fifth group. They were not monopolies in the ordinary sense of the word but, nevertheless, were given to monopolistic practices of the cartel type. It was but rarely, however, that their regulations of price, quality, and quantity were strictly enforced. An extremely interesting study of the combination that for a time controlled the supply of coal from the Tyne, the public's attitude toward it, and the economic forces that eventually broke it, should be mentioned: P. M. Sweezy, The Limitation of the Vend, 1938.

[2] The "regulated" companies, at least, were certainly *publici juris*. But the act of state which created a regulated company only recognized a preexisting body and insofar only ratified conditions that themselves were independent of any such act. Not only the sociological theory but also the juridical construction would, therefore, have to run on the same lines in the cases of the regulated and of the unregulated companies. The writer, however, does not feel sure of his ground here. The reader is referred to the fundamental work of R. W. Scott (The Constitution and Finance of English, Scottish and Irish Joint Stock Companies to 1720, 3 vols., 1912) and to Heckscher's interpretations (Der Merkantilismus, vol. I, German trans., 1932).

for its foreign establishments and fortifications, for policing, and for meeting the exactions of government, which sometimes (for example, 1560) chose the rather drastic method of confiscating a fleet and its cargo in order to extort a loan and take hold of foreign exchange.

All this can easily be verified from the new edition (from 1903 on) of Hakluyt's Principal Navigations, Voyages, Traffiques and Discoveries of the English Nation, and from Carr's Selected Charters. We will quote but the most famous instance. One of the outstanding developments of the sixteenth century which is indicative of a burst of entrepreneurial activity and sums up some of its general effects on the way of doing business is the specialization of traders, obviously productive of "external economies," which separated retail from wholesale and domestic from foreign trade. The tendency toward this goal reaches far back, but it was then pushed by the government and interested parties and institutionally ratified to the point that even past activity in retailing sometimes disqualified for membership in the companies of wholesale traders to whom the term *mercatores* was then restricted. Those who devoted themselves to sea-borne trade were called *mercatores venturarii* and a group of them, acting as a body and appearing in parliamentary records in the nineties of the fifteenth century became, in the second half of the sixteenth, a regulated company styled "Governor, Assistants and Fellowship of the Merchant Adventurers of England." Together with the Eastland Company (which became a recognized corporation in 1579) they were the most powerful body to organize and protect maritime trade in the sixteenth century enjoying various exclusive rights (for example, up to 1688, the right to export cloth to the Low Countries). But they were not what we would call a trading company, and their lawyers were not slow in pointing out that they were not technically monopolists[1]—which formally was quite true.

But corporative enterprise soon evolved out of this. It implied raising "capital," which was first done (even in the case of the East India Company) for each individual venture—a practice of the "chief adventurers" associating themselves with "partners" readily established itself—then for a series of ventures, or for a definite period of time, until finally the independent and impersonal capital of the company, as such, emerged. Shares in that capital were freely bought and sold, in curious contrast to the spirit and meaning of the old forms—which

[1] So argued, for example, John Wheeler in 1601, when the Merchant Adventurers had been expelled from Germany on a charge of monopolistic exploitation. Recent writers may be glad to have this instance of the "masquerade of monopoly." Analogies with cases nearer to us are indeed obvious—*plus ça change plus ça reste la même chose*, which remark is not meant to imply that the writer has any fault to find with the case for which Mr. Wheeler pleaded.

nevertheless, as forms, survived throughout the seventeenth century,[1] when the Joint Stock Company started on its career. In order to make that development possible, both legal and financial devices had to be invented in quite the same sense as the steam engine had to be invented.[2] The method of providing the capital which we associate with the idea of a joint stock company was the fittest survivor of many that were tried, lotteries included. But we cannot go into this. The reality of history is in its details and, even in writing this sketch, the writer is painfully aware that, each time he attempts to generalize, he is distorting the facts he meant to convey.

Industry required permanent financing of corporate enterprise much more than trade. In fact, we find two mining companies and one waterway company (Mines Royal, Mineral and Battery works, 1568, New River Company, 1618) among the first to display it. Some of the trading and colonial corporations (the South Virginian and the Plymouth, for instance) also included an industrial program. The simple partnership, nevertheless, dominated the industrial field until about the middle of the nineteenth century. However, as soon as the joint stock company had established itself, though for a long time in an obsolete legal garb, as the normal form of certain types of enterprise, and as soon as the foundation of a company really began to mean what the old company did not mean, namely, the foundation of a "new firm," we may use privileges and charters directly as data, although very lopsided ones, by which to feel the pulse of entrepreneurial activity and to identify cyclical phases.[3] To a certain extent, this can be done for England on the basis of Scott's work on Companies. From the Glorious Revolution we can trace a boom in company promotion which we may consider as

[1] If it be really true that sales of shares (or "actions") in the permanent capital of "joint stock companies" did not regularly occur till the beginning of the seventeenth century (when the East India Company had their shares sold at its commodity auctions) similar development in Germany preceded by about a century and a half. It is true that to the middle of the sixteenth century Germany led (with the exception of the Low Countries) in capitalist evolution and powerfully influenced the course of things in England, even directly by financing and managing English industrial enterprise. But that "lag" seems unbelievably great, all the same.

[2] That formulation the writer owes to the late romanist and sociologist, Eugene Ehrlich. This is certain, although he has not been able to locate it in the latter's writings.

[3] The joint stock company material, of course, reveals a much smaller part of the process than it does from the middle of the nineteenth century onward, but even so, gives valuable indications. If industrial enterprise is but scantily and unsystematically reported (however paper, silk, glass, and many other things, a periwig factory included, are there) because it did not in general use that legal form, everything else we should expect is all the more conspicuous. Considerations of space forbid entering into an analysis. The construction of canals, which from 1761 onward was an important feature, will come in for a brief notice later on.

the backbone of a prosperity phase, with all the more confidence as none of the other characteristics of what we now thus designate is absent, as far as we are in a position to judge.[1] With fluctuations which are of a kind we should expect and which are in part accounted for by external factors, such as the recoinage trouble and the wars with France, the activity lasted until the year of the Bubble Act (1719).[2] According to Scott, there were, in 1695, 140 companies with a capital of 4½ million pounds, of which less than one-fifth had been founded before 1688, and total capitalization rose to nearly 21 millions by 1717.

7. This development undoubtedly presents a number of features which are peculiar to it and do not reappear in the booms and crises of the nineteenth century. We will mention but one, namely, the role played by the financing of government expenditure. Montague's brilliant and Godolphin's careful finance are presumably entitled to the credit of having averted financial breakdown which repeatedly threatened

[1] Macaulay in a famous passage called that time the "nadir of national prosperity." As we know, there is no contradiction between the presence of prosperity in our technical sense and the absence of general well-being; in fact, there is some reason to expect that prosperity and welfare will not go together. Still, Macaulay seems to us to exaggerate. Total tonnage cleared in foreign trade, for instance, rose from an average of 142,900 for 1663–1669 to an average of 337,328 for 1699–1701, then understandably fell, but rose again to a maximum of 478,793 in 1714 (see Usher, Growth of English Shipping, Table 2). And this, in spite of the considerable losses incident to the war of the Spanish succession, during which even coastal trade was so much interfered with that coal rose to famine prices in London.

[2] Other attempts to restrain the excesses of speculation had preceded it. For instance, as early as 1696–1697 the number of stockbrokers was restricted to a hundred. The Bubble Act itself, primarily aimed at putting incorporation of new companies under control by making it illegal for a group of persons to act as a corporation without parliamentary privilege, and in particular to offer for public subscription shares transferable by simple sale. That act, which was not repealed until 1825, when it was the object of a chorus of vituperation, has been adversely criticized by a long series of historians and economists, among them no less an authority than Alfred Marshall. This would be difficult to understand were it not for the fact that we always look at things through the spectacles of our time. To be sure, the passing of the act was, as has often been pointed out, partly due to the influence of some powerful interests, the South Sea Company in particular, which wished to strike at competitors for the money of the public, but a perfectly good case can be made for it, considering the circumstances of the time and the semicriminal practices that were involved. And it is a gross exaggeration to hold, as some people have done, that it materially handicapped economic evolution for a century. Serious business opinion was entirely in favor of it and the arguments used were by no means without force. The majority of economists also seem to have agreed, and Adam Smith's distrust of the joint stock company and his advice to restrict it to a few branches of economic activity was entirely reasonable. For our purpose, it is important to realize that the Bubble Act (which contained all the exceptions required to prevent it from being really injurious) was but an incident in the development of joint stock capitalism and more spectacular than really important. It hardly prevented more than it was intended to prevent, namely speculative excesses, and repeal came precisely at the time from which onward it would have done more than this.

during both King William's and Marlborough's wars, but even so the weak financial organization of those times was subjected to all the pressure it could endure. To a great extent, this was done at the expense of the joint stock companies. The great device already used by the Tudors but then developed into a comprehensive system consisted in "soaking" them. Owing to their dependence on government, for privileges and in other ways, they could not resist, and owing to the determination of the City to support the new government, they did not really try to resist. The financial construction of the Bank of England is the first outstanding example of this technique and also the best example to show how it linked up with credit creation. The South Sea Company was practically nothing else but an instrument of government finance,[1] and part or even the whole of the capital of the majority of companies listed by Scott was invested in "governments" which most of the time were at a considerable discount and fluctuated violently in response to the political situation. Thus, company promotion provided a channel through which funds flowed away from, rather than toward, productive purposes, which is an important fact to remember in the interpretation of the economic history of that epoch. Walpole and Pelham improved the situation, and if the wars of the second half of the eighteenth century kept the government in the money market, which was until the close of the Napoleonic wars entirely dominated by its demands,[2] the companies were gradually released from its grip.

Moreover, it is also clear that the spectacular crises of the seventeenth and eighteenth centuries link up more plausibly with wars and other noncyclical catastrophes than those of a later time. Everyone, for instance, will connect the crisis of 1640 with the war with Scotland and the way in which it was financed, or the crisis of 1672 with the Dutch war. The crisis of 1667 cannot with equal plausibility be interpreted in this way, and that of 1696 is an intermediate case. 1745 was the year in which the Pretender invaded English territory, the events of 1763 and 1783 may be looked upon as reactions of a very familiar type, to postwar booms. We must, however, be careful as to the inference. On the one hand, *crises* will in fact occur under such circumstances; but as we know, they are not the essential thing about *cycles*. Nor does coincidence of a crisis with "external" events that might account for it

[1] See R. D. Richards, The Bank of England and the South Sea Company, *Economic History* for January 1932.

[2] *Cf.* E. B. Schumpeter, English Prices and Public Finance 1660–1822, *Review of Economic Statistics* for February 1938. This paper is a by-product of a larger work on the business cycles of the eighteenth century, part of the material of which has been generously made available to the present writer who derived from it much help also in his analysis of the Restriction Period.

and certainly precipitate and intensify it, prove that there is no cyclical component at work. On the other hand, it cannot be denied, and is not denied, that the course of political events during the seventeenth and eighteenth centuries was such as to exert dominating influence on economic life and on the behavior of such time series as we have. But this would not prove that prosperities and depressions in our sense were absent, even if we knew no more than that.

We can, however, prove the presence of our process. Even our inadequate sketch suffices to establish it. We have, therefore, a right to conclude that there must have been also prosperities and depressions of the cyclical type. If now we find that this conclusion is fully borne out by all the facts that the material at our disposal allows us to observe, our case seems to be made out as far as it can be made out under the circumstances. To take one instance only. Nobody denies that the events 1717–1720 (when in June the flotation of new companies reached its peak) and the bursting of the "bubbles" looks very much, in major features as in details, like the big crises of 1772—this, however, is the weakest parallel case; nor is it really relevant, because it is the parallelism with crises of the nineteenth century which is in question—1825, 1873, 1929. Situation, preceding events, actions and reactions, liquidation and subsequent prostration were, as stated before, undoubtedly and strikingly similar. What has been doubted is whether the economic process under this financial surface was also similar, or whether an excess and a breakdown of speculation was all that happened. But the answer is clear. The mania of 1719–1720 was certainly not more than that; but it was, exactly as were later manias of this kind, induced by a preceding period of innovation which transformed the economic structure and upset the preexisting state of things. The industrial and commercial process, perfectly comparable to that of the industrial revolution, is clearly recognizable. So are the complementary developments in the financial sphere (deposit business of the goldsmiths, various bank projects, eventually pushed aside by the success of the founders of the Bank of England) and the concomitant developments of commerce and shipping. Even the building boom which is a regular feature of cyclical situations of this type was there, though less marked than in France. To all these, the speculative excess and the stock exchange crisis stood in the same relation as the excesses and crises of the nineteenth century. The international character of the crisis and of the operations that preceded it points in the same direction.

8. This is our only opportunity to attempt an interpretation of the activity of John Law (1716–1720) the true meaning of which is not difficult to unravel at this distance of time. He was an entrepreneur within our meaning of the term, but one of those entrepreneurs who—like the

brothers Pereire, of whom he may be considered as a forerunner—want themselves to create the means of payments which are necessary for the financing of their plans, *i.e.*, to add the function of the banker to that of the entrepreneur. Since the control of a machine for the production of "funds" at once brings within reach a wide variety of entrepreneurial possibilities and seems to protect them against the criticism and the restraints which would in general have to be expected from an independent bank, such an idea suggests itself very naturally to the mind of an entrepreneur who harbors very ambitious plans. That any such attempt necessarily violates the structural idea of capitalism exactly as the elimination of parliament violates the structural idea of constitutional government, is clear, and so are the consequences which this may be expected to have. It is also understandable that, for such a banker-entrepreneur, acquisition of the power to create credit will seem much more urgent than any individual one of the innovations which he intends to carry out, so that both for him and for the observer the mean becomes more important than the end. John Law was no exception to this rule. He first (1716) founded a bank which issued notes and discounted bills. In 1717 he launched his entrepreneurial scheme, which was colonial enterprise in the Mississippi Valley—by no means hopeless in itself—in the shape of the Compagnie d'Occident, with which the other colonial companies were merged in 1719, and the nominal independence of which ended in 1720 through amalgamation with the bank, against whose notes the shares of the company were made exchangeable at a price of 9,000 livres.

Meantime, the bank itself had been made a government institution (Banque Royale) and had received what, in intention and in temporary effect, amounted to a monopoly of joint stock banking for the whole country. Manipulation of quotations, management of new issues of shares in an atmosphere of frenzied speculation, quickly crowded out everything else—for the public, the companies, and probably Law himself—while the American venture was allowed to go wrong. The details of the mania, the measures taken to prevent collapse, and the liquidation are of no great interest to us. But one element which to some students overshadows all others in importance, and has been made central in many descriptions of that piece of financial history, seems to contradict our interpretation—Law's great operation that turned the national debt into shares of the Mississippi Company, which thereby became much the same kind of thing as the South Sea Company. There is no doubt, of course, that this was not only the greatest, but the only large-scale operation of Law's company that was really carried out. It was also the one which, though this is not quite easy to understand, kindled the mania by virtue of all sorts of mysterious hopes for unheard-of

profits and general prosperity which it raised. But the question is whether it is correct to consider it as the crowning achievement toward which Law had been working all along, so that his banking and colonial schemes—for us the essential thing—would have been nothing but preparatory steps.

Although Law's early theories and projects seem to lend some color to this view, the writer does not believe in it. The founding of New Orleans was hardly a step on the shortest route to that goal. And whatever Law's actual intentions may have been at any moment of his career, it seems more plausible to assume that this entrepreneur-banker, dependent as he was, under the circumstances of the time and the country, on the good will of the government and the favor of the Regent, was from the first driven to put his plans into a garb acceptable to them and to represent himself as the wizard under whose wand the Regent would never know what it was to be financially embarrassed. It is not held, of course, that Law experienced any reluctance against what was considered to be very profitable business. It is also probable that, with failure of his colonial ventures looming in the near future, he was glad to have something to substitute for them. But it may, nevertheless, be true that his operations in the field of government finance mean a lapse from the logic of his plan rather than its realization. If this be so, then his rise and failure acquire additional importance as early illustrations of the possibilities and weaknesses of the capitalist machine and of all the rules that apply to its handling which are as persistently taught by history as they are forgotten each time.[1]

D. The Long Wave from 1787 to 1842.—Those years, as the reader knows, cover what according to our tentative schema—it is very tentative—we call a Long Cycle or Kondratieff. We have seen reasons to believe that this long wave was not the first of its kind. It is, however, the first to admit of reasonably clear statistical description.[2] Owing both

[1] We owe to Professor E. J. Hamilton a most interesting description of the behavior of prices and wages in Southern France, 1711–1725 (*Economic History Supplement of Economic Journal*, February 1937). It enters well into the general cyclical schema.

[2] That period is also the earliest which the writer has endeavored to study as intensively as he was able. This does not mean, however, that his study was adequate. On the contrary, it must be stated that not even the general and monographic literature of the subject has been completely covered. Particular help was derived from Porter's Progress of the Nation (new ed. by F. W. Hirst, 1912) and W. B. Smith and A. H. Cole's Fluctuations in American Business, 1790–1860, 1935 (and Professor Cole's previous publications in the *Review of Economic Statistics*) and K. F. W. Dieterici, (1) Statistische Uebersicht der Wichtigsten Gegenstände des Verkehrs und Verbrauchs im Preussischen Staate und im Deutschen Zollverbande, published in six instalments, 1838–1857, (2) Der Volkswohlstand im Preussischen Staate, 1846, as well as from the well-known works of Professor Clapham (An Economic History of Modern England; I The Early Railway Age) and M. V. Clark (History of Manufactures in the United States I, 1607–1860).

to inadequate information and to the presence of serious political disturbance (mainly the troubles associated with the American Revolution and its aftermath),[1] dating is very uncertain at the beginning. Nor is the end beyond doubt. Our choice rests on a combination of statistical and industrial fact, mainly about the cotton textile and iron trades, which further study may easily disavow. But few students will deny the reality of the process, usually referred to as the industrial revolution, which we identify with that Kondratieff.[2]

1. It is necessary, however, to guard against possible misunderstanding by making quite clear in what sense we accept the term industrial revolution and its implications. The writer agrees with modern economic historians who frown upon it. It is not only outmoded, but also misleading, or even false on principle, if it is intended to convey either the idea that what it designates was a unique event or series of events that created a new economic and social order, or the idea that, unconnected with previous developments, it suddenly burst upon the world in the last two or three decades of the eighteenth century. Enough has been said already to clear this exposition of any suspicion that it countenances the first: We put that particular industrial revolution on a par with at least two similar events which preceded it and at least two more which followed it. Nor do we adopt the second idea, for it is perfectly clear that the industrial and commercial changes which occurred in the course of our Kondratieff joined on to and grew out of developments clearly discernible before. Still less can we think of dating it by inven-

[1] As soon as we admit the validity, for certain limited purposes, of an analysis which looks upon economic evolution as a distinct process having a logic of its own but going on in a disturbed environment, it obviously must be expected that cyclical phases which are due according to that logic or mechanism will often fail to show, owing to the opposing influence of such external disturbances. No argument against cyclical schemata follows from this and, in the particular case of this country, there would be no point in objecting that we are allowing our Kondratieff to "rise," in flagrant violation of our schema, at a time which is known to have been one of depression (1783–1790). To begin with, the fact is not beyond question. Moreover, the objection rests upon what we know to be incorrect, an identification of depression and suffering. Suffering there certainly was, witness the rebellion of 1786, but this is not conclusive evidence about what the cyclical phase was. Finally, there was the obvious and independent factor of physical impoverishment owing to the war of independence and to the equally important effects of the inflation incident to it. The bankruptcy of 1780, the issue of the "bills of a new tenor," and the final liquidation of the "continental paper currency" were the landmarks on a route that went through all the vicissitudes of unbridled inflation. This, by virtue of a vicious circle which ought to be, but is not, common knowledge among economists, called for ever new inflation in cure of situations created by antecedent inflation.

[2] The reader should consult the well-known book by Mantoux, without doubt the best general treatise on the industrial revolution, in order to satisfy himself how well the facts there described fit into our schema. Professor Mantoux's emphasis on enterprise in our sense is particularly enlightening.

tions, for many of the most important ones—such as Darby's, Newcomen's or Kay's—were made in the first half of the eighteenth century, while their genealogy, of course, goes back much further still, in some cases to antiquity. Therefore, we have no quarrel with Professor Usher for pushing the beginning of the industrial revolution back to 1700—except that there seems no cogent reason to stop there—if the term is to designate the whole process of the emergence of modern industry. Something remains, nevertheless, after stripping it of all erroneous connotations. It is submitted that this something explains how it was possible for those exaggerated ideas to arise. They contain an element of truth. There actually was a bulge in all observable symptoms of business activity obviously associated with industrial change of the innovation type, and after that a process of absorption or insertion of the results into a new system. Both ran their course and produced their effects in a manner which can be described by means of our model, and formed a unit within the evolutionary process in an altogether realistic sense.[1]

Tugan-Baranowsky's dictum, endorsed by Spiethoff and borne out by Clapham, that "if one wishes to refer the industrial revolution to a definite historical epoch it can be located more justifiably in the second quarter of the nineteenth than in the end of the eighteenth century" accords with our view. As we know, it is in recession, depression, and revival that the achievements initiated in the prosperity phase mature and fully unfold themselves, thus bringing about a general reorganization of industry and commerce, the full exploitation of the opportunities newly created, and the elimination of obsolete and inadaptable elements, which is exactly what happened and what accounts for what everyone admits to have been a prolonged, though often interrupted, "depression"—from the Napoleonic Wars into the forties. The fact that, as far as we can judge, expansion of output in important industries preceded the industrial revolution as delimited by us, falls into line for the same reason.

It should be added that, exactly as the innovations which "carried" the industrial upswing of the eighties and nineties of the eighteenth century in many cases emerged much earlier—in a preparatory state that in some cases amounted to real, though quantitatively unimportant, success—so the twenties and thirties of the nineteenth century already display the first successes of the innovations which were to "carry" the next Kondratieff. The next big thing in particular, railroadization of the world, then asserted itself even to the point of playing a significant

[1] Cunningham, in dating the industrial revolution from 1770 to 1840 seems, more than any other historian, to have visualized the process which the present writer is trying to describe.

role in the last Juglar of the Kondratieff now under discussion. We observe the same phenomenon on the downgrade and in the revival of the second Kondratieff when, notably in the eighties, electrification, the most important innovation of the third, developed beyond the experimental state. Why this should be is so readily understandable that we might be tempted to consider it, by way of generalizing from our few observations, as a normal feature of the evolutionary process, and to insert it into our model. This has not been done because the intention was to keep the latter as simple as possible, in order to qualify it for the task of conveying essentials; but there would have been no difficulty in making the insertion. Wherever we find the phenomenon, it constitutes, of course, an additional link between successive cycles—there is no reason to confine it to Kondratieffs. What matters here is that the reader should realize that it does not invalidate our schema.

2. In addition to blurring—to the extent, in some cases, of inverting—contours at the beginning of this period, external factors exerted paramount influence until, roughly, 1820. The rest of the period was much less disturbed: the influence of events—such as the invasion of Spain by France (we mean the invasion under Louis XVIII, not that by Napoleon) and of the Neapolitan Kingdom by Austria, the revolutions of the Spanish colonies in South America, the Greek revolution, the French "July revolution," the Belgian revolution, the Portuguese and Polish revolutions, the troubles in Turkey, the social unrest in England—was, as far as the writer has been able to make out, either quantitatively small, in some cases like the Belgian revolution (the bombardment of Antwerp by General Chassé, notwithstanding) astonishingly small, or only local or of but minor moment to our three countries. The effects of the friction between the United States and England (1826–1830), of the Texan war with Mexico, of the American monetary and tariff policy, though important, were never dominant in the sense of seriously interfering with the interpretation of cyclical situations. But the world wars of 1793 to 1815 obviously were. Nothing illustrates better than does the figure of Napoleon what we mean by an external factor, and both the necessity for our purposes of this concept and the essential superficiality of the type of analysis of which it is a necessary element. However, that factor was so important as to raise the question of principle whether we are within our rights if we continue to speak of a distinct process of economic evolution *sui generis* going on that was merely disturbed and distorted by political events. It will undoubtedly seem tempting to many of us to interpret both the behavior of time series and the industrial and commercial processes behind them exclusively in function of those events, to look upon even purely economic changes as

induced by them and to deny that there were any purely economic cycles contributing their share to the results we actually observe.[1]

In order to form an opinion about this it is necessary to note first that the process of industrial innovation obviously began before February 1793, when England declared war upon France. Moreover, we can follow it up and conclude from our knowledge of its mechanism that it would have produced a peak of prosperity, and afterward recession, without those political events, however unscientific this turn of phrase may look to anyone who envisages purposes wider than ours. These propositions will presently be substantiated. That what we claim to be cyclical fluctuations were in a number of instances associated with political events is as true as that there were several other fluctuations which are directly traceable to the latter. But we must guard against an optical delusion which often arises from interpretation of the behavior of time series in terms of spectacular events. Where these coincide with, or immediately precede, a business situation that seems to accord with them, this is uncritically accepted as proof of a causal relation. But where a political event fails to produce a corresponding effect on business, the fact is likely to be overlooked: England's international situation in 1806, for instance, was anything but comfortable, yet the year was one of prosperity. As pointed out on a previous occasion, we must bear in mind that a political event is never the sole factor at work, that it may, both at the time and by the historian, be appealed to as a cause beyond its deserts and that historical investigation into every detail is necessary to establish a case.[2]

Second, we will classify effects roughly into wastage, dislocation, and inflation. Physical destruction and real cost of armaments—in the case of Germany, also of plunder and exactions both in money and in kind—were of course considerable, but only locally and temporarily went to the point of destroying or paralyzing business processes. Unless it does this, wastage is more relevant to welfare and misery than to prosperity

[1] Neither view has, of course, any general validity for a more fundamental analysis of the social process as a whole. On the plane on which we move in this book, however, everything is "mere disturbance" that does not come within the logic of our mechanism, exactly as the effects of our mechanism would be "mere disturbances," if our purpose were to study political mechanisms. But disturbances may be so powerful as to blot out the cyclical process of economic evolution entirely. For great parts of Germany the Thirty Years' War affords an instance. This is the only question we have to deal with now.

[2] An analogy will clarify our meaning. When the sky is clear, we see the full moon; when it is cloudy, we do not; and so a popular belief has arisen to the effect that there is an association between full moon and fine weather. This is independent of the fact that many economists will look for any plausible association between external events and business situations, because they would otherwise have to consider the latter as unexplainable. So, even very farfetched and unconvincing associations are allowed to pass muster.

and depression. Dislocation of industrial and commercial structures, both in the short and in the long run, occurred, of course, on a large scale and relative positions of national organisms, conditions of international trade also, were powerfully influenced. This destroyed some, and conditioned other, entrepreneurial possibilities. In the peaceful span of the eighties England had inaugurated that policy of freer trade which is associated with the names of Shelburne and the younger Pitt and which made it possible for Disraeli later to claim the origins of Free Trade for the list of achievements of the Conservative party. It no doubt intensified the spectacular increase of exports that was then already in progress. These conditions lasted till the turn of the century. But then came the Napoleonic policy eventually embodied in the three decrees that established the so-called Continental System. Here we meet a characteristic difficulty in interpretation. The effect of this policy, however imperfectly enforced, is beyond doubt. It would on the whole account for a fall both in quantities and prices of products of domestic industry—wool being the only important raw material that came from the countries under Napoleon's sway—for depressive phenomena and, notably, for a particular type of speculative outburst and breakdown due to partly unavoidable and partly speculative accumulation of stocks of commodities and their sudden release (commodity-trade crises, *Warenhandels-Krisen*). Yet we know from experience that similar bursts and reactions happen without any Napoleons and it could be plausibly argued that recession and falling prices would have been due about 1800 (when prices of home-produced manufactures actually did begin to fall) in perfectly peaceful circumstances, even if we had not the theoretical reason we have to support such an argument. It may be impossible to appraise quantitatively, or to isolate, the direct and indirect effects of these disturbances, which at times may well have dominated situations. But none of them was potent enough to prevent our mechanism from visibly working according to its logic—however much results may have been affected by the abrupt changes in its data—at least in England.

In Germany it may have been different. No generalization is possible because the various parts of the country met with different fates. A lot of institutional deadwood, however, was eliminated practically everywhere, in the territories that came directly or indirectly under French rule as well as in others (in Prussia particularly through the reforms known as the Stein-Hardenberg legislation). But although by removing many fetters and creating political data favorable to free enterprise this eventually quickened the pace of capitalist evolution, the circumstances noticed before amply explain why we do not observe more striking immediate effects. In the case of the United States the influence of the European events was complicated and in some respects counteracted by

the war, and by conditions verging on war, with England. Even so, American shipping, shipbuilding, and its subsidiaries reaped considerable windfall gains from abnormally high freight rates and a profitable transit trade. This, of course, helped financing and conditioned enterprise in other directions. It is not less clear that subsequent embargoes, non-intercourse acts, and the war put an end to much of this and account for depressive phenomena which would not have been present to the same degree without that temporary stimulus and its removal. But few will deny that America, as far as it was not a farming nation, would then have been primarily a seafaring and trading nation in any case and that her farming interest would have felt the impulse of England's industrial development—which made her a wheat-importing country in the eighties—even without the obstacles that impeded exports from the continent of Europe.

Conversely, first the war of independence and then the war of 1812 to 1814 together with its antecedents, affected industry much as prohibitive tariffs would have done and encouraged investment that was bound to become unremunerative as soon as those conditions were removed. The year 1815 brought a regular postwar spurt and 1816 a no less regular postwar slump, such as we always observe in such cases. Time series and industrial history, of course, reflect both. They would do so whatever the underlying cyclical phase might have been. But again, this is no reason to deny the reality of the cyclical component on principle or to assume a priori, as soon as we realize the presence of noncyclical components, that they were the only ones to act. In our particular case depth as well as duration (to 1821) of the ensuing depressive conditions could hardly be understood without reference to the location of those years in the Kondratieff. To this we shall add a few details at the end of this chapter.

3. The problem of the effects of protection on the development of American (or any) capitalism cannot be fully discussed anywhere in this book. But we will avail ourselves of this opportunity to make a few more general remarks. Although the result of much more complex social, economic, and fiscal motivations, the American tariffs of 1789 and 1816 may, from our standpoint, be looked upon as attempts to prolong the conditions that prevailed during the preceding wars and to preserve the industrial war structures. Whatever their effects in other respects and on other interests, this purpose was actually served by them as was, then and later, the cognate purpose of keeping alive structures that owed their existence to inflation and, barring further inflation, could not have survived without protection. As it was, tariffs certainly softened downgrades and accentuated upgrades. Removal, even if gradual, might even have produced depressive situations, sudden removal panics,

that could not otherwise be explained. Fear—perhaps, exaggerated fear—of immediate consequences paralyzed the badly organized and badly led interests which were injured by that policy; and the vicious circle of protection making itself necessary and creating situations that call for more protection, is at the bottom of American protectionism to this day.

But this does not mean that changes in tariff policy dominate the cyclical movement, although they powerfully determine what the industrial structure will be. It does not mean this, as a matter of fact, in the American case (even beyond our period). And it does not mean this, as a matter of analytical principle. In the former respect, we will note that the tariff of 1789 did not more than protect a number of weak industrial striplings. Of the acts from 1816, when protection got really under sail, to the "tariff of abominations" (1828)—from which protectionists receded in 1833 by what was a strategical retreat highly creditable to the cleverness of their high command—none turned any tide. Since to the knowledge of the writer nobody ever held that they did, we need not insist. In the latter respect we will now formulate more generally: imposition and removal of tariffs changes the conditions both for enterprise and for current business. As regards enterprise, protection will stimulate it in some directions and bridle it in others, so that a distorted industrial organism will be the consequence. Net effects there may be, although there need not, but positive ones will always be more visible than the (largely conjectural) negative ones. In no case is it correct to list this influence among alternatives to the influence of the entrepreneurial factor, through which alone it acts as does any other change in data. This in part explains the ineffectiveness of protection in creating booms: all it can possibly do is to add one favoring circumstance, while it is perfectly consonant with this that the removal of protection may produce a slump by upsetting calculations.

In its role as a condition of entrepreneurial activity, imposition of tariffs will thus act similarly to cheap money policy: it creates margins which would not otherwise exist and therefore calls forth enterprise and secondary expansion that may become a source of troubles. However, protection acts not only on enterprise, but also on current business or what we call the world of old firms. As far as it does this, it may directly change the complexion of the economic situation as a whole. Here it has what may be termed a mechanical or automatic effect, although this effect is never one way only. The by no means easy task of working out the implications, some of them paradoxical, of this schema must be left to the reader.[1] We will add, nevertheless, that removal of import duties

[1] This cannot be done, however, without going into the theory of international trade and finance, which is precisely the reason why it is impossible to follow up the subject here. But another remark may be in order. The above suggests that the writer believes the

in prosperity and imposition of them in recession might conceivably be used as an apparatus of control. This is no recommendation, of course; but such a measure would be free from some of the undesired effects of others of the same kind, notably of measures of credit policy. It would, however, display similar limitations.

4. The question remains to what extent the external factors Inflation and Deflation shaped events and whether they provide an alternative explanation of the economic history of the time that could stand by itself, thereby proving the futility of looking for any cycles of autonomous causation, particularly for the Kondratieff. The answer is comparatively simple if by inflation we mean merely the financing of public expenditure by legal tender or credit instruments created *ad hoc*, and if by its effects we mean merely the impact of the amount thus created times a suitable coefficient of velocity (whether or not corrected for the influence such a policy has on the disposition of people to hold cash). But such situations are invariably complicated by an expansion of business credit which superimposes itself on the direct effects and is very difficult to distinguish from expansions of business credit that during the same time would have occurred in the ordinary course of prosperity phases. For America we have also at various junctures to take account of inflationary impulses, given quite independently of any fiscal vicissitudes and often without any change in the quantity and character of legal tender, by soft and cheap money policies and "reckless banking,"[1] which in America was fostered by the inflationist temper of the public mind. This Gordian knot interpretation has got to face, however convenient it may be to slur over these difficulties by aggregative propositions. We shall class with

effects of protectionist policy on the speed of the economic development of this country to have been exaggerated by its friends as well as by its foes. He does not doubt, however, that there was some positive net effect. What he wishes to stress now is that such an effect would not in itself suffice to form an opinion about American Protectionism, even if it had not produced any maladjustments but merely increased the pace of economic development in a perfectly balanced way. For effects on the social structure of the country and cultural aspects would also have to be taken into account. And from many standpoints that cannot be lightly neglected, the case for speeding up economic "progress" is by no means obvious. At the end of this chapter, a similar remark will be made about the analogous aspect of credit creation.

[1] A working definition of reckless banking, sufficiently accurate for our purpose, is issue of notes or the creation of deposits without regard to redeemability. More accurate is it to stress the criterion of granting loans without regard to the borrowers' ability to repay. Theoretically, the one can exist without the other. But nobody should really require a definition who has ever looked into Sumner's work, obligation to which the author wishes to acknowledge, or into that of Gouge and others equally well known. See, especially, Professor Bullock's Essays on the Monetary History of the United States, pp. 79–99 and Bray Hammond, Long-and Short-term Credit, *Quarterly Journal of Economics* for November 1934.

external factors, not only inflationary financing of government expenditure, but also inflationary impulses of the last-mentioned type, provided they proceed from the political world—which mainly, though not exclusively, means legislation—while "reckless banking" will be classed with speculative manias, swindle, and the like, by which we wish to express, on the one hand, that it does not belong to those features without which our model would not be logically complete and, on the other hand, that it does belong to those features which understandably present themselves under certain environmental circumstances and in certain stages in the career of capitalism.

It is only with regard to "reckless banking," to be touched upon later, that the question of inflation arises at all for the United States. Broadly speaking, sound money policy prevailed during the whole of this period, and the Constitution—which at the time was understood to have deprived both state legislatures and Congress of the power of issuing not only "bills of credit" but legal-tender fiat, an opinion held by the Supreme Court as late as 1870—reflects acknowledgment of the lesson taught by the war inflation. It ratified the temporary defeat of inflationism and substantially settled monetary matters until the Civil War. We need not go into the policy concerning silver and gold, beyond stating that no inflationary influence can have come from it, while banking developments negative—with one possible qualification to be mentioned later—the possibility of deflationary effects.

In Germany there were monetary disorders differing in nature and degree in different territories; but since we exclude Austria, we may say that they did not amount to much. In England, however, there was inflation in every sense this term can bear. Without staying to describe its well-known features, we will first observe that inflation in the sense defined at the beginning of the preceding paragraph culminated at the turn of the century, for public revenue and genuine borrowing increasingly caught up with expenditure in the course of the first decade of the nineteenth century[1]—and there was only a minor relapse later—although the peak of the absolute amount of the floating debt comes in 1814–1815. But a "commercial" expansion of means of payments that was in part, though not wholly, induced by that direct government inflation, took its place for several years—a fact which illustrates the difficulties of interpretation glanced at above. There cannot be any doubt, of course, that this inflation and the other disturbances incident to the world wars of the time affected the course of industrial, and particularly of commercial, events and distorted the statistical picture to the point of making

[1] According to Dr. E. B. Schumpeter, 70 per cent of total expenditure was covered by revenue for the whole period from 1793 to 1816, but for 1793–1802, only 60 per cent—even this, no doubt, an admirable performance.

amplitudes unreliable and of throwing doubt on the "true" location of peaks and troughs. But the influence of inflation alone should not be overrated. The inflation was anything but wild and never went beyond that first stage in which effects—notably, on prices—are less than proportional to the amount of units of purchasing power created. Confidence—which took the form of confidence in eventual resumption of specie payments; but what matters is not exactly that, but confidence in preservation or restoration of the purchasing power of the pound, which need not imply the other—was never seriously shaken. Effects cannot be measured either by total advances of the Bank of England or by notes outstanding, which would have increased in any case, or by other deposits which were also swelled by the growing habit of bankers to keep reserves at the bank. Movements of the price level understate them. Ricardo certainly took the problem too easily when he measured depreciation due to overissue by foreign exchanges. The inflation did not prevent that fall in the prices of home-produced commodities, notably of the innovating ones, which, as mentioned above, set in when it should have according to our schema. Nor was it strong enough to blot out any of the short cycles in which prices and country banks' issues move well together. It contributed to the failure of the rate of interest to fall, but it left usual sequences of cyclical symptoms intact. Among the dislocating influences exerted on the productive organism, the stimulus given to agriculture was, so the writer believes, the most important one. In industry there was "business as usual" for most of the time; but for many a firm the day of reckoning was put off.[1]

More difficult to answer is the question of the role played by deflation. We must, of course, distinguish deflation in the sense of actual reduction of the means of circulation originally created for government financing, or in the sense of any other monetary measures taken in order to restore the pound to the prewar gold parity, from mere cessation of inflation. The latter suffices to produce a temporary slump. In our case it must be listed among the factors that contributed to the crises of 1810–1811 and 1815. Neither of these can, indeed, be adequately described in terms of external factors, still less in terms of deflation, for both occurred within the cyclical rhythm. But both were aggravated, or even turned into catastrophes, by the direct and indirect effects of political events —the indirect effects mainly consisting in business action induced either

[1] The work which is compressed in the above statements started from, and was greatly facilitated by, Mr. Norman Silberling's study in the *Review of Economic Statistics*, 1923, as was investigation of the aggregative aspects for the rest of the period. In acknowledging this obligation and expressing agreement with some of Mr. Silberling's interpretations, the writer does not wish to convey the impression that he accepts them all. As to the facts, he would have but minor criticisms to offer.

by war conditions or by the speculative anticipation of peaceful conditions—and by the interruption or definitive cessation of government inflation. The crisis of 1815, in particular, which bears an obvious family likeness to that of 1921, undoubtedly ushered in postwar adjustments. The industrial activity of 1813 and 1814, which there is no reason to ascribe to war opportunities only, since these opportunities had also coexisted with depressed business, should have led to the recession which, in fact, set in during the latter year. But then there superimposed itself upon those recessive symptoms a boom which is clearly enough associated with optimistic anticipation, particularly with respect to foreign trade, of the effects of the treaties of Paris and Ghent. It lasted into 1815, was interrupted by the Hundred Days, resumed after Waterloo, and collapsed in the fall, the most obvious cause being the failure of those anticipations as to foreign trade—some of them absolutely ridiculous—to come true. The same cause also mainly accounts for the epidemic among banks. How innocuous the recession would otherwise have been can be seen from the behavior of cotton imports, which more truly than foreign trade and speculation reflect the state of the industrial organism. They were 92 million pounds in 1815, went down to 86 millions in 1816, but rose to 116 millions in 1817. Unemployment was to a great extent technological, but also would not have been so serious as we are led to believe it was, without the external factors which account for what primarily was, in England as elsewhere, a postwar slump.

Although the crisis of 1815 can hardly be said to have had anything to do with deflation—no measures having been taken as yet—the years to the resumption of specie payments in May 1821 (after that year there cannot be any question of it, as banking developments in the twenties and thirties amply prove; moreover, the act of 1822 directly stimulated credit expansion by provincial banks) will be by many of us suspected of having been under deflationary influences.[1] This opinion was held at the time by one party to the discussion that naturally arose about the monetary policy to be followed. In this discussion, which—a fact that is not much to the credit of monetary science—already brought out, on both sides of the question, very nearly all the arguments and recommendations to which we have again become accustomed since the World War of our own time and some of which we look upon as novelties, right and wrong is not easy to disentangle. Both parties produced good reasoning, even where they arrived (from their subconscious value judgments) at different recommendations, and mistakes can be proved against both, in

[1] It should be borne in mind that the meaning of such a statement depends on the definition of deflation. If deflation is, for instance, made synonymous with falling prices, then there is no problem. Only that is not very helpful.

points of fact as well as in points of theory.[1] Both of them—or, at any rate, the majorities of both parties—erred, however, in one fundamental point: even the advocates of return to gold at prewar parity, while in many instances giving other than monetary reasons for some of the depressive symptoms of the time, always admitted or implied that the fall in the price level was simply due to that policy and, without it, would not have occurred at all. We know that this is not so from the location of the period in the Kondratieff: the normal process of the long cycle would, as a consequence of industrial developments, have entailed not a fall only, but the fall characteristic of the first stage of a Kondratieff depression.[2]

This does not mean, of course, that monetary policy had no influence on prices, but only that the mere fact of their fall does not in itself prove that it had, and that such depressive influence on business as was exerted by the fall cannot, *ipso facto*, be attributed to monetary policy alone. The extent to which deflationary measures—again, as distinct from mere cessation of war expenditure—actually were effective, therefore, cannot be simply read off a price-level series 1815–1821 (when the acute fall ceased), but becomes a question of fact which it is extremely difficult to answer because, on the one hand, even absolute reduction of means of payment might have very little effect—in situations in which part of them would be idle anyhow—and because, on the other hand, it also might have a much greater effect—if it dislocates positions and induces a cumulative process—than crude quantity-theory considerations would lead us to believe. The question acquires additional interest from the almost perfect analogy of the financial and economic, not the social and political, situation with that which faced England after 1918.

[1] Most of the facts relevant to that controversy the reader finds in Mr. Silberling's study previously quoted. There are some more in the evidence collected by the Secret Committee on the Bank of England Charter (especially in the appendices to their report). A masterly survey of the discussion is presented in Professor Viner's Studies in the Theory of International Trade, 1937 I. It should be observed that, whatever truth there may be in the rumor that Ricardo later on repented of the advice he gave, his authority cannot be claimed to 100 per cent for the advocates of return to gold at the old parity, because that advice was offered as a part of a program, adoption of which would have made some difference as to consequences.

[2] The fall in prices set in before any measures had been taken that could be called deflationary. Against the obvious implication of this, Professor Viner, *op. cit.*, adduces anticipation of such measures. But even if businessmen harbored such anticipations—which is by no means certain; they expected a return to prewar parity, but for their majority the connection between this and falling prices was, at that time especially, probably less obvious than it is to Professor Viner—the presence of another factor would not thereby be disproved. We do not, however, insist on this, because, as stated above, mere cessation of inflation would in any case have given a shock to prices and it might be held, that this shock would not have led to continued fall but for the actual measures taken.

Compared to total income, the funded debt with which England emerged from the Napoleonic wars was quite as formidable as the debt bequeathed to her by the World War of our time. Nothing was done about it, economic development swiftly reducing to a light burden what had seemed a crushing one.[1] Balancing the budget did not—accomplished as it was mainly by prompt liquidation of war expenditure—entail any drastic measures and was accompanied by the repeal of the income tax, which it is relevant to notice because it bears upon the question of "nonmechanical effects" of such deflation as there was—that is to say, of those effects which, as stated above, might either enhance or reduce the mere quantitative effect, for example, by starting a spiral. Those measures were, in the atmosphere of the time, certainly of a nature to spread confidence and even optimism and to stimulate activity, and we may conclude that deflation had in this case less than quantity-theory effects. But what did it consist in? An act was passed in 1816 to put an end to the issue of small bank notes (under 5 pounds), which, in fact, were reduced to less than a million by 1822.

This does not mean, however, that the circulating medium was reduced either in the same proportion or even by the same amount. The only other measures that could be thought of are reflected in the increase in the bank's gold reserve and the decrease of its total advances. This was not accomplished by tightening the money market—money was easy, as we should expect from our model, throughout the period, except in 1816 and at the beginning of 1819—but it came about as a consequence of government's repaying its debt at the bank, thus normalizing its position. The variations of the gold holdings of the bank and of its total advances show perfect absence of any rigid grip on the reins, which were loosened exactly as the business situations seemed to require. In 1814, gold stood at 2.2 million pounds and total advances at 42.9. By 1817 gold was up to 10.7 and advances were down to 27. But in 1819, gold was only 3.8, advances having slightly increased; that situation was handled by letting out gold freely. It quickly returned, without much pains having to be taken and in the midst of the boom, 1824, we have those items at respectively 4.7 and 17.6 millions. With the airy confidence of the intellectual, most writers of both parties seem to have agreed in thinking that the directors of the bank were absolute fools. But from their standpoint, and within their system of values, those directors,

[1] That turn of phrase implies that an internal debt can be a "burden." Of course it can. It would be unnecessary to insist on this, were it not for the talk that has become familiar about "putting money from one pocket into another" and "mere transference payments." The keeping of capitalists, whose capital has been disabled by consumptive use, is as much of a burden as is the keeping of workmen who have been disabled on the battlefields. See below, Chap. XIV.

though perhaps deficient in the art of stating—or even seeing—their case, did an excellent job. Improvement came in 1817—when "deflation" was in full swing—1818 was a prosperous year, 1819 a depressed year, in 1820 and 1821 things brightened up, prosperity followed—all of which was in the ordinary rhythm of the cyclical movement.

Active means of payment were not, of course, reduced by anything like the amounts by which total advances fell; and it is absurd to think that what reduction there was, was torn from acts of expenditure which would otherwise have been effected. Business simply liquidated war expenditure *pari passu* with the government. This certainly intensified the fall in the level of prices to 1821, as it intensified other disturbances and dislocations. And if it be simply held that monetary policy did not prevent this, but on the contrary helped to bring prices quickly down toward that lower level on which they would have moved at that time had there been no war, there is little difference of opinion, although there seems little point in calling that deflation. Nor is there any objection if it be held that continued inflationary, or "reflationary," government expenditure—without return to gold or with return at a lower parity—would have prevented it and that this would have made things easier, particularly for the agrarian interests, which had so pleasantly become accustomed to rising prices. As it was, policy consisted in providing a secure frame for entrepreneurial activity, in reducing burdens and fetters (corn laws excepted) to a minimum and in defending this system with energy—ruthless energy, even—against the outbreaks of discontent and misery. Judgment on this policy, which must largely turn on the length of the period for which effects are taken into account, is not within our task. Only, it was not nonsense, nor unconnected with the economic achievements that followed.

5. As we have seen before, England, unlike Germany and the United States, was no longer an agricultural country even at the threshold of our period. But agriculture was still by far the most important single industry and the center of many important innovations. Enclosure went on and substantially completed its task within the Kondratieff—1780 to 1810, 1,699 enclosure acts were passed—intensive cultivation in the neighborhood of cities, of the type first developed in Flanders, and better methods of raising beef cattle continued to gain ground, and improvements of agricultural methods in general—such as the Norfolk system, drainage by means of steam pumps, more scientific use of fertilizers (guano)—while not really new for the most part, were actually carried out on a much greater scale. The obvious consequences of this asserted themselves in due course. They were mitigated by favorably shifting demand conditions throughout the period and, at first, also by the wars, which, however, intensified them later on because of the

untenable increase in acreage induced by war prices: the peaks in the official annual averages of the price of wheat occurred in 1800–1801—when it was 119s. 6d. per quarter[1]—1810, and 1812–1813; about 5 million acres were added to the food-producing area during the Napoleonic wars. We observe an invincible tendency (interrupted by bad harvests 1815–1818, 1826, 1828, 1829) of prices to fall in spite of protection and a picture of "gloom," characteristically spotted by prosperity, for instance, in Norfolk, Suffolk, Cambridgeshire, the Lothians—much the same sort of thing as in the United States of the twenties of this century. This entirely accords with our cyclical schema and constitutes part of the situation characteristic of that Kondratieff downgrade. It would be difficult to find a better illustration of how innovation operates in agriculture [2] But the great agricultural depression of the period after the Napoleonic wars and the clamor for protection to agriculture is only in part explained thereby. Foreign competition was a very real cause, particularly in the case of wheat and of wool. Improvident acquisition of land on the strength of war prices played, under English conditions, a very small role in aggravating the situation but other types of improvident action were of considerable importance. Adjustment eventually took the form of curtailment and of emigration into industry and into foreign countries and necessarily involved depressive processes. It was then that the yeoman class (or classes), which had been in decline since the seventeenth century and had experienced a last spell of prosperity after 1785, definitively disappeared.

The German case was entirely different. In 1804, 80 per cent of the Prussian population lived by agriculture, and this is fairly representative of the occupational structure of all the 39 sovereign states which emerged after the breakdown of the old empire from some hundred principalities that existed before. The great agrarian operations which were inaugurated in that period and eventually created the free—and more or less compact—peasant holding, did not come about in response to any entrepreneurial impulses among peasants, but were imposed upon them

[1] As a matter of fact, in 1801 wheat reached 126s.; the official annual average of 1812 is 126s. 6d. After 1820 the official annual average never rose beyond 74s. 9d., which figure occurred in the Crimean War.

[2] It is, therefore, a matter of regret to the author that he cannot go into the subject more fully, all the more so because wrong diagnoses of that depression have been and are so widely circulated. No full explanation is possible, in fact, without reference to the cyclical mechanism. But there are other objections to the theories usually offered. Sir E. West, for example, stressed failing purchasing power of consumers, which, in the case of England, is entirely untenable, in spite of widespread misery among the unemployed.—*The Farmers' Magazine* contains much interesting material on the process. So do Smart's *Annals*. See, also, Lord Ernle's English Farming Past and Present, and Mr. Fay's article in the *Economic Journal* for March 1921.

by government authority which, however conservative in other respects, in this instance quite uncritically accepted the ideas of economic liberalism. Into this matter, the source of so many serious problems of the future, we need not go beyond stating that neither the mentality nor the methods of the peasants were much changed, within our period, by those rearrangements—exactly as previous personal emancipation had failed to change them—and that the majority, continuing in their old ways, were largely exempt from the effects of business fluctuations and, in any case, played an entirely passive role in them. What change there was, spread of the previously introduced cultivation of potatoes for instance, was similarly carried by official initiative. The landed gentry that had taken to agriculture as a profession was in a different position, particularly where, as in Prussia, it "enjoyed" the blessings of readily available credit.[1] Especially in the east, the medium-sized and larger estates had early—much before our period—developed into grain- and wool-producing factories which worked for export according to ordinary commercial principles. Among these there was progress, of the innovation type, comparable to what went on in England. In fact it largely consisted in adopting English methods, English crop rotation, deep ploughing, drilling, the drainpipe, and better fertilizers. Much of this was taught by academic authority (Thaer) while agricultural chemistry (Liebig) began to lend its aid later. Production of oil seeds and of potatoes was on a greater scale than in England and some developments were of domestic origin, especially industrial ventures—distilleries, breweries and, from the thirties, beet-sugar factories. This class of landowners was, indeed, able to make use of the new freedom (in most respects, however, they had had all the freedom they wanted ever since the sixteenth century) and not only to rationalize the management of their estates but also to extend them by purchasing peasant property or property of their less active equals.

But most of these things asserted themselves in and after the Kondratieff depression. The prosperity of these landowners was, indeed, what prosperity is not in general, namely, a function of prices, which cannot be in turn explained in terms of the innovations that took effect up to the Napoleonic wars. Prices went up till 1805, then fell to 1811, rose again until 1818, when a sharp fall set in, accentuated by the good

[1] After the Seven Years' War, Frederick the Great had organized landbanks (*Landschaften*) especially designed to serve the credit requirements of the larger estates (*Rittergüter*). They issued mortgage bonds (*Pfandbriefe*) to the borrowers, which these had to sell but which sometimes also circulated as means of payment, a quite original form of credit creation. This system functioned but too well. By making it so easy for landowners to get into debt, it helped to create untenable situations, as such policies always will: one of the home truths that everyone knows and nobody admits.

harvests from 1820 to 1824. In the latter year, some of the cereals had fallen by about 70 per cent of the 1818 figure, though meat and dairy products fell far less. Recovery (with fluctuations) still left them in 1842 at their pre-Napoleonic level. While the latter fact presumably reflects improvement in agricultural methods and hence comes within our schema, the fall which produced what is usually referred to as the agricultural depression of the twenties of the nineteenth century does not any more than the preceding rise bear the corresponding interpretation. The fall in 1805 to 1811 was obviously due to impediments to exports; the fall from 1818 to 1824 links up with English prices plus English protection.[1] Besides, impoverishment of the masses owing to the preceding wars was a very real factor in Germany. While fall in prices due to improvement need not spell depression, fall due to such causes as these naturally does. Moreover, its effect was greatly intensified by the prevailing indebtedness, which came in part from investment in land—in many instances, of a speculative character—in part from the exactions incident to the wars and from living above means. It follows that we must look upon this depression in German agriculture largely as a phenomenon *sui generis*.

In the United States the production of agricultural raw materials in general followed rather than preceded the development of the industries that use them. This is especially true of wool, which, in spite of many efforts by manufacturers, of protection, of the impulses given by the English war and by the growing demand for mutton, and of the introduction of the Merino breed (1801), developed slowly until, just beyond our period, it temporarily became an article of export. Cotton continued to be imported and also to be an article of transit trade—net exports began in 1794—until a growing industry almost impelled its production on a larger scale. The great investment in cotton planting in the South began in the recession of that Kondratieff: a typical example of an induced development or of what we have called expansion into new economic space created by previous innovation. Lumbering was, of course, basic to the general growth of the country from the start, but not very interesting cyclically, since so much of it was done for local purposes. The great development was in wheat growing. Stimulated by abundance of cheap credit due to what has above been referred to as "reckless banking," and by foreign demand, it experienced a boom, 1790–1795, which together with the development of milling incident to it—export of flour continued to increase after the export of wheat had fallen—was one

[1] Wool prices, while moving sharply in the shorter cycles, did not display any long-time depression. They fell from the peak of 1818, but recovered in 1821. In 1825 they reached their all-time high (before the World War of the twentieth century), to fall by almost 50 per cent in 1826: German wool was dominant in the English market until, after the forties, Australian and La Plata wool came in.

of the most important elements of that Kondratieff prosperity. Since that boom was primarily—though by no means wholly—a matter of ability to export, the setback and America's share in the ensuing agrarian depression must, still more than in the case of Germany, be interpreted in terms of foreign conditions, falling prices, and protection in England in particular, the effects of which were, for the country taken as a whole, alleviated by the favorably developing cotton situation.

But another phenomenon calls for attention which plays a role in all agrarian depressions in this country. That is a type of innovation which from the start has been peculiar to it and has remained so into the twenties of this century: innovation which creates the conditions for bringing new regions into cultivation. Grain production shifted its center from the New England States to Virginia and Maryland already in colonial times, and in our period began to shift it again to the Ohio and the Great Lakes. Each process of this kind spells increase of production and, at the same time, prosperity in the new and depression in the old regions—the latter well illustrating that important piece of the cyclical mechanism, the competition between the new and the old production functions. It should be noted in passing that this also illustrates the difficulty of talking about the "long-period depressions in the world's agriculture" as homogeneous phenomena, while recognition of the large number of factors that, in very different combinations, constitute the phenomenon in each country should be sufficient to expose the shallowness of monetary explanations as well as of the overproduction slogan.

6. English colonial and commercial enterprise, exploiting opportunities created or conditioned by political action, remained important, of course, throughout our period (Sir Robert Peel's second ministry, which took office about at the end of it, conveniently marks an important change of political attitude in this respect) and even beyond it, but in relative importance it distinctly declined. Commerce of the type which is associated with peaceful trade and with all that this politically implies, increased fairly steadily during the eighteenth century and continued to increase (in physical quantities) throughout our period, at a growing rate.[1] Foreign investment became important enough to be much in evidence in the crises of the last two decades of the period. But the outstanding feature was the completion of the conquest, begun in Elizabethan times, of England's domestic market by her own industry, the evolution of which is the dominant factor which shaped her business situations and induced such additional expansion (that part of the expansion which went beyond growth) of her foreign trade as occurred. English industrial history can, in the epoch under discussion, be almost resolved into the

[1] Barring the various setbacks, of course. And values were stagnant or falling in the first four decades of the nineteenth century.

history of a single industry, the evolution of which, together with all the effects on and reactions from the rest of the economic system, affords as clear an illustration of our cyclical process as we can ever hope to find—cotton textiles.

In order to guard against misinterpretation, let us repeat: the cotton textile industry was the new leader, according to our terminology, but it was not new in the sense of common parlance. Production of and trade in cotton goods, of course, existed before—in Germany and Switzerland it dates from the Middle Ages, when it got its raw material from Asia Minor—and several stages, all marked by innovations, can be clearly distinguished. The first of these consisted in the introduction of Indian cotton fabrics, mainly (or wholly?) by the East India Company (establishment of a new consumers' good). By 1721 success was important enough to have roused hostility of threatened "old firms"—that is, the woolen and silk industries—which in that year secured, with due reference to the interest of the English workman, a prohibition of the sale as well as the wearing of printed, painted, or dyed calicoes. At that time, however, an English industry using cotton as weft in a linen warp had already come into existence—the second innovation. This industry was granted an exemption for the production of such mixed fabrics in 1736, and went on developing on these lines, thus creating a demand for yarn and conditioning, by putting a premium on its production, innovation in the latter. Complete repeal came in 1774, soon after it had become possible to produce pure cotton fabrics. Many steps led up to this achievement, which constitutes a third innovation clearly anterior to our Kondratieff prosperity. But realization that counted quantitatively (for the whole of the economic system) did not come before the eighties. Experimentation, resistance, failure, and local success (Arkwright's, about 1760, was the outstanding one) is what we observe before. Spread, induced improvement, dislocation and absorption, copying, following, and competing are what we observe afterward, in the downgrade and revival, when the real avalanche of products came. Prices and exports tell this tale clearly.[1]

Again, not only, as mentioned before, had many of the most important textile inventions—the flying shuttle, the jenny, Barker's loom,

[1] See, for example, Professor Usher, Industrial History, quoted before. Price of No. 40 yarn was still 16s. at the threshold of our period (1779). It fell till 1784 to 10s. 11d.; was 7s. 6d. in 1799, 2s. 6d. in 1812 (recession effect), 1s. 2½d. in 1830. Exports rose from 300,000 pounds in 1781 to 30 million pounds in 1825. It is, as the above abundantly shows, no part of our intention to belittle previous developments. Our schema itself leads us to emphasize them. But, inasmuch as appraisal of these developments is made to rest on the fact that relative increase was just as strong 1750–1764, it is necessary to point out that logarithmic scales also may present misleading pictures. In 1802 woolen fabrics were ousted from their place as leading article of export.

and so on—like inventions in other fields that played a role in the industrial revolution in our sense, been made earlier, even if we date by eighteenth-century patents what really leads to much more ancient roots; not only can but few of these—like the waterframe and the mule—be looked upon as directly relevant to the causation of that prosperity; but it is also a fact that many of those made during that time did not take effect until after the turn of Kondratieff prosperity, because of their technological shortcomings. Cartwright's looms, for instance, were paid, it seems, too high a compliment by the weavers who in 1792 destroyed his factory. A really successful power loom evolved from the work of Austin, Horrocks, and Roberts in the two first decades of the nineteenth century. Once more we see that invention and innovation are entirely different things, not uniquely related to each other, and that only confusion can result from trying to analyze economic processes in terms of the former. But they interact, of course, and sometimes invention is an incident in an entrepreneurial achievement. Arkwright's figure exemplifies this (as far as he really invented anything himself). He is typical of what we call an entrepreneur: *sociologically*, in his background which illustrates so well the truth that entrepreneurs—Arkwrights and Dukes of Bridgewater[1]—form no social class; *personally*, in the sort of man he was; *economically*, in the nature of his achievement and its effects on the environment. Brindley the millwright, Telford the mason, Cartwright the parson, Hargreaves the weaver, Fielden and Strutt the farmers, Huntsman the clockmaker, and many others in the textile and other fields would serve equally well. Subtypes can easily be distinguished. In the alliance Watt-Boulton-Wilkinson, we see three of them at one glance.

But if invention is not the core of the matter, neither is objective opportunity. Study of our period shows us again that "doing the thing"—the actual setting up of new production functions—is a distinct phenomenon. We readily see how every step conditions other steps—yarn and cloth, for instance, alternating in offering new demand to each other and in running up against bottlenecks, the removal of which then makes the next achievement. We see how demand for cotton conditions Whitney's ginning machine and so on. But we also see that these conditions (though not always, of course—as pointed out before, wars condition enterprise in ordnance production) lead up to other innovations,

[1] They are, however, a class in the sense of scientific classification. But in this "class" they meet as people do in a railway station and outside of it they remain what they are socially. No barber becomes an aristocrat by virtue of the "Sir," and the writer guesses, although he has not bothered to verify it, that the other entrepreneur mentioned above remained, when not canal-building, what he socially was and that he then behaved much as other people do who are endowed with strawberry leaves.

and that if we stopped at this type of demand as an ultimate datum we should commit the same error as we should if we stopped in the analysis of value at given costs. Moreover, it is clear that those conditions never produce any given innovation automatically, so that insertion of another factor would be unnecessary. Most of the earlier textile improvements in the sixteenth and seventeenth centuries naturally occurred in the field of the woolen and silk trades, when these were in the van of activity. There was no technological reason why these should not have been reformed first in the eighteenth. It would have been profitable and the fact that possibilities were less enticing, owing to the comparative scarcity of wool, is no reason why such possibilities as there were should not have been exploited. Yet they were not or, at any rate, to but a small extent. The rich and well-established woolen industry lagged behind, right into the thirties of the nineteenth century. It accepted progress under pressure and was drawn along by the more active younger sister in the adaptive way characteristic of the changes in downgrades and revivals. The New Men and New Firms stand out so well in this case because the industry itself was new as (in the sense mentioned and with the qualification similarly mentioned) the industries that carry Kondratieff upswings also are in the other instances.

But this was not different in the old industries that took part, particularly in iron and steel (puddling process, H. Cort, 1784; cast rollers, improvements in blast furnaces and so on)[1] and in the many smaller or subsidiary branches which came along simultaneously—papermaking, watch-making, the making of machine tools (all-metal lathe, 1794), and others. Nor is the element of Disharmony and Jerkiness absent in any of these cases. The nature of the task (beyond conceiving the plan and overcoming environmental resistance) was similar in all these cases and may be illustrated by Watt's difficulties.[2] Before ironmaster

[1] By the end of the Napoleonic wars, cost of producing iron in England was far below that of any European competitor and its use had spread correspondingly. This success parallels that of the cotton industry and also has its roots at the beginning of the century (smelting by coke, Abraham Darby, 1709; Cort's success was preceded by experiments by J. Roebuck and Th. and G. Cranage in the sixties; Huntsman's steel dates from 1750).

[2] The fundamental idea, the separate condenser, which dates from 1765, was itself a "critical" achievement, summing up and improving work that goes back to antiquity and that made great progress during the Renaissance. For us, however, the important name is Newcomen (1712?), see Professor Usher's History of Mechanical Inventions, p. 308. Smeaton's work on atmospheric engines, mills, pumps, cylinders, and the water-power blowing machine (the latter, 1760) should also be mentioned. Watt and his partner, M. Boulton, saw success in 1782. Their cooperation, their business methods, and the organization of their firm makes a most interesting case study for us. It has fortunately been done, see Roll, An Early Experiment in Industrial Organization, the History of the Firm of Boulton and Watt, 1930. Boulton is for us still more interesting than Watt. It is not correct to describe their alliance as the alliance of an entrepreneur and a "capitalist." The career

Wilkinson (who had already improved the boring of cannon) came to his aid, his condenser was all but unworkable, his cylinders were not cylindrical, pistons did not fit them, cogwheels and bearings functioned badly. His machines wasted steam, wore out quickly, and broke down easily. Even after considerable improvement they came into use very slowly, and by 1800 the horsepower total of the steam engines installed by the firm of Boulton and Watt was small compared with that of water, wind, and animals.

Observations of this kind have induced some historians to discount the importance of innovation and the actual extent of industrial change, at any rate until well into the nineteenth century, and even to ridicule the textbook emphasis on a small number of picturesque instances. We have no quarrel with this as to the facts, although identification of innovation with invention and occasionally, also, neglect of the comparatively small size of the industrial organism to which changes must be referred, partly account for criticism of this kind. It is obvious that a large sector of the industrial world of the time was practically untouched. Building,[1] together with most of its subsidiaries, plus clothing, would by themselves suffice to establish the fact. Continued prevalence of the small unit in most industries points in the same direction.[2] But the inference one might draw from it is, nevertheless, misleading. If we are to form an idea as to the quantitative adequacy of innovation, we must bear in mind that all it should, according to our schema, be adequate for, is "ignition." What we see on the surface is largely the effect of what we have called the Secondary Wave, the phenomena of which can in fact be sufficiently expressed in terms of general conditions, growing commercial centers, independently given demand conditions, and so on. To that ignition we must, hence, always

---

of the Soho works, with their modern division of labor and their almost Taylorized arrangement of the steps of the productive process, then constitutes a second stage, presenting other, but not less interesting, aspects.

[1] Qualification is necessary, however. In the building trade the rise of small men to ownership of bigger and more efficient firms, particularly if associated with speculative building—quite common by 1800—will in many cases, though not in all, come within our concept of innovation. The great development after 1800, strikingly similar to what happened in the downgrades of the two succeeding Kondratieffs, is typically "pushing into newly created economic space."

[2] On the authority of Professor Clapham (*op. cit.*, p. 70), we put the relation of employees to employers in London industry and trade at the beginning of our period at "a good deal less" than two to one. Even according to the Census of 1851 (*ibid.*) it works out at 8⅓ to 1 for England and Wales. The rise from the status of a laborer to that of a small master and from this to "respectability"—a process particularly in evidence in this period—is a most important feature of the social mechanism of that type of capitalist society and would repay systematic study. It often implies minor innovation.

apply a multiplier before confronting it with statistical findings about social aggregates. Looked at in this manner, the development in the cotton trade alone would be adequate to explain a Kondratieff upswing. We do not hold, of course, that it actually was the only starter.[1] But it was by far the most important one and its action can be clearly followed up. Moreover, we do not find the symptoms of prosperity distributed equally or else strewn at random over the system, as we should if the true explanation were to be found in an autonomous movement of aggregative and other systematic quantities, such as output, employment, price level, interest rate, and so on responding to a process of general growth. We find a characteristic concentration of prosperity in certain lines in which employment and wages increase much more than in others, and we see how from there the impulse spreads, meeting, no doubt, similar though smaller impulses of the same kind in other fields.

That the nature of industrial processes and the complexion of business changed after 1820 (assuming that the course of events from 1800 to 1820 was substantially affected by the Napoleonic wars and their aftermath) seems to the writer equally beyond doubt. Since the difference in the behavior of aggregates and other systematic quantities cannot be contested—and that this behavior is as it should be according to our schema will be established in our discussion of time series—the only issue before the reader is, again, whether or not it is correct to attribute that complexion of business to this behavior of the aggregates, itself independently caused—by monetary policy, for instance—or to attribute the behavior of the aggregates to the industrial processes that shaped the phase of the

[1] Roadmaking was, of course, an important item of investment and contributed its share to that Kondratieff prosperity: it was no longer a new and "carrying" but an established thing, which was being steadily developed in and out of prosperity phases, although it received new impulses in every upswing. The case of construction of artificial waterways was different. This was one of the great features of the period. We observe what might almost be called a mania setting in soon after 1790. Speculative excesses attached themselves to canal promotion, which also played a conspicuous role in the crash of 1825. However, the pioneer work that initiated the movement had attained success, established methods and possibilities, and conquered the public mind before. The first great achievement (preceded since the end of the seventeenth century by improvement of natural waterways), the Duke of Bridgewater's canal, was begun in 1759, and Brindley died in 1772, after having worked out a vast programme. We have here another instance of an innovation asserting itself and even acquiring importance before it becomes the carrier of a Kondratieff prosperity. The Trent-to-Mersey canal, the Birmingham to Wolverhampton canal, and others all came before our period. Some of them truly wrought "revolutions." In other respects, the case is ideally regular: the considerable period of gestation (the Duke's canal took about two years to construct) and the expense involved, the obvious effect on costs of transportation—after the completion of that canal the price of coal in Manchester fell to one-half of what it had been before—and on comparative advantage of locations, make it particularly apt to exemplify the working of our model.

long cycle then ruling. The answer is complicated by the circumstance that we do not deny that the systematic quantities exerted influence—any quantity exerts influence of its own in a system of mutual interdependence—or that things would have been different if those quantities had been made different from what they were by political action. What we do deny is that the explanatory principle of the sequence of events can be found in them. And what we have to offer in support of this denial is the fact that their behavior can be explained in terms, and as a consequence, of the cyclical process. We have already mentioned the building booms—a building boom, in particular, preceded 1825—and the kind of general increase of physical production which comes within our concept of adaptive expansion into the newly created investment opportunities. This process—interwoven with the prosperities of the shorter cycles which added such innovations as the use of the hot-air blast furnaces (1829)—centers in cotton textiles, coal and iron, and transportation. It displays both the spread of improvement, notably of the steam engine, the iron machine, the machine tools, and mechanical engineering in general, which accounts for the impression voiced by Tugan-Baranowsky, and the competitive crowding out of older strata of inadaptable firms and all those people whose economic basis they were, the hand-loom weavers being a prominent and tragic instance. This explains depressive situations spotted with success and obviously allows of description in terms of a movement toward a new state of equilibrium that would embody the new production functions. The reader is invited to satisfy himself—for example, by applying our theoretical schema to the facts of the first volume of Professor Clapham's work—that all this, without the help of any extraneous elements, would account perfectly satisfactorily for the behavior of social aggregates and other systematic quantities which, indeed, might be deduced from it: this process would pull down prices, interest, sum total of profits, money wage rates.[1]

The unemployment of the period calls for a short comment. We do not know exactly its extent in any year of the period, except locally, still

[1] Not, of course, money wage bill or real rates. The fact that the former did not fall, except for very short, deep depressions, negatives the idea that the agricultural depression can have had anything to do with failing purchasing power of the masses. Theoretically, even a rising wage bill would, especially if accompanied by unemployment, be compatible with decreasing money demand for foodstuffs, for the higher income of the employed might not be spent on food and hence might fail to compensate for the reduced demand of the unemployed. But in the circumstances of the case and because of the low absolute level of wages, it is not likely that this played any role. As to money rate of wages, it fell from its peak (which comes about 1810) to about 1845, the years 1820 to 1824 excepted. It then remained by, roughly, one-third above what it was in 1780. Real wages, of course, increased throughout. We shall return to this subject in due course. This is only a suggestion for a preliminary exercise in the application of our model to a given historical pattern.

less its variations from year to year. But from parliamentary papers and private estimates we may infer that it was very considerable throughout, with the exception of the years preceding 1825 and in the beginning of the thirties, and much greater than in 1780 to 1815, even if we give due weight to the fact that official and private investigations and comments primarily refer to years that fall into depression phases of the Juglars and that they naturally stress conditions in the worst spots. But since real wage rates rose almost uninterruptedly and since rigidity of money wage rates cannot, at that time, have played a major role, this unemployment—which is what accounts for the darkest hues of the labor situation of the time—must have been primarily technological. In fact, this was obvious to contemporaneous observers. But total employment increased, with the exception of years of deep depression, even in the textile trades, although this increase partly veils that kind of unemployment which consisted in the replacement of male by female and child labor.[1] The machine did not, in the long run, reduce total employment or, in general, reduce it in the trades that were being revolutionized. What it did was to create cyclical unemployment—though this might be of considerable duration—primarily, in the sectors that were being undersold and crowded out, and secondarily, in the innovating sectors when they felt the repercussion of crises.

Steamers, though perfectly known and also tried out, did not rise to quantitative importance during the period. According to Porter, their tonnage was only 51,000 as late as 1837, and the iron ship remained, in spite of the success of the Manby (1822), in its experimental stage. But the locomotive, after Stephenson's success, quickly put its competitors in railway traction (horses, stationary engines) out of court, although its use was prohibited in the bill for the line between Carlisle and Newcastle[2] (1829, the very year of the Rainhill Competition). The conspicuous success in 1835 induced speculative excesses immediately afterward, although railway propositions had been sufficiently prominent before to qualify for the title of "bubble speculations." The Liverpool and Manchester was the first entrepreneurial feat of national importance which, indeed, induced not only the "following"—part of the essentials of our schema—but all the phenomena of our Secondary Wave. The contribution of railroad construction to the Juglar prosperity that

[1] Some light on this aspect of the problem of child labor can be derived from the discussions and investigations preceding the Ten Hour Bill of 1847, particularly the Inquiry of the Commissioners on Children's Employment, 1842–1843. See, also, Select Committee on the State of the Children in Manufactures of the United Kingdom for 1815–1816, and J. Dunlop, English Apprenticeship and Child Labor, 1912.

[2] Shares of an iron railway first appear, as far as the writer knows, in the official stock exchange price list in 1807. That was the Surrey (horse traction).

preceded the crash of 1837 is beyond doubt. But speculative excitement and its reflex in the talk of the time should not induce us to exaggerate the importance of the, roughly, thousand miles sanctioned in the boom itself and the, roughly, 490 miles that according to Levi (History of British Commerce, 1872, p. 302) had been constructed by 1838, involving a total expenditure of 13.3 million pounds. The great development that within a few years created almost the whole skeleton of the English railway system was the work of the forties. Therefore, we attribute, in the sense already explained, railroadization to the second Kondratieff, although all the essentials of railroad enterprise—types of entrepreneurs and methods of financing included—stand out fully fledged in the thirties.

Since limited liability was not definitely recognized as a normal vehicle of enterprise before the Joint Stock Company Act of 1856, and since during the whole of our period incorporation of a company—witness A. Smith, who in this, as in other respects, simply voices prevalent opinion—was looked upon as a somewhat exceptional measure to be resorted to only on the strength of reasons peculiar to the individual case or class of cases, we cannot expect the industrial revolution to be correctly mirrored in corporation statistics. Industrial innovation largely escapes and, even in the chosen fields of the corporate form of organization—the fields characterized by abnormal size of capital, simplicity of the commercial side of the task, comparative controlability of administration and relatively unspeculative nature of operations—the true pioneer work was, at first and unless general excitement broke down inhibitions, not likely to take that form, because, incorporation requiring parliamentary sanction, it was primarily propositions of previously established feasability and "utility" that stood a chance. In banking, the field of one of the most important innovations of the period, spread of the corporate form was until 1826 barred by the act restricting to six the number of persons who might associate for the purpose of banking. In Scotland, where the act did not apply, 7 new banks with a large number of partners were founded in the Kondratieff prosperity, and 15 between 1800 and 1815. English company promotion in the Kondratieff prosperity centered in canals—also docks, water supply, bridges, roads—and to a lesser degree in colonial enterprise and insurance. The quantitative importance of expenditure on canals, in particular, is presumably not badly reflected by the hundred or more canal acts passed before 1800.[1]

But after the turn of the century and in the Kondratieff recession, Juglar prosperities become clearly marked by the promotions of com-

[1] Compare Bishop C. Hunt, The Joint Stock Company in England 1800–1825 and 1830–1844, *Journal of Political Economy* for February and June 1935. The writer wishes to acknowledge the debt he owes to this excellent study.

panies of a quasi-corporate character. There was what has been described as a mania in 1807 and 1808 and during those years promotion, for the first time since the Bubble Act, spread, to a significant though still minor extent, to the industrial field, (paper, woolens; white flour milling had preceded—Albion Mills, Birmingham Flour and Bread, London Company for the Manufacture of Flour Meal and Bread). Some of these schemes were abortive. Others were proceeded against on technical grounds, but the ice had been broken in spite of a hostile attitude of important interests which, as in the case of the Gas, Light and Coke Company, did not always choose its objects well.[1] A long discussion and a period of uncertainty as to the attitude of public authority ensued, which may have been, in part, responsible for the lull in promotion until the beginning of the twenties. But the prosperities of the two last Juglars and their spectacular crises again display such "manias." In 1824 and 1825 we have one outburst. Foreign financing and mining ventures (Mexican and South American, in particular), insurance, gas, canals, and finally, a wide variety of trading, building, and other propositions were offered, many of which foundered on financial rocks before they had had time to fail from other causes. Of 624 companies floated, only 127 survived in 1827.[2] Novelties were not absent from the list, railroads and steamships being the most conspicuous ones. But they do not signify. Most incorporations spell expansion on the lines chalked out in the Kondratieff prosperity or simply expansion into newly created space without any particular element of innovation or, at all events, without any beyond size and the company form. The reader will observe how similar this is to what happened in the eighties of the nineteenth and the twenties of the twentieth century and how it agrees with our ideas about the course of events in Kondratieff downgrades and recoveries.

Because of the legislative barrier before 1826, joint stock deposit banks appear in the midst of the subsequent depression. No less than 15 such banks were founded between 1826 and 1830, inclusive, though 25 were founded in the next three years. Resistance crumbling

[1] If we were investigating the entire range of the economics and sociology of capitalism, we should have to emphasize that that opposition came only to an insignificant extent from intellectuals hostile to the capitalist system, and almost wholly from the industrial *bourgeoisie* itself, of which the newspapers, the pamphleteers, and the lawyers were but the exponents. Nor would it be true to say that this attitude of the *bourgeoisie* was, wholly or primarily, due to fear of competition by the companies.

[2] See Bishop C. Hunt, *op. cit.*, p. 25, based on H. English, A Complete View of Joint Stock Companies Formed in 1824 and 1825, London, 1827. We accept that estimate in preference to others, on Mr. Hunt's authority. For what follows, see also the list on p. 27 of companies, formed before 1824, which survived the crisis, and also Tables IV and V, pp. 362 and 363, in the second article.

rapidly, company statistics cover a correspondingly increasing sector of economic life during the thirties—though they have not for England become truly representative until the postwar period—particularly after the act of 1837 (I Vict. c. 73), which definitively sanctioned acquisition of the privilege of limited liability by administrative assent and headed towards the principle of registration. But even in 1844, when 947 companies were in existence (in England), there was but one cotton-manufacturing establishment among them. There were 24 woolen-manufacturing companies, 9 breweries, 14 producing other foods or drink, 1 producing railroad rolling stock, 14 in miscellaneous industries. Railroads (108), gas and water and other public utilities (420), and shipping (51), supply the bulk. Railroads, banks, foreign lending, and other foreign ventures are particularly associated with major innovations. The general picture in the thirties looks, from our standpoint, much like an enlarged edition of that of the years preceding 1825. It conforms to expectation from the location of the period in the Kondratieff, except for the violence of the boom, which entailed corresponding violence of the subsequent crash (1837) and calls for special explanation.

7. The contemporaneous development in Germany is so different in almost every respect that we shall understand, although we do not share, the view of those students of German business cycles who refuse for that epoch to recognize the presence of any cyclical phenomena, and of those historians who have set the fashion of dating the beginnings of modern industry in Germany from 1800 or 1815. It is in fact easier to discover the contour lines of our process in the quiet times that followed upon the Napoleonic period and, particularly, upon the slow emergence, from 1818 to 1833,[1] of a territory large enough to reduce political risk of investment to bearable proportions. Before 1815 we have the noncyclical impulse which was given to some industries by the Continental System and understandably called forth a great number of small and inefficient firms, which collapsed with it. But

[1] 1818 is the year of the first Prussian tariff which applied to the whole of Prussia and displayed, at least with respect to other German territories, a distinct free-trade tendency (10 per cent ad valorem, with higher rates for oversea imports). The tariff reform of 1821 was a further step in this direction, which led up to various conventions with other German states and eventually to the Zollverein (March 22, 1833; most German states joined in or before 1838, Hannover and Oldenburg in 1851; 1838 is also the year of the currency convention of Dresden). The reader should observe, however, that no great immediate effect is above attributed to these institutional changes. They undoubtedly conditioned both enterprise and growth ever after, although they asserted themselves but slowly in the course of the century. What they immediately accomplished was only removal of fetters from the things initiated in, and crippled by, these fetters. More immediate, though in the end much smaller, were the effects of the conventions that freed navigation on the Elbe (1821) and on the Rhine (1831).

for the two decades which preceded the breakdown of the Holy Roman Empire (1803), there seem to be few traces of anything that looks like a Kondratieff prosperity.

In order to arrive at a diagnosis, we must recall not only that disturbances during the nineties were quite important enough to blot out the symptoms of such an upswing, but also that the whole of eighteenth-century developments was still under the shadow of the Thirty Years' War and its consequences. Traces of even the direct physical destruction incident to it were in some localities still present at the end of the century. In many places (Freiberg, Oberharz, and others) lack of equipment or of the means to provide it, and consequent survival of old methods and forms of organization, are equally traceable to it, in particular, the inability to deal—in spite of workable technological solutions—with the water problem in many mining districts and to carry work to the greater depths required because of the exhaustion of the easier accessible levels. Wastage of actual or potential industrial personnel—the physical annihilation of great part of the *bourgeoisie*—had done the rest. There can, thus, be as little doubt about the reasons as there is about the fact of the small scale of industrial ventures and of the smallness of the success that attended such ventures as were entered upon. This smallness, then, accounts for the predominance both of external over internal factors in the German industrial history of that time, and of agrarian and commercial over industrial enterprise.

This does not mean, however, that our process was absent or confined to the worlds of agriculture and of commerce, although it does mean that booms and crises (like earlier ones—for example, that of 1763[1]) were primarily commercial in a sense in which later crises were not. There was very little innovatory activity in the textile field. Conditions in the linen industry—throughout that Kondratieff and even beyond—are sufficiently characterized by the fact that as late as 1831 not more than about 14 per cent of the total of linen looms in Prussia were operated by people who were weavers and nothing else. Since many who were "professional" weavers also were cottagers, this somewhat overstates the case; but it is perfectly clear that practically all linen weaving was done in the peasant family or else as a *Kleingewerbe*, in both cases by the most primitive methods, and that whatever change there was, was of the type of growth. Things were somewhat different, however, in the woolen industry, which not only was more of a specialized craft—reach-

[1] On that crisis, see Spiethoff, *op. cit.*, p. 48. He denies that it was commercial, and calls it a *credit crisis*. This seems, however, to be little more than a question of terminology. It is true that prices did not react strongly and also that the preceding war and the methods by which it was financed account for many of its features; but neither fact abolishes more fundamental similarities. Every crisis is in a sense a historic individual.

ing beyond the local market by means of the *Verleger*, as did the linen industry—but in places also attained the factory stage. This happened first, as far as the writer knows, in Aachen, where by 1807 there were 41 cloth factories—mostly small ones. Several technological improvements had by then been introduced, though steam, the power loom, the flying shuttle, clipping machines, and the like did not come until the end of our period, and even then played too small a role to count quantitatively. Before our period, silk had already gone through a considerable development and had locally reached the stage of larger scale enterprise (Krefeld), the basis of several industrial family positions. It rather stagnated during our period. Cotton, really a very old industry, assumed a new form entirely unconnected with its Renaissance past, though its eighteenth-century beginnings and even its developments to 1842 look insignificant when compared with English achievement. Most of the new methods—the power loom, in particular—were conspicuous by absence almost throughout and the little we see of them toward the end of that Kondratieff, when also a few establishments emerged of a size comparable to that of English mills, was of the type characteristic of downgrades: copying and adaptive, rather than truly initiating. In most other industries, handicraft prevailed, even in those which, like the Solingen cutlery, had acquired an international fame.

The steam engine[1] and machinery in general—863 machines in all were counted in Prussia as late as 1843; Freund started machine making in 1812, Borsig in 1837—made headway but slowly, though we are apt to overlook widely scattered beginnings, of which the one in the Munich brewery industry (Sedlmayr) may be cited as an example. Several innovations (such as Senfelder's lithography in 1785 and 1806; the first beet-sugar factory in 1796; Koenig and Bauer's printing press in 1814; Krupp's cast steel in 1815;[2] first steamboat on the Weser in 1816) no doubt took long in rising to quantitative importance. Others as, for example, those in the fields of chemical industry (sulphur, soda, dyes) or of optical (Fraunhofer's telescopes) and surgical instruments, remained insignificant throughout the period, or even in the experimental stage (Bauer's electromagnetic machine, for instance). Still others were late fruits of the last Juglar (Sloman's four sailing liners which in 1836 took up regular service between Hamburg and New York). So were railroads in which private enterprise took an interest almost as early as it did in England: railroad projects were pressed from the middle of the twenties (F. Harkort). After an experiment in the neighborhood of Elberfeld (1826), the first line (Nuremberg-Fürth in Bavaria) was opened 1835.

[1] There were 7,500 H.P. installed in the whole of Prussia in 1837.

[2] The date is somewhat open to doubt. The firm was founded in 1810, as was the firm of Jacobi, Haniel and Huyssen.

The line Leipzig-Dresden followed and a number of other companies started construction and/or operation before 1842 (mileage opened till 1840 was 549 km.).

Taken together, all this was more than nothing, particularly, if we recall, as we had to recall even in the English case, that a considerable multiplier has to be applied to any such data if we are to form an idea of total effects. It is true that most of it was the work of the prosperities in what, according to our schema, was the downgrade and revival of the Kondratieff. This accords with the nature of many of the achievements mentioned—though it is mainly to be explained by the political setting—and also holds of banking developments that characteristically accompanied them (Berliner Kassenverein in 1824, Bayerische Hypotheken-und Wechselbank in 1834, Leipziger Bank in 1838). In order to appreciate at its true value what, in spite of inhibitions and disturbances, happened before or about the turn of the century, and to decide whether it was adequate to warrant speaking of a Kondratieff prosperity, we must add another element to our picture. It has been pointed out that, within the social structure that emerged from seventeenth-century vicissitudes, the State—the Prince and his bureaucracy—not only meant more than, but also something different from, what they meant in other countries, and that one of the consequences of this was not only regulation of industry that amounted to guidance, but also actual state enterprise. The social stratum that supplied the personnel of public administration was—excepting the urban republics (Reichsstädte) such as Hamburg or Bremen or Frankfurt—much superior in intelligence, horizon, training, energy to the personnel of such private industry as there was; and this is one of the reasons why it would be as silly to condemn that public planning in the Germany of that time as it would be to hold it up as a model for societies of different structure. That the states built the canals and the roads which in England were created by private enterprise was natural under the circumstances. The development which corresponds to the English turnpikes came in the downgrade, from 1816 to 1841, when the mileage of the Prussian *chaussées* trebled. Effects of this investment on expenditure and on location of industries were similar to what they would have been with private enterprise, but the mechanism differed, of course, from that described by our model.

Much more interesting, however, is the entrepreneurial activity of the principalities in the field of mining and its technological neighbors, which was the "great thing" that carried what prosperity there was. In the eighties of the seventeenth century mining had in most districts begun to revive from prostration, and from that time we observe several modest waves of activity which eventually led up to the developments in

the last quarter of the eighteenth. Here initiative as well as execution came almost entirely from the princes and their bureaucracy. Reorganization and the clearing away of obsolete legal structures (as an outstanding example, we may mention the —Prussian—Renovierte Bergordnung for Cleve and the Mark, 1737) could in any case have been done only by the public authority. But the states went beyond that and even beyond forcing technological and commercial improvement on lethargic or impoverished owners. They actually undertook the development and operation of mines and embarked upon enterprise in the heavy industries, thus not only directing but replacing private initiative. The way in which this was done differed less from our schema than one would suppose. Mines and factories were operated for profit. Financing was largely on commercial lines. And the entrepreneurial function was as clearly present and as distinctly vested in individuals as it is in private industry. Those entrepreneurs were public servants and acted by virtue of official appointment, but both in type and behavior entirely conform to the idea of a "captain of industry." The central authority left them remarkably free to act, and in most cases ratified their plans as a matter of course. A single outstanding example must suffice—Von Reden's administration of the Silesian district, which covers over 20 years, to 1803. During this time the value of mining products increased to more than five times, the number of workmen to nearly five times the figures of 1780; coal mining, which was insignificant before, was put on a new basis; new iron works (the first German coke oven in the iron foundry at Gleiwitz in 1796) and two canals were built (the Gleiwitz and Klodnitz canals); and the use of coal was energetically forced on all sorts of industrial consumers (bakeries, breweries, and so on) by means of a new selling agency. In the West, the great development of the early beginnings in the Ruhr (which was then made navigable) and Saar countries dates from the same period. Though coal and iron were the main things, there were also in several parts of the country developments in copper, silver, lead (the latter somewhat interfered with by the sharp fall in price incident to the reappearance in the market of Spanish lead after 1815), lignite, and in other branches of mining and of metallurgical enterprise.

Totals of production, employment, and (as far as it is possible to judge) expenditure were very small no doubt, though not relatively to the preexisting industrial organism. Many producers, such as the peasants who made iron on a small scale and clung to old methods—or had to cling to them—were crowded out but slowly. In the downgrade, however, results became quantitatively more significant, particularly after 1815. For instance, coal production in the Ruhr and Saar districts increased considerably between 1800 and 1840, on the basis that had been

laid before. It was not until then that private enterprise began to develop in the wake of English achievement, although private iron and copper working in more or less old-fashioned ways, had considerably increased before—in Silesia (there were, for example, 49 blast furnaces in 1804, mostly owned by territorial magnates) and elsewhere (about 100 iron and copper "hammers" existed, for instance, in the neighborhood of Aachen, mostly quite small). The first German puddle work and rolling mill (Harkort) was founded in 1819,[1] Dinnendahl's Friedrich Wilhelms Hütte in 1820, after which we observe what almost amounts to a wave of promotions, especially before 1837 (Laurahütte in 1835 and Eschweiler Bergwerks A. G. in 1836, to mention but two internationally known instances). It is submitted that, considering initial data (the state of things in 1780) and the ravages of external factors (the course of events from 1792 to 1815), it is not unreasonable to say that we recognize the features of a battered Kondratieff prosperity and of typical downgrade developments that followed upon it. There seems to the writer to be no point in refusing to recognize the reality of the process on the ground that so obviously adequate impediments prevented it from achieving more and showing up better.

8. In the United States, as in Germany, agricultural and commercial enterprise (the latter, in the case of the United States, also including shipping) was the chief determinant of business situations throughout our period. Also, we must bear in mind that evolution in our sense in America—and this holds true to this day or in any case to the end of the second Kondratieff—was supported by a rate of growth in our sense which had no parallel in either England or Germany. Simple expansion along obvious lines, exploitation of opportunities which, once created, lay at hand ready and inexhaustible for a mighty host of followers, and immigration of men and capital in response to those opportunities supplied a much greater part of the propelling forces here than anywhere else. Entrepreneurial activity was generally faced with favorable changes in its data.[2] Foreign evolution and growth, on the

[1] In Lorraine, the first rolling mill was erected in 1803, the first puddle oven, in 1810 by the De Wendel family. This is one of the rare instances of a family retaining a commanding industrial position for more than 200 years (from the beginning of the eighteenth century).

[2] Thus, actual results in general ratified many things that had no claim to ratification *ex visu* of the data under which they were undertaken. It is not without interest to remark that, instead of steadying the march of evolution, these favorable long-time conditions induced so much boldness in entrepreneurial action and in speculation, that the effect was the reverse and that vicissitudes ensued in which people frantically clamored for inflationary seisachthiai and protection to make what already were abnormally favorable conditions more favorable still. However, our insistence on the element of mere Growth should not be misunderstood. While very real, it was not anything like so important as the traditional view would suggest; for much of it was induced innovation or immediate effect of innovation.

whole, worked in the same direction. The extension of the wheat and cotton areas, notably after 1830, was possible without destroying the conditions for further extension. These facts are too obvious to require proof or illustration, nor is it necessary to insist on the consequent dependence of American on English business situations. We will notice, however, that these conditions, as soon as the troubles of the eighties of the eighteenth century were over, produced two features that were prominent in the boom of the nineties as well as in many of those that were to follow—land companies and the speculation in land.

A great part of industrial production was carried on in the farmer's home or by workshop crafts throughout our period, as it had been in colonial times, or it worked under conditions which practically exempted it from the repercussions described in our model: a sawmill sawing on toll, located in an agrarian neighborhood, may pay or not, may work or not, but it has nothing to "compete down," nor will its processes react on other industrial organisms—the agrarian milieu acts as a shock absorber. How considerable, nevertheless, industrial enterprise must already have been before the Revolution and in spite of real and fancied obstacles that English policy put in its way, is proved by the fact that embargoes and actual war with the mother country caused so little serious embarrassment, and that, in particular, domestic furnaces and forges were quite up to the requirements of cannon casting and of the other kinds of demand incident to the military operations. Massachusetts and Connecticut and the neighborhoods of Philadelphia and New York were by that time industrialized to a considerable extent; there had been occasional exports of manufactured products as early as the middle of the seventeenth century, and industrial towns (Wilmington, Lancaster) had sprung up while water-power developments were of quantitative importance at least several decades before our period. Flour milling, even before the innovations associated with the name of Oliver Evans, was technologically ahead of the rest of the world. The construction of glass works by the Virginia Company and then by "Baron" Stiegel can serve as typical illustrations of our process. There were some considerable iron works. Textile interests had risen to political influence. Shipbuilding, like other industries, was fostered by bounties.

We have seen before that the British colonial enterprises, such as the Virginia and the Plymouth companies, had from the first included industrial development in their programs. And the War of Independence, of course, gave a great impulse to most of this. But up to its end the violent fluctuations and, particularly, the spectacular crises we observe must primarily be described in terms of external factors—such as wars, sudden changes in the political data, English conditions, and so on, which acted on the industries through commerce—rather than in

terms of the industrial mechanism itself. Since external factors obviously dominate the picture and are naturally stressed by both contemporaneous and historical reports, an attempt to answer the question whether there were also genuinely cyclical fluctuations would involve an extremely difficult piece of analysis which the writer has been unable to undertake. But it should be observed that the colonial issues of paper money and the other inflationist policies of the colonies cannot simply be put in the same class with European government inflations. In part at least, they stood instead of cyclical expansions of bank credit and, directly (by loans and subsidies) and indirectly, financed innovation for the financing of which there were no other means. Some of the breakdowns which studded that expansion are, hence, more akin to ordinary crises, and the processes within which they occurred are possibly more akin to cycles in our sense than we could ever realize if we saw in those colonial issues nothing but ordinary inflation. The use made of that tool was often so improvident and unsystematic that the usual comments on them may be amply justified all the same, but they do not cover the whole of the case. Contemporaneous observers, as well as some historians, such as Chalmers and Weeden, may have put the cart before the horse, and presumably implied a lot of wrong theory, but they were hardly wrong as to the facts when they associated some industrial developments, in shipbuilding and ironmaking in particular, with the paper money, although most of them failed to associate also ensuing depressions with it. There is, thus, some justification for Benjamin Franklin's views on the subject, however indefensible the arguments may have been by which he to this day grieves and shocks some of his admirers.

Taking account of the previously mentioned disturbances of the eighties of the eighteenth century, by saying either that they interfered with the rising tide of enterprise so as to blot out the symptoms generally associated with prosperity, or that they delayed the rise of the tide until about 1786—the conditions *immediately* preceding that year may partially be described as a postwar crisis—we see the setting in of the process that, fostered by land grants, loans and subsidies, and other facilities extended to manufacturers and would-be manufacturers by states and municipalities, was eventually to transform American industries in much the same way as the corresponding process did in England. Advance was spread over a wide variety of industries and was in full swing by the time Alexander Hamilton submitted his famous report. The main feature, in industry in the strict sense, was the introduction of power machinery which began to turn the workshop of the craft type into the factory. As an example we will mention the development of the cotton and woolen mills in New England and Pennsylvania—the Beverly Cotton Manufactory was chartered in 1789—which in the

nineties culminated in the "cotton mania," the most striking single phenomenon of what might be termed the positive phase of the American industrial revolution. This was, of course, intimately connected with water-power developments. The great Hamiltonian project for the exploitation of the falls of the Passaic, which after initial vicissitudes[1]

[1] Those vicissitudes and failures that were the lot of many of the foundations of the nineties, such as the two above mentioned or of the New York Manufacturing, or the Hartford Woolen, were obviously due to the lack of tradition, of personnel of the required type, and other environmental requisites, and to lightheartedness in financial methods. The smallness of immediate success has induced many historians to underrate the importance of those ventures. But they illustrate well one class of difficulties which it is the function of the entrepreneur to overcome. It would, therefore, be useful to go into details of the history of those ventures, if it were possible to do so within the frame of this book. In particular, it would be interesting to analyze in what the entrepreneurial achievement consisted in each case. In one of the most important classes of cases, the utilization of water power, it really consisted in providing facilities for secondary enterprise. We may illustrate by the outstanding, though later, example of the development of the water power of the Merrimac. First came the success of the Boston Manufacturing Company at Waltham. The same people promoted the Merrimac Manufacturing and then the Locks and Canals Company which specialized in providing and selling sites and water power. Since they not only constructed dams and canals, but also mills and mill machinery, a manufacturer who was able to buy his factory as it were ready made from them, and had very little freedom of choice, hardly comes within our definition of an entrepreneur at all. The towns of Lowell, Lawrence, and (founded by another group) Manchester, which were created in this way, together with subsidiary industries, are thus the secondary developments from (in each case) fundamental innovations—a feature which, more than any other, is typically American. The figure of F. C. Lowell illustrates this kind of entrepreneur at its best. He was the leader of a financial and industrial group, and an initiator and organizer of industrial development. He was, to be sure, also an engineer and even an inventor. But this is quite secondary.

The ventures of the nineties, though important enough to count in the picture of business situations, did not get so far as this. Since they not only actually met with failure in important cases, but sometimes also did not look very serious from the start, the aversion displayed by legislatures against incorporating them is as understandable as is the tendency to exclude from the charters the privilege of limited liability when they were incorporated. This did not amount to a principle. The Newburyport Woolen Manufactory (1794), for instance, received the privilege, while the Locks and Canals on the Connecticut River (1792) and the Boston Water Works (1795) did not, though the opinion prevalent was that companies founded for such purposes as the latter two (and colonial, road, banking, and insurance enterprises) had a stronger claim to it than strictly industrial concerns. The question was then, at the beginning of the nineteenth century, much discussed and legislated on. The legal situation was originally much the same as in England (the Bubble Act had been extended to the colonies in 1741), but the "quasi" or *de facto* corporation, i.e., an association that was, excepting limited liability, to all intents and purposes a corporation, made more headway than it could in England, both because the lack of accumulated wealth enforced capital association, and because the cheerful optimism of the people induced them to shoulder liabilities readily. Practice became, however, very "liberal" in the 10 years preceding 1815. After 1820 (Limited Partnership Act of New York in 1822, similar acts in other states toward the end of our period) things began to move toward Limited Liability without charter.

eventually created the industrial center of Paterson, may serve as an example. These water-power developments, together with improved means of communication—turnpikes and canals, partly constructed by public enterprise—and shipbuilding, made the backbone of the strictly industrial component of what we interpret as a Kondratieff prosperity. *Technological* innovation, let alone "invention," was not in prominence. The only one of first-rate importance was the Whitney cotton gin, though there were many minor ones, particularly in the field of agricultural implements. Even the introduction of English innovations was at first but slow. Though, for example, jennies, Arkwright frames, and mules all came in about 1790, they made very little headway before the turn of the century.

Whoever looks at quantities only and neglects the distinction between initiation and development of results, will be inclined, in this case as in that of England, to date the "revolution" from the first, the second, or even the third decade of the nineteenth century. That time was, however, clearly one of derivative development of the type which we associate with Kondratieff downgrades and revivals. The nature of technological innovation, in particular, accords with this. Water-power development went on along the lines previously chalked out, met its great successes, in spite of the primitive and wasteful pitch-back wheel, especially—after Paterson—in Lowell, Lawrence, Manchester, Holyoke, Philadelphia, and Fall River, and remained the main source of industrial power to the end of our period. This, together with what it induced, was the great industrial feature in the Juglars after 1820. Steam came in but slowly, both because of the abundance of water power, and because cheap freight rates were, for the greater part of the country, a prerequisite of its extended use. Within our period it had quantitative significance only in the neighborhood of cheap coal, the introduction of the iron boiler notwithstanding.

The rise of industry in the Middle West, another feature of this Kondratieff downgrade, is, however, bound up with it, and its use spread from there to the South and even into the heart of the water-power regions and to cotton textiles (Eagle Cotton Mills, 1831). After about 1810, O. Evans' high-pressure engines began to compete with the imported (low-pressure) Watt engines. But the production of engines for industrial purposes in Cleveland and Pittsburgh was, as far as the writer knows, small even at the end of the period, although it was of more importance for steamboat use. Since smelting, the other great source of industrial demand for fuel, met with a plentiful supply of charcoal, which did not begin to give out until the first decade of the nineteenth century, coal, though discovered in colonial times and even, in small quantities, imported from England before 1800, was of little importance until the

thirties. Then imports rose, and the technological difficulties were overcome which had stood in the way of large-scale use of domestic coal. F. W. Geissenhainer's invention, if this is the word, the introduction of the hot blast, already successful in England, and coking, all contributed to the prosperity of the last Juglar, although the great development came after 1842.

The iron industry in general and rolling in particular had, as we should expect, expanded in the upswing of the nineties, but they outgrew the small-scale type and old methods in the downswing. The puddling process came in 1817, rolling mills became bigger (Pittsburgh) and began to crowd out forge hammers. But the production of cast steel in Cincinnati and the output of the crucible-steel works in Jersey and Pittsburgh, although dating from the upswing preceding 1837, did not attain quantitative importance within the period. We have here a typical instance of an industry drawn along by foreign innovation and increasing home demand, expanding in response to the general march of things. Downgrade and revival developments in the textiles, particularly in cotton, were of a different character because this industry, which expanded still more vigorously "into new economic space" during the first 40 years of the nineteenth century, had created that space itself and did not merely respond to, although of course, it profited from, the growth of the environment. In Massachusetts alone about 90 companies for making cotton and woolen goods were incorporated between 1807 and 1818 (V. Clark, vol. I, p. 266) a fact which, though it does not measure, yet indicates the rate of expansion,[1] greatly surpassed, of course, after 1820. A number of domestic improvements of the technological type attended this downgrade process. The most important was F. C. Lowell's loom (1814), which almost immediately induced a great increase in weaving by power, the application to woolens succeeding in the course of the twenties. It was preceded by the invention of "pickers" and "willows" (according to Mr. Clark, 1807) and was followed by the Goulding condenser, which revolutionized the woolen industry in the thirties (Kondratieff revival), and a considerable list of minor new devices. What we know of quantities of product[2] and prices behaved accordingly.

[1] Mr. Clark states, *ibid.*, that between 1800 and 1823 eight states incorporated 557 manufacturing corporations, with an authorized capitalization of over $72,000,000 and that over half of these were organized during the four war years. It has been pointed out in a previous note that these figures, although more significant than corresponding figures for England would have been, are yet an unsafe guide. In particular, the practice of the states being different, the figures do not tell anything about the relative pace in different parts of the country.

[2] Various reports and other official papers, also private publications, supplement to some extent the very unsatisfactory evidence from the early census. But, of course, such bits

This must suffice for our purpose. In transportation the great thing was the construction of canals. Within the last three decades of our period, cost of transportation between the East and the Middle West fell spectacularly in consequence, both per ton-mile and because of the saving in time and distance. Philadelphia became the center of a system of waterways. The canal between the Hudson and Lake Champlain was opened in 1823; the most important of all, the Erie canal, in 1825. The truly revolutionary effect of this on physical production, prices, and location—an ideal instance by which to illustrate the nature and *modus operandi* of innovation, in particular the way in which innovation produces prosperity and depression—is luckily so obvious and its quantitative importance so palpable that we need not stay to prove it.[1] While canal traffic reached its peak about the end of the Kondratieff (1840), railroads—there were about 1,500 miles in operation by 1837 and about 4,000 by 1842—cannot have been a major factor in the upswing of the last Juglar, except locally and by the contribution of railroad projects to the speculative situation of 1837, when they featured along with banks and land companies.

Demand for rails began before 1830, but the steam locomotive, tracks, and roadbeds did not get into a serviceable shape until, roughly, 1835. Comparative slowness of beginnings is accounted for also by the fact that the entrepreneurial task of breaking down the resistance of the environment proved astonishingly difficult. Impediments, such as constraint to pay tolls to canal companies in cases of competition, local jealousies obstructing necessary connections, and so on, were not overcome until much later. Public enterprise in the field began in 1836 and 1837 (Illinois, Michigan, Indiana). As elsewhere, the first railroads were local and sponsored by businessmen in important towns on the coast or other navigable water, with a view to opening up the hinterland. The Mohawk and Hudson was an Albany enterprise to cut Troy out of the transshipment trade between the Erie Canal and the Hudson. The Baltimore and Ohio was Baltimore's bid for interior trade, the Charleston and Hamburg was an effort on the part of Charleston to divert the trade which went down the river from Hamburg to Savannah. The "competing-down element" is thus obvious from the outset, and even absolute losses—as distinguished from the relative losses equal to the net result of general development and this competition—must have been felt

---

of information as, for instance, that between 1820 and 1832 spindles in Massachusetts increased from 52,000 to 340,000, may easily mislead.

[1] The developments in the West, largely induced by that innovation, are, of course, but inadequately characterized by the fact that between 1820 and 1840, the population of Ohio increased from 581,295 to 1,519,467; that of Illinois, from 55,162 to 476,182.

almost immediately, not only by canal and highway companies, but in general by business in towns that lagged behind. Freight rates fell quickly to—on a rough average—three cents per ton-mile which, however, was still about double the charge on canals, though only one-fifth of the cost of transportation on a turnpike.

9. For Germany and England it is not easy to size up the role of credit creation in the financing of innovation during that period. The reasons for this have been touched upon before. It is not only that credit creation was in fact of smaller relative importance, but also that there was a tendency for whatever of it existed to hide, the burden being shifted to the financing of working capital—current business being run on credit, thereby setting free funds for "investment." But there are plenty of indirect symptoms. In the case of Germany, we need only look at the practice revealed in the crisis of 1763 in order to satisfy ourselves that finance bills were by no means unknown even before our period. We have also noticed the banking developments after the Napoleonic wars. In England (R. D. Richards, Early History of Banking in England, 1928; W. T. C. King, History of the London Discount Market, 1936), trade began increasingly "to lean on banks" in the eighteenth century. Even earlier merchants and goldsmiths had "bought bills with deposits," but with the rise, since 1740, of the country banks, which not only issued notes but also did deposit business, the contours of the modern apparatus of credit creation slowly emerge, among them the practice of interbank deposits, the clearing habit, and the clearing house. There were 150 country banks in 1776, 350 by 1790, and 721 in 1810. During the restriction and afterward, these facilities produced such a plethora of "money" as to give a great impulse to bill broking. The test came after 1815 and the heavy mortality among banks—primarily due to speculative investment and to lending which was short only in appearance —is witness to our view of the matter. Later developments (joint stock banking) have been noticed before. In the thirties, wildcats do not seem to have been confined to the American fauna.

In the United States the case is plain: profits—theoretically, a secondary and derivative source—and the *ad hoc* creation of means of payment were obviously the main domestic sources of the "funds" which financed industrial and other enterprise. It has been stated before that after 1780 sound money principles prevailed as far as Federal policy was concerned. Repayment of the national debt, substantially accomplished between 1832 and 1835, was in keeping with this, yet there are several qualifications to be made, two of which are relevant to our subject. At no time, first, did the Federal government really support the two Banks of the United States in such attempts as they made—the first bank hardly did—to acquire the position of central banks and to

exert a restraining influence on loose or even semicriminal practice; in the autumn of 1833 it even weakened the position of the second bank and materially helped to urge on private banking by withdrawing its deposits (about $29,000,000) from the former and distributing them among the state banks—a measure that was partly counteracted, only when it had taken full effect, by the Specie Circular (1836), stopping sales of public land on credit and insisting on payment in specie, which, under the circumstances, amounted to an official declaration to the effect that the state banks were not to be trusted.[1] And at no time, secondly, was the Federal government able—at some times it was not willing—to restrain the states from fostering methods of banking obviously at variance with the principles of monetary policy it professed. In the country at large, though with notable exceptions, the inflationist mentality that had developed in colonial times continued unabated, and each depression brought its attack on the monetary system with the utmost regularity.[2] Politics in some states was entirely swayed by it. For instance, Kentucky founded (1820) the Bank of the Commonwealth of Kentucky, in order to issue paper money to the amount of two millions to be lent on mortgages, which was held to be constitutional in 1835. Pennsylvania in 1840 authorized the banks of the state to issue three millions in notes redeemable in state bonds.

The first bank of issue, the Bank of North America, was established in 1782. During the first four years of its existence, it confined itself to discounting for not more than 45 days. Others followed in quick succession. According to Gouge there were 21 of them by 1795 and—in spite of the crash of 1809—119 by 1812. In 1829 there were 329, by 1837 the number had increased to 788, a peak of 901 was reached in 1840. They lent on promissory notes secured by collateral or endorsement, often on mortgage, keeping very scanty reserves and not caring too much about such details as the paying in of capital or redemption, in spite of the facts that there was no central bank to fall back upon and that supporting relations between banks developed but slowly after 1820. The passionate inflationism of the public mind protected them, although we also read of complaints about the "deluge of paper money." In

[1] The Independent Treasury Episode of 1840–1841 would have had similar consequences, but it happened to hit upon a quiet situation and seems hardly to have ruffled the surface—an instance which shows what things of that order mean and do not mean. The Specie Circular affords the only instance within the period of a measure taken by the Federal government which could possibly be suspected of having had restrictive or "deflationary" effects.

[2] The nature and motivation of the measures proposed are strikingly suggestive of the measures and arguments of our time. The scheme submitted to the Senate during the depression that followed upon 1826 may serve as an example. It was proposed to issue paper money "in order to bring about prosperity and to enhance the value of property."

some communities the attempt to present notes for payment involved the danger of seizure of the notes or arrest or even danger to life and limb. Although it is the notes about which we read the picturesque stories, too familiar to bear repetition, checking deposits were also very freely created.[1] The rule of lending short and acquiring quick assets broke down from the first—although there were banks and bankers who kept to it throughout; deviating practice went to very different lengths in different parts of the country—and was soon challenged on principle by the copious writings of valiant pamphleteers.[2] The notes of many banks depreciated seriously between 1814 and 1817, suspensions of specie payments (1814 and 1837, in particular), and failures were of frequent occurrence. We hear of industrial concerns applying for power to form banks in order to finance themselves by note issues and some Midwestern states gave railroad companies such powers for this very purpose.

This detail is significant. It provides a clue to the interpretation both of that practice and of the inflationist mentality of that time which made such practice possible in communities that were in other respects supernormally strict about moral standards.[3] Neither of them can be disposed of by an expression of moral disapproval. Nor does it help us to criticize them from the standpoint of the classical theory of banking. Whatever our opinion might be if we placed ourselves on other possible standpoints, however strongly we may feel it our duty to condemn—from some of those other standpoints—both the misconduct involved and the public opinion that not only condoned but fostered it, the fact still remains that we have before us the clearest historical instance by which to illustrate the function of credit creation. It was the financing of innovation by credit creation—the only method available, as we have seen in the course of our theoretical argument, in the absence of sufficient results of previous evolution—which is at

[1] Compare Smith and Cole, *op. cit.*, p. 5.

[2] Compare, again, Bray Hammond, Long- and Short-term Credit in Early American Banking, *Quarterly Journal of Economics* for November 1934.

[3] It is no part of the author's intention to "justify" anything, least of all inflation. What follows in the text attempts to explain or interpret economic fact and is entirely irrelevant to moral or any other evaluation. But without violating the boundary line imposed by our purely analytic intention, it may still be stated, first, that as a matter of psycho-sociological interpretation it makes a great difference whether a given pattern of behavior is condemned by the conscience of the community or supported by a large and vociferous sector of public opinion—the American banker who resorted to all kinds of shifts to make it impossible for holders of his notes to present them successfully, did something which, for this reason, *differed* from an analogous behavior of an European banker —and secondly, that under the circumstances "abuse" and "recklessness" must be defined in terms of bad faith and of lending for the purposes of either fraudulent or otherwise unsound projects rather than in terms of infringement of the rules of "classical" banking.

the bottom of that "reckless banking." This undoubtedly sheds a different light upon it. Those banks filled their function sometimes dishonestly and even criminally, but they filled a function which can be distinguished from their dishonesty or criminality. Sound money men of all times, hence, threw and still throw away the baby with the bath by condemning the principles of that practice, however understandable their clamor for policing and controlling the practice itself may have been. The people felt this. So did some of the advocates of inflation, though they were unable to formulate their case correctly. And this goes some way toward explaining that riddle in the history of American moral sentiment (also see above, *sub* 8).

That this is so, we can also see from the long-run behavior of the level of domestic prices (compare Smith and Cole, *op. cit.*, charts on pp. 15 and 68; see, also, comparison with British index on p. 66). It is not as we would expect it to be if there really had been "paper inflation" *sans phrase*. On the contrary, it is distinctly as we would expect it to be from the normal working of our model—namely up in the Kondratieff prosperity, and down afterward. Increase of output in the sense defined in Chap. IV eventually overtook the effects of bank expansion each time and exerted its downward pull on the price level exactly as it should according to the *modus operandi* of our mechanism of innovation. There is no such difference between the behavior of the American and the British price indices as we would assuredly find if our diagnosis were seriously at fault.[1]

This does not cover the case, however. In 1812 and 1813, then again from 1834 to 1836, we find spectacular rises which are contrary to expectation. The first is accounted for by the English war. The second is due to what, even from our standpoint—and not only from the standpoint of the classical theory of banking—obviously was excess, *i.e.*, more than the usual Juglar expansion. Jacksonian policies—the hostility to central banking or, in fact, any control of credit creation—may be held responsible for its violence, as well as for the violence of the subsequent fall. The case provides interesting material for study with reference to contemporaneous problems. Moreover, we do not, of course, deny the presence, during practically the whole of the period, of "reckless banking" either in this country or in England, although we define its nature differently. There can be no doubt, not only that unsound and fraudulent schemes were readily financed in many instances, but also that credit was freely extended for other purposes than innovation, most of which would only pay at rising or, at least, constant prices.

[1] The issues of some banks depreciated so promptly in terms of the issues of other banks that, it is fair to say, it was not the whole of the amount of bank notes created that acted on price quotations. But this involves only a minor qualification of the above statement.

The Secondary Wave loomed large in every Juglar and many secondary maladjustments were the consequence, requiring additional processes of liquidation and accentuating those violent crashes which would have been much milder without them,[1] although the vicissitudes incident to economic development, within a young country of such possibilities, could not have been avoided entirely by even the most conservative behavior of banks.

10. Finally, we will try to locate the Juglars. The Kitchins are, as has been pointed out before, in any case beyond the reach of the historical information at the writer's command and can, therefore, be established from time series only, although some support can be and has been derived from annals of the general business situation. But as regards the first Kondratieff, at all events until about 1820, that information is not even quite adequate for the Juglars, particularly in the case of Germany. The reader should recall, moreover, what has been said in the fourth chapter about the meaning of our dating and the unavoidable roughness of it. It is for him to judge how far what follows suffices to make a common-sense case.

In England, a boom followed upon the close of the American war. It broke in 1783 in a crisis and may, no doubt, be looked upon as a postwar boom and nothing else. The reason why the writer doubts this diagnosis is that there were, from the beginning of 1782, indications of a widespread industrial activity—in cotton, in particular—which seems to have gone deeper than that. However, he does not know. Several years followed which look like years of an ordinary Juglar depression and revival (the

[1] This is not the place to try to strike a balance of ultimate effects of either "normal" or "reckless" credit creation, and to draw any inferences for monetary policy. It can, no doubt, be reasonably argued that without that credit expansion—and protection—American evolution would have been less rapid and, in an obvious sense, sounder, and that many of the problems of today would, both in this country and in Europe, be much more manageable than they are. But two remarks impose themselves: first, we see again, that effects of credit creation are not simply or primarily a question of quantity, but mainly depend on the purposes which credit creation serves and on the success that attends these purposes. As regards this primitive wisdom, which some of our contemporaries have made every effort to obscure, the value of the evidence from our period is second only to the value of the Law case. Second, the reader knows by now that the author is not a wholesale admirer of Professor Von Hayek's theory *as far as it claims to be a fundamental explanation* of the causes of the cycle. All the more is it a duty to point out that the course of American events in the twenties and thirties of the nineteenth, not less than the course of events of the twenties and thirties of the twentieth century, invites interpretation in terms of that theory. In fact, when we observe the behavior of the price level which was such as to negative all idea of "inflation" according to one definition, and the behavior of the banking sphere which spells violent inflation according to another definition, and when thereupon we further observe what happened between 1836 and 1840, fairness almost compels us to tender to that eminent economist our most sincere congratulations.

latter covering 1785 and 1786). But the interpretation implied is frankly admitted to be one of the many *non liquet's* in the writer's mind. There is no doubt, however, that 1787 was a year of prosperity which went on intensifying itself to February 1793. It is clearly linked to cotton innovation and canal construction—there were minor features also, among them the steam engine, which, however, was not sufficient to count quantitatively. So we date—and all doubt there can be about this turns on the processes of the preceding years—the rise of the Kondratieff and of its first Juglar from 1787 (inclusive). That there should have been (a little more than) six years of boom—the dent in 1788–1789 does not mean much and really invites interpretation as a Kitchin depression—which, according to our schema, means that business went on improving right through a Juglar recession and into a Juglar depression, is perfectly in keeping with expectation for a Juglar that runs its course entirely on a Kondratieff prosperity. A crisis came, and depression asserted itself when we should have expected it, but the war with France came also (February 1793). Measures immediately taken by both parties to the conflict were such as to account quite plausibly for both the panic that lasted about half a year and for the depressed state of things in 1794. But considering the underlying industrial process as well as its surface symptoms—looking, for instance, at the "canal fever" (the expression is used by Professor Mantoux) and the 25 canal acts that were passed in 1793 alone—we are obviously within our rights if we conclude, on the strength of common experience, that that sort of thing would have had the same consequences then which it always has. That coincidence has nothing astonishing about it; external factors will precipitate a crisis that may be due, as well as produce one that is not due.

Revival ensued in 1795—as short as we should expect from the Kondratieff phase—and is much more plausibly accounted for by the cyclical rhythm than by political events in which there was nothing that looked particularly bright. The course of military operations, dislocation of foreign trade, domestic unrest, threatening invasion, suspension of specie payments, and government inflation then command the scene. But it does not follow that they were the only factors to act. On the contrary, we know, that the processes of the industrial revolution went on, in textiles and iron in particular. Since there is no convincing method, in the present state of information and of analytic tools, to separate effects, we ought perhaps to abandon the material of the stretch between 1796 and 1815 as we abandon the material of the period from 1914 to 1919. It seems, nevertheless, that legitimate interest attaches to a—perfectly noncommittal—experiment with our schema. We take it from experience, not from theory—least of all, from our theory—

that Juglars are as a rule of a duration of a little over nine years and consist of four phases, and we try how this schema fits the actual course of business situations. 1796 would then be the first year of the second Juglar—the one that is "astride" the Kondratieff turning point—which would last through 1804 into 1805. The third Juglar, the one to complete the Kondratieff recession, we count from the first months of 1805 to about the middle of 1814; the fourth—the Juglar that entirely lies in the Kondratieff depression—from about the middle of 1814 to about the end of 1823. The reader is invited to compare this with, say, Mr. Thorp's comments on the individual years, taking account of the difference in terminology (Mr. Thorp attaches to the terms *prosperity* and *depression* a meaning which does not coincide with ours) and of the nature and importance[1] of the external events. The beginning of a prosperity phase shows in all three cases, as well as the—obviously adequate—events that killed it. In the first two cases, revival also shows distinctly, though in the first it will be attributed to the peace of Amiens. What Mr. Thorp designates as depression in the second half of 1803 and in 1804 is amply accounted for by the political factor. Prices, of course, are no guide during the war.

As regards the time which, according to our schema, would be covered by the fourth Juglar, the boom in 1814 and at the beginning of 1815 is beyond doubt. Since this can be interpreted in terms of the effect of the treaties of Paris and Ghent—although the recovery of 1812 and 1813 came about without any such stimulus—the writer does not wish to insist. But the business history from the crash of 1815 and its aftermath

[1] It has been pointed out, in the discussion of the external factors which influenced that Kondratieff, that economists too often content themselves with indicating—for instance, on time series charts—certain well-known events, a war, "unrest," an epidemic or even a fire, without asking the question whether the event was really adequate to exert the influence which it is implied it exerted. Answer to this question is a distinct task in each case and, though in some the answer may be obvious, must not in general be taken for granted. The English declaration of war in 1793, for instance, need not immediately have been the great disturbance it actually was, and we must not infer that it was from our knowledge of later events. Military operations were at first not on a great scale. It is the study of other measures and effects which justifies our statement in the text. Be it added at once that for Germany the French troubles to the end of the war of the First Coalition did in fact not amount to "dominating" disturbance. At first, there were operations, troubles, and dislocations in those parts of the Austrian Low Countries and of Alsace which bordered on France, and then there were revolutionary movements in the Rhineland. But in the bulk of Germany things were much as usual. Nor, at first, were preparations exhausting. In the campaign, for instance, which failed at Valmy, the Duke of Brunswick never commanded more than about 80,000 men. As far as German economic life is concerned (we exclude Austria, even the German part of Austria, though this is not legally correct for that time), things did not become really serious, except locally, until the turn of the century. Then, of course, they became so all the more, especially after Jena and Auerstädt.

in 1816 (dealt with before) to the middle of 1823 fits in excellently, and this may, after all, suggest the possibility of an interpretation which would be somewhat more convincing than the monetary one. The depression in 1819 and 1820 and the revival in 1821, 1822, and the first half of 1823 were ideally normal from the standpoint of the schema. There is little difficulty about the last two Juglars—nobody ever has denied the existence of two outbursts of industrial and financial enterprise that broke in two spectacular crises and were separated by what is very naturally described as a depression and a recovery. We date: end of 1823 to about middle of 1833, and middle of 1833 to end of 1842. Whether the reader accepts this dating or not, the facts it is intended to convey are palpable. As pointed out elsewhere, the sixth Juglar presents irregularities (showing especially in its last phase) which can, however, be accounted for.

Here we will insert a remark on the crises of 1825–1826 and of 1836 or, as some authors have it, 1836–1839; there seems no need to add anything about either 1793 or 1815. Both crises occurred when, taking the Juglar and the Kondratieff phase together, we should be prepared to find major dips in prices and values: a Juglar recession on a Kondratieff depression forms the background of the one, and a Juglar depression on a Kondratieff revival, the background of the other. But beyond this, our model does nothing for us except to explain why errors and excesses should have been particularly in prominence during the preceding years. Thus it explains conditions favorable to the occurrence of what the untechnical term *crisis* designates; but it does not explain the crises themselves, and still less their violence. This will have to be pointed out again in later cases: each time we see an economic process which by virtue of its own consequences annihilates profits and enforces adjustments—prolonged ones, particularly in Kondratieff downgrades—but for the phenomena of the crises themselves, which our schema leads us to look upon as erratic and nonessential, exactly as experience leads the businessman so to consider them, we have to fall back in each case upon very untheoretical observations—among them, speculative manias, foolishness, swindle, and chance occurrences of all sorts. The importance of some of these elements was enhanced by the fact that foreign financing and speculation in foreign securities—Mexican and South American securities being particularly prominent in the first case and North American in the second case—played so great a role, a much more important role than ever before. Building and, as mentioned before, promotion booms preceded both crises,[1] and so did a spectacular increase in consumers' spending. We have also noticed that credit expansion

[1] As Tooke noticed for 1833, construction of new mills was at the basis of them.

and the increase in the engines of credit creation formed a feature in both cases, though very much more notably in the second than in the first: 22 banks and insurance companies with a capital of over 36 million pounds were, however, founded in 1824 and 1825. As the reader knows, it is to wildcat banking that we attribute the violent movements of 1836–1839, as well as their aftermath. Stock exchange panics led the sequence of events (May 1825, May 1835) and the impact of depression on business seemed to come from them. On the surface, it was not the effects of the innovations on the economic structure that caused the trouble—and, in fact, they did not cause the *crises*—but simply overcommitments, inconvenient calls on shares, failure of expected returns to materialize, unfavorable gold movements[1] incident to foreign financing, and so on. Hence, it is perfectly understandable that students who look mainly to the mechanism of crises, should develop a propensity for monetary explanations, for quite naturally the mechanism of money and credit will be the first thing to reflect all this and to be affected by it.

We need not parallel this by a discussion of American crises, for we should have only to repeat.[2] As regards dating, we meet, of course, the difficulty, already encountered, about the beginning of the Kondratieff. The wave of cotton and water power, of wheat growing, and of a few minor innovations is obvious. In the early nineties it was certainly running strongly. But how far back we are to go and how we are to appraise the relative importance of the various unfavorable external factors that acted on the industrial process—such as Shay's Rebellion—the writer feels unable to say. Nor do our difficulties stop there. We are able to follow, from 1788 or 1789, the rising tide until the last quarter of 1796. Till then there were only the financial troubles of 1792, which did not amount to much. Prosperous conditions continued to prevail in the South after 1796, but in New England preponderatingly unfavorable situations followed until a rally in 1804. This makes a picture of one big two-phase cycle with smaller fluctuations of an erratic character in its second half. But all it really shows is that aggregative contour lines and the complexion of general business situations are unsafe guides

[1] Harvests have also been blamed. As the reader knows, we do not object to this on any principle. But there was nothing wrong with English harvests, as far as the writer can see, in the case of 1825–1826—which shows that crises and depressions can come about without that element. As regards 1836–1839, the first really bad harvest (failures in 1836 were but local) was in 1838, and any cyclical influence was mitigated (though the misery was not) by high price. The rich harvest of 1835 spelled, it is true, suffering in the agrarian sector.

[2] But since the plan finally settled on for this exposition leaves no room for the crises of colonial America, which present many interesting features, it may be useful to supplement this regrettable lacuna at least by a reference to Mr. Clark's first volume. See, also, Osgood, The American Colonies in the Seventeenth Century, 1904–1907.

to the deeper things in the economic process. The reason for that impression is not far to seek. The American general business situation was at the time largely a function of European war demand. Farmers, merchants, and shipowners were dependent on it. In 1797 and 1798 trading was imperilled by privateering and the country was on the verge of a war with France. This passed and trade recovered, but the peace of Amiens meant nothing less than a catastrophe, sending down prices, inducing failures and idle tonnage. All this impinged on the rest of the organism through a highly precarious banking situation.

The same factors acted the other way again in 1805 and 1806, but the Jeffersonian embargo (December 1807 to March 1809) exerted, of course, a strongly depressive effect. February 1811 brought the Non-intercourse Act to life again, then came the war with England and the damage it did to trade and shipping, and the stimulus it gave to domestic manufactures, followed by the reverse state of affairs (enhanced by European crop failures) in and after 1815, until the crisis which broke out in the last quarter of 1818 liquidated, for America, the abnormalities of the Napoleonic time. But, once more, that an organism lives in a stormy environment which tosses it and alternately benefits and injures it does not prove that it has no life of its own. How strong that life was, shows on occasion, for instance in 1793, which was a year of prosperous business, although trading and shipping interests were affected considerably by the events in England, or in the prosperous conditions that prevailed in the South while the trading and financial centers suffered. In the situations of 1795, 1807, and 1814, however much colored they were by the influence of foreign situations, the specifically American component may yet be recognized and linked to industrial processes and, as their complement, banking developments. Since, however, the question could in any case only be whether or not there were traces of the endogenous rhythm of economic life, we need not insist. The tentative dating is: 1787–1794, 1795–1804, 1805–1813, 1814–1822.[1] There is no doubt about the period which, in case we accept this, would have to be called the fifth Juglar: 1823–1831. Nor is there any doubt about the reality of that unit in the evolutionary process which ran its course in the thirties and early forties: 1832–1842, as the writer thinks. But, as in England, it displays many irregularities.

For Germany, existing material is still more inadequate or could, at all events, be collected only through an amount of work which the writer has been unable to undertake. That there was, between 1780 and 1800, a wave of entrepreneurial activity (public and private) seems certain, however. As has been indicated, there is also some evidence of another

[1] Comparison with Mr. Thorp's Annals is again invited.

that started somewhere after 1804 but was crippled by political events. While these tatters suffice to reveal indications of a larger movement, such as the Kondratieff, they do not suffice for an attempt to subdivide it. That movement is somewhat different from the period from 1814 to 1822 which bears a family likeness to its English counterpart, though this cannot (save in the case of prices of articles of international trade) be due to foreign influence. And it is very different from the following twenty years which clearly show two waves of activity. There is some doubt about their exact dates, but not about their reality. We date 1823–1831 and 1832–1842, on the strength of indications, some of which have been presented above. The writer feels no hesitation in calling them Juglars. Some interest attaches to comparing them with the two that correspond to them in England. Of course, they were much more modest affairs—the developments in mining, iron, steel, cotton manufacture, agrarian industries (distilling, brewing, in the latter Juglar also sugar refining) cannot, even relatively to the economic organism, be put on a level with English performance. This would, in itself, account for milder crises. But there were *no* crises. The nature and the mechanism of the process were the same as in England and it produced recession, fall in prices, and losses, yet—the troubles in Hamburg in 1836 and 1837 were not very serious—nothing amounting to either panic or deep depression. Obviously, this was due to the absence of speculative excesses, of foreign financing of any importance, and of "reckless banking." The simple home truth implied in this will presently be reemphasized by other instances. It may be trite, but it is important.

CHAPTER VII

Historical Outlines

II. 1843–1913

A. The Period 1843–1897.—This period covers the second of our Long Waves. We have learned before that there is some difference of opinion among those students of the business cycle who use that concept at all, as to whether the forties are to be included with the first or the second, while some historians date the beginnings of what they, along with everyone else, feel to have been another economic revolution, from earlier developments.[1] The reasons—justifiable, all of them, from the different standpoints taken by individual investigators—should be clear, as should be those which we have for our decision which needs, however, qualification in the case of the United States. The important thing is that nobody doubts the reality of that revolution which in nature and importance is perfectly comparable to the one that occurred in the last two decades of the eighteenth century, and that nobody could fail to associate it with what we call the railroadization of the world, which obviously was, though not the whole of it, yet its outstanding feature. The latter statement particularly applies to this country, the Western and Middle Western parts of which were, economically speaking, created by the railroad. For England and even for Germany the importance of their own railroads was absolutely and relatively much smaller, and for them our statement should be modified to read that railroad development in the world was the outstanding feature that dominated economic activity in those countries also. On the importance of the changes wrought and of the subsidiary developments induced, it is superfluous to insist. Nor need we stay to show more fully than we did in the course

[1] The second volume of Professor Clapham's Economic History of Modern Britain, for instance, covers, under the title Free Trade and Steel, the period 1850–1886. This roughly falls in, as to the former year, with Kondratieff's dating. Similarly in his Economic Development of France and Germany 1815–1914, the year 1848 stands for more than a merely expository division. But on the whole, historians are inclined, as is perfectly natural from their standpoint, to let "modern" developments begin with either the English industrial revolution, or the end of the Napoleonic wars, or the early railway age.

of unfolding our theoretical schema, how railroad construction produces both prosperities and recessions—with the latter, situations which easily slide off into depressions—and, in particular, simultaneous cycles of different span. But the reader should not fail to work this out again step by step. For railroadization is our standard example by which to illustrate the working of our model. The comparatively long periods of gestation, both of the individual line—each is an innovation within our meaning of the term—and of the sectional or national system—which, as such, constitute innovations of a higher order—the quantitative importance of the expenditure involved, the consequent dislocation of all the data of economic life, the new investment opportunities and the new possibilities that are created for further innovation, and the (cyclical) disturbances in turn caused by these, combine to make the essential features of our evolutionary process more obvious in this than they are in any other case. More easily than in any other can the usual objections to our analysis be silenced by a simple reference to obvious facts.

1. While railroad developments in the forties, particularly in England, are our chief reason for dating the beginning of the second Kondratieff as we do, it is not, of course, implied that railroads were of no cyclical importance after 1897, which would, for this country at least, be as untrue as it would be to assert that the cyclical role of cotton textiles ceased in 1842. Innovations which "carry" a Kondratieff, continue to contribute to the next, just as we have already seen that they develop—as did, for instance, railroads themselves or at least one of the "great things" of the third Kondratieff, electricity—from beginnings in the downgrade and revival of the preceding one. Yet there is little difference of opinion about dating the end of the second Kondratieff. What difference there is turns on months or, at most, a year. This comparative agreement is, of course, due to the strong testimony of aggregative and systematic series and to the unmistakable complexion of business, which at that time emerged from what has come down to posterity as the Great Depression. But it can also be justified from the nature of the business processes behind those series.

The properties of the social pattern as revealed, for example, by the foreign, social, and financial policies of the great nations, also lend support to the view that 1897 may, symbolically as it were, be taken to mark the end of an era and the beginning of another, quite irrespective of our particular—and particularly narrow—purpose. Although the whole process we are analyzing in this book is essentially the process of capitalist evolution—economic evolution as conditioning, and being conditioned by, the institutional pattern of bourgeois society—yet the second Kondratieff has a special claim to the epitheton *bourgeois*. By

this we mean that the interests and attitudes[1] of the industrial and commercial classes controlled policies and all manifestations of culture in a sense in which this cannot be asserted for any preceding or any subsequent period. In Europe this did not as a rule—the earliest case, that of France under Louis Philippe (Laffitte, Périer, Thiers, Guizot), comes, however, before our period—amount to conquest of the place at the helm of public affairs. Even in England Gladstone was an exception and the lists of his first two ministries have a very aristocratic tone (Disraeli of course defies classification). In Germany the genuinely bourgeois element in responsible office was insignificant, Miquel being the most important instance. But, although Bismarck's attempts at official cooperation with the bourgeois class were thwarted by various circumstances into which we cannot enter, his policy—primarily, but not only, his economic and financial policy—courted the industrial and commercial interests.

In England there were, until the discovery of new sources of political power by the radicals of the Chamberlain-Dilke type, hardly any other to court even for politicians who, like Gladstone himself, cultivated the good will of the masses and actually appealed to them. Opposition to "capitalism" there was, of course. But it had no economic significance beyond the various measures of "Sozialpolitik," which nowhere went near to vital nerves and which were enforced against such bourgeois resistance as there was—we are prone to overrate it by taking phraseology at face value—by the noncapitalist strata above the *bourgeoisie* rather than by the masses below it. This is particularly true of Germany, but it is also true of England (Lord Ashley, Disraeli's tory-democracy). Socialism counted for so little that its exponents, actually overlooking the possibility that cabinet office could ever come to them in the most unexciting and unrevolutionary way, framed its policies on the hypothesis of permanent exclusion from power, thus creating for themselves what presently amounted to the perplexing problem of Millerandism. So safe, and so convinced of its safety, was the *bourgeoisie*, that it went politically beyond the lengths compatible with the survival of its economic and social pattern. It cheerfully believed that the masses, if only sufficiently educated, would see the excellence of the bourgeois world and support it by their votes, entirely forgot how much it owed to the protec-

[1] Interests and attitudes are not the same thing, nor do the latter follow from the former: for instance, it sometimes is, and sometimes is not, both to the objective and to the putative interest of the *bourgeoisie* to prefer peace to war. That class sometimes decides for the one and, at other times, for the other. Independently of this, however, it is a fact that the bourgeois type of life creates a mentality better suited to peace than to war and, hence, an attitude averse to war.

tion of precapitalist elements in the social structure and was blissfully unaware of the explosive forces that gathered below the surface.

2. The rule—in the qualified sense just indicated—of the *bourgeoisie* and of bourgeois rationalism extended, as could easily be shown, to the religions, the arts, the sciences, the style of life, to everything social in fact, with the single exception of the Catholic Church, which hence became an object of aversion and of temporarily successful attack. All that matters for our purpose, however, is the fact that the bourgeois world behaved politically in such a way as to minimize external disturbance of our process. What institutional change of the kind relevant to our subject there was, grew much more clearly out of the immediate economic situations than such changes did at any other time, so much so that our way of defining, and dealing with, external factors becomes more impossible than ever if looked at from the standpoint of any other than our purpose. In order to show this, we will take England for standard and *paradigma*, and confine ourselves to the headings: Free Trade, the Bank Act, the Company Acts. The first, which stands also for a series of supplementary measures, such as the repeal of the Navigation Act, as well as for a fundamental principle of policy in general that asserted itself in many ways in the current management of affairs, was primarily the outcome of a diagnosis of the national interests of the moment which seemed to call for new outlets for the newly created productive power and for the relief of social tension. Wider aspects and visions of more remote effects were not absent, to be sure, and their presence—and the way in which the necessities of the moment were made to serve them—makes, together with the sacrifice by a ruling aristocracy of its own economic interest, the unique historical greatness of the Peel policy.[1] But the profit motive and profit effect of this move to take the fullest advantage of the existing industrial superiority of England is obvious all the same.

For us it is important to note that English free trade undoubtedly increased the long-run efficiency of entrepreneurial activity but hardly affected the cyclical rhythm beyond, on balance, reducing the amplitudes of fluctuations. In the forties it probably exerted, during its gradual introduction and afterward, a dislocating effect, which may have been responsible for the failure of that epoch to display to the full the regular symptoms of prosperity. Neither the increase in values nor even the increase in corrected values of exports of British products from 1847 to 1874 can be attributed entirely to the free-trade policy, as some enthusiasts have held. Growth and evolution would account largely for it. The case for a more generous view of the effects of free trade must,

[1] That its social value and its moral implications were sneered at by socialists then and afterward is but another testimony to their reality.

therefore, rest on the (defensible) argument that growth in our sense, as well as evolution, would have been crippled without it.

The Bank Act of 1844 gave effect to views which the experience of the late thirties had made irresistible. It would have spelled restriction, had deposit banking not sufficiently developed before. As it was, little, if anything, of the general complexion of business in the forties—or ever after—can be attributed to it:[1] it presumably did not do much more than kill a form of credit creation that for technical reasons was dying in any case. This is perfectly compatible with the fact that the system worked with considerable friction each time "pressure" arose from other reasons. The Humble Petition of the Merchants, Bankers and Traders of London against the Bank Charter Act (July 13, 1847) does not really charge more than this, and the action taken by government[2] perfectly logically confined itself to what practically, though not legally, amounted to amending the act. Thus we need not list the measure among the major factors acting on the cyclical process of evolution, except as an element of the general sound money tendency of the times. Some points about the behavior of the Bank within the limits of the act will be noticed in our discussion of the relevant time series (Chap. XIII).

The Companies Registration Act of 1844, permitting incorporation by double registration without limited liability, the Limited Liability Act, permitting the same with limited liability, and the Joint Stock Companies Act of 1856 (extended to banks in 1858 and to insurance companies in 1862), which marks the definitive victory of limited liability (the act of 1862 was mainly a codification and of little moment in itself) supply another instance of institutional change that merely formulated the logic of an economic situation. While, of course, the development of the latter—which, however, forms part of the process described by our model—is of great importance, the legislative change itself is of comparatively small importance in such cases. The opposite view derives spurious verification from an optical delusion similar to that which tempts us when we behold the increase in value of English exports after 1847. There was undoubtedly a spurt in company promotion after 1856 and an even greater one after 1862; but since those periods fall into Juglar prosperities, we must guard against the inference which we might feel inclined to draw.

[1] The investigation on which that statement is based has been carried out by Mrs. M. Shaughnessy Gordon.

[2] Treasury Letter over the signatures of Lord John Russell and Mr. Charles Wood, of Oct. 25, 1847, "recommending" to the directors of the Bank to enlarge, at a rate of not less than 8 per cent, the amount of their discounts and advances, and assuring them of indemnity for any infringement of the existing law that might be involved in doing so.

Much the same applies to the other two countries. In Germany, the Zollverein and the Norddeutsche Bund developed into the Empire. Economically, this mainly meant further removal of fetters and further reduction of the political element in the risk of investment, which tended to make entreprenеurial effort more productive than it otherwise would have been. Summing up, as it did, previous development, it can hardly be said to have acted as an external disturbance on preexisting structures. After 1871, policy was quiet and peaceful, and an undercurrent of free-trade opinion was present throughout—though fought against with increasing success by agriculture and the heavy industries from 1870 on, when the duty on pig iron had been reduced to a nominal amount and the duty on cattle repealed—and asserted itself once more in the Caprivi treaties toward the end of the period. This is all the more remarkable because the "immediate" arguments for free trade that propelled English action did not apply to the German case. Bismarck's motives for turning toward protectionism (1878) were not so much economic—though American wheat had its share in converting him—as fiscal (in the budget of the Reich for 1878, revenue from import duties figured at 106 millions of marks in a total revenue of 536.5 millions) and political (the idea of strengthening by tariff walls the bond that united the new Empire). In and around Germany the last tolls fell that hampered traffic on the waterways (on the Sound in 1857, on the Scheldt in 1863, on the Rhine in 1867, on the Elbe in 1870). The Suez canal (1869) was, of course, an innovation (as new trade routes mostly are) though an external factor for our three countries.

The reform of the Prussian Bank (1846) was intended to be, and in some respects was, an improved edition of Peel's Act. The changes incident to its transformation into the Reichsbank did not alter the general financial conditions of enterprise to any marked degree,[1] the less so because the Reichsbank did not embark upon any active policy of control within the period under review—various details will be noticed in their places. Nor was the substitution of a gold for the silver standard—a national currency (the silver *Thaler*) had been established before in 1857—the great disturbance it is sometimes held to have been.[2] The

[1] The Bank of Prussia filled the functions of a Central Bank as then understood. The reform also spelled definitive defeat of the free banking school in Germany, but some of the small principalities set up banks of issue, whose notes circulated beyond their territories. This was stopped in 1875, when this power was confined to a few institutions in the major states and subjected to limitations even in their cases. There is thus some analogy also between the German legislation of 1875 and Peel's Act. The contemporaneous increase of banking facilities of other types made, as it did in the English case, that operation innocuous to business.

[2] The old question of the effects of the demonetization of silver here crosses our way. We cannot go into it beyond stating that it, of course, affected trade with countries that

joint stock company was by about 1870 as entirely freed from fetters—at all events in many states—as it was in England, so much so that this must be listed among the causes that contributed to the severity of the crash of 1873. This experience led to some retracing of steps, but the act of 1884 did not seriously interfere with that freedom.

As for the United States, the free trade that really mattered was the free trade within the country. Compared with this—and the economic history of the Middle West and West is no doubt the greatest historical example of free-trade achievement—the regulation of foreign commerce, very important during the first Kondratieff, steadily declined in economic, although only temporarily in political, importance. In spite, however, of that fact and of the influence of the South, protection was retained throughout. Fiscal considerations had their part in determining the increases of 1842 and the reductions of 1857, but the long-lived Walker Act of 1846, which may be taken to represent what to Americans seems to be moderate protection, still kept all the more significant items at 25 or 30 per cent ad valorem. After the Civil War, duties on wool and woolens again moved into the center of the political game about the tariff (1867). The law of 1872 and the general revision of 1883 brought small reductions, but the McKinley tariff of 1890 gratified manufacturers (worsted manufacturers, in particular), while giving to the farmers a full measure of protection to wool, the only thing protectionists had to offer to them. The Wilson Act—the most courageous deed of a courageous man—abolished the tariff on wool and reduced the duties on woolens on the average from 91 to 49 per cent, only to provoke the violent reaction embodied in the Dingley tariff, which, unfortunately

remained on the silver standard. The larger problem, much discussed at the time, whether free or regulated coinage of silver would have influenced cyclical fluctuations—it was the standard remedy for them in the eyes of the monetary reformers of the time—should undoubtedly be dealt with here. But it can be treated in the same way as the analogous question in all other cases of additions to currency or to credit facilities: silver would have set a higher level of prices and accentuated both prosperities and depressions without altering the cyclical rhythm itself. There is, however, one point about bimetallism which must at least be mentioned: as long as there is free coinage of both silver and gold at a fixed ratio of values and as long as neither of the two has driven out the other, there will be a mechanism of automatic regulation of the quantity of legal tender. The metal the market value of which is less than the value fixed by the legal ratio will tend to flow into circulation, while the other will tend to flow out, thus increasing the supply for its nonmonetary uses. This mechanism actually worked in the forties and fifties, with France as its center. It can work only within limits which would probably—though this is not certain—have been transgressed by later developments in silver mining, even if bimetallism had been as generally adopted as the various monetary conferences of that period suggested. But the principle (sponsored by no less an authority than Walras) is not, on that account, wrong. The question is, however, of but secondary importance to the analysis of this book and will be taken up again in the writer's treatise on money.

for the standing of free trade in the public eye, happened to come at the threshold of the third Kondratieff, as the reductions of 1872 and 1883 had come at the threshold of crises.[1] As far as the writer is able to see, this policy may have alleviated temporary difficulties for some industries—while changes such as that brought about by the Wilson Act certainly created *some* disturbance—but on the whole it hardly influenced the march of things substantially. It never was a major factor in cyclical turning points and still less turned depressions into prosperities or vice versa. Its provable influence on trends is confined to a small number of industries, and there is something curiously unreal about the place it held in party politics and in the thought and talk of a large sector of the community.

The currency troubles incident to the Civil War will be mentioned presently. In the sphere of banking, the outstanding institutional change was the creation of the National Banking System, about which we might repeat, *mutatis mutandis*, what has been said above about Peel's Act and the German Reichsbank. Two developments which almost amounted to institutional changes should be noticed, however. One was the rise of the New York banking center to something like the position of a central bank. The other was the gradual reform of banking practice, in some states—for instance in Louisiana (1842)—enforced by law, in others, like Massachusetts, by the banking community itself. In New York the safety fund and bond security systems were improved; in South Carolina and some Middle Western states serious banking also prevailed, although "bogus" and "mushroom" banks, the notes of which were dealt in at discounts up to 90 per cent, were still frequent in the West and the South. The National Banking Act did much, directly and indirectly, to improve matters further and, until the setback caused by the early practices of trust companies, progress in that direction was all but unbroken.

It is neither possible nor necessary to discuss the details of the fiscal policy of our period, but it is necessary to advert to its spirit. In the United States, the tariff as a rule took care of Federal expenditure and even yielded surpluses so large as to be almost embarrassing, except during the Civil War and some years after it.[2] In England the income

[1] These are good instances by which to illustrate the dangers of arguing by coincidences, in particular in explaining business situations by external factors. They are so valuable because it is plain that those measures cannot be held to have produced the cyclical phases that happened to follow upon them. This should make us careful in other cases also.

[2] The tax on the output of manufactures was then a considerable burden. The per capita tax, however, cannot be considered as heroic. Repeal of war taxation failed to bring about the reduction in prices expected from it—a fact which constitutes valuable comment on the "deflation" of that time.

tax reappeared for good, but throughout the period behaved with the restraint of a newcomer not quite certain of his right to a place. In Germany the same holds true for the various state income taxes which were introduced or reformed and among which Miquel's Prussian income and property tax (1891) was the supreme achievement. The writer has been told, though he has not been able to verify it, that Miquel believed an income tax which in the highest brackets asymptotically approaches 5 per cent to be dangerously high. The practice of German municipalities of levying an additional percentage for their own purposes, which was soon to make even that income tax a serious burden, did not develop within our period. All this, of course, implies acceptance of the bourgeois schema of things economic. No group that had any political significance doubted anyone's right to his private income or inheritance. Income was earned primarily for private purposes and the state and other public bodies were to take away as little as they could. Taxes were a necessary evil, to be confined to amounts and to be laid on in ways that would as little as possible interfere with the disposal of returns as it would have been in their absence. Retrenchment or, at all events, economy was meritorious in the management of public affairs; saving or accumulation, in the management of private affairs. Supported and controlled by the approval of the political powers—which, however, let us repeat, were in Europe not as a rule bourgeois themselves—the bourgeois worked and saved—within a firm framework including a safe and sound monetary system—for an indefinite family future, and invariably took as long a view as he could afford to take.

These are the principles behind the splendors of Gladstonian finance or the six budgets for which Goschen was responsible. Peel was the patron saint. Compared with the performance of these three, all other English and, with the exception of Miquel, all German ministers of finance were distinctly mediocre and at times seriously below par—even Disraeli was mediocre *qua financier*—but not one of them deviated from the creed. We are neither analyzing nor evaluating cultural patterns. But it is obvious that this finance and the general policy of which it was an element had much to do with the results displayed in the behavior of our physical series.

3. The bourgeois Kondratieff spans a long list of wars, foreign entanglements, revolutions.[1] Space forbids explanation of why they seem to the writer to have been, even in a deeper sense than that which is implied in the narrow purposes of this book, factors external to that social pattern. But we may point, by way of indicating the line on which the argument

[1] The behavior of gold—the Californian and Australian discoveries certainly were external factors since, primarily at least, they were due to chance—will be more conveniently considered at other turns of our way.

in support of this contention would unfold, to the fact that Sir R. Peel —Peel again—inaugurated and Gladstone—again Gladstone—fully developed that consistent policy of *détente* which in England has never been seriously challenged since, not even by the primarily phraseological "imperial policy" of Beaconsfield, and which could be shown to be the most perfect expression of the economic and cultural structure of capitalist society. We will, however, confine ourselves to discussing the importance of a few instances, or types of instances, for the working of the mechanism of economic evolution. There is, first, the group of what, from our standpoint at least, we may designate as minor ones, such as the various frictions that arose between this country and England. Some of these the business community rightly refused to take cognizance of; others caused small ripples. Even disturbances involving military operations come within this category, such as the war between the United States and Mexico which, through the payments of the latter to the former, exerted some influence, though only on short-run money-market situations, for some time after its close. The detailed study of time series has, of course, to take account of this type of disturbance, but it is safe to say that no major effects are overlooked by neglecting them here. Minor also, for this country—if we except effects on immigration—was the repercussion from the continental revolutions of 1848, the troubles in Russian Poland, and even from most other European events, however momentous they were in themselves. This country was not, to be sure, a world sufficient unto itself; but the nature of those events was such as not to interfere materially either with agricultural exports or with capital imports.

For England, the continental disturbances of 1848 were economically a more serious matter. They cannot be left out of the picture of her economic situation. The Crimean War, the Mutiny, the American Civil War, and the Turko-Russian War complete the list of major external factors of this type. Egypt and the Soudan, South African (our period ends in 1897), and other colonial troubles did not amount to serious disturbance of the general domestic business situation nor did—this is more astonishing—the Italian and German wars. The money market, through gold flows and otherwise, was undoubtedly affected in each instance, but beyond this, little injury to our process is provable. This was due, not only to the great elasticity of that economic system, but also to the fact that public finances and money never did—nor were they expected to—get dangerously out of order. Even where business and external disturbance coincide, we must be careful not to attribute too much causal importance to the latter. Moreover, in almost every case, negative effects of political disturbances were, partly at least, balanced by positive effects, for there were nearly always interests that

profited by them. This was so even in the case of the cotton famine which fell so heavily on Lancashire yet failed to produce—though there was much suffering—anything like a general depression, or even to blot out the symptoms of the contemporaneous Juglar upswing.

German business and, in particular, German money market situations show, of course, the imprints of all European events very clearly, both of political disturbances and tensions (in the eighties, the effects of strained relations with Russia) and of economic fluctuations abroad, particularly of English crises. The German wars created the unified territory and hence powerfully influenced economic trends in the long run, but otherwise they disturbed the flow of economic life much less than one might expect. The Danish war was a small affair. The Austrian war was too short and not exhausting enough to cause prolonged deviations. It was different, of course, with the French war. But even in that case only one major problem arises, the effect of the indemnity which to the amount of 4,990 million francs was actually paid in cash or exchange, 742 in the former and the rest in the latter. Payment was effected with astonishing promptness and ease, mainly from two great borrowing operations in 1871 and 1872. The transfer was much facilitated by the facts that about 2¼ billions were subscribed by foreigners, Germans among them, and that there were at the disposal of French capitalists more than sufficient foreign assets which were readily saleable. The strain, thus distributed over a very wide area, did not anywhere outside of France assert itself to a really uncomfortable degree. The French commodity balance in foreign trade also became "favorable" for four years—to the amount of 1.1 billion francs in all—as we should expect from the classical theory of foreign payments. The effect on the German business situation is clear from the use that was made of the indemnity. A small part (150 million francs) was hoarded in gold by the imperial government. An amount, estimated at 750 millions, helped to provide the basis for the new gold currency. The rest paid for debts, war pensions, fortresses, and so on. It is obvious, and has often been pointed out, that this increase of monetary wealth gave an additional impulse to the excesses of the prosperity of those years, and in part accounts both for the violence of the crash of 1873 in Germany and for its leniency in France. In fact, it is reasonable to suppose that the safety reserves for a gold currency being ready at hand not only meant that the pressure was avoided that otherwise would have attended their accumulation, but also that credit conditions were eased beyond that. And it is certain that a still stronger effect in the same direction was exerted by the replacement by cash of a considerable part of government obligations, and by the increase in unproductive expenditure on war pensions, armaments, and so on. Here, then, we have not only a case

that illustrates very well the effects of adventitious "liquidity" in general, but also a causal element (obviously an external one) in the pattern of one of the three greatest crises, as well as depressions, within the whole stretch covered by our material, the postwar time included. It is interesting to note the *modus operandi* of that element. As far as either our facts or our schema will permit us to judge, it did not alter the cyclical rhythm. We should have expected prices to rise and a period of supernormal promoting and other business activity to set in without it. The mechanism of prosperity was actually in full swing before, and a major setback would have been due in any case. What that liquidity did was to accentuate amplitudes by facilitating the operations which we comprise under the heading of Secondary Wave and by widening artificially the scope for error and misconduct.

4. By far the greatest and the most interesting "external disturbance" of the period was, however, the American Civil War. Barring the physical injuries to the productive apparatus of the country, which (again illustrating the difference between misery and depression, or welfare and prosperity) had very little cyclical importance[1] (what cyclical importance they had was in the prosperity direction, for reconstruction supplied the basis for a postwar boom), its effects bear a striking resemblance to the effects on this country of the World War of this century. We have an understandable financial and commercial earthquake at the beginning, and stringency and stagnation lasting almost to the end of the first year of hostilities. Then, helped by a good crop, a typical war boom developed in response to government demand supported by the issue of the greenbacks. The conflicting forces of the postwar boom and of postwar liquidation impinged on a rising cyclical (Juglar) tide which in this case it is very easy to distinguish from the effects of the external factor, because it was so clearly based on a development that had nothing to do with the war—railroad construction. Most of the effects and after-effects of the war were drowned in the rise and break of that wave, and although some of the fluctuations in the last sixties have to be attributed to them, neither the cyclical rhythms nor trend results were affected enough to become unrecognizable. Even the difficulties in 1866 and 1867 were not due to postwar adjustments alone. But the question still remains what importance we are to attach to the monetary element during the seventeen years of the greenback standard.

Again—as in all such cases, the English one after 1815 and the American one after 1918, in particular—it is a matter of definition

[1] Physical destruction of plant and stock was quickly repaired—J. Stuart Mill commented on this—as it always will be so long as the capitalist engine is intact. What matters economically in such cases (morally, other things matter much more) is impairment of the capitalist motive power and mechanism, rather than physical loss. And that motive power and mechanism had in this case not suffered at all.

whether we can speak of deflation at all. In our sense there was none, for there was neither net contraction of the volume of the circulating media nor any pressure on the money market, such as we might expect would attend a policy of raising exchanges to gold parity. A sector of public opinion was in favor of both, and Secretary Hugh McCulloch's report of December 1865 actually envisaged both. Looking upon greenbacks and compound-interest notes in the most orthodox light, he proposed to fund them by means of bond issues and in fact set about retiring them out of surplus revenue. This policy at first met with an astonishing amount of approval, both from the President and from Congress. But it was presently curbed by the act of April 12, 1866. Retirement actually effected was quite small and more than compensated by the expanding circulation of the national banks' notes.[1] The Secretary was probably right when, several years later, he stated that but for the Treasury's monthly statements nobody would have known that there was any retirement at all. What eventually happened was what his successor and Congress professed to aim at—the economic organism was allowed to grow into its monetary coat.

Pressure on the money market was—with but few local exceptions—also avoided through various favorable circumstances. No great efforts, such as might have crippled business success, were needed to restore the Federal budget to order. On the contrary, it was possible to begin reducing the Federal debt from its 1865 peak of 2,675 million dollars. The situation of banks was further eased by the emigration of American bonds to Europe, which set in almost immediately, and by other foreign credits which became available to American business; but it was strong from the beginning. In 1866 national banks held legal-tender reserves to the amount of 211 millions, against deposits of 539 millions. This is but one symptom of a fact that is most important for the diagnosis of the inflation as it stood at the end of the war. It had not taken full effect, *i.e.*, it had never gone beyond that stage in which part of the swelled receipts are being used for increasing cash and paying off debts —it had never become "wild."[2] Part of the rise in prices in 1864 was not the mechanical effect of the quantity of greenbacks but was due to the impediments to production and trade and to speculative anticipation,

[1] At the close of the war, 431 millions of greenbacks were outstanding. The resumption act still authorized a maximum of 346,681,000 dollars (see W. C. Mitchell's History of the Greenbacks and D. R. Dewey's Financial History of the United States). National bank notes in circulation rose, with fluctuations, to 352 millions in 1882. Decrease to 162 millions in 1891 had various technical reasons, among which the spread of the habit of payment by check was the most important, and thus does not mean a reduction of the amount of circulating media. Also see D. C. Barrett, The Greenbacks and the Resumption of Specie Payments, 1931.

[2] The only circumstance that seems to contradict this is the practice of exchange houses that developed in 1864 of quoting in gold instead of in currency. But this was due not to

and the whole of the fall to the end of 1865 (a fall of, roughly, 22 per cent of the level of September 1864) was simply the reversal of this, an adjustment to the actual amount of fiat, not the consequence of any stringency or pull at the monetary rein.

On the whole, industry emerged from the period of hostilities in a liquid state, though not so much so as it did in 1918. Banks, being still more liquid, soon began to expand credit in the rising wave of prosperity. Loans and discounts of national banks increased from 500 to 900 millions from 1866 to the end of 1872, while loans of the New York City clearing house banks moved around a fairly even level till the end of 1869.[1] This is not contraction. Moreover, the monetary element obviously did not depress output which, on the contrary, made new records throughout the period to the Resumption Act—except in 1871, 1874, and 1876—and increased by 50 per cent per capita, in spite of the huge wave of postwar immigration. It did not prevent increase of money wage rates to 1872, nor decrease in rates of interest, nor even lax habits of lending and speculative excesses. As far as it has anything to do with Black Friday and the crisis of 1873, it was not through stringency but through its opposite. The inference seems to be unavoidable that stabilization of the dollar at the peak of the gold premium or, in fact, any devaluation, would have enforced continuance of inflation, still more excesses, and a still more severe crisis. This is not to deny that the fall in greenback prices—rapid to 1871—spelled hardship for large sectors of the community, the agricultural sector in particular[2]—wheat fell to nearly half the 1866 price by 1870, cotton to less than half within a year—nor that, although the monetary factor evidently accounts for only a minor part of this, devaluation and continuing inflation would have brought temporary relief to those sectors.[3] Finally, the importance for our understanding the nature of the cyclical process of evolution, of this case of prosperities accompanied by prices that were not only falling (1866–1880,

---

any "flight from the dollar" but simply to the rapid and erratic changes in the price of gold which made quotations in currency technically unworkable.

[1] For this and the following statements, as well as the general statistical picture of the period, see W. M. Persons, P. M. Tuttle, and E. Frickey, Business and Financial Conditions following the Civil War, *Review of Economic Statistics*, Prel. vol. II, 1920.

[2] The woolen textile industry also saw its war profits vanish. But objective facts do not, in general, bear out the description of business as "depressed" and "unsatisfactory"—which epithets frequently occurred in the press of that time. Cotton and iron, in particular, expanded vigorously (see Report of the Commissioner of Inland Revenue for 1867). The general picture exactly fits our idea of a Kondratieff recession. The complaints probably mean reduced profits.

[3] The discussion of the behavior of price level in that period will be resumed in Chap. VIII.

at an average rate of about 4 per cent per year) but also expected to fall, cannot be too strongly pressed upon the reader's attention.

5. After 1878 progress toward full ratification of the gold standard, which eventually came in 1900 (Gold Standard Act of March 14), need not have been difficult. If, nevertheless, it proved to be so, this was not due to any hitches in the working of the monetary or the economic system, but to the temporary success of the silver interests. This "external factor"—and the case illustrates well in what sense and why politics can be considered as an external factor—from 1876 to 1896 repeatedly threatened to block the road and adversely influenced business situations mainly in two ways. First, both American and European business opinion, seeing some and anticipating further success of silver politicians, tried to prepare for possibilities and responded in a way which should be highly instructive for any mind at all open to factual evidence about the economic—let alone moral—importance of safe and stable currency conditions. Second, the mechanical effect, as distinguished from the effect on anticipations, of the silver actually bought was to jeopardize the gold position of the country, which but for this would have been very favorable throughout. For instance, from 1891 to 1893 there was an export of gold to the amount of $155,000,000 for which neither the unsatisfactory crops and prices of 1892 and 1893 nor any other element in the situation will fully account. The Treasury, then the only guardian of the national gold reserve, had, for both reasons, to face a task that at some junctures (1884 was the first) looked hopeless.

The currency factor was a major source of weakness during the vicissitudes of 1893 and was primarily responsible for what proved a specifically American catastrophe, not otherwise fully motivated, in 1896. But while silver thus undoubtedly influenced cyclical situations, it did not do so in the manner we should expect from a perusal of the Bland (1878) and Sherman (1890) acts. The provisions of the former, although the free-coinage clause—free coinage of silver had been abolished in 1873—was defeated in the Senate, were in themselves quite sufficient to impart an "inflationary" impulse to the system. Yet the price level continued to decline from 1886 on, as mentioned above, even more than in England. The explanation lies in the policy of the Treasury. The passing of that bill really meant a drawn battle: the sound money front[1] had had to give way, but it stuck to the guns of the gold standard. In moving, as it were, on the resultant of these two component forces, the

[1] The reader will observe that for our purpose it would not make any difference if that expression, which is intended to be neutral, were replaced either by "the conscience of America" and "all decent or serious people" or else by "criminal usurers," "capitalist exploiters."

Treasury, while obeying the letter of the law, buying silver in the amount required and doing something toward putting it into circulation, at the same time did its best to prevent it from taking effect. The issue of small greenbacks, for instance, was discontinued in 1885. Some gold in the New York associated banks was, at the same time, replaced by silver. Besides, silver was allowed to accumulate in the Treasury's vaults and thereby was "sterilized." This policy meant sailing close to the wind, but it succeeded because of several favorable circumstances.

As has already been pointed out, barring the effects of the silver experiment, the gold position of the country was favorable, in some years that might have been critical exceptionally so. Moreover, the fall in interest rates induced an increase in United State bond prices, which backed the notes of national banks. The value of the right to issue notes being decreased thereby, the amount of national bank notes outstanding shrank by about 200 millions during the eighties—a process which was, of course, quickened by the Treasury's policy of debt redemption. Finally, the surpluses which made that policy possible also facilitated accumulation of idle silver. Whatever may be thought of the spending of 300 million dollars or so on the purpose set by the Bland act, effects on prices and on the rhythm and the trends of the cyclical process must have been small, if not altogether absent. The same, or almost the same, is true of the Sherman Act, which much more obviously suggests a compromise between the necessity of satisfying the silver interests and the wish to keep the gold standard—notwithstanding the declaration about "the established policy to maintain the two metals on a parity . . . " It is particularly significant that the monthly amount of silver to be bought (4,500,000 ounces) was to be paid for in "treasury notes" which were legal tender in every respect but redeemable *in gold* or silver, as the secretary might see fit. Tactics veil intentions. But facts seem to warrant the interpretation that the leaders of the gold party, faced with an attack which was irresistible because some of them and many of their followers needed the support of the silver party in order to gratify their own protectionist desires, decided to *reculer pour mieux sauter* on the strength of two observations and a hope. The observations from recent experience were, first, that the Treasury could stand a lot of strain and, second, that silver could be turned into redeemable fiat—which is the way that in fact, though not in law, it had been worked under the Bland Act—and thus prevented, for a time at least, from swamping the monetary system. The hope, according to this interpretation, was that tactical and economic situations would sooner or later arise in which the dragon might be killed. They had not long to wait. Eighteen hundred ninety-three came and brought repeal.

B. The Agricultural Situations of the Period.—These situations sum up and reflect both one of the outstanding results of capitalist evolution and its repercussions, with a clearness that leaves nothing to be desired. In a first approximation, the story of the way in which civilized humanity got and fought cheap bread is, for our period, the story of American railroads and American machinery[1] (toward the end of the period, dry farming must be added). We will at once notice some points which in part account for peculiarities in the *modus operandi* of these two innovations. First, the policy of land settlement entered upon after the Civil War greatly helped to propel the process and stands in a relation of interaction with railroad building. It increased and it directed toward the land a stream of immigrants which, but for it, would have flowed in more slowly. This qualifies, but does not invalidate, the sweeping statement just made: neither immigration nor land policy comes entirely within our schema, but neither of them is independent of the process it describes. Second, those two innovations did not arise in the agricultural sphere. Transportation service was wholly, agricultural machinery mainly, the product of industrial initiative. This entailed an important consequence, particularly obvious in the case of transportation. Typically, a railroad opened a region, built elevators, prepared many things for the would-be farmer, sometimes even furnished instructions about products and methods. Any hardy couple which was at all of the type embodied in Grant Wood's "American Gothic"—and many which were not—could go out to the Middle West or the Far West and know exactly what to do and how to do it. Therefore, the agricultural effects of each railroad asserted themselves with a rapidity which would have been

[1] Some of the developments in the field of agricultural machinery will be mentioned later. Exact estimate of the labor-saving effect is difficult, even if confined to the saving, per unit of product, of labor *on the farm* or, perhaps, owing to the large local differences in actual practice, impossible. For the nineteenth century there are many data, some obviously unreliable, about the saving in individual operations. The Thirteenth Annual Report of the Commissioner of Labor (1898) contains a very comprehensive estimate which, owing to its date, it is very tempting to use. The writer has, however, come to the conclusion that he cannot take upon himself the responsibility for using it. Such inquiries as he has been able to make have convinced him that that very important desideratum of American agricultural economics is not only unfilled but not likely to be filled for the span of that Kondratieff. But Mr. Leo Rogin's analysis should be mentioned (The Introduction of Farm Machinery, University of California Publications in Economics vol. 9, 1931) Two periods of great increase of production—1867–1880 and 1890–1898—are, however, clearly associated with either older machinery (McCormick's reaper, Cahoon's seeder) coming widely into use or new machinery being added (disk drills, separators, self-binders, big threshers, and many others). Reduction of cost through labor-saving appliances, not increase of yield per acre, was what this mechanization aimed at and achieved. Increase in total output was brought about by increase in acreage.

altogether impossible in the case of a genuinely agrarian innovation, and this tended to shorten periods of agrarian prosperity in our sense.[1]

For America, however, the consequences were, third, mitigated—during by far the greater part of the period even reversed—by the fact that wheat and cotton production faced a world-demand schedule that, in real terms, shifted upward all the time. If that production had been monopolized instead of being perfectly competitive, it might still have been during that Kondratieff the best long-run policy to extend acreage and to produce simply as much as possible. For the time being, and before competing sources of supply were opened (Argentina in particular), progress in shipping and fall in ocean freight rates worked in the same direction. But, fourth, those consequences were intensified by the fact that in agriculture the "old firms" in our sense are not eliminated so quickly as in industry but go on producing much longer. This is the phenomenon which, if there were not objections to using a term which is associated with so much faulty reasoning, we should call agrarian overproduction. Although the old, on which those innovations would, if our process had been allowed free sway, have passed sentence of economic death, was mainly located in Europe, some effects of this type show also in the Northeast of this country. But dairying, vegetable growing, and so on then, before the time of modern refrigeration and canning, afforded much more compensation than they do today, and New England farming was able to contract by the comparatively painless method of the farmers, without ceasing to be farmers, moving to the West at the expense of abandoning investment.

In order to bring out a very simple but also very important point, we will, for the argument of this paragraph, assume that there are not any chance variations in crops or any effects on yield per acre of innovations—which are assumed to act on costs and acreage only—so that the latter remains constant from year to year. Then we can say that for American agriculture, taken as a whole, variations in earnings and variations in prices of products were indeed very different things and that, in particular, falling prices were perfectly compatible with rising earnings —to some extent even the condition for increase in earnings from sales to Europe. But it is also true that for considerable sectors, and for many individual cases in all sectors, money earnings were, under our assumption, simply proportional to prices. These sectors and individuals were bound to suffer from any fall of prices below the level to which their

[1] The case was not one of innovation without profits (compare the third chapter) or of cycles without prosperity phase (compare the fourth chapter). But both profits and prosperities in our sense showed rather in the railroad and in the industrial than in the farming business. What farmers earned (in good times) was of the nature of exceptionally high wages.

locations and methods were adapted. Such a fall must occur by the working of our process and is, in fact, an essential part of the mechanism which spreads the fruits of progress and redistributes productive resources in accordance with the requirements of the new situation. It would have occurred even if there had been no other innovations: agrarian developments alone would have been sufficient to depress the general price *level*, but all other innovations worked in the same direction.

Now, because of the favorable shift in European as well as American demand, mentioned above, and because of those other innovations, agrarian prices did not substantially decline, during our period, relatively to other prices. As far as this goes, even those farmers whose earnings were proportional to prices of products suffered only to the extent to which the prices of what they bought were retail prices which did not fall as much as the wholesale prices they got, and to the extent to which protection prevented nonagrarian prices from reacting as they would have done without it. It was debts, particularly debts incurred for the acquisition of the holding, which gave to the fall in the price level its sinister connotation. This would have been so in the absence of any speculation in farm land and even if nobody had ever bought a farm in erroneous anticipation of rising product prices. But both these factors added dark hues to the picture. This seems to do justice, and at the same time to assign limits, to the view which links agrarian prosperity and distress simply with prices. According to *Technical Bulletin* 288, U. S. Department of Agriculture (D. L. Wickens), 27.8 per cent of all farms operated by owners were mortgaged in 1890, to 35.5 per cent of their value—figures which, while showing the seriousness of the situation, also show that at least three-quarters of all farms (for among the mortgaged ones there must have been some that carried the burden without distress) cannot have been vitally affected. There were other debts besides the mortgages, of course, for which the writer has not been able to make or get any reliable estimate; but these were mostly short-term bank debts and, in all normal cases, amenable to current adjustment.

This analysis supplies the theory of what is generally known as the agricultural depression[1] of the last quarter of the nineteenth century,

[1] Space forbids elaboration, and this may well create, particularly in the mind of agricultural economists, an unfavorable impression. We have not been able to point out for instance, that owing to the "economic lag of agriculture," the farmer gains more in improving and suffers more in worsening conditions than the manufacturer, that the increase in land values which occurs during a boom intensifies difficulties afterward, that marketing cost being sticky, farmers' incomes rise more in booms and fall more in depression than prices at centers of trade, and so on. But nothing of this alters our argument. For a very good exposition, the main results of which apply very generally, see C. Dampier Whetham, The Economic Lag of Agriculture, *Economic Journal* for December 1925. Also H. Belshaw, The Profit Cycle in Agriculture, *Economic Journal* for March, 1926.

which bears, mainly because it occurred in about the same segment of the Kondratieff, so unmistakable a family likeness to the agricultural depression of the post-Napoleonic period. For America, it should be dated 1882 to 1890, for in 1891 the acreage harvested again starts expanding, and 1877 to 1881 were years of either good harvests or good prices or both, the bumper year, 1879 (rich crop plus high prices owing to failures in Europe) and 1881, the year of maximum price of wheat (119.2 cents per bushel, December farm price) being among them. The reader will observe that the monetary factor has not so far been assigned any independent (causal) role, our analysis having been exclusively in terms of the process described by our model. It is, indeed, believed that this explanation accounts for the essentials of the case. But by itself it is, nevertheless, inadequate for the period 1848–1869.

Californian and Australian gold was, of course, a factor in the expansion and in the behavior of prices during that time. The rise in prices to 1866 and the incident speculation in farm land induced an agrarian postwar crisis—see preceding section—which, however, lasted three years only. But after that our process is subject to much less disturbance and is much more nearly adequate to explain the course of things. From 1866 to 1880, the acreage harvested increased from 15.4 to over 38 millions. This is quite enough to bear out the view taken.[1] The long-run tendency of prices accords perfectly, though short time peaks and troughs occur irregularly in response to variations in American and

[1] Exception to the above analysis will be taken, not only by those economists who make agrarian prosperities and depressions (these terms do not now carry the technical meaning assigned to them in this book) wholly a matter of the behavior of money, but also by some who do not. The latter may hold that by our neglect of the decrease in gold production in the seventies and eighties, we make outselves guilty of a one-sidedness similar to that of the purely monetary explanations. This is not so. The gold factor is not neglected but, though only implicitly, fully taken account of. It is not mentioned explicitly, except for the fifties and sixties, because it was only then that it played an autonomous role. Nor do we deny that the monetary factor could have behaved, or have been made to behave, in such a way as to avoid that fall in price level. Any effective inflation would have done that and brought relief to debtors, agrarian and other. What is objected to, in any diagnosis of the agrarian depression which makes gold production the central fact about it, is that not only does it look merely at the agrarian problem, failing to see it as an element of the process of economic evolution, but also that it looks even at the agrarian problem only from the standpoint of a single surface fact. And what is objected to in the motivation of any policy—*ends* of policy we neither espouse nor object to—based on that diagnosis, is that it not only looks at the agrarian problem exclusively from the standpoint of the interest of the agricultural producer, but even neglects all the real problems of that producer. To avoid misunderstandings, the writer wishes to say what may be gleaned also from other remarks in this book—that he is not out of sympathy with measures in support of a healthy class of bona fide farmers, and does not think it ought to be allowed to perish. But there are ways of helping them without interfering with the efficiency of the capitalist machine and without producing consequences other than those that such a policy is intended to serve.

European harvests. Prices of farm products in general rose (see Warren and Pearson's index, Prices, p. 25) fairly steadily from 1843 to 1857—a rise which almost exactly covers the prosperity phase of the second Kondratieff—and then fell, as again they should have done according to our schema, to a level in 1861 (75, on a 1910–1914 basis), somewhat above the level they again reached at the time when the effects of the Civil War disturbance were substantially digested (1878: 72). They continued their downward course, as we should expect, to 1896 (56). The minimum in December farm price of wheat (48.9 cents) occurs in 1894 (cotton was near its minimum in the same year) and in 10 years, during the period from the Civil War to 1897, it was below 75 cents. Of these, nine years were between 1884 and 1897, the fall after 1891 being again associated with increase of acreage.

As stated above, English and German agriculture drifted during that Kondratieff, as far as the money crops go, substantially into the dismal position of the Old Firms in our model. In the upswing and to the beginning of the seventies, the effects of the prosperity phase, enhanced and prolonged by the new gold—the Californian and Australian gold discoveries were indeed a stroke of luck for English free-trade policy—prevailed, but as soon as those factors ceased to act and ocean freight rates, after 1873, started on their downward course (their minimum, for our period, which occurs in 1894, is little more than 20 per cent of the figure of 1873), an agrarian depression set in, in a sense in which there was none, except locally, in the United States. If it be correct to make the impact of American (later, also Argentinian and Australian) products the mainstay of the explanation we must find the situation particularly serious in free-trade England. So we do. The total of the income from ownership of land in the United Kingdom, as published in the Statistical Abstract, is for various reasons not quite satisfactory evidence, but it is still significant that it fell from its maximum, which occurred in the late seventies or early eighties, practically (though of course with fluctuations) until the World War. English agriculture was again—as in the twenties of the nineteenth century—saved from disaster by her system of land tenure, which prevented resort to credit for the acquisition of land. This accounts for the orderly retreat. But such retreat was actually necessary (farmers and agricultural laborers were, in 1881, 13 per cent of the population), though the total area in cultivation did not decline. Adaptation was, however, not only by abstention from expensive investment, such as in drainage. There was, also, further improvement in crop rotation, machinery, and concentration on certain high-grade products—beef and mutton among them; these products were also sheltered by the preference of the English consumer—for which there was no serious competition until the nineties, although there was some for dairy products.

In consequence, we again find in the depressive picture a considerable number of brighter spots. For instance, Cheshire, Lancashire, Devonshire, and Northumberland seem to have borne up well.

In Germany, protection (1879, increased 1885 and 1887, reduced 1891), complicates diagnosis. It was by no means an unmixed benefit to German agriculture as a whole. The bulk of the peasants, most of whom were not sellers of grain to any vital extent, reaped little advantage and some of them who bought fodder suffered from it, as did the fattening establishments in the Northwest. There is no doubt, of course, about the effects on the medium-sized and large estates, particularly in the East, both of the imposition and increase and of the subsequent decrease of the import duties. These estates had, in the times of rising prices and rising land values, run into debt to a very considerable extent, and, speaking from their standpoint, we have hence to date the agricultural depression —which, like the English one, is not primarily an element of the cyclical process but due to the impact of what for these countries was an external factor, foreign innovation—with reference to prices, *i.e.*, from 1873, when the increase that had begun in 1823 came to an end, to about 1896 (according to the index of the Institut für Konjunkturforschung) with an acute phase from 1880 to 1886. Land values did not fall, however, or did not fall enough for such data as we have to show the fact. Also, that indebtedness had in part been incurred for productive purposes, of which some come within our definition of new production functions,[1] though others were ameliorations which yielded but little surplus over interest: many of the larger estates went through complete reorganizations, improved machinery was widely used, new methods of fertilizing came in, agricultural industries continued to expand (sugar production, for example, was very lucrative most of the time, although the price of sugar—artificially pegged before the Brussels Conference—fell to 1906). Producers were, therefore, able to meet falling prices by increased output, which did not, under the circumstances, necessarily defeat its purpose. There was another reason for reacting in this way to falling prices. More than in industry, the element of effort elasticity asserts itself in agriculture. If incomes fall the agricultural producer may, under the stimulus of higher marginal utility of income, respond by greater exertion and more careful management. For both reasons incomes did not fall as much as prices. On the other hand, one feature of our process was

[1] One of the most important branches to be improved was potato growing. Since prices of potatoes fell less than those of grains, the great increase both in acreage and in yield per acre must have considerably alleviated the situation. The writer takes the opportunity to recall that in Germany rye, and not wheat, was the standard material for bread. This was, though not unaffected, yet less affected by American wheat. But there was the Russian competition instead.

just as much in evidence as in England, the industrial entrepreneur's demand for labor. Those German landowners who had to rely mainly on hired labor began to suffer from the agricultural laborers "flight from the land," although in the East this was in part met by resort to Polish labor.

The peasant was not much affected by the latter difficulty. He was also probably less deeply in debt, although ample credit rope had been provided for him to hang himself.[1] If he was unencumbered, prosperity and depression meant little to him. Moreover, butter and pork kept up very well throughout—which fact, incidentally, is in itself sufficient to negative the idea that failing purchasing power of the masses had anything to do with such plight of agriculture as there was. The new methods, however, and in particular the new machines, did not help him much and would not have done so even if they had all been applicable to his holding and if he had been the acme of alertness. For as far as they were labor-saving they would not—his own and his family's labor being part of his overhead as it were—have improved his competitive position. As to relative prices ("purchasing power") of his products, he was all right as far as his prices were retail prices, which, of course, was much more often the case than in England, let alone America. When they were not, his purchasing power during the eighties declined as against the articles he bought. The statistics of foreclosures do not give a clear picture before 1886, but indications suggest that the percentage of mortgages foreclosed was never serious either for small or for large agricultural holdings.

The effects of the fall in agrarian products on the standard of life of the masses—much greater than those of the fall that the first Kondratieff had brought about in cotton fabrics—need no comment.

C. Railroadization. 1. While for this country railroadization was still more obviously the "big thing" or "backbone" of the bourgeois Kondratieff than for the other two, it really got under way, if we judge by mileage added, in 1849, *i.e.*, about six years later than in England. The, roughly, 1720 miles added in 1840, 1841, and 1842 failed to produce any

[1] Even the Reichsbank was forced throughout its career to countenance, directly but mainly indirectly, extensions of credit to the agrarian interests which it would never have thought of countenancing without the political power behind the applications. The excellent organization of agricultural credit culminating in the "Preussenkasse" and the way in which the savings of the small man were, through the saving banks, forced into agrarian channels, are other instances of a policy that never dared to face fundamental issues. It was in Germany, however, (K. Rodbertus) that the truth began to dawn that the ordinary forms of credit are not a safe thing to handle for either peasant or Junker. The legal institutions of the *Grundschuld* and *Rentenschuld* were the first fruits of this discovery, and useful as far as they went.

of the symptoms of prosperity and were, moreover, the leavings of the boom of the thirties rather than the first installment of new developments. The New England railroad boom which contributed so much to Boston's prominence at that time (connection with the Erie Canal and Buffalo) began in 1847, but meant little until 1849. By not dating accordingly—but the reader is welcome to do so; it does not make any difference to the analytic schema presented—we are acting on the theory that the irregular twin peak in the thirties upset the course of events[1] which would otherwise have been more like that in England or Germany and that we are but "reconstructing the temple in ruins" if we date as we do. The ruins in question or, without metaphor, the indications that guide us, are the time series: receipts from land sales began to increase in 1842, deposits (Due Depositors: New York City Banks) and stock prices soared in 1843, when also prices started to rise (see Smith and Cole, *op. cit.;* about prices in particular see charts 17–22). Liquidation of the excesses associated with wildcat banking stunted, according to this view, the beginnings of the prosperity phase of the new Kondratieff, and this accounts for the mildness of the setback—the strong term *crisis* is hardly applicable—at the end of 1847. Several good crops, English free trade, and the Californian boom helped to shorten the ensuing depression, which covers not quite a year (1848) and to accentuate revival, which—still according to that theory—also made up for what the stunted prosperity had failed to bring about.

Transition to the prosperity of what, then, has to be counted as the second Juglar was effected in an atmosphere of boom, unusual expansion of credit and speculation, particularly in land and railroad stock, to all of which Californian gold (since 1850) and the favorable development of foreign trade lent their aid. The warrant for speaking of a new Juglar, although the curve of new (less abandoned) mileage displays nothing but a dip in the year from which we date it (1852), is in the shift of building activity from New England to the Central Atlantic and the Middle Western states, which clearly meant a distinct new step within the Kondratieff process: this statement should be compared with the discussion on possible relations between longer and shorter cycles in the fourth chapter. The reason why we do not attach more weight to the setback which occurred as early as autumn 1853 and lasted through 1854 and (almost to the end of) 1855 is that it seems to have been entirely due to speculative excesses—in part, no doubt, fostered by the new gold —and to their repercussion on railroad construction. Therefore, we date prosperity plus recession of that Juglar from the beginning of 1852 to

[1] Clément Juglar's authority may be quoted in support, see Crises Commerciales, 4th ed., p. 468.

the second half of 1856.[1] Finally, the reason why we do not attribute to gold anything beyond excesses and reaction to excesses (and such disturbances as the failure of the rates of interest to rise promptly and "tight" situations *consequent* upon this) is that the railroad construction was clearly under sail before the Californian gold began to act, and that, looking at the data of the situation, we do not see any justification for holding that that process would, barring those excesses, not have run its course or produced its effects without it. Part of the rise in price level we do attribute to it.

The quantitative adequacy of expenditure on railroad construction is beyond doubt: the trackage operated reached about 30,000 miles by 1860, and the capital debt of railroads alone then was about 900 million dollars; for actual cost of construction, there is no reliable estimate, but it certainly exceeded that sum,[2] of which about three-quarters were spent in that decade. Beyond doubt, too, is the truly revolutionary effect of the mileage opened. Freight rates fell drastically and by 1854 averaged between two and three cents per ton-mile. The entrepreneurial function consisted, in this case, not so much in visualizing possibilities—everyone saw them and speculated on them—or in the solution of technological problems—the locomotive functioned sufficiently well by that time and was thenceforth improved almost automatically by a series of typically "induced" inventions, and no major problems impeded the building of the lines—as in the leadership of groups, in successfully dealing with politicians and local interests, in the solution of problems of management and of development in the regions the roads opened up. It was "getting things done" and nothing else, a variety of pure entrepreneurship stripped of all accessories. But this entrepreneurship was often split between several individuals and is not always easy to attribute to any single one.[3]

2. As regards financing, we must distinguish the task of creating the conditions of profitableness of the enterprise from the task of

[1] If the reader compares the above with Mr. Thorp's grading of the individual years, he will find that there is little difference between his and our appraisal of the facts. But again it must be pointed out that there is considerable difference in terminology. In particular, he describes 1856 as a year of prosperity (to the last quarter, for which he also notes depressive symptoms) while for us this year ends the recession and ushers in the depression phase of that Juglar. It is hence important to remember that conditions which justify speaking of prosperity in the usual sense of the word are by no means incompatible with our idea of a Juglar recession (in our sense) which lies within the prosperity phase of a Kondratieff.

[2] The report of President Schuyler of the Illinois Central to his board estimates at 16.5 million dollars—23,570 dollars a mile—the cost of construction for 700 miles. But for that decade of rapidly rising prices, actual costs must be put much higher than that.

[3] In many cases, the promotor was the entrepreneur in our sense or, at all events, the first of the entrepreneurs who took hold of a line. But sometimes he was not more than a financial or political agent.

providing the money for construction. That the first should have been a distinct task is due to the fact that the Middle Western and Western projects could not be expected to pay for themselves within a period such as most investors care to envisage. Many of them meant building ahead of demand in the boldest acceptance of the phrase and everyone understood them to mean that. Operating deficits for a period which it was impossible to estimate with any accuracy were part of the data of the problem. In a sense, any construction under such circumstances implies "overdoing it." But this concept is hardly applicable to a situation in which, without producing some of the effects of overdoing, the thing could not have been done at all. Under different environmental conditions and with a political structure different from what it was, those circumstances might have constituted a strong case for railroadization's being planned and executed by the national government, as it was in Russia by the imperial bureaucracy. State enterprise was, in fact, prominent in the early stages of American railroad development; but by that time it had failed.

Since many projects that were obviously socially productive (in Professor Pigou's sense) were not at that time paying propositions,[1] additional sources of revenue, or contributions to the costs, had to be found. Where it proved possible to secure subsidies or loans amounting to subsidies, this at the same time helped to solve the problem of financing construction.[2] But the solution presently hit upon in the case of the Illinois Central Railroad, the donation of land by Congress (1850; the immediate grantees were the states of Illinois, Mississippi, and Alabama) did not.[3] Previous profits or domestic savings being inadequate, railroad

[1] The above statement involves several theoretical questions, into which it is not possible to enter here. Still less is it intended to imply anything about desirabilities. It is certainly true that the strong desire of the people to see quick development of the railroad system, no matter whether due to lofty patriotism, business calculation, or the interests of speculators in land, led to a policy which accentuated booms and crises. It is also true that the statement that something is socially productive and yet not a paying proposition, although all its productiveness comes within the business sphere and is universally understood, always requires the most careful scrutiny.

[2] So did the guaranty of capital and interest of bond issues, such as was granted after the Civil War to the Southern and the Union Pacific. Legally, these were no guaranties but loans of United States bonds. But economically they were nothing else but guaranties and exactly similar in nature to the guaranties of railroad bonds by European governments.

[3] From 1850 to 1856 such land grants amounted to 20,000,000 acres. This policy went to much greater length later on, until its abandonment after the crisis of 1873. The Northern Pacific alone received 40,000,000. The method has often been criticized adversely. But it was not only a special case of a much more general policy of encouragement of enterprise that goes back to colonial times, but also, given the economic and social conditions of the time, the most economical as well as most logical method to bring about the result desired, hence belongs neither in the class of futile measures—*i.e.*, measures that by virtue of their

construction was, therefore, mainly financed by credit creation. From the standpoint of the United States, foreign buying of American railroad bonds amounted to this—even if the bonds were paid for out of, say, English savings—as did European credits extended in anticipation of bond issues or simply as overdrafts. Foreign investing was at times heavy. According to the estimate given in Sumner's History of the American Currency, English investments in this country (not only in railroads) amounted to about 400 million dollars before 1857. Overdrafts (though mainly for what purported to be "regular" commercial credit) were granted, in many cases, with almost unbelievable freedom and carelessness. Domestic credit creation was even more freely resorted to. We do not know its amount, but we can, in most cases, trace it in one or more of the following forms: direct lending by banks to companies against their notes or on bonds to be sold later to the public; financing the subscriptions of the promoting groups or of the public (in which case we must, as has been repeatedly mentioned before, also take account of the fact that a customer may borrow for other purposes because by subscribing he binds means which would otherwise serve these); and financing speculation—there is a significant coincidence between the increase of railroad stock prices and of deposits in 1852. The fact that credit, created *ad hoc* by both the preexisting banks and the many new ones that emerged, to a large extent financed railroad and other inno-

---

nature cannot produce the results which it is desired to produce—nor in the class of wasteful measures—if we define these as measures which produce the result desired at the disproportionate sacrifice of productive resources or together with results which partly or wholly counteract the desired ones. The idea underlying it is to *apply part of the values which an enterprise will create but which will not accrue to it* (to some extent this happens in every case) *to the purpose of recovering part of its costs.* This is, in itself, perfectly sound economics. Colonization was not impeded, but furthered, thereby; "monopolistic exploitation" of settlers seems to the writer to have been little more than a political slogan. That policy really amounted to no more than the removal of the obstacle which the national *dominium eminens* of land put into the way of evolution. And it was discontinued as soon as the development of the milieu made it unnecessary—as shown by the case of the Great Northern, which was a success without it, and by earlier instances. Now, although all of this is nothing but factual analysis which the writer is prepared to defend on purely scientific grounds, he still confesses to a wish to avoid the addition of unnecessary differences of opinion between his readers and himself to those that are unavoidable. He therefore begs leave, because of the implications the argument of this note seems to carry, to drop for a moment the analyst's overall and to state his conviction that had it been politically feasable to entrust an ideal civil servant with dictatorial power over all railroad matters *and all the land,* this individual would have produced the same ultimate results at incomparably smaller economic and moral costs. But the point is that no such individual was possible in the milieu of those times and that, had he been possible, he would have been lynched immediately by the very people whose pocketbooks and cultural attitudes he would have been protecting.

vation, has often been emphasized and never been contested. The reader should refer, for instance, to Dunbar's famous essay on the crisis of 1857 (republished in his Collected Essays). We may illustrate, however, by one instance, the case of the Illinois Central Railroad.[1]

The burst of speculation which occurred in the Middle West in the twenties and thirties and led up to the peak in land sales in the middle of the latter decade, had really no other basis than everybody's conviction of the imminence of great developments. What these developments were to be and which part of the region would lead in them was in this case entirely indefinite, no particular locality holding any particular advantages. Preferential positions had to be created, largely by political action, and an anarchic struggle ensued between local communities, each controlled by its own group of speculators—railroad and canal projects, which for the moment were mostly bubbles, being the chief bones of contention. Moves and countermoves in this struggle constituted state politics and dominated the state legislature of Illinois, which under the circumstances was the only possible source of powers and means. Plans of a central railroad, which came to nothing, emerged in 1818 and 1835. The Internal Improvement Bill, passed in 1837, provided a little over 10 millions for the carrying out of various railroad and waterway projects, one of which may be looked upon as a second attempt to do what eventually was done by the Illinois Central Railroad Company. This time a beginning was made, but it soon ended in collapse and discredit. Another attempt to make headway was made in 1843, when a charter was granted for the Great Western Railroad Company, which after failure was renewed in 1849. Soon after this, however, the campaign in Washington, first for a right of preemption of land, and after that for a straight land grant, met with success and the Illinois Central Railroad Company was chartered and organized in 1851.

There is no need for any comment on the nature of the proceedings which thus inaugurated the colonization of a great part of the country, or for explanation of what the entrepreneurial function so far consisted in. The financial group which eventually found themselves in control of the enterprise (the same which had bought the Michigan Central in 1846) were well connected and by no means lacking in seriousness. Their methods and attitudes were fully up to the standard of their time in such matters. The charter, which among other things provided that 7 per cent of the gross income was to go to the state, cannot be said to have failed to take account of public interest. But the fact had to be faced that there simply were no means available at all commensurate with building costs, which were budgeted at 16½ millions. On the stock,

[1] The following two paragraphs are based on P. W. Gates, The Illinois Central Railroad and Its Colonization Work, Harvard University Press, 1934.

which at first the group had thought of keeping to themselves, they looked very much in the light of what in French finance is termed *parts de fondateurs* or, to use an American expression, of velvet. They were businessmen who had their means and more than their means engaged in other ventures, and their behavior but too well illustrates our theory of the logical primacy of created credit in the financing of innovation. They did, however, pay in an assessment of 20 per cent on the first million of stock, and both the directors and their business connections took 2 millions of bonds, to be paid for by installments. They thus proved that they meant business, but it is not unfair to suspect that the money they actually paid was borrowed from banks. This was the war chest with which they embarked upon surveying. They also induced the Michigan Central, which they controlled, to enter into an agreement to carry, in consideration of certain concessions, another 2 millions of bonds of the Illinois Central. The fundamental idea, however, was from the beginning to sell, or borrow upon, mortgage bonds secured on the land grant and the right of way plus improvements. This method then was a recognized one and for a time became still more so—in other cases existing contracts of a nonexisting enterprise were used as security—and it was far from being disapproved of, so long as it did not coincide with fraudulent representations. They offered these bonds in England and, in spite of the refusal of the Rothschilds and the Barings, succeeded in forming a syndicate. The means so provided ran out by 1855, when the promoters had to take additional bonds. Further calls on the stockholders and borrowing on short-term notes became necessary before the work was completed in 1856. Embarrassments were not ended thereby, and in 1857 catastrophe was—even apart from damaging revelations—perilously near, but the company, under the able management of an extraordinary man, stood its ground and, with sales of land developing steadily, consolidated its position. The effect of the line on the development—or, rather, the economic creation—of its territory and the whole country needs no emphasis.

3. Our analysis contains all the elements necessary for a diagnosis of the crisis of 1857. It will be convenient, however, to add a few minor points and to round off the picture, in order to show once more how what we consider the fundamental mechanism of fluctuations combines with accidents and incidents not inherent to its logic. To begin with, the crisis was an international one, commercial and financial relations between our countries (and others) being strong enough to synchronize events remarkably and to play a large role in shaping the surface. But it is nonetheless a fact that fundamental explanation could run for each country in terms of its own development. Second, the crisis coincides with, or rather lags behind, the upper turning point of that Kondratieff.

All statistical indications combine to support this finding, which is all the more remarkable because gold production could have been expected to interfere with their behavior. It actually did to some extent, but not enough to alter the fundamental contour. This happened later, when the Civil War and other external factors make it possible to speak for Europe of a "rising trend" in prices up to 1873. But in the United States wholesale prices (see the unweighted index of Smith and Cole, *op. cit.*, p. 100) recovered only moderately in 1859 from the sharp fall in the preceding year and then continued to fall until the first quarter of 1861.[1] Although gold thus failed to keep up the price level, it had, as stated before, undoubtedly a share in bringing about the preceding rise. This influence was exerted partly through the expenditure of gold miners and partly through the additional facilities for credit creation it provided. But through the whole of the upswing we observe recurrent situations of stringency, which is exactly what we should expect. The case shows very well how easy money, due to the action of external factors, will on a rising tide of business always produce stringency and, hence, is the most ineffective of means to prevent recessions.

Third, the increase in gold production and what, without explaining again, we term *reckless banking* actually do account for many surface phenomena. In particular these factors account for the sharp and short panic that followed upon the failure of the Ohio Life and Trust Company on Aug. 25, 1857, after which 150 banks failed up to Oct. 17: there was a spectacular run on Oct. 13. It is only natural that public attention concentrated on this, and that many writers at that time and later simply formulated the popular theory that the whole catastrophe was due to the shortsightedness of banks which called in loans in a panicky way. Although neither this contraction nor the preceding "recklessness" provide fundamental explanations, it should be emphasized that both played a very real role in the "abnormal liquidation" that ensued and that our theory neither requires nor justifies any attempt to discount their importance. Difference of opinion arises only if it be held that either the credit expansion or the credit contraction was the essence of the matter, and that without either of the two everything would have been well. But we may go some way with those more careful analysts of that situation who pointed to a number of auxiliary factors which intensified the boom and the removal of which intensified the depression. One of these factors—the speculation in land—went to lengths entirely out of proportion with what would have been a normal incident of the contemporaneous development and must hence be classed as a separate factor requiring in turn special sociological explanation. Stock exchange speculation played a smaller role. Railroad stocks reached their peak toward the end of 1852 and

[1] In Germany where the peak of wholesale prices comes earlier, recovery from the fall in the crisis took place to but an insignificant extent, although there was then no further fall.

then fell sharply to the end of 1854 in the course of what in September of that year amounted to a financial panic and entailed a considerable number of failures. The air being thus cleared, no speculative crash occurred afterward and the abrupt fall in the crisis of 1857 gave way to partial recovery within the year. Another factor was of course the import of capital, of which the unfavorable balance in commodity trade between 1850 and 1857 was a symptom. This certainly contributed to making the situation more sensitive than it otherwise would have been. The very good wheat and cotton crops of 1855, which were sold at favorable prices, also gave an impetus to all sorts of activities which then added to the difficulties of liquidation. Of other causes contributing to the slump there is a long list.

Fourth and finally, however, there cannot be any doubt in this case of the reality of the fundamental explanation following from our schema. This has so often been emphasized by the most unsophisticated of writers that we can confine ourselves to a few remarks. Railroad construction was the main but, as we shall see later, not the only factor that carried that wave of evolution. Taken together, the innovations of the period and the adaptations they enforced explain primarily the turn of the Kondratieff. Again, as in earlier cases, it is not claimed that they explain the crisis also, except in the sense that they make it understandable that speculative furors broke out and that error and misconduct accumulated: they thus furnish a reason why the situation became so sensitive as to be easily turned into a crisis by unfavorable events or by troubles arising out of those weak spots. The actual picture of the crisis could never be understood from innovations alone. It must be remembered also that many things in that upswing—railroad construction in particular—were done under the influence of artificial stimuli, by which we mean that a number of them would not have been undertaken at all or would not have been undertaken just then and on such a scale without encouragement from the political and the financial sphere. No critique is implied by this. On the contrary we have said before that the term *overdoing* must be applied with caution. But this accounts of course for some of the difficulties of the ensuing situation and also for the presence of a Hayek effect: in a very obvious sense the period of production was lengthened beyond what the economic organism could stand for the moment.[1]

4. We go on. At the time of the crisis the Juglar turned into depression. There were many failures in 1858, prices fell sharply, and construction decreased further—exports and imports nearly balanced for the *fiscal*

[1] Critics of the practice of credit creation (as, for instance, Professors Hayek and Machlup) may in particular point to the destruction wrought by the crisis, in support of the thesis that credit creation helps as much to destroy as to create. There is some truth in this, but also the lasting achievements of that Juglar prosperity could hardly have been attained without it.

year. In spite of easy money, good crops in the South (five successive supernormal cotton crops, in 1859 also coupled with high prices), and all-round activity, the general atmosphere, as recorded by the press of that time, was anything but cheerful until into 1860; but revival asserted itself, below this surface, from the beginning of 1859. The fact that this revival differed so much from its predecessor (1850, 1851) we attribute primarily to the underlying Kondratieff which had by then completed its prosperity, and entered upon its recession. This recession underlay the shorter ups and downs of those years and shaded off into the Civil War, the approach of which intensified, although it did not altogether create, the troubles of 1860.[1] The war dominated the third Juglar (1861–1869; diagnosis of 1861 is doubtful owing to political events) and of course interfered both with the behavior of our series and the processes behind them, displacing peaks and deferring steps in industrial development, thus crowding them into the years immediately preceding 1872.

[1] In 1859 imports again approached the 1857 level—for the second half of the fiscal year they were even considerably higher—and there was a vigorous expansion of bank loans, with specie in banks declining, that led to stringency in the fall. Moreover, new banks were founded and captal of banks was increased in the West (which until 1860 suffered from bad crops and liw prices of breadstuffs). These Western banks, mostly modeled after the New York Free Banking System, but with much less sound and stable securities to back their issues and with arrangements about redemption amounting to evasion (see Dunbar, Economic Essays, p. 297), rapidly became a source of weakness of the situation, although the banks in the South, particularly in Louisiana, and, to a lesser extent, those of New York and New England were still in a strong position. The Western record crop of 1860 and other favorable circumstances might have availed to prevent trouble, but for the political situation. Its seriousness was first realized in the South, the banks of New Orleans beginning to restrict and to look askance at Northern paper in August. This affected New York banks, while in the West many banks got into trouble through the decline in the bonds of Southern states that formed a great part of the basis of their note issue. There was a premonitory panic in the New York Stock Exchange in October, in spite of easy money. After the presidential election on Nov. 6—we cannot enter into the interesting phenomena incident to the disturbance of the exchange between the North and the South which immediately followed—panic and disorganization spread through all sectors of the country's economic system, of no greater industrial significance, however, than the panic of 1914. The one point calling for notice is the novel method which was resorted to in order to handle the situation and which constitutes a more important step in the development of banking than many a reform act. The 50 New York banks which formed the Clearing House Association decided on corporative action, in order to extend credit instead of restricting it, by means of practically pooling their cash reserves and creating clearing-house certificates against deposit of adequate security including receivables, to be accepted in settlement of claims between themselves. Only one bank held aloof. Success was complete and almost immediate. Boston followed with similar results; in other parts of the country banks had to suspend. Both the device and its success are highly instructive. The latter, never again quite repeated, although this bit of central bank policy thenceforth became part of the household remedies in such situations, was precisely due to the fact that there was not much wrong with either the industrial or the banking situation and that disturbance by an external factor was all that had to be faced.

New trackage (minus abandonments) in 1869 began its unprecedented increase, which reached a peak in 1871. The success of the first transcontinental route, which had been pushed as a war measure to link California to the North, led the way and indicated what was to be the particular feature of this boom. We have again the same pattern of entrepreneurial activity and financing: promotors securing options of right of way, having the company chartered and endowed with land grants, selling the options to it and taking securities in payment, finally placing the bonds—the stock being commonly treated as a bonus—in order to provide the means for construction, and buying equipment on installments through equipment trust certificates. In case of success, issue of further securities would then become possible to consolidate the situation. Failing this, there was reconstruction. In almost every major instance, promotors might have plagiarized the Duke of Wellington's (alleged) saying at Waterloo, "Blücher or the night." The Blücher in our case was primarily English (and other European) capital, which took the responsibility for a great part of the 2 billions[1] which are said to have been expended on American railroads from 1867 to 1873. A very efficient machinery[2] for pressing European capital into the service had by that time replaced the individual efforts of earlier times.

Two things are perfectly clear. First, that development which quantitatively outstripped the one of the forties and fifties as it was outstripped by the development in the eighties (the all-time peak in miles added comes in 1887) was a typical downgrade development within the meaning of our model. It was a Juglar prosperity superimposed on a Kondratieff recession, a new step in what no longer was fundamentally new, but a process of carrying out what had previously been initiated. Railroad construction was now swimming with the stream in a sense in which it had not been before. What was to be done, how it had to be done, was chalked out, and all the characteristics of induced or completing development were present. This left plenty of problems for the individual case, but they were comparatively easy to solve, further eased by the growth of the environment, and of the type which is characteristic of "exploiting investment opportunity" and "pushing into new economic space." Moreover, the general features of the period support this inter-

[1] The estimate is, at best, very rough, and cannot be said to give more than an order of magnitude. No doubt is possible, however, as to the adequacy of that expenditure to account for all the major features of the boom.

[2] The names of Peabody and Morgan are only the most prominent ones in a long list. But that firm, both when it was Peabody and when it had become Morgan, more than any other succeeded in establishing a position and prestige quite independent of the American business which, of course, buttressed their position in the latter. Witness the loan to the French government in 1871, a transaction the very success of which veils its boldness.

pretation. There was a great building boom. The well-being of all classes in the years 1869 to 1873 of which we read (and which we are able to verify as far as our information goes)—the fact in particular that wages rose and wholesale prices fell while the former had risen less than wholesale prices in the early fifties—is obviously due to the expansion of production which our schema leads us to expect in every Kondratieff recession. But it is not less clear, in the second place, that that method of financing which so well illustrates our theory, was handled with such carelessness as to make it an additional cause of the situation of 1873. It not only induced but really also presupposed abnormal speculative activity and could not without it have gone to anything like the lengths it did.

The phenomena of the Secondary Wave were developed to an unusual degree thereby, and errors and cases of misconduct became possible which our model does not account for per se. The Gold Corner, Black Friday, bank failures, campaigns between stock exchange operators, and other purely financial incidents were symptoms of this, and it becomes understandable that even as regards the railroad business these things were more obviously in evidence than the underlying process and that it seemed as if construction had been brought to a stop and the success of existing lines had been jeopardized by them rather than by any "logic of evolution." But even so, nobody can deny, and as a matter of fact nobody ever did deny, that railroad construction had temporarily exhausted possibilities—a formulation which is more correct than the more common phrase of things having been overdone—and it should be easy to see that this, together with the dislocating consequences immediate and ulterior, for the economic system, of new construction was what created the situation in which the Secondary Wave broke, and with it untenable credit situations and speculative bubbles all over the field of industry and commerce.

Although the abnormal liquidation which has come down to posterity as the crisis of 1873 clearly first broke out abroad (in Vienna), and the American scaffolding received its first decisive shock on the wire of foreign credit, our diagnosis seems to stand. It is not astonishing that the impact was primarily on the new, instead of on those elements that progress had made obsolete. For, as was pointed out in our theoretical chapters, this will always happen if the new things stand on a slender and the old things on a safe financial basis. Thus, the role played in the drama by the Northern Pacific failure does not any more contradict expectation from our model than does the fact that, in general, danger signals first became visible in the railroad field. Railroad stocks reached their peak in 1869, *i.e.*, in the revival of the preceding Juglar, were no more than steady in the boom of 1871, and declined in 1872 while industrial stocks rose. Tightness of money, smallness of bank reserves, a premonitory panic on the stock exchange in October 1871, all link up with

railroad finance, as do the slackening in increase of exports and the sharp rise of imports that occurred in 1872. Once the panic had broken out in the fall of 1873—up till then general business kept up well—the typical sequence of events followed. Speculation in land and stocks collapsed, prices fell, exports increased, imports decreased, firms of all types failed in large numbers, the stock exchange had to be closed, banks suspended payment, unemployment became serious almost immediately. We shall not repeat what has been said in the discussion of the crisis of 1857. The fact is significant, however, that, as far as mechanisms go, there would have to be repetition.

But this time the breakdown was much more serious and a prolonged depression followed. It is hazardous to rely on statistical evidence for an appraisal of relative severities of crises, because equal reactions of identical symptoms may mean very different things at different times, and presence or absence of others may be accidental or due to difference in the handling of the situations. As far as mere figures go, however, some aspects, at any rate, of the depression were quite as dark in 1873 to 1877 as they were in 1929 to 1933. Data about unemployment, for instance, are, it is true, entirely untrustworthy and incomparable. But if we could believe in the figure, mentioned by some authors, of 3 millions of "tramps" (in the winter of 1873 to 1874) then this, considering the smaller quantitative importance of the industrial sector and the absence at that time of any tendency to exaggeration, would indicate that relative unemployment was actually worse than it was during the recent world crisis. Prices fell less abruptly than they did in and after 1930. But this is because their downward movement from the Civil War peak had not, except in 1872, been previously checked. The decline was more gentle then because it was more even, but it was not smaller if we consider, as we must, ultimate results and not only what happened in the crisis proper. The political complement also was similar, granger movement, agitation for inflation, strikes and riots being, if we take account of differences in social and political structure and attitude, more than fair counterparts of corresponding phenomena in the recent instance, although in the bourgeois Kondratieff they were handled in a different way.

5. According to contemporaneous report, 1874 to (the first half of) 1878 were years of almost unrelieved gloom. But adjustment and the elimination of untenable positions went on steadily, and the path was cleared for recovery. The process is well reflected in the figures of railroad construction. It touched low point as early as 1875 and suffered another setback in 1877, but there was significant increase in 1876, both in new trackage and in locomotives built, in the midst of a renewed outbreak of failures and a great fall of railroad stock prices. Thus the tide began to turn before either people's "depressed state of mind" had changed for the

better or surface mechanisms had ceased to work in the downward direction, also before the revival on the stock exchange (1877). It was the improvement in the *objective elements of the situation* which turned both the psychic states (expectations) and the mechanisms (cumulation of depressive effects and that sort of thing), and not vice versa. Nor was it external circumstances which stopped the downward course. Crops were good in 1878, but prices of wheat and cotton were low and improvement in any case set in before good crops became a certainty. *The system recovered of its own and this in the face of steadily declining general prices.* We date the fourth Juglar 1870–1879.

Now the eighth decade of the nineteenth century lies, according to our schema, entirely within the depression phase of the second Kondratieff, which turned from recession into depression about 1870.[1] A whole Juglar as well as the prosperity and recession of another which began with 1880, therefore, completed their course on what statisticians would call a downward trend. And this is our explanation of the severity of the crisis, the depth of the subsequent depression—which is, in all respects, as strikingly similar to the one of 1826 to 1830 and the one of 1929 to 1933 as were the prosperities that preceded them—and the fact that gloom and difficulties persisted far into recovery. All three cases were characterized by the fact that the shorter wave had to subside to what was a falling level while, in other cases that did not lead to such breakdowns or prolonged depressions, it had only to subside to a rising level. The writer does not see that this does violence to any facts nor does he see how it could be contested—the more so, because the same could, as far as formal contours go, be put as well in terms of theories more satisfactory to other students. As an explanation, however, it might be held to be tautological. So it would be if, after having described statistical contours by means of the three-cycle schema, we turned around and called this description an explanation. But we do not do this. We explain those contours in terms of an industrial process which shapes them.

In the case under discussion, nobody can doubt the reality of the particular process that constituted the Juglar in the course of which the crisis occurred. Nor is it farfetched to say that the larger process—mainly associated with railroad construction—within which the events of 1870 to 1873 constitute a step, had so revolutionized the economic system

[1] This turn occurred, therefore, before the last boom which preceded the great crisis. Without unduly stressing the regularities which form the basis of our schema, we should recall that this is perfectly in accordance with it, since it makes the beginning of a Kondratieff depression coincide with a Juglar prosperity. The reasons why an "about" should be inserted are, on the one hand, that the gentle sweep of the Kondratieff displays broad heights and depth and not any peaks or troughs, so that precise statistical location is always difficult, and, on the other hand, that aftereffects of the Civil War must be taken into account.

that liquidation, absorption, adaptation—all of what these terms mean can be clearly observed—was an unusually long and painful affair. If objection to the three-cycle schema be insuperable, we do not insist on it. The facts remain, whatever the merits or demerits of the schema by which we present them. But what it is necessary to insist on is, first, that in the other two cases which are in an analogous position on the two other Kondratieffs and stand in approximately the same time relation to preceding industrial revolutions, we also find similarly severe and prolonged depressions and, second, that we do not find such depressions in any other case.[1]

As soon as paralysis due to the shock was over, expansion of physical production resumed *within the Kondratieff depression*, as we should expect. Railroad construction, going on to be the carrier of the cyclical movement, soared from 1878, to a peak in new trackage in 1882 and (from the fall to 1885) to the all-time peak of 1887 (nearly 13,000 miles). This almost gives, if the lag is taken into account, the history of the cyclical fluctuations of that period. But this does not mean now, as it did before, that the relation of railroad construction and general business was primarily one of cause and effect. On the contrary, the more an innovation becomes established, the more it loses the character of an innovation and the more it begins to follow impulses, instead of giving them. Besides, Kondratieff downgrades and revivals precisely display a wide variety of induced or completing innovations which develop and carry to their limits possibilities opened up before, of which railroad building was but the most important. Accordingly, railroad construction, increasingly settling into a predetermined framework and exploiting preexisting investment opportunities, became during the period under discussion much more (though not yet entirely) a function of railroad business and, hence, of the rest of the business organism than it had been before, and the relation became substantially one of mutual dependence. However, the railroad industry had not sown its wild oats as yet, either as regards boldness of advance or as regards financial methods.

Traffic and earnings had revived by 1878 (1877 marks the low point in the latter), which we consider as the last year of the recovery phase of the fourth Juglar. Then they strongly increased, with general business, to 1881, when the flow of new capital into railroads reached the peak corresponding to the peak in miles added that occurred one year later.

[1] The above refers to the stretch of time between 1787 and 1934. Further back the writer does not dare to make any positive assertion. But we have seen reason to think that the crisis of 1720 was comparable in severity (and the subsequent depression in duration) to the cases envisaged above. If so, then it becomes relevant to remember that there were very strong reasons for believing that that crisis also stood in a similar time relation to a preceding industrial (and commercial) revolution.

Investment continued, though at a decreasing rate, until 1883, when it experienced a check, with the Juglar turning into its recession (1882), followed by a depression in the ordinary course. But although the above shows that we make as full allowance for the influence of business on railroads as we do for the influence of railroad construction on business, railroads still set the pace. It would not be correct, in particular, to emphasize the part played by the crops of 1878, 1879 (this one, as mentioned before, accompanied by high prices), and 1880 to the point of making them the main factor in railroad construction. They constituted a favoring circumstance. But farm products (animal products included) after all made up less than 20 per cent of total tonnage hauled, and average range of variation was roughly 5 per cent.

We may date Juglar depression from the end of 1883. It lasted through 1884 and 1885 and is marked by a crisis in the former year,[1] panic on the stock exchange, strain in the money market necessitating issue of clearinghouse certificates, failures of banks and stock exchange firms, unemployment, and so on. The author sincerely sympathizes with critical readers, but feels unable to suppress the fact that according to the schema the Kondratieff would have been due to embark upon revival in that year, and his belief that this accounts for the further fact that neither severity nor duration of that depression were at all comparable to the severity and duration of the events of 1873 to 1877. One point calls for attention, however. In expounding the working of our model we have laid stress on the fall in the price of new products, which is a major piece of the mechanism that conveys the results of progress to the masses. We also saw that this fall, though as a matter of general theory it should primarily affect competing industries as well as old firms in the same industry, will also react on the innovating industry itself, especially if it stands financially on slippery ground and if further steps in the path of evolution begin to compete with the creations of earlier steps.

The history of railroads affords a good illustration for this. Freight rates began of course to fall at a very early stage, but they still averaged about 2½ cents in 1868. Then they fell sharply, though at a decreasing rate, to 1874, when they averaged 1.8 cents, and still more sharply during that depression. They increased slightly in 1878, but reached the one-cent level in 1885. Now this process was perfectly normal, but it upset many a financial structure in the railroad business. And because of the imperfections of competition in this industry, it did its work by way of spectacular struggles between controlling groups, which exercised the

[1] There were corresponding depressions in England and Continental Europe. But the French crash of 1882 was a local affair and exerted little even of indirect influence on the American situation. The tightening of money in the fall could be accounted for by American conditions alone: America was becoming economically autonomous.

public mind and set everybody talking about freight wars, cutthroat competition, discrimination, and the evils of unregulated enterprise, to the exclusion of what the thing really meant. As a matter of fact, it paved the way to consolidation, efficient administration, and sound finance, thus ushering in the last step of America's railroadization.

It took another Juglar, however, to accomplish this (1889 to 1897), the last one to be dominated by the railroad industry, although the days of new companies had passed. Some of its features have been and will be discussed in their various places, when also certain difficulties of dating and interpretation will be mentioned. For the moment it is sufficient to note that the crisis of 1893 has in a sense more claim to be called a crisis of railroads than has any other. While the preceding crises of that Kondratieff were railroad crises primarily in the sense that railroadization played the leading role in the process of economic evolution which produced the situations that developed into crises, and railroads were but secondarily affected, the case of 1893 was primarily a crisis of the roads themselves—roughly one-quarter of which (measured by capital) went into the receiver's hands. Earnings fell off in 1894, when for the second time in the history of American railroads there was an absolute decrease in traffic, and construction displayed the lowest figure since 1851. Duration of that depression—abnormal for a Juglar in a Kondratieff revival—and irregularity of ensuing fluctuations, though also conditioned by external factors, are substantially accounted for by the effects of that house cleaning in what had then become an "old," and after the World War was to become a declining, industry. A final boom in construction and new organization was still to follow and to contribute to the prosperity of the next Kondratieff[1]—as the leading innovations of every Kondratieff seem to do—which carried mileage to about 250,000 by 1910. After that year, net construction rapidly decreased to zero and below.

6. It is convenient to insert here what it is necessary to notice about the railroad development in the two other countries. As stated above, it would not be so nearly possible for them as it is for the United States to write their economic history in that period in terms of railroad construction and its effects—steam and steel, in general, with railroads as the most important special case, would make a better heading. For England, the business of financing (to a lesser degree, of initiating) foreign railroad development soon became more important than was domestic construction. Only the first Juglar of the bourgeois Kondratieff was dominated by it; after the second, it almost drops out of sight for the purpose in hand, however important railroad traffic and finance remain throughout.

[1] In various parts of the world great things were still being done in the railroad field during the 20 years preceding the World War; but they did not, except by way of the London and Paris money markets, directly influence developments in our three countries.

This is of course primarily due to the fact that the "great thing to be done" was of much smaller size than in this country and hence was more quickly accomplished. The heroic age of genuine railroad innovation that revolutionized the economic system was entirely over by about 1860, when (in Great Britain and Ireland) about 10,000 miles were in operation. This mileage increased by roughly 50 per cent in the next decade and again by about 50 to 1910 (increase at rapidly falling rates continuing into the postwar time). But this it did within a framework previously established and within the great concerns which could go about the task of expansion and completion on the basis of calculable returns. Innovation was of course not lacking; but it was of a subsidiary kind—the various achievements that improved speed, safety, comfort—which did not greatly matter cyclically.[1] Thus English railroad development from about 1860 on was a consequence of growth in our sense and of innovation elsewhere in the system, responding at every step to existing conditions, rather than an active factor of evolution. The accumulated wealth of the country also eased matters, and bold finance was much less necessary than in America. In fact railroads constituted one of the main outlets for savings and within the period qualified for the investment of trustee's funds.

This does not mean that there were no difficulties or miscarriages or public outcries over one thing or another. The committee of 1853 hinted at discrimination, for the suppression of which an act was passed in 1854; the committee of 1872 discussed amalgamations; rates and fares were, of course, a standing grievance; and so on. But by comparison it was easy going in this, as in other respects: the Railroad and Canal Traffic Act of 1888 was a very conservative measure. Another element of the situation—competition of railroads with canals—deserves to be mentioned. Turnpikes and all interests connected with transport by road also suffered, in many cases to the point of extinction. But whether or not this was quantitatively sufficient to have any cyclical influence, the author has not been able to trace it. Most of the really important effects of railroads on old firms in our sense were not exerted by any direct competition with any of them, but through their influence on location in general. Canals, however, afford an instance of direct competition that counts quantitatively. Some were in an impregnable position and have retained their business to this day. Several of these flourished and paid high dividends throughout the period, while others (for instance, the Manchester Ship

[1] This was because they were, looked at from our standpoint, mere improvements on an existing innovation, substantially complete and workable without them. Some were much more original than was the railroad itself, and also of considerable importance for the railroad-using public. But this did not make them factors in evolution as by us defined. The reader should make use of the case in order to add precision to, if necessary to correct, his idea of our concept of innovation.

Canal) were actually constructed toward its end. But by 1880 the role of most of them was over, although the financial position of many was so very sound that they were able to carry on and to earn some quasi-rent by drastic reduction of rates. Decay, therefore, came gently to them and did not create financial trouble. Precisely, however, because they could afford to reduce rates without bankrupting themselves, they were dangerous competitors to the railroads, which, as imperfectly competing big units are prone to do, in many cases tried to bring them under their control. This policy met with some success until the late fifties and was then abandoned, presumably as much because of its costliness and the superiority of railroad transportation, by that time established even in the case of transporting coal, as because of public resistance, which was fostered by industrial interests.

Up to about 1860, however, railroads were the great innovation. The course of events in the forties, in particular, centers in the "railway mania," the one full-fledged railroad boom which England experienced. In 1847, the peak year for investment during the forties, capital actually raised by the issue of shares and loans[1] amounted to 40.7 millions of pounds (to which correspond 1,182 miles opened in 1848), while, for the financial year 1846–1847, ending Apr. 5, taxable income (J. C. Stamp's comparable series, see British Incomes and Property, p. 318) was 209.6 millions. But the quantitative adequacy of even the smaller figures in the preceding and subsequent years (1844, 6.7 millions; 1845, 16.2; 1846, 37.8; 1848, 33.2; 1849, 29.6; 1850, 10.5; 1851, 8; 1852, 16; 1853, 9.2; 1854, 12.9; 1855, 11.5) is beyond the possibility of doubt, as is the importance of the number of persons employed on lines under construction (peak, 1848—188,000). As was mentioned before, direct credit creation—short borrowing by railroad companies from banks—played an incomparably smaller role than it did in America. More important must have been, though we lack data to verify this, credit creation for the financing of subscriptions and for the speculative acquisition of shares. When the speculative excesses were nearing their high-water mark, which occurred in October 1845 (the peak in promotion came in 1846 if we measure it by mileage sanctioned by act of parliament), business funds were to some unknown extent applied to the payment of subscriptions, and many small people depleted their cash reserves. The former practice would in many cases involve resort to bank credit as well as produce a strong tendency to annihilate the deposits thus created by a speedy repayment of loans. The prosperity of 1845 and 1846 gave some opportunity for such repayments and there is nothing in the facts we know about the banking processes of that time to negative the possibility that they played some role.[2]

[1] Compare Tooke and Newmarch's History of Prices, vol. V, pp. 348, 352, and 356.

[2] Tooke attached great importance to the saving or retrenchment of consumers' expendi-

Projectors or promotors as a group hardly differed much from the American type. Only part of the projects were at all serious, as may be inferred from the fact that Parliament passed only a fraction of them, which is not wholly accounted for by the large number of mutually exclusive ones. Of those that were passed, again, only a part were actually proceeded with and even some of these failed in their early stages. At first, projects were simply for new lines, but soon a second type of innovation emerged, amalgamation. Such attempts at "rationalization" and at creation of monopoloid positions—we remember that our concept of innovation covers such cases—had occasionally occurred before, as early as in the thirties. But it was the construction boom of the forties which brought them to the fore or indeed made them unavoidable. This was the main field of the activities of George Hudson,[1] the railway king who gave the decisive impulse by his success with the Midland (1844). The London and North Western followed, later the Lancashire and Yorkshire, the North Eastern, and others. Thus that time not only created the skeleton of the English system, but also its leading concerns. Rate wars, again illustrative of the way in which reduction in the price of the new products or services is achieved in the absence of perfect competition, occurred as an incident of this. Knowledge of the strong position of the enemy contributed to make them comparatively mild affairs, however.

Symptoms of prosperity in the technical sense—in which prosperity is not only not identical with welfare, but in important respects rather its opposite—predominated for nearly five years (end of 1842 to middle of 1847) without any major interruption; thus they cover both the prosperity and the recession phase of that Juglar, the setback in railroad speculation which occurred in October 1845 indicating roughly where we are to look for the dividing line between. This and the absence of the typical phenom-

ture, that was forced, during the years of heaviest construction, on the holders of shares by the calls for further installments. He believed that these retrenchments "more than counterbalanced the effects of so large a distribution of wages." Although lack of data prevents exact verification, we may safely assert that there was *some* truth in this. There is no doubt that it was a time of dogged determination to finance all that could be financed from current receipts. That diagnosis is perfectly compatible with ours.

[1] The type, his behavior, his rise and fall are full of interest for us. Originally a small man, entirely unconnected with the technology, economics, and finance of the railroad business, a linen draper from York, he had and contributed one thing only, but one of supreme importance—the knack of putting things through and of bending other people's wills to his purposes. He would have made an immensely useful member of the Council of Commissioners of the People in a bolshevist state. As it was, he handled Parliament—absurd though it was to speak of the state being run by the railroads—and impressed the good bourgeois by "associating with peers," in the eyes of many doubtless his supreme achievement, though it is easy to see that he was never *reçu*. The misdeeds that eventually swept him from his leading position were rather primitive. He was obviously no adept of the higher arts of swindling.

ena of recession are what we should expect on the rising tide of the underlying Kondratieff, and are in keeping with the analogous observations in the cases of the first Juglars of the first and third Long Waves. But we should have expected that the depression phase of the Juglar would also be crippled. Instead, we find it fully developed, extending over a little more than two years. This is all the more remarkable because, with due respect for the absolute amount of swindling (though there may not have been very much of it relative to the total of transactions), and recklessness, it is impossible not to recognize that a great part of the preceding innovations were very soundly financed and that credit creation was kept in narrow bounds. Perhaps the first effects of free trade and the political troubles of 1848 may be trusted to explain. The crisis itself, which came at the turn of the Juglar into depression, obviously was a railroad crisis—although there had been other innovations, very important developments in coal mining, for instance, being directly induced by the new transport facilities—both as to fundamental causation and as to surface mechanisms. The revolution in industrial location had begun to assert itself, spelling losses and bad business for large sectors. And the financial requirements of railroad construction, precisely because it was not possible to curtail them quickly, pulled at a great many spots in the financial structure—most perceptibly, though not exclusively, through the railroad calls. Speculative positions that had to be liquidated, mismanagement, errors, and the phenomena of the Secondary Wave, which had been accentuated by favorable developments in the foreign trade of the country (United States, China), played their usual role, gold movements—those in payment of the food imports incident to the failure of the wheat and potato crops in 1846 may have had a direct effect on price level, of the kind described by the classical schema—and financial transactions (Baring loan to the Bank of France, 1846), rather more than their usual role. What panic there was, disappeared when the Bank Act was suspended, although bankruptcies were frequent into 1849 (many, such as the failure of grain houses and of some merchants trading with the Continent, were unconnected with the crisis, however).

The element of overdoing or, more correctly, of exhaustion of immediate possibilities[1] reveals itself in the fact that new railroad capital, raised by shares and loans, touched its low point as late as 1851, though Juglar revival had set in by the end of 1849. This was followed, however, by a sharp increase in 1852, the first year of the second Juglar: we have

[1] The situation does not seem to contain any Hayek effect, although the money rate of interest rose but weakly; for it cannot be said that the new investments were made unprofitable by a subsequent increase of it. Professor v. Hayek, however, would presumably accept this, and point to the large proportion of that investment which was actually financed by genuine savings.

here a new wave of railroad innovation, which, among other things, brought new trunk lines (such as the South Western) into existence—also, another big amalgamation (North Eastern, 1854). However, it was, absolutely as well as relatively, of smaller importance than the preceding one and was no longer more than the heaviest individual item in a much larger movement. The crisis of 1857 could not primarily be accounted for by it.

7. For Germany railroads meant much more than they did for England. The revolution they wrought in her economic system in some respects almost suggests analogy with America; and so do, in some cases, the financial methods of the early stages. Public enterprise on a nation-wide scale was one of the economic policies advocated by some of the earlier champions of national unity, and a dream of Bismarck's early manhood. In some states it was embarked upon from the beginning and more or less adhered to throughout. But not so in Prussia, where government acted upon what later it became the fashion to call—with some derogatory implication—*Smithian principles*. The creation of the German railroad system was, hence, substantially the work of private entrepreneurs, although a bureaucracy, supremely efficient, quite above temptation, entirely independent of politics, did much, in many ways besides exerting discretion in chartering, to prune promotion, to sober finance, and to steady advance.

Later on, the temper of the times changed, however. As regards the empire, Bismarck's ideas were, by the resistance of the states, reduced to the creation of an Imperial Railroad Office in 1873, which did not mean a great deal, and to the acquisition of the lines in Alsace-Lorraine; but in Prussia they eventually had full sway. Under the Maybach administrations, the Prussian State (which in 1866 had acquired the state railroads of the states then annexed) bought up about 5,000 kilometers of private roads in 1879, about 3,000 in 1882, and nearly 4,000 in 1884 (in the subsequent 20 years another 3,400 were added, which practically completed the nationalization), while no more private companies were chartered. Construction was thenceforth done by the state, which unified rates, rationalized administration, and achieved what was in the whole world looked upon as the standard example of successful public enterprise. The compliment, while very well deserved, must not be overdone. The main work was accomplished by 1875, *i.e.*, if we take account of the lag in railroad construction, by the end of the prosperity phase of the fourth Juglar; private industry continued to offer to, in fact almost to force upon, the state-managed railroads a stream of improvements—particularly improved types of locomotives, cars, brakes, safety devices—so that the merit, as far as that goes, is reduced to not resisting and to displaying an intelligent demand; and conditions, both technological and commercial, were quite

exceptionally favorable in a thickly populated, predominantly flat country. From the early eighties new construction went on with hardly any reference to cyclical situations, but the difference, in this respect, from contemporaneous development in England was not so striking as one might expect.

Private enterprise, which ruled from 1842 to 1879, faced problems that only in degree differed from those in America. The proportion between existing and potential possibilities was in Germany more favorable beyond comparison. But existing means were not much less inadequate for the financing of the great innovations that loomed in the immediate future than they were in America or, to put the same thing into a slightly different form, the sum total of capital in the business sense plus current saving minus what was applied to consumptive purposes was at any point of time substantially absorbed or tied up in the current economic process and its growth. Hence credit creation, as far as it was not replaced by English lending—which, let us repeat, would, from the German standpoint, have been the same as domestic credit creation—may be expected to show, almost, in the role assigned to it in the "pure" edition of our analytic model. So it does. In all those cases in which the piece of innovation that was within the reach of the individual entrepreneur, was capable of being divided up in such a way that each partial success could finance the next step—and this was so in the case of many industrial firms and family positions that gradually acquired national and international standing—that element is naturally less in evidence and, in some instances, even absent, but the phenomenon stands out unmistakably all the same, so much so that no economic history of Germany would be complete, or in fact, understandable, without it. The German, or Franco-German,[1] solution of the problem may be conveniently inserted here.

[1] This is our only opportunity of mentioning the *Crédit mobilier*. It cannot be said to have been the first specimen of its type. The Belgian *Société générale* for instance (1822) was much the same kind of thing and similar practice dates further back than John Law. Nor should it be said that it was the model of the German concerns of this type. For at least one of them preceded it, and the logic of the situation would presumably have asserted itself without any model to copy. But the brothers Pereire certainly were the first modern pioneers to attract international attention to the possibilities and dangers of that form of banking. Nothing fails like failure, however, and the fundamental conception was mixed up with error and misconduct in its execution by a not unnatural gust of uncritical wrath. For an analysis that comes nearer to understanding, see A. Plenge, Gründung und Geschichte des Crédit Mobilier. J. E. Pereire rose as a railroad man. He promoted and built the first steam railroad in France and took a leading part in the French railroad ventures of the thirties, forties, and fifties. So far, he was an entrepreneur with an unusual bent of mind—coordinating his activity with ideas of social reconstruction of the St. Simon type. Perhaps it would come nearer the truth to say that he realized, consciously though somewhat fantastically, the ultimate meaning and consequences of capitalist enterprise. The *crédit mobilier*, conceived as an engine for promotion—or innovation—on a large scale, and in

In England presence of a huge mass of previous profits and other factors not only reduced the actual importance, but also veiled the role, of credit creation in financing innovation to the point, on the one hand, of making it a difficult task to bring it out in its true proportions and, on the other hand, of eliminating it completely from the range of vision of orthodox English banking theory and practice. In America the ordinary type of banks in the sense of that English doctrine—and the American ideas as to what a bank should be, were fashioned on the English model hopelessly though this was at variance with American conditions and practice—was made to serve the purpose in a way which from the standpoint of that type and those ideas was simply malpractice. In Continental Europe, in Germany (and Austria) in particular, this element was not absent. And whenever it showed, it was always disapproved of, on the ground that bank credit should be confined to short-term commercial operations; for the official theory of banking was no less English in Germany than it was in America. The practical difference between this view of the function of banks and what we are about to describe must not, however, be exaggerated. The link between the two was the lending on the stock market, which was always looked upon as a part of regular banking operations. Stock exchange speculation, especially, and the speculative holding of newly issued stock were in all countries largely financed by banks, which therefore always served the purpose of financing long-time investments, at least in this indirect way, even if in no other. The novelty about the practice of those French and German promotion banks, consisted only in the directness with which the problem of financing innovation was faced and the energy with which regular banking business was made ancillary to it. While elsewhere this use of short-term credit, created *ad hoc*, led to a situation in which it was up to the entrepreneurs to look (unless receipts were coming in very quickly) for some method of funding and thus consolidating their position, these "indus-

---

this respect akin to what the writer believes to have been the essence of John Law's plan, as well as to the French and German promotion or industrial banks, was founded in 1852. The financial idea, namely, financing enterprise by bonds to be issued by the bank and to be substituted for the stock of the new creations, was, however, never sanctioned by government, and in this sense the venture was a failure from the first, though on the surface popular success was spectacular. It is true that many of the propositions financed were not successful, or not sufficiently so—this is always the crucial point about any such venture—but it must be said that many difficulties, intimately associated with ultimate failure, would never have arisen, had that financial plan been carried out, which was not in itself unsound. It should be borne in mind that the *crédit mobilier* was not an investment trust in the English or American sense. It is often interpreted so, but this interpretation misses the essential point. Nor are the American private banking firms and financial houses the same kind of thing, although they often did that kind of business, first in the railroad field, then especially in the field of industrial mergers.

trial" or "promoting" banks provided machinery to do this themselves. They took care of the necessary issues of stocks and bonds, thus helping the enterprise to redeem its short debt and providing it with additional means. In order to effect this they were ready to take those stocks or bonds for their own account, not only if they were unable to place them, but in the ordinary course of their business routine. Thus they were able to await developments before making an offer to the public and even, in many cases, to keep a parcel for good. When eventually they placed the securities acquired, they again financed the private investors so that, temporarily at least, the transaction often meant no more than a shift in assets. The money-market aspects of this will call for our attention at a later stage. All that is important to realize now is how short-time credit creation was thus made to dovetail with long-time investment in a way which almost perfectly expresses the economic nature of the process of financing innovation.

The close connection between banks and industries which naturally arose out of this has so often been commented upon that it is more important for us to qualify than to emphasize it. If a bank holds a controlling or, at all events, an important part of the capital stock of an industrial concern and acquires, as it then naturally will, all its current banking business, and if the fortunes of the concern and the price of its shares are associated with the bank's name and pecuniary interest, much closer supervision becomes of course necessary than would be the case if the bank were in a position to deal with every single transaction with the concern individually and simply on its merits. But although this supervision in many cases amounted to initiative and even to compulsion (such as enforcing mergers of, or at least understandings between, competing enterprises, all customers of one bank) and although direct interest in an enterprise undoubtedly often was the motive for deviation from sound practice, the influence of banks did not in general go so far as that. The functions of entrepreneurs and banks and the essential opposition of their interest were not necessarily or regularly abolished, and the honorific positions on the board of industrial concerns usually granted to officers of the financing banks were apt to give to the financial press and to the social critic a very exaggerated idea of what those "huge compounds of capitalist power" really meant. It is amusing to note that bank executives were sometimes quite pleased to have the public believe in the reality of their power. This belief and the corresponding resentment were injurious and dangerous to them. But they also flattered their vanity. The efficiency of that engine for the purpose of financing and supporting new enterprise is, however, beyond question.

The first great banking concern of that type was the Schaffhausenscher Bankverein (1848). The Bank für Handel und Industrie zu Darmstadt,

which is the one that was most nearly a copy of the *Crédit mobilier*, followed in 1853. There was an outburst of such foundations in 1856, when the Discontogesellschaft, which had in 1851 been founded for quite another type of business, joined the ranks. The Mitteldeutsche Kreditbank, the Berliner Handelsgesellschaft, the Norddeutsche Bank in Hamburg, the Hamburger Vereinsbank, the Leipziger Credit-Anstalt, and others then saw what for some of them presently proved to be a rather melancholy light. But most of them were able to hold on through surf and breakers, which shows that both their structural idea and their practice were not so unsound as they seemed to many observers. We will add that they expanded vigorously in the boom that preceded 1873 and afterward, and that the system, later on mainly modified by mergers, was completed by the foundation of the Commerz- und Privatbank in Hamburg (1870), the Deutsche Bank (1872), the Dresdner Bank (1872), and the Nationalbank für Deutschland (1881). It should be recalled, however, that during the boom of the fifties another machine for credit creation experienced its last stage of development: many small states were, as mentioned above, only too glad to charter additional banks of issue.

This financial apparatus was a powerful help to railroad development from the beginning of the second Juglar onward, but during the forties it had not yet come into existence. Nor, as far as the writer knows, was capital import from England of much importance then. Hence, financing from genuine savings must have played a much greater role than it did later. This fact lends its distinctive character to that Juglar, particularly to its prosperity phase, and accounts for many of its features. Railroad construction and developments in subsidiary industries dominated the picture fully as much as in England. Trackage increased from 549 kilometers in 1840 to 6,044 in 1850, which was a greater relative increase than in England or in the United States; but speculation and other secondary phenomena were much less marked than in those countries and the crisis of 1847 was correspondingly milder. It is true that in March and April there were difficulties in Hamburg, that bank notes were presented in Berlin and the Rhineland, and that the Prussian bank had to borrow from the government; but this did not seriously threaten the financial structure. The troubles would have displayed still smaller proportions had not the political disturbances of 1848 added a spell of depression which cannot be accounted for by any known economic facts. Comparison between the course of events in Germany, England, and the United States may hence be used to form a rough idea about the answer to be given to the question as to what part of the phenomena that constitute a crisis should be attributed to the essential features of the evolutionary process in our sense and what part to the secondary phenomena which are undoubtedly induced by it but are no necessary elements of it.

There is, however, an atmosphere about those years which is anything but cheerful and this is particularly true of the years of boom. Although bad harvests and other adventitious circumstances partly account for it, for the fundamental explanation we must look to our process itself. Prussian statistics prove beyond doubt—although, of course, they are far from complete—that consumption actually fell for years together while at the same time production and sale of equipment goods increased. Spiethoff (*op. cit.*, p. 48), while recognizing the extraneous circumstances mentioned, which also worked in that direction, concludes that we have here an important historical example for the independence of prosperity from consumption. Since the case is statistically and otherwise not beyond doubt (but it is a fact that saving banks' deposits increased all the time), it is perhaps hazardous to add that those years also afford an illustration of what prosperity really means and what its features would be if it were not, in general, overlaid by the joyous optimism that comes from speculative gains. The reader is invited to judge for himself. Elsewhere we use the case in this sense.

Three more Juglars were still to come in which railroad building loomed large. It increased again during the fifties, nearly 5,500 km. of trackage being added up to 1860. The crisis of 1857 does not, on the surface, display the influence of the railroad situation so strongly as the American crisis did. Nor were railroads quite so dominating a factor as they were in America. But it must be remembered, also, that methods of financing were comparatively sound and that the dislocating effect on the preexisting economic system was not anything like so great. The next decade accounts for nearly another 8,000 kilometers, and from 1870 on Germany experienced her last railroad boom. Further construction, which carried the 33,838 kilometers that existed in 1880 up to the figure of 63,730 in existence in 1913, was almost wholly the work of the states, but would have been "induced and completing" extension in any case. We need not stay to prove the quantitative importance of expenditure on railroads, which, however modest the factor by which we multiply it, obviously was the most important single element in the cyclical fluctuations, at any rate to 1873. The peculiar type of entrepreneurs who emerged to create the German railroads, and extended the sphere of their activity to Austria and the Balkans, will be commented on later.

D. Some Features of the Development of Manufactures in Our Countries.—

1. We begin by going on with Germany. In interpreting the statistical record of quantities of commodities and services produced, which it is not our intention to present until later—details cannot be presented at all—account must, as everywhere, be taken, for the whole span of the Kondratieff, of growth as influenced by the progress in transportation by

land and sea.[1] To dispose of the latter, the first German steamer crossed the Atlantic in 1850—a great innovation, of course, and expressive of a development in Bremen and Hamburg that played a not insignificant, though local, role in the first, and still more in the second, Juglar; yet it was not, in itself, particularly remarkable either technologically or commercially. German shipping was scoring a number of minor successes, the great concerns of a later time were forming or reforming—especially the North German Lloyd, founded in 1857 by a merger of several concerns of moderate size—and were invading what for them were new realms of trade. All this implied many innovations (every new route is one), but all of it was on a small scale, insignificant if compared with contemporaneous American or English, or later German, development. Its importance consisted in breaking the ice, solving threshold problems, creating conditions for further advance, preparing quantitatively important success. This success came within the period, but practically wholly in the recession, depression, and revival of the Kondratieff. And it is easy to see that, in fact, it was of the nature of downgrade expansion and downgrade innovation, induced not only by what had been done before in the same industry, but also by the evolution in other lines of industry and by the favorable change in environmental, particularly political, conditions. During the boom that broke down in 1873—and contributing to it—the mercantile marine of Germany slowly struggled across the million-ton line, mostly wood and sail, the small fraction of steam tonnage in great part foreign built. The latter rather more than doubled to 1880, then trebled to 1890, about doubling again to the end of the century, when it was all steel and almost entirely the product of domestic yards and domestic ship-engine factories. Most of it was owned by about 24 Hamburg and Bremen concerns, the Norddeutsche Lloyd and the Hamburg-America among them. It is perhaps unnecessary to list the types of innovations involved—the Stettin shipyard for instance was one of the most important of them, though it had nothing to do with "invention"—to show their opportunity-exploiting character, or to dwell on the importance of the expenditure and of its direct and indirect effects (dislocation

[1] Construction of roads and canals and, what was still more important than the latter, improvement of natural waterways, went on throughout the period. All of it was done by public authority, from public resources, on noncommercial lines. The Prussian *chaussée* system developed steadily beyond the lines indicated in the previous chapter, especially from the eighties onward. This is also true of canals, construction or completion of which reaches far into the third Kondratieff. Improvement of natural waterways was carried to much greater length, and by 1895 over one-fifth of total German traffic was by inland waterways. This innovation was, in fact, one of the major features of the downgrade and revival of that Kondratieff and amounted to a complete change in the data of railroad transportation and domestic commerce in general. Investment rose into considerable figures. Its "induced and completing" character is clear.

was mainly by facilitating imports, but not otherwise significant). Nevertheless, two remarks suggest themselves.

First, that development was not so astonishing as English observers —or the English press—seem to have felt it to be. It was only part of the process by which during that time, in the German territory and with the German nation, anthropological and sociological possibilities reasserted themselves after the break which had interrupted development for more than two centuries. Interpretation must take account of the spring resuming its form (though something in it remained paralyzed) after removal of the weight. Looked at in this light, that development is not at all astounding. A similar statement may be made about any line of German development. Conditions being provided, security and space being guaranteed by the Hohenzollern empire, Germans readily and, as it were, naturally, took to industrial and commercial tasks on a large scale, and many old attitudes and traditions that had not been quite extinguished, revived in new forms. The question arises how such a fact is related to our schema. It certainly imparts to German series what might be termed a special trend due to the influence of favorable changes in environment. These have nothing to do with entrepreneurial activity. But enterprise, itself the inheritance of bygone ages, supplied the mechanism by which these new conditions asserted themselves. It was simply attended by success greater than it would otherwise have had. There is, hence, no reason to think of this factor as exerting an influence distinct from our process—and no reason to expect that the evolutionary process presents, on that account, any new problems.[1]

This set of facts is as German as its repercussions are English, and as immigration, the conquest of the frontier and so on are American. In all countries, however, and in Germany not more than in the other two, we again observe, in the second place, that expansion of production, that pushing into economic space newly created, which is characteristic of Kondratieff downgrades and revivals and which is as strongly marked in that Kondratieff as it was in the first, and will be seen to be in the third. We know the phenomenon and the reason why it is not the prosperity phase of a cycle which gathers in the harvest in terms of increasing real wealth, but the others. All that needs to be mentioned is that the instance under discussion is particularly enlightening because it has come to be known as the Great Depression.[2] The use of the term varies. Most

[1] It will be seen that the above analysis yields another contribution to our treatment of data and of external factors.

[2] It is, indeed, a great satisfaction to notice that in one of those Revisions in Economic History which are so excellent a feature of the *Economic History Review*, Mr. H. L. Beales (October 1934) deals a vigorous blow to the implications, so long uncritically accepted, which the term carries with the majority of students. The historian's evidence, entirely

people will, the writer believes, apply it to 1873–1896, which makes it roughly cover depression and revival, or to 1873–1886 which almost exactly covers the former. The case of Germany is, in this respect, peculiar only because her Kondratieff prosperity was crippled by various circumstances while the harvest phases were accentuated by the facts mentioned above. The latter is true also—*mutatis mutandis*—of the American, the reverse of the English case.

Since German industrial development was to a considerable extent conditioned by railroads, it is in this light that German urbanization[1] and the conquest of her home market by her industries must be looked at. Much of it was subsidiary to railroad developments or directly induced by them. This holds true not only of some branches of the machine industry, such as locomotive building—it was in the forties that the firm of Borsig made its big stride—but of all, and still more true of coal mining, iron, and steel. The prosperity of the forties carried output of coal to not more than roughly 5,000,000 metric tons, however, and the great expansion in absolute quantity came in the downgrade of the Kondratieff, or more precisely, in the upgrades of the Juglars superimposed upon that downgrade, which is exactly what we should expect, if we take account of the cyclical nature of part of the demand for coal (consumption in homes was, in the last two pre-war decades, only about 12 per cent). Relatively it rose by roughly 50 per cent in each decade from 1870 to 1910 (in 1896: 85,690,000 tons). Lignite was neither a new commodity—it is first mentioned, as far as the writer knows, in 1549—nor did it enter upon its career as a chemical raw material within our period, but it also swam with the

---

free as it is from any theoretical bias, should go some way toward convincing economists. The well-known and much-quoted Third Report on the Depression of Trade also fails, by the facts actually presented, to bear out its title fully, although it refers mainly to two really depressed years.

[1] The process of urbanization is very clearly cyclical. It should be mentioned that its pace is not quite exactly depicted in the statistics, which, even after the improvements incident to the foundation of the empire, remained unsatisfactory in various respects. Classifying all places above 2,000 inhabitants as urban and all below that figure as rural is not only arbitrary but, if taken to indicate the distinction between industrial and agricultural sectors, misleading.

We take the opportunity to add that the three occupational census (1882, 1895, 1907), which naturally constitute one of the main sources of our sketch, differed in method and are neither strictly comparable, nor entirely reliable. Variation in the number of gainfully employed women, for instance, is in part due to differences in the wording of instructions. It is, however, broadly true that the number of people employed in agricultural pursuits remained fairly steady, so that the bulk of the increase in population was absorbed by industry and (until the last years of the century) by emigration, which reached its high-water mark between 1880 and 1885 and then fell off (from 1895 to 1905 there was net immigration). The number of people attached to agriculture (*Berufszugehörige*) was in millions. in 1882, 15.94; in 1895, 15.44; in 1907, 14.92.

stream. Briquette production was a feature of the downgrade, increasing from 754,000 tons in 1885 to 3,061,000 in 1895; but the increase to 21,418,000 tons occurred within the prosperity phase of the third Kondratieff. Otherwise, innovation in the field of coal mining consisted in the creation of larger units and in the increased use of machinery—particularly for reaching greater depths and for sorting—only partly novel.

The case of pig iron, or the iron industry in general, enters into the same class. It was in the forties that the foundations of its modern structure were laid. The fifties brought new developments. But the great increase in absolute quantities came later, in the downgrade of the Kondratieff: 529,000 tons of pig iron in 1860, nearly 4.7 millions in 1890. The great leap was in the sixties and early seventies—from 1873 to 1877 iron consumption fell by 50 per cent. True to form, output and number of concerns increased in Juglar prosperities and decreased in Juglar depressions, but in each prosperity productive capacity was so much increased that recessions and revivals display as a rule greater absolute increase in output than the preceding prosperities. This of course, inverts the Kondratieff picture as to absolute quantities—though not as to rates—but should easily be seen[1] to conform to expectation. We shall return to the matter when discussing the time series. Innovation in this field consisted in commercial, locational, and organizational change rather than in the introduction of major technological novelties, and the type of entrepreneurs—many of whom were members of old industrial families—corresponds to this. In 1847 methods were as yet quite primitive. Use of coke did not spread before 1850, and it was only by 1870 that charcoal was (substantially) supplanted. In the downgrade of the Kondratieff, development of this type loomed large, also in the neighboring industries of ironworking and engineering, the boom in which was an important feature from 1870 to 1873.

Steel of course presents a different picture. In its modern functions it was a novelty and the product of technological novelties. German figures were swelled by the annexation of Alsace and Lorraine, which meant not only increased possibilities, but also acquisition of several leading steel concerns already in existence (deWendel, Dietrich). Increase in output was however striking independently of this. But the most important innovations came from abroad, so the Bessemer, the Siemens-Martin[2] open-hearth, and the Thomas basic process. Not until the last overcame the difficulty incident to the comparative scarcity of non-

[1] The reader who desires to acquire command of our model as a working tool for the analysis of concrete situations should carefully discuss the case, which is more instructive than others, in order to satisfy himself that this is so (see Chap. IX).

[2] The writer supposes that Sir William Siemens counts as an Englishman for our purpose, though Werner von Siemens remains a German.

phosphorous ores, did German steelmaking really get into its stride. Again, this was a typical downgrade development. We confine ourselves to adding a few data which constitute landmarks in the progress of German enterprise in the iron and steel field. Krupp, who was also the first producer of cannon from cast steel (1856), introduced the Bessemer process in 1861. Others followed quickly. Borsig constructed the first Siemens-Martin work (1864). It is interesting to note in this connection that great firms at that time began to push into the higher stages of their process—the innovation of "vertical integration." The firm of Borsig for instance acquired coal, iron, and other mines in Silesia (1847), built blast furnaces in the sixties, as well as a puddling plant and a rolling mill, and so developed from a locomotive factory into a "mixed" steel concern. The same tendency is observable in many of those entrepreneurs or, as we might say in this case in spite of our proposition that the entrepreneurial function is essentially personal, those entrepreneurial families that created the German heavy industries, such as the Stinnes, Haniel, Harkort, Funke, Stumm, Grillo, Röchling, Guilleaume, Pastor, Böcker, Henckels, Mannesmann, Talbot, and Thyssen. Cartels and "communities of interest" developed here and there, in rails for instance, before 1873, and then quickly became a dominating feature of the group of industries the evolution of which was, as Mr. Robertson pointed out long ago, particularly prominent in what, according to our count, was the penultimate Juglar.[1]

In the fields of finished steel and nonferrous metal products there was, as we have seen, an old tradition to start from, on which much effort to apply new improvements was brought to bear. The Solingen cutlery trade, older than, but still sufficiently similar to, the Sheffield trade, may serve as an example. Though a large part of it remained in the craft stage and another part in the domestic industry stage throughout the period, the innovation of factories came in during the second Juglar, at first into forging only, later on into everything else. These factories were small or of medium size, many highly specialized, all of them transformations of the artisan's shop, some the creations of entrepreneurs who had been artisans themselves—a type not uncommon in Germany even at a later time. About Nuremberg and other centers of metalworking similar statements could be made. The quick rise of the armament,

[1] Compare Banking Policy and the Price Level, p. 11*n* (1st ed.). Mr. Robertson was one of the first *theorists* of business cycles to recognize what to *historians* always has been a matter of course, that innovation had something to do with them. In that note he definitely links up individual cycles with evolution in particular industries. In referring to the "boom of 1882" he may have been thinking primarily of England, but the statement is much more obviously true for Germany, although there seems to be no point in emphasizing the particular year.

machine, and machine-tool industries, which almost suddenly emerged in the prosperities of the forties and fifties, and rose to equality with, and even to superiority over, their foreign competitors (American harvesting machinery is the most important exception) during the three subsequent Juglars, was in part due to that tradition, which accounts for the presence, from the first, of an ample supply of workmen of the locksmith type. These industries afford examples of entrepreneurial activity which are particularly instructive and illustrate to perfection certain aspects of the working of our process, both as to how these innovations intrude into the system and as to how they affect it. We cannot enter into the matter, however, and will confine ourselves to stating that, according to the census of 1882, more than half of the men employed in the division of "machines, instruments, and apparatus" worked in concerns employing 50 workmen[1] or less. The large concerns were, of course, in shipbuilding, structural material, and so on, and many of the smallest ones were only repair shops. It is, nevertheless, significant to note, particularly by comparison with the census of 1907, that, throughout that Kondratieff, small-scale enterprise—the entrepreneur who was his own engineer, buyer, salesman, personnel manager, efficiency expert—counted for so much in one of the most conspicuously successful fields. It is important to visualize the type, to put him side by side with the railroad promotor and to realize that both, and all that comes between them, enter into our concept of "the" entrepreneur.

The modern German textile industry is a product of that Kondratieff. Introducing methods that had already been successful abroad, mechanizing by means of partly imported machinery, setting up new factories, especially solving the problems of the large-scale factory, exhausts the bulk of entrepreneurial achievement in this field. There is little technological originality about this, although much organizational and commercial energy. Each Juglar brought its installment, none was dominated by textile developments. The old silk industry revived in response to increasing wealth, but did not display any innovating activity until mechanized mass production—both in silk proper and in spinning waste, also in dyeing—came in. This entrepreneurial achievement was a feature of the last Juglar. Linen decayed, being crowded out by cotton. Both in this respect and because of headway made by the factory and the power loom, this industry affords a particularly drastic example of how the New crowds out the Old. The process of elimination did its work substantially in the downgrade and revival of the Kondratieff, although

[1] It should be observed that German statistics define a large-scale concern (*Grossbetrieb*) by the criterion of employing more than 50 hands. So very unreliable and modest an idea of what a large concern is, may obviously prove misleading in arguments about the relative growth of the large-scale unit.

the census of 1895 still showed some remnants of the old domestic industry, both of the independent small man and of the putting-out type, and although the decay of the latter had, with all the misery incident to it, set in during the first Juglar.

Similar statements may be made about wool—the factory and mechanization having substantially won out, by 1895, in spinning and, though not quite so much, in weaving—except that in this case a great modern industry emerged. The quick decay of domestic wool production after 1870 helped rather than impeded this development, for otherwise protection for the raw material could hardly have been avoided. As it was, cheap wool from overseas, particularly cheap tops for the worsted industry, which was a novelty, greatly facilitated matters. It was mainly a downgrade development, though the power loom began to gain ground in the forties. Even in cotton weaving the hand loom and the domestic system persisted throughout—about 22 per cent of hands employed were counted in those categories in 1895—but in cotton spinning there was quick development toward the mechanized large-scale concern during the second and third Juglar, and further concentration during the fifth and sixth. Clothing and bootmaking remained predominantly crafts throughout the period, even putting-out and large-scale retailing meeting with great resistance, while the "small man" enjoyed official favor that had much to do with his survival in the downgrade (*Mittelstandspolitik*[1]).

Building activity was in proportion to industrial expansion and to the rate of increase in wealth and population. We have seen theoretical reason to expect that, while industrial and commercial building is of course positively associated with all, and particularly with Juglar, cycles, dwelling-house building should, owing to its dependence on the mortgage rate, display an opposite tendency. This is, on the whole, what we find, although the statement calls for various qualifications. In particular, it is clear that where innovation implies migration, workmen's and other dwellings will in some places be constructed, along with industrial plants, during prosperities. This in part explains, more perhaps than the short interruption of building activity during the Franco-German War, the

[1] The measures that went by that name and the measures that were advocated by the craftsmen and their representatives present a good example both of the resistance that innovation meets with and of one type of defense that threatened strata resort to. We have observed them in England ever since the sixteenth century, and we can observe them today, not only in Germany. How far they were really effective in alleviating transitional difficulties it is hard to say, because modern industry did not simply crowd out those older forms of production but at every step also offered new possibilities to them—cheap semi-finished products, for instance, openings for retailing activities, better tools and power, and so on. Also, the attitude of the public helped, particularly in Germany. There was a strong dislike of any but custom-made garments or shoes. In the case of large-scale retailing, anti-Semitic tendencies also helped to protect the small man.

building boom which preceded the crisis of 1873 and has in its violence never been equaled in German history, either before or after. There was, however, another reason for it. Technologically the building trade as such did not materially change throughout our period, although brick production did: the ring oven (Hoffmann-Licht, 1858; improved in 1869, after which it rapidly spread) and a brick-pressing machine (1854) were fundamental innovations.[1] The steel-concrete building (1867) did not until the third Kondratieff play any great role. But the obvious tendencies of the time gave scope to another type of innovation—speculative building, ahead of immediate demand, often implying the development of whole suburbs or quarters, always implying speculation in sites. Banks were founded for the purpose of financing business of this kind—the mortgage banks (Hypothekenbanken) got into difficulties over it in the middle of the seventies. Trade in building material became a matter of speculation. Homes and apartment houses were commonly built and bought on credit. Analysis of this boom of 1872 would lead to a diagnosis similar to the one we shall arrive at in the case of the American building boom in the twenties of this century. All that matters here is to realize its exceptional character. The development of German cities, taken as a whole, remained, however, a typical feature throughout the Kondratieff downgrade, and was in keeping with all its other characteristics. We will notice, in particular, the importance which public-utility enterprise—gas, water, and means of transport—acquired especially in the eighties. Municipalities increasingly embarked upon it, and at the same time began also to expend heavily on other public works, thus quickly running up what then was thought to be a formidable load of debt. In this respect, phraseology has changed more than practice.

Again we observe the phenomenon that called for attention in the last two Juglars of the first Kondratieff. The same place that was then occupied by railroads, was in the downgrade of the second Kondratieff filled by the chemical and electrical industries. They were—together with other innovations, such as the rubber development, turbines, internal-combustion engines, and so on—to "carry" the third Kondratieff; but, unlike those others, they achieved enough success to reveal their possibilities and to play some role, though not a major one, before the second had drawn to its close. The beginnings of Germany's chemical

[1] Compare G. Clausing, Die Uebererzeugung in der Ziegelei von 1867 bis 1913, No. 4 of Spiethoff's Beiträge zur Erforschung der wirtschaftlichen Wechsellagen, 1931. This excellent study follows the course of events in the brick industry, cycle by cycle, and draws a most interesting picture of how, with small capital requirements (a ring-oven brickwork producing 2½ millions of bricks per year used to cost, including machinery, about 100,000 marks) and an inelastic but highly variable demand, things work out under competition and also under combination.

industry go far back, and both tradition and other conditions that have often been emphasized, perhaps overemphasized, may be adduced in explanation of later successes. But in our period, that practical chemistry which counts—or counted at that time—for industrial purposes was further advanced in England than in Germany. Great original innovations were not absent. For instance, the coke oven became the source of coal tar, and ammonia and coal-tar dyes were first produced in 1846, azo dyes in 1863. But the production of ammonia was no more than 84,000 tons in 1897 and the dyes (though alizarin met with success in 1876 and artificial indigo had been invented in 1850) did not triumph till later. More important were the developments that followed from the discovery of the potassium deposits (Stassfurt, 1861; production started in 1863; others were discovered later). But on the whole, chemical production—both of basic materials, such as sulphur (from pyrites), sulphuric acid (innovation: contact process, success in 1888), sodium chloride, benzol (commercially successful by 1849), and of finished products, such as fertilizers, matches (safety match, 1855), explosives, paper (wood pulp[1] treated by the soda or the sulphate process), oleomargarine (1868, but not of importance until the nineties)—followed rather than preceded the general evolution of the environment and foreign achievement (*e.g.*, Solvay process, 1879). Enterprise was, in accordance with this, of a type similar to that which prevailed in the textile industries.

The occupational census of 1895 is the first to recognize the existence of an electric industry. By then it employed 26,000 men and had revealed possibilities—both as to light and as to power—far beyond its actual performance. The particular relation between invention and innovation, the entrepreneurial type, the problems of financing and marketing it presents, and the revolution it wrought would repay more attention than we can bestow on it. To recall a few familiar facts, Faraday's discovery in 1831 of induced currents (the fundamental principle of the dynamo) was, in the same and the following year, applied by H. Pixii to the generation of alternate current (with permanent and rotatory magnet); in 1833 Gauss and Weber displayed their magnetoelectric telegraph at Göttingen; in 1833 and 1835 followed the work of Saxton and Clark on rotation of coils; in 1845, Wheatstone's substitution of electromagnets; in 1849, Nollet's magneto machine; in 1856, Werner Siemens' shuttle-wound armature; in 1860, Pacinotti's ring armature (reinvented by Gramme in 1870); and in 1867 the full-fledged "dynamo" emerged. After that, improvements followed quickly (Hefner, Brush, Thompson, Edison), Deprez's experiment in transmission of several horsepower over telegraph

[1] Manufacture of paper from wood pulp met its first successes in 1803; the cement-lined pulp digester, in the early nineties. G. Keller's invention started a development of some importance in 1845, which linked up with the rotary press (1846).

wires meriting particular notice. It was repeated in Frankfurt (O. Miller, 1891) on a much wider scale, 200 horsepower being transmitted over 180 kilometers. Experimental use for lighting purposes (Faraday and Holmes, 1858) had been made by then; but up to, say, 1873 (end of recession of the fourth Juglar), electricity was of established importance only in telegraphy, though soon afterward the telephone widened its field somewhat. Telegraphic appliances and cables were the chief item in the program of the firm of Siemens and Halske when it was founded in the forties. It was a success. The history of the man and of the firm is, of course, a classic in the collection of the student of innovation. We will mention another instance—equally characteristic, although wholly different—that of the former iron manufacturer Emil Rathenau, who in 1883 formed the Deutsche Edisongesellschaft. In the seventies and eighties, however, America led, and most of the special-purpose firms that sprang up in Germany at that time were not very important. None of the great technological conquests, such as the electric tram displayed in Berlin 1879, electric steel, and the electric supply stations, achieved quantitative importance during our Kondratieff.

One of the main shortcomings of this sketch is its failure to do justice to a characteristic feature of Kondratieff downgrades and revivals: the unmanageable variety of minor changes—induced and adaptive in the main—that in those phases spreads over the whole system and is as difficult to follow up as it is important. We must confine ourselves to indicating briefly the course of cyclical phases. We have already disposed of the first Juglar; but we have also seen that the next three were primarily propelled by new railroad construction and its effects. The second rises clearly in 1852 (there is, except for the terminology which follows from our schema, no difference of opinion about this), when industrial conditions were such as to make it quite clear that another period of investment would in any case have come about irrespective of the new gold.[1] Railroads, iron, steel, machinery, the emergence of a modern textile industry and of the type of financial institutions mentioned above, formed the core of the innovations of that period and were obviously adequate to induce all the investment and to produce all the phenomena of that prosperity which in 1856 tapered off into what contemporaneous reports describe as overproduction. We shall have little difficulty in identifying this as the effect on total output of those innovations and their subsidiaries.

Some of the factors being absent which in England rolled up the Secondary Wave to such dimensions, the ensuing crisis was milder. There

[1] On the other hand, it would not be correct to argue simply that gold could not have influenced the German price level or otherwise given an impulse to German industrial development because Germany (the German States) was not then on the gold standard. Very little reflection will show that. Moreover, silver production also increased,

was, however, a panic in Hamburg at the end of November 1857. Many bankruptcies followed elsewhere, and 1858 displays all the features of depression, although the price level did not strongly react—this, of course, was partly owing to the new gold and partly to the phase of the underlying Kondratieff which was just turning into recession. The year 1861 completed recovery, and 1862 started the new Juglar (again there is no difference of opinion about the fact that a new *Aufschwung* set in, see Spiethoff, *op. cit.*, p. 51), which could be described in exactly the same terms but for the American Civil War, which affected Germany less, and the Danish and Austrian wars, which affected her more, than they did England. The Prussian Bank rate was at 7 per cent in the last three months of 1864 and again from October 1865 to February 1866. Diagnosis is hence uncertain; the general aspect of things nevertheless warrants the statement that the Juglar turned into recession in 1864 and into depression in 1866. There was no crisis, however, merely a flutter before the war. The year 1867 is generally looked upon as one of depression, although, contrary to expectation, prices continued to rise. Things distinctly improved toward the fall, from which we date revival, although, like Spiethoff who counts the whole of 1868 as *Stockung*, we have to note an abnormally short duration of depression. Revival went on, gathering momentum in 1868 and 1869, and the prosperity phase of the fourth Juglar may be dated from the beginning of 1870.[1] There is some uncertainty because transition to buoyant activity was so quick and smooth.

This as well as the shortness of the depression of the previous Juglar—which, however is partly also accounted for by the fact that the disturbances in the first half of the sixties interfered with, and thereby prolonged, the processes of prosperity and recession—is perhaps due to the fact that the fourth Juglar was again a railroad cycle, the last one in Germany. It seems plausible to argue that, since it was a step in the same direction, the stage was set for it and people found it easy to rush forward from the beginning. This would also explain why finance was not so sound as, by comparison, it had been in the three preceding prosperities and why the Secondary Wave rose to unprecedented dimensions. There was first a setback due to the Franco-German War, but then prosperity resumed in an environment of understandable joyous optimism —there is no reason not to admit this element where there is provable warrant for it—and postwar spending. The period is known as the "promotor's time" (*Gründerzeit*). Enterprise, spreading from the railroad business[2] and allied lines, extended lightheartedly to everything imagi-

[1] If, again, account be taken of difference of terminology and descriptive arrangement, our dates accord with those of Mr. Thorp, see Business Annals, p. 206.

[2] The type of entrepreneur that then came to the fore as it never had in previous prosperities and never did again to the same extent, had very little affinity with the type that

nable, both methods and schemes being clearly fraudulent in many cases. The building boom has been mentioned above. Iron, steel, and machinery made a big stride. So did textiles. Consumption of iron per head more than doubled. Mushroom banks—many little better than bucket shops—sprang up. Everyone knows that often-painted picture. Speculation reached its high-water mark early in 1872 and then began to decline, stock prices giving way in September. The "crisis" broke in Vienna on May 8, 1873, in a most dramatic way and lasted for about half a year. In Germany there was a great epidemic of financial and industrial bankruptcies, but much less panic.

Again, the reader is invited to observe that this picture—or rather the picture that would be drawn, had we space to do so, since the few lines above can hardly be called a sketch—excludes none of all the historical facts of the case. We do not aim at an one-cause explanation of any concrete situation, and a full report would, as far as contours and details of that situation go, run on much the same lines as all the others that have ever been published.[1] The "crisis" itself, in particular, which we hold to be no part of the logic of our process, we could only describe in such terms as reaction to excesses, swindle, cumulation of depressive effects

---

created and organized German industry. Nor has it an exact counterpart in England or America. Yet the larger sized individuals of that species were by no means simple *faiseurs*. The railroad man, Strousberg—who was arrested when public and political opinion, which had been not only patient but complacent for a time, at last began to turn against promoters, and whose arrest brought down what was considered as his house of cards—may serve as an example. After more modest beginnings, he launched out on large-scale railroad enterprise that extended beyond Germany. The method he gradually evolved—one which became typical also in other fields—was this: he acquired a concession and sold it to a syndicate that founded a company, to which the concession was in turn resold at a profit, payment being effected in shares. Preferred shares were then issued, as soon as possible introduced at the stock exchange, and unloaded on the public to finance construction (insiders frequently cleared out as early as at that stage). This construction he undertook himself by way of what was called *Generalenterprise*, that is to say, at a fixed price per mile, profiting on the purchase of materials and so on, which as far as possible he again paid for in shares. The roads were not, as a rule, badly built, at least in Germany, where the authorities saw to that. But financial difficulties were likely to arise even during construction, and the slightest shock to confidence was bound to spell catastrophe. Yet there was real achievement in much of this. Strousberg's roads were not ill conceived; and it is very difficult to say whether there was bad faith in his case—his glowing fancy prevented him from seeing anything except the most rosy possibilities, and it was said of him that he would never, during his whole career—even while people believed him, and he believed himself, to be fabulously wealthy—have been able to realize a net worth from his assets. He told his own tale in a book entitled Dr. Strousberg und sein Wirken.

[1] We must, however, notice with regret the astonishingly small amount of scholarly effort that has been directed toward a subject which is obviously not uninteresting. There are a few antiquated standard works upon which most later writers rely. First-hand research, of later date, there is very little.

(bankruptcies inducing others and so on), and the like. All we have to add from our standpoint is, first, that such description takes hold only of the surface, of the phenomena of what we call the Secondary Wave, which is an "understandable incident" to a particular link in the sequences of situations created by an underlying process of evolution. The reality of this process and the particular innovations by which it asserted itself stand out in this case with an unmistakable clearness. The extent of the catastrophe and the duration of the ensuing depression is, again, accounted for by the location of that Juglar in the Kondratieff and again suggests analogy with the cases of 1825 and 1929. This analogy is much less convincing than in the case of the United States, because in Germany there was not so spectacular a crisis or spiral in either of these two instances. Substantially it holds true, however. Price level behaved, from 1857 to 1873, contrary to expectation. According to our schema it ought to have displayed a tendency—interrupted in each Juglar prosperity, no doubt—to fall. Gold must be held responsible for that, and gold plus the French indemnity for the abundance of credit and the excesses of speculation. We may hence use the case to demonstrate the consequences of such abundance and of conditions—there was at the time of course no *policy* aiming at that goal—which overbear a systematic tendency of prices to fall. Clearly gold production did not, previously to the crisis, slacken in such a way as to entitle us to speak of any scarcity as a causal factor, even if there were any theoretical justification for doing so.

That depression is usually held to have lasted through 1879. But we can easily see in the German case, as we saw in that of America, that recovery started in 1877, when industrial conditions brightened up and iron production ceased to fall. This recovery was so weak and halting, however, and such a depressive atmosphere persisted throughout its course, that we have little quarrel with that statement, provided it be understood that this use of the term *depression* does not carry the technical meaning we have given to it. Now, explanation of this phenomenon follows much more completely from our schema than does the explanation of the "crisis." Change, revolutionizing everything in German economic life, had come about in the three preceding Juglars and in the prosperity of the fourth, and long-time effects had begun to tell. Germany had become an industrial nation: a powerful apparatus for the production of industrial equipment had been built up, all industries had been expanded and reshaped and were ready to pour forth their products. Prices high enough for the new firms in an industry were much too low for the old ones. This spelled bad business, loss, death for large strata of the economic structure, some of them vocal—as, for instance, the stratum of the artisans and small men in general—others silently decaying. For the moment possibilities for advance were obviously exhausted and the

milieu had to adapt itself as best it could. This adaptation was a painful process, particularly in a country that had been so little "capitalistic" as late as 1842. No wonder, then, that investment dropped to almost nothing, that unemployment prevailed, that the vicious spiral cut deeply into what for the time being was a very unresisting organism. The characteristic features which are conveyed by the phrase *poverty in plenty* very naturally emerged—only there was no paradox about it.

The two last Juglars display some aftereffects of that shock as well as the influence of the agrarian situation which we have dealt with before. We know the reason why gold cannot be relied on to contribute significantly to explanation: it is more than doubtful whether, taking gold production together with contemporaneous banking developments and changes in the habits of the public, there was any net effect at all. The fundamental fact is again in the location of those Juglars in the Kondratieff which in the absence of any major disturbing factors fully asserted itself. We should expect great increase in output, an indefinite number of induced improvements in technique and organization, the "pushing into newly created economic space," adaptive investment—and all of it on the lines chalked out before. This is what we find and what readily accounts for the fact that upswings are so much less marked than downswings. Increase in real wealth, greater expenditure of municipalities, easy money, and unemployment, all fit into this frame.

The fifth Juglar begins in 1880, with a moderate wave of new incorporations. Iron and steel reacted to the impulse of the Gilchrist Thomas process (success in 1879), which of course greatly improved the possibilities of German production. And utilities, textiles, and machines made another stride. But however important that innovation—there were others in the same field—the prosperity was weak (if measured, as Spiethoff measures, by consumption of iron, it was very weak,[1] though strong enough to turn the price level upward for more than a year). In the second half of 1882 it turned into recession, then in 1884 into a depression, which was not a severe one, however, with iron, steel, shipbuilding, textiles, and other physical items increasing practically all the time. That depression was fertile in cartels. Revival came in the fall of 1886 and took its normal course.

From the very beginning of 1889, a reversal of the falling tendency of the price level and an increase in pig-iron consumption beyond the rate of 1873, indicate the rise of the last Juglar. It was characteristically

[1] Mr. Thorp, p. 209, actually speaks, for 1880, of a "mild depression." But surely this overlooks the downward trend of many indices which gives additional importance to any upward deviation. In view of recent discussions, it should be observed, however, that there would have been no less justification than there is at present for economists to talk about the exhaustion of capitalist possibilities.

what we should expect a last Juglar to be—a Juglar of odds and ends. The electrical industry perhaps counted for something, though certainly not for much. Another feature, novel in its extent though not otherwise, was capital export—Germany beginning to take a hand in the "capitalization" of noncapitalist countries. In part, this consisted simply in the acquisition of foreign securities, but to a much greater extent than French capital export it implied actual enterprise abroad and hence orders for the German equipment industry, in spite of failures and losses. For the rest, there was induced and completing innovation in steel—electric steel was a really new thing, however—and textiles, coal and gas—in the latter the Welsbach invention supplied an additional impulse. There was also considerable (public) railroad construction. Perhaps it was owing to repercussions from London that recession set in as early as the autumn of 1890, though prices continued to rise into 1891. The turn into depression occurred early in 1893, partly again from extra-German causes, to which the German organism had by then become much more sensitive than it had been before. Depreciation of foreign securities was a really serious matter and created difficulties in the sphere of credit for which there was no adequate industrial reason—production of pig iron and of textiles continuing to increase. Difficulties in business were of a particularly trying kind. For years together, many firms led a profitless life on the verge of bankruptcy and struggled on amidst what to them seemed hopeless overproduction. But there was no "crisis" either in 1890 or 1893, and toward the end of 1894 things began to straighten themselves out. Nobody talked overproduction in 1895, and the stock exchange once more enjoyed a temporary boom. In 1896 (second half) prices and interest rates recovered, return to normality was the obvious tendency all round. And 1897, although it shaded off into prosperity, gives, on the whole, a very fair idea of what a neighborhood of equilibrium looks like in reality. There is nothing astonishing in the unusual length of this recovery phase.

2. With the more familiar history of the English industrial revolution of that period we will deal as briefly as possible, using what has been said about Germany as a plane of reference. The two outstanding differences should hence be mentioned first. England was a fully industrialized country of accumulated wealth from the start. As far as this goes, her cyclical fluctuations should have been milder than the cyclical fluctuations in "younger" countries, in which bold advance and catastrophic setback are more likely to alternate and credit creation must be resorted to much more. Rates of increase cannot be so spectacular. Moreover, the rise of competitors must affect not only relative but also absolute positions and cyclical situations, if the industrial apparatus has been fashioned with respect to a given state of foreign competition. From the standpoint

of welfare there may be, and generally will be, compensation and more than compensation; but this does not entirely dispose of the argument that nationalists and protectionists began to press during the last two Juglars. In diagnosing English business fluctuations and their result trends, this must be kept in mind.

England also, on the one hand, was a capital-exporting country from the start, and, on the other hand, grew more and more dependent on imperial and extraimperial foreign trade. For both these reasons, her cycles tended to shape in function of foreign business situations and her "crises" as well as financial booms to originate in foreign events. The states of her industrial organism were so profoundly affected by her capital export because, unlike the French and like the German case, a great part of it meant actual enterprise embarked upon in foreign countries. Acquisition of foreign securities, which increased in absolute and relative importance from the beginning of the sixties—capital export to this country being before that time the outstanding item—also acts on commodity trade and hence on industry, but financing foreign enterprise of conationals does so in a much more direct and effective way. From 1875 to 1890 export of capital (and income from abroad) increased strongly and in a relation to cyclical situations which is perfectly understandable.[1] Later, it fell sharply during the last stage of the Kondratieff revival.

Value of exports of British and Irish produce rose from 1847 to a peak in 1874 (after which it fell to 1879, owing to the fall in prices). Under the circumstances this could defensibly be taken as the most important economic fact of the period and the most significant rate of increase. In a sense it was. But it should be observed how readily any such statement lends itself to faulty interpretation: it is tempting to say that, given the situation prevailing in 1842 and Free Trade, such a development would automatically follow, as to trends as well as to fluctuations, and that there is hence neither need nor room for an autonomous mechanism of cycles. Most students would in fact, even if they admit the explanatory value of the latter, list foreign trade and innovation as two separate—though perhaps interacting—factors. Such a view would, however, overlook not only that the increase in exports can only to a minor extent have been due to free trade plus such growth as would have occurred independently of innovation, and that every inch of ground beyond that had to be conquered by what was industrial or commercial innovation within our

[1] See Jenks, Migration of British Capital; Hobson, Export of Capital; Feis, Europe: the World's Banker; also, Clapham, *op. cit.*, vol. II, p. 234. For points of theory, reference should be made to Professor Taussig's standard work on International Trade. The question of the relation of capital export to cyclical situations will be touched upon in Chap. XIII.

meaning of the term, but also that the industrial apparatus of 1842 obviously would have been unequal to the task and that its transformation was a necessary prerequisite for that development of foreign trade, which therefore was but a form and result of innovation acting upon the data created by free trade. In other words, barring the factors of English growth, the upper limit of which is certainly below the rate of increase in population, of foreign growth, and of foreign innovation, England's foreign trade and industrial progress were not two different things, but only different aspects of the same process.

Having previously disposed, however inadequately, of railroads and canals, we will recall their pivotal importance in breaking up old and conditioning new industrial structures—the fundamental fact about cycles throughout the first half of that Kondratieff—and go on to notice developments in shipping and shipbuilding, which, besides opening new outlets for English products, were the chief factor in all the possibilities and realizations incident to cheap food and cheap raw materials—the fall in the prices of which was one of the most outstanding features of the bourgeois Kondratieff and nowhere so important as in England. Apart from the commercial and organizational achievements involved, such as the foundation of big concerns (for example, the Cunard in the early forties), which rationalized shipping and reduced the tramp to a modest role, the main thing was, of course, the iron steamer. Its career brought United Kingdom (registered) tonnage from less than 3 up to more than 8 millions in the period, or approximate carrying power adjusted for steam (see Usher, Growth of English Shipping, *Quarterly Journal of Economics* for May 1928, p. 467) from a little over 4 millions in 1850 to nearly 31 millions in 1900, or shipping cleared in foreign trade (*ibid.*, p. 469) from a little over 2 millions in 1840 to nearly 28 millions in 1900.[1] It established itself in the fifties, quickly crowding out the wooden paddle steamer: the ill-starred City of Glasgow which heralded the innovation was launched in 1850. The steel ship was an achievement of the penultimate Juglar, though attempts in this direction date from the early sixties. Along with it came size, the screw, better boilers, and, with boilers that could stand it, the application of the high-pressure expansion ("compounding") engine, which was definitively successful (though worked out and applied before by John Elder in 1854) in the early eighties, greatly reducing cost of fuel and increasing carrying capacity. Everything else, the long series of induced improvements in particular, is for us of minor importance. The tremendous upheaval caused by this development in all conditions of production and trade may be inferred from the ensuing fall in freight rates.

[1] There were about 900,000 steam tons in 1865, compared with nearly 5 millions of sail, but by 1875 they had increased to nearly 2 millions and by 1885 to about 4 millions.

A few points that are of interest for our subject may be briefly noticed. First, we neither can nor need tell the story of the Great Eastern (iron; paddles and screw; six years from design to launching, in 1858), the great premature innovation in size. Its complete failure, which is not accounted for by any obvious faults in technique or in the commercial idea, is so good an illustration of the nature of the entrepreneurial task and the conditions of entrepreneurial success that it repays careful study. Second, the history of the steel screw steamer equipped with a "compound" engine affords an ideal example of the resistance of the environment to innovation, which is not everywhere so obvious in that period. Silent refusal—stubborn precisely in its lack of motivation—insistence on, and exaggeration of, initial difficulties and blemishes; the setting up of unreasonable standards (the Admiralty in particular surpassed themselves in this); strategic use, for no particular reason, of antiquated rules and regulations; resistence of threatened interests—all these, had we space, could be delightfully displayed to show the realistic virtues of the idea that innovation comes, if at all, by rushes. Third, like the railroad, the steamer was first thought of for carrying passengers and mail, which was by no means self-evident or logical. As it was, the iron steam freighter was a distinct innovation of the third Juglar, made possible by the previous success, in the second, of the iron steam collier. So was the partial conquest of trawling, which ushered in a new epoch in the history of fishing and whaling. And, fourth, the case serves well to exemplify various forms of adaptation by "old firms," some of which are not usually met with. One of them is, however, very regular indeed, though its success in prolonging the life of an "old method" was in this case exceptional.

There are to this day instances in which it would pay to build a sailing ship or a ship so constructed as to be able to use sail when convenient, rather than a steamer, even if all other things were equal. But they are few and cannot have been very numerous in the latter part of our period. What carried English sailing tonnage to its peak (1875) and made the sailing ship survive throughout, was extrarational preference or habit, the existence of shipyards equipped for the purpose, the imperfect economic mobility of seamen who were really sailors and would serve for low wages, the possibility of taking up other, partly new, trade routes when old ones had to be yielded to the steamer—a very good case of "old firms" being gradually pushed back into the dusk. But much more interesting is another type of adaptation which was temporarily quite successful. What the new ship did for English shipping, both qua iron ship and qua steamer, was not only to offer a more efficient substitute for the wooden sailing ship, but also to wake up the producers of the latter. English yards had gone to sleep on the laurels of a bygone

time, and were inferior in performance to American and French yards for at least half a century. Now they tried new designs and several minor improvements, and somewhat shook off the trammels of tradition. They even reacted by an innovation of their own—the "composite" (wood on an iron skeleton), which flourished in the fifties and sixties. The purely iron sailing ship dates as far back as the iron steamer and does not come within the same class.

We will now exclude everything except coal, iron, steel, machinery, and textiles, although this will fatally impair our picture, since our choice of topics excludes not only some of the newest industries, such as electricity—no great loss however in England's bourgeois Kondratieff, although electric light and telephone companies were a feature of the Juglar that culminated in the early eighties—and rubber—this omission deprives us of one of the classical instances of entrepreneurial struggle and entrepreneurial achievement, the case of the firm of Thomas Hancock (first patent for the elastic wrist band in 1820, some success before 1837, vulcanization in 1843, success on a considerable scale in the fifties)—but also removes from our view the changes and petrifications alike in a great number of those medium-scale industries which really constituted the core of competitive society and which are particularly important in the processes of Kondratieff recessions, depressions, and revivals. The loss of the stories of gas, chemicals, cement, beer, paper, and glass is particularly regrettable.

Technologically coal was, of course, the basis of the whole development of that Kondratieff. But the coal-mining industry itself displayed very little initiative. This is not difficult to understand, considering the type of owners and the security of their position: here we have indeed an instance which almost verifies, on the one hand, the idea some economists entertain of the capitalist-entrepreneur and, on the other hand, the idea other economists have of economic development consisting of industry's being drawn along by widening markets, realizing external and internal economies which fall into its lap in the process. It moved along slowly with a considerable lag, and some of the improvements we observe were forced upon it, for example, by the teaching of some inspectors of mines since 1850. As canals had done before, so the railroads widened the area of production, in fact, from the middle of the thirties. The monopoloid position on the Tyneside was thereby broken up and no other could develop, so that competition or rather what we have called a disorganized market ensued, price falling promptly. During the same time coal experienced another type of competition, which was to become very much more serious in our own time. In the same sense in which we can say that a labor-saving device competes with labor, it can also be held that coal-saving devices, more economical machines and furnaces, began to compete with coal. Capitalist development

abroad which made coal—South Wales coal, in particular—an important article of export (excluding coal for use of steamers in foreign trade, the yearly average of exports in the early eighties was over 20 millions, in the early nineties nearly 30 millions of tons) somewhat atoned for this; the severity of the depression of the coal trade in the eighties nevertheless reflects the effects of both kinds of competition, which were of course a much-needed boon for the heavy trades at that time.

The second and third Juglars brought deeper pits, inducing more efficient winding machinery (which in the fifth was improved, among other things, by steel cages and ropes coming into general use), scientific ventilation (the great step in introducing mechanical fans of foreign invention was in the sixties), and better methods of haulage underground. Mechanical coal cutting came in very slowly though a workable machine was patented in 1861. Output per man employed increased, however, by something like 50 per cent, from 1851 (if we start from W. St. Jevons' estimate in The Coal Question, 1865) to 1881, though it declined subsequently.

There was not much progress in coking or in the utilization of heat and by-products, but pig-iron production displayed more initiative of the kind that is of "igniting" importance to cycles. The steam hammer (Nasmyth) definitively conquered in the forties, and the integrated concern, controlling production from the ore to the finished or semifinished article, began at the same time to intrude into a world of medium-sized firms. New ore districts were opened or developed in every Juglar—Staffordshire, Wales, Derbyshire, with Scotland as the new development, were the main sources in the first and second Juglars; Cumberland, Lincolnshire, Northampton, the North East came to the fore in the third, fourth, and fifth; foreign ore in the fourth and fifth—the location of pig-iron making was adapted to changing conditions, and there was considerable improvement in methods of production. The hot blast was known long ago (Neilson, 1828), but took the whole Kondratieff to pave its way into use, against enormous resistance if we can trust contemporaneous observers, such as L. Bell. Utilization of waste gas, which, with the increased temperature it made possible, and with increased size of furnaces, about doubled output per unit of outlay, was first practiced in the Middlesborough district (J. Vaughan). Here we have a definite New Man and New Firm, which in two successive Juglars (the second and third) carried out two definite innovations, and thereby set the standard and enforced adaptation by the Old Firms in the industry for the rest of the period. There is some doubt about the timing of that process of adaptation, some districts resisting more than others. The lessons of prolonged "bad times" were necessary to convert recalcitrants who resisted as late as the eighties. But there is no doubt about that general contour line and about the increase in output which ensued in the Kondratieff depression.

The great new thing in that field, however, was steel. Its career up to the eighteenth century is not an English story, although B. Huntsman and A. Crowley—both genuine entrepreneurs, yet without the following to make them important for the cycle—began production by novel methods, and steel forges in Sheffield were one of the minor features, in the upswing of the first Kondratieff. After the Napoleonic wars, England began exporting. Springs, high-grade tools, blades, and so on were then the only finished products for which it was used, and there the matter (substantially) rested until the time of H. Bessemer. The situation, the man, the kind of achievement, the economic success illustrate in such exceptional purity one of the types that enter into our concept of entrepreneur that much more attention than we can bestow would be desirable,[1] as it would in the similar cases of William Siemens and Gilchrist Thomas. To begin with, though he was called a professional inventor, his outstanding invention can hardly be called a scientific novelty. The use of the air blast for refining and of manganese and, of course, the converter, were old and common knowledge. Real genius, but of the typically entrepreneurial kind, was in the vision of the vast possibilities for *cheap* steel. He applied himself to the task by putting those things together and adding a number of contrivances which eliminated the hitches, altering his "intermediate aims" as he went along. Failure of the method to work with phosphoric iron and also other difficulties seemed for a time to bar progress. As soon as they were removed, mainly by recourse to nonphosphoric ores, another kind of failure came to illustrate the theory of enterprise: hardly anybody in England would buy a license, though some people on the Continent did.

Bessemer now took the line, much more consciously and according to reasoned plan than entrepreneurs do as a rule—and hence in our model—of going straight into the citadel of the enemy, to Sheffield, in order to produce and undersell. There, steel that was good, though not as yet very cheap,[2] eventually saw the light of the market (1858) and was a financial success from the first. The plant of his firm wrote itself off even more

[1] Sir Henry Bessemer's Autobiography makes very interesting reading and is strongly recommended for study. But it must be remembered that in some respects Bessemer, as well as Sir William Siemens and Gilchrist Thomas, was not typical at all. It is not typical to start proceedings by reading a paper to a public audience about what one is going to try. As far as this goes, he belongs to a minority which is as small as it is distinguished. But this should not prevent us from recognizing the fact that, in the respects that matter to us, he is no exception, but only one of the most brilliant specimens of what is an extremely large genus—a genus that includes innumerable humble ones.

[2] Especially for other producers who had to pay for the license. But it was not very cheap for the firm of Bessemer himself, because nonphosphoric ores were comparatively expensive and his productive apparatus was not the ideal of rationality. The superiority of his product as compared with iron rested, at first, entirely upon quality.

quickly than plants do in our "pure model." The immediate victory, however, was gained, not so much over the enemy it had been his intention to attack, but over the producers of wrought iron. Beyond such things as cranks and shafts and the like, there was indeed successful experiment. Bessemer himself and many followers—the phenomenon of the host following in the wake of the innovator stands out very well—were soon trying their hands at rails, ropes, plates for ships. But resistance and the price still limited steel to what was comparatively a modest role during the sixties. Even at the top of the fourth Juglar production of steel ingots was not more than about ¼ million tons, although steel had won out in rails, and foreign (Spanish) ore had come in to fight the rising price of the raw material—this, the consequent change in the location of the industry, and the alliance with smelting constituted, in fact, another innovation that was effective in the early seventies.

The path of the successful competitor of the Bessemer method, William Siemens' open-hearth process, was still more arduous. His regenerative furnace, patented in 1861, technologically successful at Montluçon in 1863, was at first a commercial failure. In 1867, however, the Great Western had its old iron rails converted at Siemens' Sample Steel Works at Birmingham. In the same year, the Londore Siemens Company was formed and the Martins of Sireuil—under license—succeeded with the direct process. In 1868, the London and North Western adopted the process at Crewe. In 1869, the method was worked on a considerable scale in England as well as on the Continent (Verdie, de Wendel, Krupp, and others). But production of open-hearth steel was still not more than 77,500 tons in 1873—it increased to 436,000 by 1882, and to 2,400,000 by 1896, when the Bessemer process accounted for 1,800,000. Final success, powerfully helped by the Thomas-Gilchrist invention (1879), which released the phosphoric ores and, by its immediate adoption, showed how completely the battle of steel had been won, came in the eighties. Until the boom that culminated in 1882, output of puddled iron had—disregarding the depression after 1873—either not fallen at all, or fallen no more than it might in any case have been expected to fall from the quite abnormal peak in 1872. This was due to the fact that steel entered a field which was rapidly expanding and which it expanded still more. In such cases, which in the capitalist process are anything but exceptional, the "competing down" of the old is naturally much mitigated. But from the setback after 1883 the puddler's product recovered no more.

The quantitative effect of steel on the cyclical process of evolution cannot, of course, be gleaned from steel figures alone. The revolution which it wrought and which extended to practically all parts of the

economic organism was much greater than they suggest, because of the increase in the efficiency of steam-driven machinery and of tools in general which it induced: better plates, rails, and structural material, and so on were only a part—perhaps in the end a minor one—of its performance. Whitworth's compressed steel, patented in 1865, began to play a role in the early seventies, Armstrong's hydraulic machinery—elevators, drawbridges, cranes, pumps—put in an appearance in the forties and at the beginning of the eighties triumphed in the field of maritime armament. Ordnance, rifles, small arms, and munitions were all greatly improved in the first and second Juglar, partly under the impulse of American achievement, and entirely new developments transformed the Birmingham industry[1] during the second and third. Woodworking, textile, grain-milling machinery—roller machinery established itself in English flour milling only in the seventies and eighties, a rather belated, though still genuine, innovation—tin-canning and refrigeration, hence food preservation, the sewing machine—practically borrowed from America during the fifties—and other mainly American machinery that in the eighties began to turn bootmaking into a mechanized mass-producing industry, self-acting screw machinery—the use of which, illustrating a familiar proposition about the results of falling average cost, led up to the monopoloid position of Nettlefold and Chamberlain—the bicycle, manufacture of which rose to quantitative importance in the eighties (it was patented for E. A. Cowper in 1868), and a thousand other things that gave the reins to steam were partly or wholly the effect of steel. Of course, all of them remain innovations, including mere borrowings from abroad: they were simply in part conditioned by the steel innovations. Several quite new departures already mentioned—the dynamo, for instance, or the internal combustion engine (the improved Otto engine was a feature of the early eighties)—which, once established, quickly called many new firms into existence, ought to come in for discussion, but cannot.

One other development should be mentioned because of the peculiarities it presents. It is the increase in exactness and standardization, and in the use of interchangeable parts which so greatly improved quality and facilitated mass production at rapidly falling costs. Whitworth (d., 1887), who in many respects followed up the earlier work of Maudsley and, after modest beginnings in the thirties, conquered fame and success in the forties and fifties, was the leader and hero of the movement. Many steps simply constituted ordinary innovations, the individual entrepreneur introducing the improvement and reaping his profit in the

[1] The writer acknowledges indebtedness to Mr. G. C. Allen's work on the industrial development of Birmingham and the Black Country, which represents a type of analysis very important for the understanding of business cycles.

ordinary way, a particularly "pure" kind of profit too, since anyone was able to "work to gauges" or to push a standardized specialty if he wished to. But there was something else. Whitworth himself and his many pupils not only did such things, but also preached them. They were not mere entrepreneurs—some of them were not entrepreneurs at all—but also reformers who taught their ideas as a doctor or a scientist would. If everyone in the trade had promptly listened to them, *there would have been no profit and no crowding out or competing down.* As it was, progress went on largely through the influence of associations and exhibitions, and on a much broader front than is usual with innovation. The case thus illustrates that turn in our theoretical discussion (Chap. III) at which we envisaged the possibility of profitless advance and prosperityless cycles.

The textile industries, the standard example of competitive capitalism, did not boil over with individualistic initiative quite so much as one might expect. Although they did not behave like coal mining, they conform very closely to our idea of an established industry running along an established path. Their great expansion in the period is due mainly to favorable conditions not of their own making—though, of course, not independent of innovation in other sectors—and many improvements were offered to them or forced upon them from outside. The theory of "external economies," though not really satisfactory even in this case, may well have some subconscious roots in the observation of this pattern.

The woolen industry derived a new impulse from the innovations which drastically reduced the price of wool from the forties on—for Australian and, toward the end of the period, La Plata sheep farming was itself an innovation and induced by other innovations (progress of ocean transport). It derived another impulse but, in part, also experienced competition from the success of what was not quite a new substitute, but became a very effective one—shoddy, use of which was the outstanding innovation of the time in the field of utilization of waste products. This gained ground somewhat subterraneously but quickly, also from the forties on, although it had already been the object of adverse comment soon after the Napoleonic wars. Both impulses had an awakening effect, and the great technological innovation of the age, the wool-combing machine, was an immediate success (Heilmann, then, perhaps independently, Donisthorpe and Lister in 1851; improvements by Noble and others followed quickly). This entrepreneurial achievement was a feature of the second Juglar and centers in the personality of Lister, who mechanized, on a royalty system, wool combing all over Europe. Since the method was highly labor saving and since the product presents as close an approximation to the perfectly competitive pattern as we can hope to find in industry, we have here, assem-

bled for us in a practical case, almost all the characteristics which went into the construction of the fundamental and simplest form of our model.

The only other innovation that we must mention, the mechanical condenser, also came in during the fifties, but met with much greater resistance. The innovating period, in which a minority of leaders took it up, was in the sixties. The old billy was being crowded out in the fourth Juglar, although it took a long time in dying. In some cases this was due to the fact that efficient machinery in this field often is a minor consideration: in the production of fancy goods, for instance, design and clever marketing are of so much greater importance that it often does not pay to bother about technological perfection. Examples are frequently met with in all textile industries—there are even now branches of the silk trade in which taste, a flair for the logic of fashion, and the knack of being in the market a fortnight before the others will spell success which the most ideally equipped firm may be powerless to attain. But mainly the explanation is in the presence of many small or medium-sized firms which were inefficient but unencumbered and could muddle on indefinitely. The hand jenny and the hand loom persisted for the greater part of the period and even toward the end of it there seem to have been firms which used not only antiquated power machinery, but no power machinery at all. Worsted was much more progressive and became well mechanized in the fifties. The jute industry also developed to quantitative importance in the second Juglar. There is little paradox in calling it the one innovation of note that occurred in the field of *linen*. Silk lingered on. The hosiery and machine-lace industries expanded vigorously in the Kondratieff downgrade.

American raw material and falling cost of transportation propelled the cotton industry. It stood in need of such incitement. Its first achievement in the period was not an innovation but an adaptation—completion of mechanization, the weeding out of wooden machinery, and so on. Even the self-actor was still in the innovating stage in the early sixties and did not conquer until the early seventies. The improved hand mule survived still longer in the finer counts, on the low wages of old people. Really new was the combing machine, which was introduced in the fifties. The American ring spindle featured in several Juglars successively, but did not win out until the end of the period. Still, there was entrepreneurial activity, and the competing-down process within the industry never ceased: the turnover of families and firms, the "vertical mobility of labor," was considerable throughout that Kondratieff and even afterward, and output per head more than doubled (according to von Schulze-Gaevernitz, The Cotton Trade) during the period.

A closer analysis than can be presented of the course of cyclical phases in England would be very interesting and would also afford a series of instructive exercises in the application of our model to patterns that differ widely from each other and display to very different degrees the influences of external factors on the complex organism of an "old" capitalistic country. The first Juglar, dealt with before, is the only one to admit of a simple diagnosis. We date the rise of the second, as Professor Spiethoff does, from the beginning of 1852. The influence of Californian (1848) and Australian (1851) gold must again be kept in mind throughout, because it must be held responsible for certain abnormalities in the market rate of interest—the failure to increase promptly at the beginning, in particular—and partly for the intensity of the rise in prices, the Australian gold also for the additional stimulus it gave to English exports, notably of consumers' goods. All this—and the Crimean War (March 1854 to March 1856) which, though the (roughly) 70 millions of expenditure it entailed were to about 50 per cent covered by taxation, exerted some inflationary influence—prepares us to expect a crisis of more than usual severity. The impulse imparted to exports and imports by the change in institutional data—the introduction of free trade—acted in the same direction. The economic process cannot be described in terms of railroadization only, but the 4,000 miles added during the Juglar probably represented an investment of not much less than 150 million pounds and were certainly by far the biggest individual item, especially if we add investment in foreign, particularly American, railroads, which made the situation sensitive to the fate of the latter. But as we have seen above, other innovations, in shipping—and, partly incidental to this, the development of oversea markets—in the iron and textile industries and expansion induced thereby, particularly in coal mining—output of coal rose from 34,000,000 tons to 66,645,450 in 1856—were of equal or greater importance in the explanation of the recession which, clearly due to the impact of the new products, set in by the middle of 1854 and lasted through 1855. During 1856, however, the war asserted its effects in producing a hectic boom which disturbs the picture. It broke in the following year, when the tide of depression was running strong. The year 1858 presents the regular features of depression, and 1859 and 1860 present those of a regular recovery.

The third Juglar, 1861 to 1869, is of course distorted by the cotton famine and other repercussions of the American Civil War.[1] Steel began to count, and so did various minor things, for example, cement, but in the main it was a textile wave that started. A great wave of flotations,

[1] Mr. Thorp aptly expresses this, (*op. cit.*, p. 165) by describing the years of the prosperity phase and of incipient recession by the heading, *uneven prosperity*. The cotton famine itself presented no other features than those which one would expect.

wrongly attributed to the Company Act—it set in before and the outburst of 1863, 1864, and 1865 merely marks a boom that could have occurred without it—gives a general idea of the range of innovating activity, mining and cotton manufacture leading in 1860 to 1862, and hotels, land, and buildings in 1863 to 1865[1] but, much more than this, an idea of how far such excesses travel from the contemporaneous economic processes that really matter. Flotations of foreign government loans also began to play a leading role: first sign of an approaching rentier stage? Now, a setback in cotton and the aspect of the money market—though not employment; here the expected effect was perhaps merged in the fluctuations caused by the cotton famine—indicate the advent of recession in the second quarter of 1863. Depression was delayed, owing to the stimulating effects of the cessation of hostilities in this country, and did not come before the beginning of 1866. But until then promotion and stock exchange speculation were booming. Financial malpractice went to lengths not previously experienced in this Kondratieff, not only with promotors, but also with established concerns, several railroad companies among them. By August 1866, over 200 companies were in liquidation and, as in 1847 and 1857, the Bank Act had to be "suspended" under what had by then nearly become routine conditions. The sorry tale of fraud and foolishness need not detain us,[2]

[1] *Cf.* H. A. Shannon's most interesting paper, The First Five Thousand Limited Companies, *Economic Journal* for January 1932.

[2] The failure of the company that, on the basis of a very reticent prospectus, had been floated to take over the business of Overend, Gurney and Co., on May 10, 1866, which did not start the crisis but the panic, deserves a passing remark, however. The Gurneys were a Quaker family in the woolen trade of Norwich and took up bill broking in the last quarter of the eighteenth century. They came to London at the beginning of the nineteenth and built up a most solid, regular, and conservative banking business to about 1850. Then, in the hands of a new generation (H. E. Gurney and D. W. Chapman) the house drifted into what was euphemistically called financing business, mostly, it seems, by way of accepting equity interests for unrepayable loans, in the hope of getting rid of them by means of floating companies. The leading partners, more strenuously devoted to their pleasures than to their business, very likely did not fully realize what the firm was doing. And still more likely is it that they, too, believed in prosperity plateaus (see W. T. C. King, History of the London Discount Market, 1936, p. 242, *et seq.*).

Two further remarks suggest themselves. First, the Gurney firm became, once it had drifted into financing industrial enterprise, no doubt the kind of thing which we tried to visualize when discussing the French and German banks of the *mobilier* type, and thus made itself guilty of a mortal sin against the spirit of English banking. The true charge, however, is not in this, but in their inability to acquire sound propositions. As in every single one of such cases (from John Law on) it was not the "system," not the use of short "funds" for long purposes as such, which brought disaster. Any storm of this kind that firm would have been able to weather. That formula is inadequate and fastens upon a secondary element of the case. The real trouble was that the iron works, shipping ventures, and so on which their agents had procured for them, were no good. Second, the case

but one point is of interest. Apart from the doings of what has aptly been called the financial underworld, there was no obvious reason why the breakdown should have been as severe as it was. That whole Juglar is, to be sure, within the Kondratieff recession, but no industrial or commercial facts are known to the writer to account for it—pig-iron production made a new record[1] in 1868, which year, together with 1869, makes a fairly normal revival phase. The inference is that promotion and speculation played, more than they usually do, a causal role. But there is more danger of exaggerating than of overlooking this.

The fourth and fifth Juglars are inscribed to steel. As regards the former, it is necessary to recall, on the one hand, that innovation merely "ignites" and that quantity is added by the secondary processes and, on the other hand, that steel means more than another commodity would—in particular it meant new machinery, a new type of ship, and so on. As regards the latter, the quantitative importance of steel is so obvious as to make that reminder unnecessary. In both cases, but especially in the first, textile developments and many minor ones counted for much. But again, and more than ever, foreign enterprise and capital export were among the main features of the situation. International finance had, by the end of the sixties, grown to new dimensions. Foreign government loans then enjoyed an increasing popularity with the investing public which they had not enjoyed before, and a technique developed of handling such transactions on a large scale, many of which were of a

---

not only illustrates well how the mechanism of a crisis works in detail—every plan of reconstruction, however plausible at the moment, being disavowed the next day by further shrinkage of values—but also one more type of third-generation incapacity which leads into such predicaments. One, at least, of the partners may be assumed to have had misgivings when it would still have been possible to take losses resolutely and to save the house. But he seems to have been unable to muster the energy that would have been required in order to take such a course, and to have deluded himself with hopes, perhaps also to have yielded to representations, and to have hesitated. The writer could not prove every word of this, but such is his impression. If it was so, the case enters into a very large class. It is mostly in this way that such things happen. They happen even if foreseen by the actors in the drama. Small men can get themselves, at times, to survey a situation as a whole and to diagnose it correctly. It takes a personality of unusual power to act on such diagnosis. The opportunity may be taken to mention that companies of the *crédit mobilier* type were a feature of that Juglar. They did not call themselves banks, however. Some were serious, for example, the General Credit and Finance Company of London, founded by an Anglo-French group of standing in 1863. Others were not, such as the Credit Foncier and Mobilier of England, the foundation of Grant alias Gottheimer, and more than half a dozen others.

[1] This is the main reason why we date as we do. Mr. Thorp, evidently influenced by the state of the cotton industry, labels 1868 as depression. He further mentions "extensive unemployment." It was, in fact, greater than in 1867 but only by ½ of 1 per cent, and smaller by 4 per cent than in 1858. Professor Spiethoff dates prosperity from the beginning of 1869.

doubtful nature from the start or became doubtful as soon as borrowers realized how easy it was to get new money in order to pay for the old. The importance to England of foreign business and political conditions increased proportionately. Our sketch amply proves that it would not be correct to attribute her cycles to repercussions from abroad; but her manias and crises were to a considerable extent conditioned by them. This is all that we need to add to what was said about 1873 and its aftermath in the case of Germany. Fundamentally, the diagnosis is the same —England, too, had an industrial revolution to liquidate. Many other points, such as the building boom from 1869 to 1872 and the excesses of speculation, were also present in both cases. But England suffered much more from the American crisis. And the ensuing depression and the conditions in the eighties displayed, as stated before, the influence of German competition.

The prosperity phase of the fourth Juglar covers 1870—as in Germany, a short upset occurred in the financial world when the war broke out—1871, and the first half of 1872. Recession was cut short by the panic on the stock exchange, the passing of which but served to show up the underlying industrial situation. Again we find that most observers speak of unrelieved gloom lasting through 1879, and in a sense this is entirely justified. But the same explanation and comment apply as in the case of Germany. And only the fact that in such cases swimmers often drown in sight of land—that epidemics of failures sometimes recur from no other cause than that most moribund firms do not immediately collapse but first hold out for a year or two—prevented revival from asserting itself in 1878. The following year brought substantial improvement. In 1880 begins the prosperity phase of the fifth Juglar. Owing to its position in the Kondratieff, it asserted itself, as in Germany, so weakly that the year is not generally recognized as one of prosperity, although it is by Professor Spiethoff and although the new impulse in the steel trade is obvious.[1] That phase lasted to the fourth quarter of 1882. Recession and depression then covered almost exactly two years each. Before the Juglar embarked upon the latter, there were failures and generally a state of things which might easily have turned into a crisis. If none ensued, this was primarily due to the sobering and solidifying effect of the decline of prices in the preceding prosperity. Output increased most of the time, and 1887 and 1888 were years of recovery of the normal type. Iron and steel were active enough for Professor Spiethoff to label 1888 as a year of prosperity.

[1] Mr. Thorp speaks of rapid improvement, first quarter, checked by fall of commodity prices. It is submitted that this statement, as the one occurring in the comment on 1873—expansion checked by high money rates—implies a theory and does not simply formulate observation. We disagree with both, although we admit the historical association.

Undoubtedly, 1889 and 1890 were such years. They form the prosperity phase of the last Juglar, in England as in Germany, a Juglar of odds and ends that mainly summed up and completed. Some of its features, not covered or not quite covered by this statement, should be added. The great developments of the following period, in electricity and chemistry in particular, already began to show. The shadow of the approaching building boom is also discernible. From 1894 onward, there was large investment in breweries and distilleries which, by 1898, the first year of the third Kondratieff, carried them to the front rank of English industries. Revival brought a considerable boom in bicycles, which culminated in 1896, a typical case of recovery quantitatively fulfilling the promise of possibilities created before. The new gold discoveries and the outstanding innovation in the production of gold, the cyanide process, asserted themselves, among other things, in greatly increasing exports to South Africa. The picture of the surface of affairs was much influenced by a violent boom in South African mining (1895), followed by a still more violent one in Westralian mining, during which 81 Westralian companies were floated (April 1896), while between Mar. 1, 1894 and Sept. 30, 1896, 731 Westralian gold-mining companies emerged, offering nearly 76 million pounds of capital for subscription. In this connection, one more innovation requires mentioning, if only to remind the reader that it was an innovation in our sense, or rather, a series of them. After having consolidated the bulk of South African diamond mining into the De Beers Company, Cecil Rhodes in 1889 organized the British South African Company, which was to found Rhodesia. Here political and business action become rather hard to distinguish. The foundation of the De Beers Company, as well as the combination of the Deep Level Mines on the Rand into the Consolidated Gold Fields was undoubtedly an enterprise in our sense. But Rhodes was also for a time prime minister of the colony, and many of his actions and plans transcend the business sphere as distinctly as does Dr. Jameson's attempt to innovate by means of a raid (1896).

Export of capital had greatly increased from 1885 and again in 1890, after which it rapidly shrank to 1895. Again we observe the prominence of the borrowing by foreign governments of doubtful standing, assiduously patronized by even the best of financial firms. The deeper meaning for the economics and the sociology of capitalism that is sometimes attributed to those transactions does not concern us here. But they landed the prosperity phase of this Juglar in a financial panic of which it has been rightly said that it was over before the public had become aware of it. There was plenty of reason, independently of any untoward event, for a fall in stock prices—that phenomenon was due in the ordinary cyclical sequence. But it was accentuated by the fact that the firm of Baring

Brothers, which enjoyed a position and looked back on a past in many respects similar to that of the Gurneys in 1866, had tied itself up in Argentine securities it had failed to place while carrying on a large short-time banking business and holding millions of deposits against its simple acknowledgment. In order to meet prosperity demand in the regular business, it had to liquidate its security holdings, and then, on Nov. 8, to appeal to the Bank. The latter had recently, by means of a more active policy, strengthened its hold on the market and was perfectly able to render assistance. Leading city men were in a "blue funk," some of them almost hysterical; but on the advice of Goschen, a guarantee syndicate was eventually formed, enabling the Bank of England to guarantee in turn the liabilities of Baring Brothers. The firm was reconstructed in due course, and no panic or panicky restriction ensued. The case is as illustrative of certain shortcomings of the financial machinery of capitalism as it is of the kind of thing that can be really handled by central bank action.[1]

The Juglar recession of the years 1891 and 1892 was overshadowed by that shock. Although English pig-iron production, which had been 8.3 millions of tons in 1889, fell to 6.7 millions of tons for 1892, this is only what we should expect, and the same applies to the increase in unemployment and the fall in prices. Not much was wrong with the industrial and commercial organism; but the losses on securities were tremendous and persistent, in international securities hardly less than in 1873. It was from the financial sector, therefore, that the darkest hues of the picture came. Depression set in by the middle of 1893 and again it was the link of international finance which both anticipated and intensified symptoms: the crises in Australia and the United States probably account for as much of a crisis in England as there was. Revival came strongly in the summer of 1895 and ran its course to the end of 1897. Money was very easy throughout—in the year of depression, 1894, the open market rate in London fell to 9/16 of 1 per cent, and in 1896 3 per cent consols reached 113½. The years of revival display results and conditions of the bourgeois Kondratieff at their best. Hardly

[1] Governor William Lidderdale seems to deserve full credit for the change in the policy of the bank mentioned above and the consequent power for remedial action. But as regards the action itself which was taken in the emergency, the Goschen Papers (see Life of Lord Goschen by A. D. Elliot, 1911, vol. II, pp. 170, *et seq.*) make him look a good deal less heroic than some admirers would have him look. He seems to have lost his nerve and to have appealed for help to Goschen, then Chancellor of the Exchequer, who very properly refused any state aid and coolly indicated the way to a solution. Credit for the success seems to be largely due to him. The "preposterous" which occurs in his diary by way of comment on that application, characterizes to perfection the attitude of an officer of state in the time of intact capitalism, as do his admonitory speeches about that time. Moreover, refusing help is often the best method of helping.

any other period gives us as good an idea of what, economically and sociologically, the immanent tendencies of capitalism really are.

3. We have seen that, for the United States, a history of the cyclical process could, in the period of the second Kondratieff, be written almost exclusively in terms of railroad development. Inserting immigration of capital and men—about 14 millions immigrated, from the end of the Civil War to 1900—harvests, and the Civil War, we would get practically all the fluctuations and trends there are. By 1897, "net capital" of the railroads stood at $9,168,072,000 (a little over $50,000 per mile in operation). Everything else turned on the roads and was either created or conditioned by them, and large-scale financing found its main object in them. But we must not exaggerate. The railroads did not teach Americans capitalist methods and attitudes. These, as well as large-scale industrial enterprise, existed before. Nor were the industrial processes of the period mere adaptations to, or exploitations of, the conditions created by the roads. Scarcity of labor and wealth of natural resources presented problems and conditioned achievements of their own. These—efficient labor saving machinery, in particular—became characteristic of American innovation, which no longer internationally lagged but increasingly began to lead during that Kondratieff. We must, however, confine ourselves to a few points which will help to round off the picture.

In that environment which contained no large, antiquated structures it is not easy to find decaying industries. Whaling, which steadily declined (with one short interruption) after the sixties, is, however, one. It affords a good example of the mechanism that draws resources toward new goals. Shipping in general reflects, apart from coastal, river, and lake shipping, the same tendency. During the first two Juglars, in the days of the clippers and also during the fifties, the American merchant marine had almost defied competition in the Atlantic trade. But it lost much of its ground during and after the Civil War, in spite of many attempts and in spite of subsidies. This was not due to any shortcomings in shipbuilding, which was more progressive than the English and repeatedly competed successfully even as to price. America simply turned away from the sea. We will merely note that in the construction of the wooden sailing vessel America was supreme, and that this was a feature of the prosperities of the forties and fifties.[1] The iron steamer, also the iron sailing ship, was being successfully built in the prosperity

[1] Tonnage built in the United States rises, with very well-marked Juglar fluctuations, around an approximately straight-line trend until the Civil War (peak, 1855). The trend from 1860 to 1914 can be well represented by a catenary, the upgrade of which after 1890 about balanced the downgrade to 1890. In 1914 begins ascent to the all-time peak of the World War.

of the fourth Juglar (John Roach and Son, Cramp and Sons), and shipbuilding was conspicuous by precedence in the processes that started the fifth—in fact it was active already in 1877. In the fifth and sixth, the all-steel ship established itself and the triple-expansion engine put in its appearance. Colliers, tankers, greatly improved coastal and river steamers, after 1890 battleships, also continued to give employment, and in 1891 one of the greatest yards of the world started launching (Newport News Shipyard and Drydock Co.).

Coal mining, though perhaps to a greater degree the object of active enterprise than it was in England, was more pushed along than pushing. Developments of new districts, availing themselves either of existing or *ad hoc* created new transport facilities, constitute in the American case definite innovations and contribute to definite prosperities. For anthracite this was true before our period—an outstanding instance being the Lehigh Coal and Navigation Company—bituminous coal first featured in the forties, during which steam began to push out water power—a process more characteristic of that Juglar than railroads were. Coking did not play any role and was done in very primitive ways until the prosperity that preceded 1873. Then it developed in the Connellsville field, producing mainly for the Pittsburgh district. Production spread and went on growing during the depression and made a big stride in the prosperity of the penultimate Juglar. The census of 1890 enumerates 13 districts. But to the end of that Kondratieff (and beyond) the wasteful beehive oven prevailed.

The use of petroleum for other purposes than lighting is, like electricity, a "carrying" innovation of the next Kondratieff, and was in the incubating stage during the second. "In 1878 a vaporizing device for burning a residuum of petroleum and coal tar in conjunction with superheated steam was tested at the Brooklyn Navy Yard. Nearly nine years later, an oil-burning locomotive · · · was reported to represent the first practical application of this fuel to land transportation. The following year oil was used at the plant of the North Chicago Rolling Mill Company." (V. S. Clark, *op. cit.*, vol. II, p. 517). All sorts of applications were experimented with and by-products gained rapidly in importance (gasoline, lubricants); but none of them was a major feature of entrepreneurial activity during that period.

Petroleum for lighting purposes was one of the great innovations—a New Commodity in our sense—of the second Kondratieff, and all the features of an innovation of this type stand out very well.[1] It had

[1] Petroleum for lighting and petroleum for other purposes are really two different commodities. This is well illustrated by the behavior of the price. While petroleum was used mainly for lighting, *i.e.*, almost exactly from the beginning of its career to 1894, the history of its price is explainable by means of the schema: initiating stage, diffusion,

been used occasionally before, but wells were first drilled in 1859 (drilling and pipe lines were the two great innovations of the period). In the very limited field it entered, it first competed out kerosene (made from shale and coal) as well as other illuminants (for example, whale oil). Later it had to meet gas and electricity, which eventually competed it out in turn. Quantities, prices, profits behaved in the process as we should expect. The first wave of this innovation starts in—and helped starting, of course—the prosperity of the third Juglar. As a result, there were 194 refineries by 1865, mostly in Ohio (the biggest enterprise being that of Rockefeller, Andrews, and Flagler), Pennsylvania and New York. The expansion thus induced went on in the Juglar downgrade and revival, powerfully propelled by the discoveries in California, the price of refined and still more of crude petroleum falling accordingly. Pipe lines and tank cars also emerged at that time and consumers' resistance was speedily overcome. The regular situation of the Juglar downgrade led to the organization of the Continental Improvement Company (1868), which developed into the South Improvement Company (1872). The fifth Juglar then brought the completion of the organizational innovation that was to set the outstanding example for other industries,[1] the Standard Oil. It remained a "trust" for a decade only, and independent refineries continued to exist. But the ideas of the centralized management of an industry, of running it as a unit according to a plan, and of acquiring control of some of its conditioning factors—railroads, in particular—persisted.

Gas was also a major element in the entrepreneurial activity that carried the second Kondratieff—though it had a much more important previous history than had petroleum—and similarly completed its career substantially within the period. In England gas is reported to have been first used for lighting a house as early as 1792. Boulton and Watts' installation at Soho (1804) made it widely known. London began using it in 1807, and most of the larger cities followed suit in 1816–1819. In this country Baltimore adopted it first, in 1816, New York in 1823, Boston in 1828; and there were many other installations previous to the

absorption, and with well-marked cyclical fluctuations it fell as we should expect. Then its price began to rise according to a new law expressive of the new uses. Similarly, two branches of the smoothed curve of output can be distinguished, though the break does not stand out so clearly.

[1] In 1884 it was followed, though on a much lower level of efficiency, in the cottonseed oil industry (American Cotton Oil Trust), which never really conquered. In 1887 the Southern Cotton Oil Company was founded, a many-plant concern which was to play a great role in the industry. The cotton-oil case is particularly interesting because of the complications and changes in the competitive position of the product. Cyclically, it was important throughout the last three Juglars. Its innovating stage was in the late sixties and early seventies.

crisis of 1837. But it was in the forties that the first great wave set in. The process lasted into the seventies—the westward expansion of the country continuing to supply new objects, though in the East it was substantially completed by the end of the first Juglar, when coal gas also began to supplant gas from rosin and whale oil. Municipal initiative and regulation, naturally much concerned with this commodity, accounts for the deviations of investment from the cyclical schema. Prices were still high for the private household, partly because of the discrimination in favor of the public consumer (the city rate in Baltimore was, for instance, in 1848 $1 per 1,000 cubic feet, as compared with $4 for private consumers). The great difficulty which hampered enterprise at the beginning, the lack of an adequate meter—there were many inventions for the purpose made before—was definitely overcome in 1843. Until 1872, gas was distilled from coal—a process that was to regain importance when markets had been found for the by-products—but in that year water gas was patented. This innovation, although introduced in Philadelphia the year after, entered upon its career in the eighties. Carburetted water gas was successful in warding off the attack threatening from kerosene, and the Welsbach mantle (preceded by the Bunsen burner, 1855, and the Lungren mantle, 1881), in deferring defeat by electricity for about a decade. In the fifth Juglar, also, gas began to invade other uses besides lighting. There was a considerable development of gas motors, gas stoves appeared in 1879, circulating-tank water heaters in 1883 (the improved Ruud heater came in 1897).

Another competitor arose, however—natural gas, which had been used for lighting before our period (Fredonia, New York, 1821) and had conquered considerable ground in this capacity. It had sometimes a price advantage over manufactured gas and always other advantages which made it preferable for industrial use. This began in the boiling of salt brine in West Virginia (1841), but the first important case was its use in Pennsylvania iron works in 1873. The first pipe line of any length (pipe lines of over a thousand miles are a postwar development) was opened in 1875. The big wave of this innovation was an important element of the penultimate Juglar and culminated in a boom in 1886. Its importance from our standpoint consists in the fact that it shifted industrial location, newly creating several centers, and powerfully affected the coal situation in Pennsylvania, Ohio, Indiana, and Kansas. But production of the wells of that district then rapidly declined. We will add here that the great increase in the use of natural gas about 1908 accounts for the break in the curve of sales of manufactured gas that occurred at that time.

Technologically, iron-ore mining was a simple affair; nor does its progress call for any comment. It was, however, the object of entre-

preneurial activity in two ways. First, there was the task, absent in other countries, of exploring and developing a district before mining operations could be started. Northern Minnesota (1884) may serve as an example. Transport questions and new commercial combinations attended the development of the Lake Superior districts: the Marquette range in the second Juglar, the Menominee mines in the fourth, the Gogebic mines in the fifth (1885)—the Mesabi mines belong to the next period. Second, there were organizational innovations in the eighties and early nineties, some horizontal combinations, which for the greater part failed—the Lake Superior Consolidated iron mines, 1893, however, was also (primarily) a horizontal combination, although it owned its ships and linked up with the railroad interests of its shareholders—and the vertical ones which arose from the intrusion of the steel concerns. The competing-down process was, to a great extent, geographical. We have seen that this was so in many other cases and that it explains certain features of American cycles and certain local result trends: it is essential to notice that this rise and decline of industrial centers is part of our cyclical mechanism. The case in hand presents, of course, one of the most familiar instances. Migration of the iron industry from New England, New York, New Jersey, and Pennsylvania (which as late as 1880 produced nearly half of the 4 million tons of iron then put out) to the Central Western states and to the South was in part conditioned by ore and coal developments. Output of the Lake Superior district increased roughly from 1 to 9 million tons between 1870 and 1890. Together with the ores of Alabama and Tennessee, the Champlain ores and imports from Spain (also from Greece, Asia Minor, and Cuba), it brought price down to roughly one-third during that time.

This rapid shift of the centers of iron production was one of the reasons why from the time of the Civil War there was, even in prosperity, so large a percentage of idle furnaces, which is thus seen to have nothing to do with any inherent tendency to overproduction or overcapacity. The furnaces in the districts that were being competed down simply did not disappear at once. But there was also rapid technological obsolescence during the last three Juglars: up to 1850, when the drop bottom came in to facilitate the handling of the cupola furnace, there had been hardly any change since colonial times. Charcoal furnaces had to go, though they did so slowly.[1] Coke and bituminous coal furnaces adopted the same improvements that were being introduced in Europe—the introduction of the fuel-saving regenerative stove was one of the most important of them—and grew in size and efficiency. This is the reason for the failure of attempts made after 1873 to limit output by agreement: the up-to-date

[1] The writer has been told that in Germany the last charcoal oven was laid off in 1896. But this can only have been a solitary instance of chance survival.

firms were perfectly able to produce at a price which fell, with fluctuations, from 1872 to 1897. The great stride in absolute quantities (not logs) was a feature of the penultimate Juglar. It becomes still more impressive if we consider that by then the iron-saving effect of the use of steel had already asserted itself.

In spite of the fact that the fundamental principle of the Bessemer process was independently discovered in this country (W. Kelly, 1851), introduction of this process was one of the achievements of the prosperity which preceded 1873. Only eight firms had adopted it by 1875, though a few other Bessemer plants—running into the depression with their period of gestation—were then being built. Other novelties came at the same time, but the open-hearth process was not among them. It was still an innovation in the last Juglar, when the Homestead works took it up (1888). The same applies to the Thomas-Gilchrist process, although the license for America had been bought in 1881 by the Bessemer Steel Company.[1] Alloys (chrome and nickel steel) put in an appearance in the seventies and eighties, but more effectively in the last Juglar, in which also the Harvey armor-plate process was developed in works built for the purpose. Steel casting was then greatly improved. Scrap was coming widely into use as a raw material of the steel industry.

Organizational innovation may be instanced by the two outstanding cases. The first Bessemer plant in Pittsburgh was the Edgar Thomson Steel Company, in the foundation of which the iron-manufacturing firm of Carnegie Brothers took a leading interest. This was the first of a series of conquests (Homestead, Union Mills, Duquesne) which in 1891 culminated in the foundation of Carnegie Steel. An equally comprehensive structure of the vertical-combination type had by then been erected in the Illinois Steel (1889 or 1891, since it grew to full size in the latter year). The Colorado Fuel and Steel dates from the same epoch. Consumption of iron and steel reached a cyclical maximum in 1890. Then a decline set in which eventually issued into the crisis of 1893, in which 32 failures occurred to the end of June, among them the failures of concerns so considerable as the Philadelphia and Reading Coal and Iron and the Pennsylvania Steel. In itself, this does not show more about the nature of that crisis than do the railroad failures; but taken together with what has been said before, it seems to justify the diagnosis

[1] The picture of the cyclical rhythm of innovation could, of course, be much improved if space allowed going adequately into the history of iron and steel production. For instance, puddling was, till the end of the seventies, competing with the Bessemer process. During the fourth Juglar, its position was strengthened by two inventions which deserve notice. The Ellershausen process and Dank's puddling mill (John Fitz, 1857) spread during the sixties, its superiority over the English two-high mill mainly resting on American labor conditions. There were half a dozen other improvements in rolling about the same time.

that that crisis was the "abnormal liquidation" of positions which had become inadaptable in the course of an evolution that primarily centered in iron and steel.

Tools, mechanical objects of use, and machinery are among the things which it is very difficult to quantify and the importance of which would not be adequately rendered by quantity even if we could quantify them. The importance for the cyclical process and for the resulting trends of that bold originality which characterizes American achievement in this field and to which European industry owes so much, is obvious but hard to follow up in detail, because it covers a wide surface and because it consisted much more in devices to make things work economically and efficiently, than in spectacular "invention." Export statistics reveal, by the sixties, how very wide that surface was and how far it extended beyond what had become American specialties, such as sewing machines and agricultural implements. Locomotives and "unspecified machines and other iron and steel products," taken together, were more important than either. A few instances must suffice. Though "quantity" came in the downgrade, foundations were laid and leading innovations introduced in the upgrade of that Kondratieff—as has been observed by Professor Kuznets (Secular Movements in Production and Prices, p. 27).

Cyrus McCormick's invention is usually dated 1834, but he himself tells us that his reaper got into really workable shape by 1845.[1] Innovation—the "carrying into effect"—was an element of the second Juglar. Induced improvement and diffusion contributed to all the other Juglars up to the organizational innovation which occurred in the last (foundation of the American Harvester, 1890). Other steps in the mechanization of agriculture—some have been mentioned before—could readily be inserted.[2] Still more than in other cases, the fact of—and the reason for—progress going on in cyclical jerks is evident.

The sewing machine (invention by E. Howe in 1846), produced in its practical form by the Singer concern in 1850, also was one of the innovations of the second Juglar, and had already become an international

[1] There is some doubt about priority. Hussey, according to his statements, definitively succeeded in 1847, but may have had worked out all essentials before 1845. See L. Rogin, Introduction of Farm Machinery, 1931, and the review by W. T. Hutchinson in the *Journal of Political Economy* for June 1932.

[2] Improved tools began to replace the old spades, hoes, and rakes at the beginning of the century. G. Wood's plough (1819), J. Deere's rolled-steel plough (1849), and Pennock's seed drill (1841), satisfying obvious and urgent wants, found their way into use along with very many other devices. Corn planters and hay forms came in after 1860; 1868 brought Appleby's twine binder; after 1870 a sort of combine was used in the Pacific states. The industry of farm implements had risen to considerable importance by 1850, trebled value of output to 1860, and quadrupled it again to 1890.

success in the third. Except for its application to bootmaking, to be noticed presently, its effects on the system were different from those of the majority, and similar to those of a minority, of innovations. Since it can be used by the individual worker, it did not in itself induce the regular competing-down process, though it wrought a revolution in efficiency. Specialized forms of it, facilitating increased division of labor, did, however. We may proceed to notice some of the industries of metal consumers' goods in which innovation consisted in successful standardization, specialization, and mass production—locks (New Haven), clocks and watches (also Connecticut, and Waltham, the dollar watch competing successfully all over the world), and small arms (for example, Colt) were all in their innovating stages either in the first or in the second Juglar and became established in the next one. The pioneer concern in the field of watches, the American Watch Company, struggled with the problems of mechanical watchmaking in the fifties—1857 found it insolvent—but was highly successful in the sixties, when the host began to follow (New York Watch, National Watch, in the next Juglar: Illinois Watch, Rockford Watch, to mention a few). Typewriters reached the manufacturing stage about 1873. No notice was taken of them in the census of 1880, but there were thirty factories in 1890.

Woodworking and metalworking machinery (circular saw, revolving-disk cutting machine), Blanshard's copying lathe, Sellers' planing and bolt-screwing machines, the milling machine and the turning tool, wood screws, precision gauges, nuts and bolts, the dry-clay brickmaking machine, Blake's machine for stone breaking, the continuous-feeding printing press, the typesetting machine (working indifferently in the sixties), great improvement in boiler making, the Corliss engine, later the Porter-Allen engine for electric dynamos—all that this medley stands for had, with few exceptions, its initial struggles and successes in the Juglars of the Kondratieff upswing and its diffusion in the Kondratieff downswing and revival, as we should expect. Quantitative importance in the cyclical mechanism is certain, and in the cases, frequent in New England, in which this type of industry formed the core of industrial agglomerations (the cases in which the Marshallian speaks of external economies), even obvious. Large concerns emerged (Axe and Edge Tool, 1889; National Saw, 1893). The principle was the same in all cases. It consisted, even, in applying labor- and power-saving devices to the production of labor- and power-saving devices themselves. Everything was subordinated to cheapness. Where wood was cheaper, it was used. Painting was preferred to polishing. Englishmen called these machines flimsy. But standardized mass production was the result. Very few branches remained unaffected. Cigar making was one of these.

We will choose the boot and shoe industry as an example for the revolutions which machinery wrought in consumers' goods industries during the second Kondratieff. No machines were used in the American shoe industry[1] before our period, though in some towns a fairly advanced division of labor had turned to good account the ample sources of the raw material and the developed practice of tanning. Wooden pegs for fastening soles were used, however, from 1800, and in 1820 a peg-cutting machine was introduced. The rolling machine for hardening sole leather, 90 times as fast as hammering by hand, came in 1845, and the Howe sewing machine as such meant a step in the mechanization of the industry, since cloth uppers were much used for women's shoes as late as the eighties. Its adaptation to upper leather sewing (1851) is said to have quadrupled the output per man. The same year brought the machine that pegged around a sole in one minute. A number of other innovations were introduced in the course of subsequent Juglars, in fact about 4,000 patents were taken out between 1850 and the end of our period. The most important was the McKay sewing machine (1858; practical success in 1860), which is still used on two-thirds of the total output of shoes, and on nearly all women's shoes. This innovation then induced the "avalanche" in the Kondratieff downgrade—a truly typical case in this as in another respect, for the nature of entrepreneur's profits is well brought out by the practice, then established, not to sell shoe machinery but to lease it.

By 1895 there were 4,000 McKay machines in use, turning out about 120 millions of pairs. They had been improved in 1867 and are said to have reduced costs of sewing on soles from 75 to 3 cents a pair. The Goodyear welt-sewing machine (invented in 1862), which became practical in 1877, was 54 times as fast as welt sewing by awl and needle. But its success was a matter of the last Juglar, and within our period it did not get beyond 25 millions of pairs (1895). The Cable screw bottoming machine for heavy shoes (1869), the heel-building machine (1870; by 1889 there were 200 establishments in this country producing heels only), the standard screw bottoming machine (1875), which is still used, substantially complete the story for our period. We will, however, add that the success of the lasting machine, the feature in shoemaking of the first Juglar of the third Kondratieff (in general use by 1900, though patented in 1882) increased output per workman twelve times at least. The net fall in monetary labor cost which that list of innovations brought about from 1850 to 1900, was from $408 per hundred pairs to $35. There was no further reduction after 1900. Horsepower installed increased from about 3,000 in 1869 to about 50,000 in 1899.

[1] The writer wishes to acknowledge the help derived from a study made for him by Dr. E. M. Hoover on technological developments in that industry.

But the number of wage earners employed increased steadily until 1923.

The cyclical behavior and the resulting trends in the major textile industries is not, as in England, completely described by the schema of an established industry that expands with the environment, innovating moderately in the process.[1] But some of its traits are present[2] in the cases of cotton and wool, the former of which was, of course, also propelled by the development in the production of its raw material. Worsted, though experimented with in the thirties by the Lowell Company, was practically a new industry. Not much success attended its beginning in the first Juglar, but it got into its stride as one of the major innovations of the second. Combing was then done by hand. The combing machine, although invented, was not yet a success. After the Civil War the Lister comb came in, and even in the eighties this machinery was largely imported. Expansion of the worsted industry was a feature of the last three Juglars of that Kondratieff.

As regards cotton, the impulse of innovation came—apart from migration to the South, which first became important in the eighties—from machinery. In this respect the case would be analogous to that of the shoe industry, were it not for the fact that textile men had a much larger share in the evolution of their machinery than had the shoe manufacturers. They displayed much more initiative in ordering it and they took a hand in producing it,[3] although the production of textile-mill machinery as a distinct industry dates from the beginning of the century. In Worcester, Paterson, Lawrence, Fall River, and Philadelphia this specialty, and all the specialties within this specialty, had risen to considerable importance in the downgrade and revival of the preceding Kondratieff. This simply continued on an increasing scale in the forties

[1] Though the few facts we are going to present are within the range of the most common knowledge, the writer wishes to acknowledge obligation to Professor Arthur Cole's standard work on the American Wool Manufacture.

[2] The reader will, it is hoped, excuse the pedantry and observe again: It is always possible and perfectly sound analysis to explain the expansion of an industry by an appeal to Growth in our sense, in this case also to such external factors as immigration of men and capital. It is also permissible, in dealing with any single industry, to include within the phrase, expansion of environment, innovation outside of that industry, although this phrase then does not any longer connote a single distinct process. But it is not permissible to take expansion of environment in the latter sense as a full explanation of the development of any individual industry as far as this development implies changes in production functions elsewhere.

[3] The Lowell group in particular, besides producing textile machinery for their own mills, from the first also sold to other people, to whom, as we have seen in the preceding chapter, they also offered sites and water power, thus exerting a function of leadership for which there are not many parallels. But by the sixties its role had almost become a matter of history.

and afterward. Technological development in the cotton industry itself lies between the two great specifically American innovations, the introduction of ring spinning (invented in 1828 or 1831), which spread in the period, and the Northrop battery loom (successful by 1894) which properly belongs to the third Kondratieff. The eighties were the time when Fall River flourished, although it lost its iron industry. Many interesting incidents, for example struggles between different methods of production,[1] should, if space permitted, be noticed in that process of expansion. But it went on almost uninterruptedly and there was no vision about it of possibilities differing in kind from what, at every step, actually was. In this sense it is true that the great things had by then been done. There is, hence, much less reason for us to stay with the case than there would be for the purpose of general economic history. Investment does, as a matter of fact, cluster in prosperities and contributes to them, but they are in this period, from the standpoint of this industry, independently given "conjunctures" with which it swims but which it does not initiate by its own operations.

In the downswing and revival of the Kondratieff came the great expansion of output, and in the depressions, particularly those of the middle seventies and the middle eighties, there were losses, failures, shutdowns, complaints about overproduction. One point about these spells of bad business merits attention, *viz.*, the fact that they impinged with so very different a severity, not only on different districts—the astonishingly great difference in wages, taxes, costs of power and raw materials might account for that—but also on different firms. In 1883 for instance, when "overproduction" began to show itself, some firms were losing and restricting, others paying high dividends and working overtime (the young worsted industry was booming). From this we may infer that in spite of the standardization of mills—which also was one of the major novelties of the period—there was a good deal of difference in the production functions (including commercial combinations) of individual firms, which was due to inconspicuous innovations of the type that a Kondratieff downgrade is apt to induce. In consequence, costs probably differed widely and a competing-down process was running strongly. If this be true, it would follow that there was nothing in the general outcry about overproduction—those crying out, simply, who were not able to keep the pace and whose concerns were being made obsolete—although the surface presented a picture almost ideally conforming to the conceptions of the theory of overproduction.

[1] See M. T. Copeland, The Cotton Manufacturing Industry of the United States, 1917. In spinning there was not much that was new after the third Juglar; Wade's bobbin holder, an important progress in spooling, came during the fourth, however. No major changes occurred in bleaching and printing.

The woolen industry suffered from the price of its raw material, and although consumption of wool nearly doubled from 1870 to 1890, there were few major new developments. The Goulding condenser (1826) had come before; the Crompton mule was applied to the production of cashmeres and woolens from the beginning of our period; in 1841 a new loom for carpet weaving was invented (E. Bigelow), which, improved and developed in various directions, practically started an important carpet industry that, after its innovating stage in the fifties, expanded throughout the period; an invention for card cleaning was made in 1853; the seventies saw the transition from the spinning jack to the mule. Shoddy, cotton mixtures, progress in dyeing, and, of course, the great innovation of ready-made clothing (victorious in the fourth Juglar)—all lent their help. The industry felt crises, particularly some of them, such as the one of 1857, very acutely—more acutely than the writer is able to explain. Behavior in the Kondratieff downgrade and revival as compared with the behavior in the Kondratieff prosperity is according to expectation.

In the last three Juglars, but particularly in the last one, production of fertilizers (phosphates) made considerable strides. The dogged survival of the use of charcoal in the production of iron led to the distilling of the timber and to the production of acetates as a by-product—an innovation of the penultimate Juglar, as was the production of soda by the Solvay process. Manufacture of sulphuric acid on a large scale begins with the third. The stories of the American sugar refining industry, which, for the time being, culminated (1887) in a combination that controlled 90 per cent of the production, and of the American Tobacco Company (1890), highly interesting though they are, cannot be dealt with here. Nor can developments in the industries of glass (tank furnaces were an innovation of the last Juglar), cement (Portland cement—innovating stage in the fifth and sixth Juglar), paper (new uses: paper collars, paper carwheels; new processes: mechanical and sulphite pulp, successful in the eighties), and rubber (rubber boots, rubber reclaiming; substantial consolidation in U.S. Rubber Company and Mechanical Rubber Company, both 1892).

But we cannot, as we could in the case of England, pass over the beginnings of the electrical industry. Both names and investments are too big for that. Since, however, the former are so familiar, we can confine ourselves to noticing, in passing, the type of entrepreneur to which they belong and of which they are among the best instances.[1] Since

[1] Again, one may greatly clarify one's ideas about the problem how development is generated by the capitalist system, by a perusal of F. L. Dyer and T. C. Martin, Edison, His Life and Inventions, 1910. For one type of difficulties, see vol. I, Chap. XIII, A World Hunt for Filament Material. For an instance of comprehensive vision, Chap. XIV,

the first Morse patent was taken out in 1840 and telegraph lines extended as far as Pittsburgh in 1847, the commercial history of electricity actually dates from the beginning of that Kondratieff. Telephones began their career in 1877, when A. G. Bell floated a company for the exploitation of his patent, adopting the policy, similar to that of the McKay shoe machinery concern, of leasing the instruments. Percentage increase of telephones connected was very rapid in the prosperity of the penultimate Juglar, then slackened to 1895. In 1897 over 500,000 were installed (as compared with 20,200,000 in 1930). An electrical equipment industry—motors, electric wiring, and so on; not exclusively telegraph and telephone appliances—produced, according to census, values of 2.7 millions in 1879 and of 92.4 in 1899 (not including machinery and supplies made in establishments belonging to other industries). In the latter year, kilowatt-hours produced were a little over 3 billions; in 1930, 96 billions.

Electric current for light and power dates really from 1882, when Edison's hydroelectric station in Appleton, Wis., his thermoelectric station in New York, and the one in Chicago went into operation. By then, the Edison Electric Light Company (1878) and the American Electrical Company (later, the Thomson-Houston Company; E. Thomson in 1886 patented electric welding) were already in existence; and electric light, according to the principle of C. S. Brush, had been installed in a few cotton mills and in San Francisco. The arc lamp and Edison's incandescent lamp then competed with each other. In 1886 W. Stanley constructed the first station using alternating current. Problems of transmission were being solved. In manufacture, electric power was coming into use, especially in cotton mills, from 1882. This established all the fundaments of the technique, bore down resistance, and prepared the great development that was to follow and to turn revival into a Kondratieff prosperity. But quantitatively it did not signify. Only traction did. Here the name of Sprague should be mentioned. After a number of more or less experimental ventures, an electric tram service was installed at Richmond in 1887; then this innovation spread rapidly. In Massachusetts, for instance, 1,400 miles (including sidings) of overhead trolley street railways were constructed from 1890 to 1897 (see E. S. Mason, The Street Railways in Massachusetts).[1]

A Complete System of Lighting. For a delightful illustration of entrepreneurial psychology, the story of the failure of the New Jersey ore venture, retold in F. W. Taussig, Inventors and Money-makers, 1915, p. 17. The reader's attention is called to the latter book which expounds many points relevant to our subject in a masterly way.

[1] Trams in general were substantially an achievement of the second Kondratieff—the bus was one of the downgrade of the first Kondratieff. In Philadelphia, for instance, the

Not only the technological but also the financial and organizational bases were laid during the last two Juglars. The Edison Electric Light and the Edison General Electric (1889) were successful and had a number of subsidiaries, some of them abroad. Then there were the Westinghouse and the Thomson-Houston concerns. When the latter coalesced with the Edison General Electric (General Electric, 1892, capital 50 million dollars), which by that time, at Schenectady and elsewhere, employed over 6,000 hands, a concern emerged that controlled practically all the more important patents, supplied 1,277 stations and 435 traction companies operating nearly 5,000 miles—in itself a powerful engine of economic revolution.

Since we sketched the course at the Juglars when describing railroad developments, and since we have so framed the above comments on American industrial history as to make it easy for the reader to insert innovations in their proper places, we need not now add a detailed survey but only a bald calendar. With the qualification mentioned, we take 1843 as the first year of the first Juglar, its prosperity lasting until the middle of 1845, its recession until the end of 1847, its depression covering 1848, and its revival, 1849, 1850, and 1851. The prosperity and recession phases of the second (1852 to 1860) ran from the beginning of 1852 to the middle of 1856 (irregularities making it difficult to distinguish between them); depression lasted to the end of 1858; and 1859 and 1860 make up the recovery phase. The rise of the third Juglar is blurred by, and uncertain because of, political events, and so is its course. We simply count it from 1861 to 1869, on the strength of the aspects of the period 1867 to 1869, which seems to conform to our idea of a revival as modified by those external factors. The prosperity phase of the fourth Juglar (1870 to the middle of 1879) covers 1870, 1871, and the first half of 1872; the recession phase, the second half of 1872 and 1873; the next three years form the depression; and 1877, 1878, and the first half of 1879, the recovery phase, the beginning of which was still under the clouds of the preceding storm. The fifth Juglar covers the period from the middle of 1879 to the end of 1888. Its prosperity lasted to the middle of 1881; recession, from the middle of 1881 to the end of 1883; depression covered 1884 and the greater part of 1885 and was followed by more than three years of recovery. The sixth Juglar (1889 to 1897) illustrates our proposition about the irregularity of panics or crises. The course of things in the last quarter of 1890 and the first half of 1891 interrupted and distorted what, nevertheless, we consider as the prosperity phase

---

oldest companies received their charters in 1857 and there was an outburst of promotions after 1858. Horses and mules were used until 1885, then the underground cable. From 1893 on, trams were electrified. In financing, holding companies began to play a role during the fourth Juglar.

of that Juglar. The rest of 1891, 1892, and the first half of 1893 make up the recession; the second half of 1893, 1894, and the first half of 1895, depression. Revival then set in—and symptoms shaded off, by the end of 1897, into a new prosperity—but 1896 interrupted its course, though in a way which can be satisfactorily accounted for.

E. The First Sixteen Years of the Third Kondratieff (1898–1913).—The sixteen years preceding the World War—analysis of the events of 1914, very interesting in itself, would not throw any additional light on our process—cover a little more than the prosperity phase of the Kondratieff, the whole of its first and about half of its second Juglar. An application of our schema which involves, as it must in this case, speaking of a Long Wave that is still incomplete, will no doubt seem hazardous, to say the least. The future course of events may entirely fail to justify the hypothesis that this implies. But evidence tending to justify it will presently be submitted, and we shall also have the opportunity to test it by confronting the expectations that follow from it with postwar facts. For the moment, it is sufficient to agree that a significant "break in trends" occurred about 1897—few people will deny that; there is even not much doubt to cloud the exact date—and to state our thesis that what caused it was once more an economic revolution, analogous in every respect to the "industrial revolution" of textbook fame and to the other revolution, which was wrought by railroads, steel, and steam. By speaking of still another economic revolution we are not departing from prevalent opinion—hardly even by making it the basis of our analysis of the cycles which occurred during the period—for the New Industrial Revolution has become a very common phrase by now. Again we observe the tendency, noticed in the case of the first Kondratieff, to apply that phrase to the downgrade—which in this case, since the war dominated all things while it lasted, practically means the postwar period—rather than to the span which is the subject of this section. To do this is right and wrong in the same sense in which it was right and wrong in the other case, and not only does not contradict our view, but in one vital point actually lends support to it: for the reason why more of "revolution" is found in the postwar period is precisely that results show more obviously in the downgrade than they do in prosperity, exactly as they should according to our model.

In the same sense in which it is possible to associate the second Kondratieff with railroads, and with the same qualifications, the third can be associated with electricity. In order to see this statement in its true light, it is necessary to observe, first, that it refers to ignition only and does not imply that all economic changes of our period are due to electricity—growth and the phenomena of the Secondary Wave would in any case have to be added; second, that quantitatively very

important developments were either simple continuations, or continuations induced by the impact of the new things, of the innovations that carried the second Kondratieff; third, that electricity was not the only new thing and that several others of first importance were as independent of it as the new shoe machinery was of railroads; finally, that electricity, though an innovation in our sense—the same sense in which railroads were innovations in the second Kondratieff in spite of the railroad boom of the thirties—yet has had, as we have seen, a previous industrial history going back to the forties, while its history as an invention goes back to Volta at least. It seems idle to ask whether the importance of electricity was greater or smaller than that of steam.[1] It has certainly created new industries and commodities, new attitudes, new forms of social action and reaction. It has upset previous industrial locations by practically eliminating the element of power from the list of determining factors. It has changed—rather, is changing—the relative economic positions of nations, and the conditions of foreign trade. Only a small fraction of this, however, asserted itself in the sixteen years under discussion, although all the fundamental conquests and extensive investments were then made, and all the bases were laid. Not before 1908, completely not before 1914, did installations of power, even in this country, spell the victory of electricity. Immediate cost advantage was at first small, in many cases negative—as it was, for example, in the case of the all-steel ship—and reciprocating and similar steam engines kept often more than their own, a most interesting case, in its complexity, of reaction to innovation. Even in lighting, electricity was expensive, and the difficulty arising from the necessity of supplying current for disproportionately great peak loads, hence at a low percentage of average utilization, was overcome but slowly.

1. For want of a more adequate label, we will speak of the Neomercantilist Kondratieff. Few will deny that the social atmosphere characteristically changed about the late nineties, though not everyone who recognizes that change will be ready to grant the claims we make for the "symbolic" year 1897, and most people will also agree with the proposition that those changes were of two kinds—the one represented by such symptoms as the recrudescence (as we should say from the stand-

[1] Professor Kuznets, whose opinion is entitled to our greatest respect, considers it to have been smaller and includes this estimate among the instances by which he illustrates his tendency toward retardation of industrial growth (Secular Movements in Production and Prices, p. 29). But the saving in the cost of power is obviously no adequate measure of the contribution of electricity, though we shall quite agree with him in looking upon this as a relevant measure of part of it. However, his remark refers to data of 1907 and neither that nor any other contribution of electricity had by then shown its true dimensions, any more than textile machinery had by, say, 1807. Results do not show in Kondratieff prosperities.

point of the typical political attitude of the times of the second Kondratieff) of protection and the increase in expenditure on armaments, the other by such symptoms as the new spirit in fiscal and social legislation, the rising tide of political radicalism and socialism, the growth and changing attitudes of trade unionism, and so on. Both kinds of changes asserted themselves differently and at different times in different countries. In America (Dingley tariff, 1897) protectionism meant little more than another victory of a tendency that had been present from the first; in England, no more than a slow change of public opinion on the subject of free trade. The new Labor party in the English Parliament did not at first count greatly, but all the more significant was the change in the attitudes of what was still known as the Liberal party that manifested itself after Sir Henry Campbell-Bannerman's victory in 1905 and produced old-age pensions instead of the reduction of the income tax, the "people's budget," and unemployment insurance. In Germany the power of the Social Democratic party increased, expenditure by municipalities began to be a serious matter, and the social insurance item rose to 1.1 billion marks in 1913, while in America there was little of all this beyond social legislation in some states (Wisconsin) and a general hostility to "big business," satisfied for the time being with prosecutions under the Sherman Act and regulation of utilities. Whatever we may think of the importance or unimportance of immediate economic effects, looking back today, it is impossible to mistake the significance of these symptoms of a changing attitude toward capitalism.

The deepest problem of the economic sociology of our epoch is whether those tendencies—for our purpose we have a right to speak of two—were not fundamentally one, and whether they grew out of the very logic of capitalist evolution, or were distortions of it traceable to extracapitalist influences. In Chapter XIV this problem will again cross our way. For our present purpose the following comments suffice. First, those tendencies, whatever their nature, sources, and relation to each other, hardly asserted themselves strongly enough in prewar America to have to be listed among the main factors that shaped American economic history. The Cuban war—and what Europeans loved to call American Imperialism, in general—conditioned not unimportant innovations, but it is here assumed to have had no great influence in distorting any cycles.

Second, in the case of Germany, the only way in which those tendencies asserted themselves significantly was in expenditure on armaments. Since this was mainly financed by taxation and genuine savings—the German central authority, unlike the individual states, borrowed freely—it certainly diverted toward consumptive purposes sums that otherwise would primarily have financed additional investment, for we must

remember that that expenditure coincided with a Kondratieff prosperity in which savings are promptly spent. Hence, it made Germany poorer than she would have been otherwise, and her money market still tighter than we should expect it to have been in any case during a Kondratieff prosperity. Symptoms of this show clearly enough in the difficulties the government met with in the bond market. But precisely because of this, no stimulating effect on the rising tide of prosperity can have been exerted by that expenditure—cycles were substantially what they would have been without it and resulting trends in quantities were, during the prosperity phase of the Kondratieff, probably not much affected, although that diversion of resources might have told in the subsequent phases, had the effect not been lost in the upheaval of the war.

The case of England, third, was different. Both actual burdens and anticapitalist attitudes were such as to make it impossible to dismiss *a limine* the hypothesis that they may have had something to do with the fact that England did not take part in that prosperity as vigorously as the other two countries did. We shall briefly return to this in our discussion of the postwar period. Meanwhile, it should be added, for the comfort of those who abhor any such statement, that for our purposes there is very little practical difference between it and the much less objectionable proposition, that social radicalism and decreasing energy of entrepreneurial activity are interdependent and that both of them are but symptoms of the same deeper cause. The Boer War, vigorously as it was financed in accordance with English tradition, would, however, account for some deviation of the course of events from that in the other two countries, quite plausibly until the year in which the Campbell-Bannerman government took office.

Of the multitude of facts that these remarks are intended to cover, some at least must be mentioned explicitly. English and German war budgets—for all budgets from 1899 on were to all intents and purposes war budgets and the World War could have been, and to the knowledge of the writer actually has been, at least in one instance, predicted from their figures alone—were the main, though not the only, factor to cause gold currencies to work with increasing friction, in spite of the, roughly, 7,000 tons of gold that were produced from 1898 to 1910. The phenomenon, so obvious in the postwar period, that the world grew out of humor with gold because it told unpleasant truths, became first observable then. Advocacy of the gold exchange standard, actual policy that tended to conform to its principle, an almost bullionist struggle for gold,[1] in Germany also the "reform" of the bank act (1908)

[1] This alone suffices to reduce to modest proportions the autonomous influence that gold can have exerted on business situations. The behavior of the English Bank Rate, which after 1897 was steadily over 3 per cent, is conclusive evidence in this respect.

were some of the symptoms. More immediately important in their short-run effects on capital movements and currencies, however, were other shadows of the approaching war. The Moroccan and the Bosnian crises had a powerful influence on the structure of international financial relations, though on the surface this showed more clearly in other countries than in our three—for instance, in the Austro-Hungarian Monarchy. The Russo-Japanese war, the post-bellum policy of Japan, and the revolution, the armament and the railroad development in Russia, loading respectively the English and French money markets with large commitments to loans that could not be relied on to produce corresponding productive assets, added to the strain, which no doubt was eased by the increase in gold production. Finally, whatever we may think of the intra- or extracapitalistic origin of some of the tendencies, so pregnant with human suffering, that then began to assert themselves, there cannot be any reasonable doubt that the capitalist evolution of the previous Kondratieff now produced, as one of its rationalizing effects, what the writer personally considers—without being able to go into the reasons—to be the most obvious symptom of the decay of a civilization, a fall of the birth rate in the upper strata of society. In the case of Germany this was associated with so rapid an increase of wealth and economic welfare that emigration practically ceased.

2. American agriculture has to be listed among the industries which added important developments on the lines chalked out by the innovations of the second Kondratieff. Since some of the problems of the agricultural depression of the third will have to be taken up in the chapters on the postwar period, we will here merely recall the agricultural conquest of the Far West, completed by the end of the century, improvement of agricultural machinery (big threshers and combines for instance), increased use of gas engines—light tractors came into use in the first decade of the century; 3,000 were sold in 1914—the beginning use of electric power—total horsepower employed rose by 32 per cent from 1899 to 1909—and rapidly increasing consumption of fertilizers (from under 2 million tons at the beginning of the period to over 7 millions in 1914; no correction need, for that time, be made for variation in plant food content). All of this increased wheat acreage by about one-third, as between the average of the last decade of the second and the average of the first decade of the third Kondratieff, and also yield per acre. Cotton increased its acreage still more and similarly displayed increase in yield per acre. German agriculture contributed, in spite of important strides on the road of technological improvement (the great new things however worked themselves out in the downgrade after the war), very much less obviously to the processes of that Kondratieff prosperity. But it profited by it, and was put in a position to do so to the full by greatly

increased protection of grains and meat (Bülow duties), which, though injuring not only the masses, but also wide sectors of the peasantry and even some types of large-scale agrarian enterprise, induced an increase of acreage east of the Elbe, partly on poor soils, that was in some degree responsible for the difficulties after the War. Though complaints never ceased and legislation and other favors, particularly as to credit, were always clamored for, the state of German agriculture as a whole was, according to any ordinary standard, flourishing throughout those 16 years. Developments in England, although extremely interesting from other standpoints, do not present any features that would have to be noticed from ours.

3. The last installment of railroad construction, a typical instance of completing development on established bases and in part merely the reflex of the sharp rise in net earnings which set in during 1897 and continued until 1911 (with peaks in 1904, 1907, and 1910—this is a systematic series in our terminology), contributed substantially to the prosperity phase in this country, very much less, even proportions guarded, in Germany and England. In America about 70,000 miles were added and "net capital" increased from a little over 9 billions in 1897 to 15⅓ billions in 1913. There is thus reason to speak of another railroad boom—secondary phenomenon though it was, in spite of its quantitative importance—and to remind the reader of the meaning of this way of fitting things together. Ignition and quantitative importance do not necessarily go together. Quantitatively or statistically, the processes of every cycle are always contributed to by the completion and the working of the inheritance of preceding evolution, even as they hand over their own contribution to the next cycles. If, on the strength of ideas formed by the pedagogical simplicity of our "pure model," the reader should find anything in this to contradict the principles of our analysis, then the writer has, in spite of all repetitions, failed to convey his meaning. All he can do about it now is to recommend that the reader carefully reflect on the case in hand.

The "induced" or "completing" character of railroad achievement during that time shows not only in construction—in the commercial nature of the new trackage and the fact that it was largely built in response to existing demand within an existing framework—but also, and still better, in other elements. The great clearing of the ground that the crisis of 1893 and its aftermath had effected, brought control over many roads into new hands. New types of men took hold of them, very different from the type of earlier railroad entrepreneurs. Some of them were not entrepreneurs at all, but simply efficient administrators. According to Mr. H. Jerome's index (Mechanization of Industry, 1934) "product" per man-hour in steam railroad operation rose from 104

(base, 1890) to 138.9 during the period 1895 to 1910. The new administrations improved tracks and roadbeds, raised horsepower installed (between 1899 and 1909) from roughly 21 millions to roughly 45 millions, accepted improvements in safety devices, began to accept automatic train control and mechanical stokers, new types of locomotives and cars, and thus evolved the railroad service that since has come to be looked upon as a matter of course, though many of these things—the electric and the oil-burning locomotive, in particular—did not spread until the postwar downgrade.

As far as the new men (no need to mention the familiar examples) were not administrators, they were organizers and financiers. In both these respects, 1893 had indeed left many problems. The situation may even be said to have set a definite task to which the financial groups that had carried out the liquidation and reconstruction, and the executives they had put into power or accepted, now applied themselves. This task was one of consolidation in a very comprehensive sense of this word and it implied, in many cases presupposed, consolidation in the particular sense of combination, amalgamation, and merger. What the public and the political world saw and felt about was, on the one hand, the creation of new economic positions invested by the imagination of the man in the street with a power that was both immense and sinister and, on the other hand, the spectacle of financial maneuvers and of the struggles between financial groups that offered as much food for the prevalent propensity to gamble as for moral indignation.[1] Since it is these aspects which still dominate the economic historiography also of the industrial "merger boom," it is necessary to point out that for us the latter means something which the public mind either did not realize at all or entirely failed to link up with those financial operations: new production functions, reorganization of large sectors of the system, increase of productive efficiency all round. Mergers must, therefore, be listed among the innovations that carried that prosperity.

4. Of course, consolidation was not a new phenomenon. Railroad systems, in particular (in England we have met them as early as the forties), had been built up before, and industrial combination had begun in the sixties and been a feature of the late eighties. New, however, were the scale, some of the methods, and, to a certain extent, the meaning. In all cases, whatever the legal garb (which however soon conformed, in the holding company, to the economic nature of the thing)

[1] Neither that attitude of the public mind and the discovery by the politician of its political possibilities, nor actual measures taken (prosecutions under the Sherman Act, the Hepburn Act, and so on) are relevant to the purpose of this study. They are however important for the sociology of capitalism and, in particular, of the rise of that hostility which today prevails in the public mind.

those mergers meant new units of control, new principles of management, new possibilities of industrial research, and, at least eventually, new types of plant and equipment—also, new locations—intended to achieve, often built to exceed, the absolute optimum of known, if untried, technology. The productive capacity that was thus created and could not have been created without them ranks high on the list of the factors that explain the torrent of products that broke forth in the postwar part of the downgrade. It is hence not correct to call those combinations monopolies simply,[1] without adding that they were monopolies of a special kind, very different in theory and practice from the genuine case. What such combinations, provided they go far enough, might mean for the mechanism of the business cycle has been pointed out, under the heading of trustified capitalism, in the third chapter. As a matter of fact, however, the course of events in the period under discussion and its statistical picture hardly bear out the expectation—quite defensible in itself—that the cyclical movement would be substantially altered by their policies. This statement requires the following qualifications, which do not, however, invalidate it: individual prices were frequently deflected (those of steel rails, for instance) from the course they would otherwise have taken, though this did not amount to more than what combinations of the same or different type (cartels and so on) had done at all times; the combinations frequently included firms which otherwise would presently have been competed out of existence, and thus may be said to have provided a method for the elimination of the obsolescent elements of the system that obviated the death struggle by anticipating its results. Once formed, the giants in some cases, though not in others, threatened the life of outsiders—both new and old—also in other ways than by their technological and commercial superiority.[2]

Difficulties arise in some cases in settling who the entrepreneur was. In the two outstanding instances in the railroad field, all the criteria

[1] That is, however, precisely what is done and what has been done from the first. Compare the Petition of U. S. Government *vs.* Northern Securities Company *et al.*, quoted in 193 U. S. 197, 255. The Attorney General did not take account of any other aspect than the "monopoly" and the danger of "the entire railway system of the country" being "absorbed, merged and consolidated." It has been pointed out before that this attitude was specifically American and that, in Continental Europe at least, that argument would have entirely failed to arouse sensation.

[2] That superiority has often been denied. It is, of course, true that mere size is not necessarily an advantage and may well be a disadvantage. Judgment must turn on the merits of each case. But statistical evidence to the effect that smaller concerns often do better than the giants should not be uncritically accepted. The smaller concerns may *now* often be in the position of the new, and the giants in the position of the old firms in our model. It is held above that the big concerns (there may be exceptions, of course) implied technological and organizational improvement when they were founded. It is not held that they retained their advantages until the present day. Our theory would in fact lead us to expect the contrary.

were present in the two leading men (Harriman and Hill). One of them was as much an organizer and reformer of administrative routine as he was a stock exchange leader. But this combination of aptitudes only serves to show how rare, with this kind of innovation, must be the cases in which one man can be said to have been "the" entrepreneur. The industrial function which amalgamations fulfilled was in most cases entirely divorced from the task of bringing them about. Yet that traveling salesman who turned into a promotor of combinations was no mere financial peddler, though he probably understood little and cared less about anything except a profitable deal in industrial properties. In some cases, bankers played a leading role, although one must be careful not to overrate the initiating importance of an agent whom negotiations place in the limelight. The Mercantile Marine, which, among the transactions of first importance, came nearest to being a bankers' venture, was no success. The steel combine was almost exclusively determined by the dominating position of the Carnegie concern and practically dictated by its head. The average banker's contribution was a subordinate one and consisted mainly in forgetting what banks exist for in capitalist society.[1]

[1] The capitalist agglomerations of the period, the mergers and their financial sponsors, will by many be considered as the very incarnation of *Finanzkapitalismus* in the sense of R. Hilferding. They will be interpreted as a new stage of capitalist exploitation, closely linked to Imperialism—capitalist groups (the "capitalist class") conquering, by concerted action, the productive apparatus so as to be able to wring the maximum of surplus value from the masses (also, which Marx himself did not stress, by exploiting them as consumers), and to subject to their control government and politics, in order to secure protection of the home market and enslavement of the working classes, then to go for, say, Cuba, in order to provide opportunity for capital, which restrictive policy at home would make redundant, and to open new sources of surplus value by the more primitive methods of exploitation possible in more primitive environments. This is a rough statement of the Neo-Marxist theory of the imperialist stage of capitalist evolution, which has certainly the merit of having attempted to visualize the facts of a historic epoch from the standpoint of one great principle. Since the cyclical process is not an incident but the whole of what is specifically capitalistic in economic life, it would really be our duty to enter upon a discussion of that theory, and either to accept it or to develop a theory of our own, elements of which are, in fact, implied in the construction of our model. But this cannot be done within the frame of the present work, into which the device of operating by means of "external factors" has been introduced precisely in order to exclude those deeper problems and to concentrate attention on a more restricted task. If, of course, financial groups *as a matter of fact* did wield control over production and politics of the kind and to the extent that that theory presupposes, it might not be possible thus to restrict our discussion. And in this sense, it can be said that we have not really succeeded in skirting those questions, but are implying a definite answer to them, namely the answer that the rule of the financier over industry, still more over national politics, most of all over international politics, is a newspaper fairy tale, almost ludicrously at variance with facts. But so far as we need this proposition in order to justify our *modus procedendi*, it is largely established by our analysis of industrial evolution.

The movement started in 1898, immediately after recovery from the troubles of 1896. The year 1899 saw it in full swing, especially in iron and steel. The big events came in the first years of the century; then 1907 called a temporary halt. The policy of the Union Pacific may serve as an example from the railroad field, which will at the same time contribute to the understanding of the crisis of 1907. Obviously it was no mere attempt to secure a monopoly position as such—which, as must have been clear to anyone, could never have been exploited in the sense of the classical theory of monopoly price—or simply financial piracy, but an attempt to build a system so circumstanced as to realize maximum economy, and to make it yield surpluses *through this increase in efficiency*. The way was found barred at the very beginning: the most important link in that system, the Chicago, Burlington, and Quincy, had been conquered by the Northern Pacific and the Great Northern. By this transaction the "collateral trust bond"—not new in itself—came into prominence. The buyers of the stock of the Chicago, Burlington, and Quincy handed it to the Northern Pacific and the Great Northern at a price almost 50 per cent above what it had sold for before the buying began, and this price was paid in bonds that were issued by these two companies and then gradually sold to the public.

In other cases, we will add at once, corporations were formed for the purpose of acquiring controlling parcels and issuing their own stock or bonds against them. This is the American form of a method of acquiring industrial control, which in the time of giant units became quite general, though it nowhere else went to the same lengths, and nowhere else so directly produced new industrial structures. The German form differed mainly by virtue of the role of the *crédit mobilier* banks. But some of the institutions that were called "special banks" in Germany were fundamentally nothing else but such holding companies, while the great industrial concerns, in the electric industry for instance, though in a more conservative way, lived and worked on exactly the same principles as their American relatives. For reasons too obvious to detain us, there was much less of all this in England, the English banks in particular keeping much more firmly to their ideas of what a bank should be. These things are familiar. But it is important to realize how they fit into our schema of entrepreneurial activity and the cyclical mechanism. *Control* is an empty phrase. It acquires meaning only in connection with the particular purpose for which, and the effects with which, it is acquired and exerted (compare the analogous proposition about credit creation or saving).

When, as stated, the Union Pacific interests saw the road blocked, they tried to unseat the blockaders by acquiring a controlling parcel

of the Northern Pacific itself. What strikes the observer is not this move as such, but the absolute disregard of costs and consequences that characterized its execution.[1] The managers of the campaign acted like some generals in the World War and even, like a few of these, took pride in doing so. The Union Pacific troops were set to storm the concrete trenches of the Morgan position, perfectly impervious to frontal attack. Europeans helped, against their will, by selling short when the attacked stock soared, and by lending, though English banks tried to discourage this whenever the purpose was detected or suspected. The Northern Pacific Corner of 1901 ended in a draw from which an understanding emerged (Northern Securities Company, to be presently prosecuted under the Sherman Act), but the harm done to the financial structure and to the international position of American currency and credit accounts for a sequence of events that lasted through 1903 ("rich men's panic") and was serious enough to affect somewhat, though not to the extent one might have expected, the industrial processes below that surface. We note two things. First, innovation in the formative stages of trustified capitalism will regularly produce such events owing to the fact that large-scale financial operations of a type entirely lacking in the mechanism of innovation in competitive capitalism are in this case necessary for the entrepreneur to get his hand on the wheel. It would always do that even in later stages, if there were not the alternative method of the rise of new men to leading positions within the giant concerns, once these are formed. Second, the maneuvres and excesses of those as of earlier times, and hence the crisis that ensued, are not simply accounted for by the fact that in one way or another they served, or were induced by, the purposes of large-scale innovation. Crises, be it repeated, are historic individuals, into the making of which enter many peculiarities of individuals and environments, besides external factors. Our model explains, it is believed, the underlying process and even, in most cases, approximately the location in time of the turning points, and the *modus operandi* of the features peculiar to each situation. But these remain distinct facts and exert distinct consequences, all the same. In the case in hand, for instance, a less speculative-minded public, a banking system of firmer tradition (its organization, deficient elasticity, and the like, which have been so much stressed, is by comparison quite a minor matter), entrepreneurs less bent on immediate financial success and less free from inhibitions would of course have made a great difference

[1] The idea itself and that method of giving effect to it are of course entirely different things. Quiet buying, making judicious use of depressive situations, might have led to success in so short a time as 10 or 20 years; but 10 or 20 years are indistinguishable from eternity for the American mind.

to, among more important things, the behavior of our time series and would have eased, among more important ones, the difficulty we have in dating Juglars in that period.

Another aspect is best displayed by the next step in the Union Pacific's financial career. After the dissolution of the Northern Securities Company, it had no interest in holding the parcel of Northern Pacific and Great Northern stocks which had come to it in the liquidation, and it began to sell out, acquiring, up to the middle of 1906, about 56 millions in cash and on call. This sum was obviously assembled by way of preparing a new campaign in the fields, this time, of the New York Central, the Santa Fé, and the Baltimore and Ohio. In this campaign, what we may term *seriousness of purpose* is, at least from the standpoint of the Union Pacific itself, very much less obvious than is the deliberate fostering in 1906 of a speculative craze that had already set in. We note first, the spending of the Union Pacific's funds for this campaign and the straining of its credit to the extent of 75 millions borrowed on notes; second, the fact that banks offered less than no resistance to this borrowing and not much resistance to speculators' borrowing in general; third, that, European capital being drawn to this country by high rates and prospects of speculative gain, an additional relation between the American and the European short-money markets, normally inoperative at that time, was set up which was bound to act as an ideal conductor of repercussions. The importance of such things is clear and so is the consequence that for us follows for the diagnosis of 1907.

5. Industrial mergers displayed similar phenomena and call for but little additional comment. The theory of their financial construction may, in case innovation consists simply in the cheapening of the costs per unit of a product already in use, again—since we have met such cases before—be formulated like this. Entrepreneurs' profits may be expressed as the difference between the present value of a set of factors of production, evaluated with regard to the net returns they are expected to yield if used within a given new production function, and the present value of the same set, evaluated on the basis of the net returns they are expected to yield within their old one. In the limiting case of perfect competition and perfect absence of friction they can be bought at prices corresponding to the latter while, until competition steps is to reestablish normal relations of values—in accordance with the theory of imputation—the products of the new combination that is being envisaged would also sell at their old prices, hence, at more than cost. Suppose that the factors required for a new combination consist of the plants of a number of independent going concerns—these can never be used as they are, but we now only wish to clarify a principle—and that these concerns can be acquired at prices corresponding to the conditions prevailing

in the preceding neighborhood of equilibrium. Then we get estimated entrepreneurial profits by deducting these values from those higher ones which the plants are expected to realize within the new combination. If we further assume that in payment of the former, bonds (or preferred shares, or bonds with common shares thrown in as a bonus, to supply the motive or an additional motive for selling out) are issued to vendors and that profit expectations are embodied in common shares, we have the rationale of a method which in itself but expresses the economic logic of the situation. Its peculiarity so far consists only in the facility it affords for cashing unrealized profits which may never be actually earned and which, even if they eventually are, exert, by being cashed in advance, an influence on the monetary part of the mechanism entirely different from that which profits exert in the ordinary case. In particular they must be financed, unless that common stock is held indefinitely by the founding group and its associates. This may for instance be done by the savings of the public or by credit created in order to enable the public to buy. The various aspects of this are left to the reader to work out.

Attention is called especially to the effects that, thus applied, saving will have on producing excesses in consumption as far as those non-existent but realized profits are spent on consumers' goods. As far as they are not, these savings probably fulfill their normal social function of improving the productive apparatus, although, *even if everything had always been done with ideal correctness*, the private interest of those savers who bought common stock would, in many cases, have been better served by a game of poker. It is perhaps not superfluous to add that, apart from such sales to the public of the securities created, mergers as such—as distinguished from their industrial programs—did not require any funds. This is one reason why it is idle to speculate about where the "huge sums" came from that figured in those capital transactions. Already for 1899, for instance, stocks and bonds alone of new industrial combinations that were "absorbed by investors" are said to have amounted to nearly 3.6 billion dollars,[1] three-quarters of which was common stock. This does not mean, of course, that existing funds, let alone savings, were actually spent on those stock and bonds to anything like that amount. Some vendors kept their bonds, and some "entrepreneurs" their stock. Nor was there new investment if, instead of keeping them, they sold in order to buy other securities with the proceeds, for this was equivalent to an exchange of securities. And even as far as they simply sold for "money," *i.e.*, against existing or *ad hoc* created deposits, that money was, of course, not bound or absorbed by

[1] See V. S. Clark, vol. III, p. 7. Mr. Clark's figure is from the *Financial Chronicle* for Mar. 24, 1900; but it seems to refer not to combinations but to companies and not to sales to investors but to incorporations.

the transaction. Any sums thus withdrawn from their channels were speedily returned to them again, as we shall see in our discussion of stock exchange processes in Chap. XIII. As far as that goes, it was not the supply of "capital" that was exhausted in 1907, but the supply of folly.

That interpretative schema is, of course, entirely independent from actual financial practice. The vast scope for irresponsibility and misconduct which is inherent in that method and immeasurably increased by the fact that the evolution of an environment's system of moral ideas and legal safeguards tends to lag behind its economic evolution, is mainly relevant for the explanation of the details of particular situations which so easily veil, to the eyes of many students, the fundamental facts under a surface of "shortage of credit," "lack of confidence," "hoarding," or "shortage of reserves." Combinations of all types emerged all over the industrial field—some will be mentioned later—but we will confine ourselves, for the purpose of illustration, to one instance only—one which presents the essential features with unusual clearness—the United States Steel Corporation (1901). As stated before, the financial construction—the form was simply that of a holding company—was practically determined by the Carnegie Company which in the Juglar recession of 1900 was tactically in a still more advantageous position than it had been before and not only impregnable to attack, but also perfectly ready to attack, itself—such an attack was actually expected and, in fact, announced in the shape of an extensive program of new construction. In order to apply our schema to the case, we must recognize that the chief vendor combined the role which it assigns to vendors, with the function of the entrepreneur who creates—in this case, had created—the future possibilities (or a great part of them) so that securities transferred to him would represent both the value of (his share in) his plant as it was, irrespective of and previous to the new combination and the additional value of capitalized expected profits. To a minor degree this applied also to other vendors who, in fact, were less favorably treated. So far, deviation from our schema can only have resulted from the possibility that fixed interest bonds of the new corporation formed, within the "payments" to vendors, a larger part than they should have according to the relation between preexisting and expected values. This is all we would have to say, had the vendors kept their common stock. But it was clear from the outset that this was precisely what they—or most of them—did not wish to do. In order to gratify them, a syndicate was formed and a market was created by methods of high-pressure salesmanship that included "matching orders" and the like. This seems to have been more than "cashing unrealized profits."

The further career of the United States Steel Corporation is, owing to its central position in the typically cyclical industry and to the accuracy

of the information it puts at the disposal of the public, a subject of commanding interest. Only one remark is necessary here, however. The 301 millions of bonds were, of course, a heavy burden, but the 1,018 millions of capital stock were no burden at all. If our diagnosis of the economic nature of this stock (or a great part of it) be true, absence or smallness of dividends would not be a sign of bad financial health; and their gradual dwindling and final disappearance is what would have to be expected from the standpoint of our theory. As a matter of fact, so far they have not dwindled to zero. But we also observe that the concerns' real earning power over time—*i.e.*, earning power independent of short-time fluctuations and of the effects of the rise in the *level* of prices and of such events as the World War—was kept up only by incessant "ploughing back" of surpluses[1] and by a sequence of innovations, mostly minor ones. The case is thus seen not to contradict, but on the contrary to illustrate, our thesis that no structure of real capital is ever the source of permanent net returns, although this proposition is, in strict theory, true in the case of perfect competition only.

6. We return to what, in the sense defined in the introduction to this section, is the backbone, though not more than the backbone, of the purely industrial processes of this Kondratieff. That is to say, the stage having been set before, both technologically and economically, the electric developments that we observe in the later nineties, spreading their effects over the industrial field, would in themselves have been sufficient to produce what we call a Kondratieff prosperity and to impress a dominant contour line on, or to provide a unifying tendency for, the successive business situations of that time, although independent innovations in some sectors, completing developments in other sectors, growth, external factors are just as important for the analysis of actual long-run results and more important for the analysis of short-run situations. To save space, we will neglect the progress of the telegraph, the telephone (numbers of telephones installed in 1897, 515,200; in 1914, just over 10 millions—estimates by W. M. Persons, An Economist's Appraisal of Domestic Electric Refrigeration, no date), and of electric lighting (arc lamp, incandescent lamp, metallic filaments), the two last of which practically exhaust what advance there was during the prosperity phase toward the electrification of the household, which became so important a downgrade development. The essential thing was the production of electric power: 3,150 million kilowatt-hours in 1899 (no figure is known to the writer for 1897) and 19,652 million kilowatt-hours in 1914 (estimate by Edison Electric Institute), no year showing decrease and only 1908 the same figure as the preceding year.

[1] Compare John B. Williams. The Theory of Investment Value, 1938. A most interesting case study on United States Steel is presented in Chapter XXII.

Soon after the turn of the century long-distance transmission, the triphase current, the spread of the steam turbine (which did not, however, get beyond 2,278,000 kilowatt-hours in 1912; its great career was a downgrade development), improvement of hydroelectric motors, construction of hydroelectric and thermoelectric plants of ever-increasing capacities, and the victory of the big power stations over the plants of individual industrial consumers became the leading features of the period, which also persisted, on the much larger scale characteristic of Kondratieff recessions and depressions, in the postwar epoch. As mentioned before, hydroelectric enterprise had started on a large scale in 1895, when the plant at Niagara Falls went into operation. It supplied industrial power from the first and in 1900 embarked upon a still more ambitious program. In New England (Holyoke Water Power Company), on the Mississippi (Keokuk), in Montana (Great Falls), on the St. Mary's River (Consolidated Lake Superior Company), on the Pacific Coast, in the South (many local companies; Southern power Company, 1906, the first one of importance beyond its neighborhood; Alabama Power Company; the plant of the Aluminum Company in Tennessee; then an interesting development of transmission lines that led to a cooperation between several systems in the Southern Appalachian region, buying current from each other and helping each other in cases of breakdown and so on), the foundations were laid, during the first two Juglars of the third Kondratieff of the electric system of the country, as the foundations of its railroad system had been laid during the first three Juglars of the second Kondratieff.

Only in exceptional cases did large-scale electrical enterprise proceed from the industrial consumer, the outstanding instance being the Aluminum Company's venture. New industrial enterprise proceeded from electrical enterprise also only exceptionally, the outstanding case being that of the Consolidated Lake Superior Company, which set out to create—from nothing, or not much—a whole industrial district by taking up pulp and sulphide production, copper refining, and steelmaking. Comment that would well illustrate some properties of our model is invited by the plan and its execution. The former was perfectly sound and the latter perfectly competent from a technological standpoint. The water power, the ores, the timber, were all there and their role within a comprehensive scheme was easy to visualize. But this is not enough. One essential peculiarity of the working of the capitalist system is that it imposes sequences and rules of timing. Its effectiveness largely rests on this and on the promptness with which it punishes infringement of those sequences and rules. For success in capitalist society it is not sufficient to be right *in abstracto;* one must be right at given dates. In this lies one of the difficulties of remedial policies and one of the reasons for doubts as to the efficiency of socialist systems.

The general rule was that industries availed themselves of and expanded on the new supply of power. Cotton (later also other) textile and paper mills, the metallurgical and the chemical industries installed electricity. Some iron-works, however, used their furnace gas for thermoelectrical purposes. A most important development ensued in steel. This movement was well under way before the first Juglar had run its course, but assumed much larger dimensions later on as the price of current fell. The superiority of new over old plant was considerably increased because in many cases—that of cotton mills, for instance—different types of factory buildings were necessary in order to take full advantage of the installation of electric power. Electrical equipment was produced by the General Electric and the Westinghouse concerns and also by many other firms, some dating from the eighties (as, for instance, the Electric Storage Battery Company). Some of the most important ones were highly specialized (Electric Boat Company, National Carbon Company). Electric dynamos gained ground fairly rapidly; the water turbine less so. Both the General Electric and the Westinghouse exported successfully and also started enterprise abroad (British Westinghouse in 1899). But total added value under the census heading of Electrical Machinery and Apparatus was only about 180 millions in 1914. A great feature of the first Juglar were electric trams, of which about 25,000 miles were built up to 1907. The competition of the motorcar and the motorbus then stepped in to dim prospects. Though maximum of trackage was not reached until 1917, they were no longer of cyclical importance after that year; but until 1907 they were in the foreground of speculative interest and railroads were so concerned about the danger to their local traffic that one great system impaired its financial position in the attempt to buy up lines in its territory. The equipment of the London Underground Railway was supplied by American firms (1897). Finally, it should not be forgotten that in 1914 there were still above 40 firms fighting the losing fight of the electric automobile.

The writer frankly despairs of his ability to give, within the space at his command, anything like an adequate picture, both of the ramifications of the transforming influence of electricity and of the other innovations which—independently of it or induced by it—grouped themselves around it and, together with it, set a pace to output of producers' goods that, in spite of "responsive" extension of capacities, repeatedly resulted in steel and even coal "famines" or conditions approaching serious shortage.[1] These conditions were particularly remarkable in the case

[1] This strain on a productive apparatus, that at the same time was being expanded at an unprecedented rate reflects, of course, the fever induced by the proceedings in the sphere of finance and speculation and was, in this sense, a harbinger of future difficulties. But it does not seem correct to argue that the mere fact of full (or more than what should be

of coal, because hydroelectricity itself and many other innovations were obviously so fuel-saving that something like technological unemployment of coal (which did come about, demand for coal as a chemical raw material notwithstanding, in the downgrade) could reasonably have been expected: consumption of coal in the Edison Chicago works, for instance, was 6.9 pounds per kilowatt-hour in 1900, and 2.87 pounds in 1913. We must confine ourselves to a few desultory remarks.

7. First, we remember that steam engineering reacted to electricity in two ways, by the improvement of competing engines—of the compound (reciprocating) engine and of high-pressure boilers (superheating); the Diesel motor did not as yet play any considerable role—and by offering the completing steam turbine (turbogenerator). On both lines it would be possible to array, in descending order of importance, a vast amount of new industrial activity. The reader recalls that the entrepreneurial role and the change in production functions that defines our concept of innovation, are both capable of many gradations. They include Edison and Carnegie achievements, but also achievements that may be exemplified by a man who first, or among the first, carries our the idea of letting cars on the drive-yourself system. And those who follow the pioneers are still entrepreneurs, though to a degree that continuously decreases to zero. The doings of all of them must be visualized if a correct idea is to be formed about the nature, role, and quantitative importance of innovation. Nonelectric engineering enterprise in the epoch of electricity fills densely the whole scale, but crowds particularly in the middle range. All types of toolmaking were, for instance, in a process of transformation in which firms producing specialties rose and fell quickly. Of large-scale enterprise in this field and of this kind, the two plants of the American Bridge Company (1902) may be mentioned, but the whole huge development in steel shapes, though mostly under the control of the steel concerns (the Bethlehem, for example, bought H. Grey's patents of the steel section, which was so great an improvement in the rolling of big beams for structural purposes), really belongs here. Railroad locomotives and rolling stock, bicycles, agricultural machinery, ships (not to forget battleships, W. Cramp and Sons), all had their minor innovations directly induced or indirectly

called full, that is, optimal) employment of resources would suffice to bring about the upper turning point. Increase of physical output is not necessary to prosperity. For its symptoms to persist, it is sufficient that people *try* to increase output. In fact, if it cannot for the time being be increased, this would only accentuate those symptoms, and any rise in cost would always be at least compensated for by an increase of prices of products, until new products emerge. That such periods of superheated atmosphere put also a strain on the moral and social framework of society and are productive of serious problems is perfectly true, but that is another matter.

conditioned (via creation of new demand) by the "carrying" ones. We proceed, however, to the second great innovation of this Kondratieff.

The automobile industry[1] affords a good example of a purely entrepreneurial achievement turning to new uses not only existing resources but also existing technology, *viz.*, the Lenoir-Otto internal combustion engine, the principle of interchangeable parts, the possibilities offered by steel developments and modern machine tools. Among modern industries it also was, in its beginnings, almost in a class by itself with respect to financial methods. Its own productive process consisted in assembling intermediate goods which it was possible to buy on credit (on 60 to 90 days' open account, for instance), so that the resulting product, sold for cash, could directly pay for itself. Later on, the retailer, or institutions that financed him, came in to bridge the gap by remitting not only in advance of his sale to the consumer, but also of delivery to him. Thus, the manufacturer need not borrow at all from banks and may still induce expansion of deposits to an extent amounting to inflation. No better instance could be found to show how credit creation for the purpose of innovation can hide. This industry, though not a starter yet one of the most important carriers of this Kondratieff, revealed its full meaning for the economic process and for civilization—it has altered the style of life and the outlook on life probably more than any prophet ever did—in the downgrade span after the war, exactly as cotton textiles asserted themselves fully in the downgrade of their Kondratieff. In the prosperity it did not get so far.

The problems of assembling were solved in Germany and France. G. Daimler and K. Benz produced vehicles in the eighties; Elwood Haynes, C. and F. Duryea, R. E. Olds, by 1893; A. Winton, in 1894. Half a dozen small companies, with a quantitative importance practically equal to zero, were founded in the next six years by these men (Duryea Motor Wagon Company, 1896; Winton Motor Company, 1897). Registration in this country totaled 8,624 in 1899, and in 1900 the Olds Motor Works of Detroit started what to them seemed mass production, reaching the figure of 4,000 in 1903. Ford, somewhat hampered in the nineties by a struggle with the Selden patent—this and similar struggles soon led to an understanding about pooling nonessential patents and to a considerable measure of cooperation which it would be interesting to analyze—reached incorporation stage in 1903 ($100,000 capital, $28,000 paid up). Mortality among pioneers was as high as in such a case we would naturally expect. With the (tem-

[1] The writer acknowledges his debt to Professor R. Epstein's monograph on The Automobile Industry and to Mr. Seltzer's Financial History of the Automobile Industry. Compare also Fraser-Doriot, Analyzing our Industries, and Mr. Clark's History of Manufactures.

porarily) successful ones, profits paid for expansion. Along with the gasoline car came the gasoline mower. The first bus routes and stage lines were established about 1905. Between 1902 and 1907, 322 companies started operations. In the latter year, 8,423 cars were sold for about 5½ million dollars, of which 1 million was profit. The year 1908 closes the first stage.

In that year innovation turned against itself. The great new thing appeared in the shape of the light and cheap four-cylinder Ford car for the masses, which drove from the field many of what by then were old firms in our sense. That the increased mortality—the modal firm founded in 1902 lasted until 1910, and the modal firm founded in 1908, also—was mainly among firms under four years of age, does not contradict this statement, because in a period of such rapid change a great many new foundations will start on a plan that has already become obsolete, although the failure of others was no doubt due to unsuccessful innovations of their own. General Motors, founded in 1908 (Durant), provided the first occasion for bankers to enter the field (1910), which until then had been entirely outside their sphere of influence and substantially remained so to the war. Ratio of net profit to net worth, though declining, remained on a level about twice as high as in the postwar period and equal to, according to Professor Epstein's estimate, six or seven times the "normal rate of interest."[1] Prices, also declining, moved on a level still further above that of the twenties, which loose statement applies even if no account be taken of the difference in quality, which defies comparison, and of the change in the price level. Product

[1] That suffices to give an idea, although both the meaning of normal rate of interest in this connection and comparison with it of net worth are not free from doubt as to significance. It should be observed that these high, in one case at least spectacular, profits—they were profits in the full sense of our definition of the concept and a very good instance by which to illustrate it—were earned, despite the fact that the period of gestation of the automobile plant of the time was quite short, so that there hardly was a span during which spending on plant could have exerted influence undisturbed by the impact of additional products, while in all other respects it is clear that entry into the industry was perfectly unimpeded. The case thus serves to show that neither prolonged gestation nor bars to entry are so essential for the emergence of profit as might be thought—although in many cases both do play a role. It also serves to show what it is that prevents competition from stepping in promptly and effectively and how realistic the fundamental distinction is between the behavior of the mere economic man and the entrepreneur. Enticement for entry was not wanting. Nor was there any friction to hold back would-be competitors or any lack of promptness among them. There was nothing but the difficulty of doing a new thing and making a success of it. Competitors crowded along and, in an industry requiring but little capital, not only hovered around, but actually entered the field. Only, most of them failed to produce a car that would sell at a price covering cost, there being absolutely no other reason for this than the one embodied in our theory of entrepreneurial activity. Coincidence of high mortality and high profits ideally expresses this situation.

per man-hour (*Monthly Labor Review*, 1930, p. 502), whatever it may mean in such a case, rose (logarithmically) more sharply between 1909 and 1914 than ever before or after. Designs became more stable, parts more standardized, after 1912—the year that closes the heroic age of the industry. In 1914, 338 firms (the 1914 census of manufactures gives, however, 415, not counting producers of electric vehicles) produced a total of 573,114 cars (Bureau of Foreign and Domestic Commerce), to which Ford contributed almost one-half. The importance of the industry and of its demand for the products of other industries was, therefore, perfectly adequate to "ignite" the second Juglar, although, even in 1914, value added was only 210.6 millions. Subsidiaries developed quickly. In 1914, 971 firms existed producing bodies and parts, and motors infused new life into the rubber industry.

Also in this country, there had been a considerable amount of enterprise in the field of rubber clothing fabrics in the thirties of the nineteenth century, but it ended in failure and disappeared in the crisis of 1837 to 1839. Vulcanization accounts for a new start that was a minor feature of the first Juglar of the second Kondratieff (from 1842, on). The next event, following upon a long period of quiet and rather passive expansion, was the merger that combined 10 concerns into the United States Rubber Company (incorporated in 1892), which conquered more and more ground in the Kondratieff prosperity under discussion (later on it also acquired plantations of its own). This industry felt the impulse of the new demand from the motorcar innovation soon after 1908, when production of tires (fabrics; the innovation of high-pressure cords, which in 1913 were only 2 per cent of total tire output, did not become important till 1918), tubes and other accessories began to count in production programs.[1]

The oil industry also became almost a subsidiary to the gasoline engine. In 1899, only 12.8 per cent of crude oil on stills went to the production of gasoline, kerosene still absorbing 57.7 per cent; but in our period the former and the use of oil for fueling purposes in general approached their postwar importance. From the standpoint of the industry, this was but a favorable external fact, without which decay would have been unavoidable, and the considerable development during the period—value added in petroleum refining increased from about 21 to about 71 millions between 1899 and 1914, and output of crude petroleum from about 60 million to nearly 250 million barrels between 1897 and 1913—was primarily a case of "being drawn along" or of passive

[1] The third new industry, rayon, met during the period under discussion with so little success in this country—the companies that were founded from 1897 to 1911 were unqualified failures and the American Viscose, founded in 1911, was a foreign-owned enterprise—that we need not mention it at all.

adaptation. The rise which occurred in prices bears witness to that.[1] Pipe lines, tank ships, and tank cars were no longer novelties. There was progress in the methods of prospecting, in drilling to greater depths—the rotary drill came after the war—and in rational treatment of oil fields by gas and water pressure. Refining was still done in "skimming" and in complete straight-run plants, and gasoline yield from crude was still only 18.6 per cent in 1914—the cracking process was to increase it and hydrogenation to raise it to 100 per cent in postwar times. Profits were high all the time and partly financed new investment, particularly within the Standard Oil concern. Its dissolution by judicial decree in 1911 did not, within our period, affect the division of labor between the constituent companies, although it did so later.[2]

Among old industries, glass production was thoroughly revolutionized by innovations that were almost entirely independent of anything that happened elsewhere.[3] Up to 1898, slow introduction of tank furnaces had been practically the only change that had come to the bottle-glass blower's old trade for decades, and this had left his function untouched. In 1898 came the semiautomatic machine, which, though it eliminated blowers, still required skilled labor; and in 1905, the completely automatic (Owens) machine. A later development, which we shall not have occasion to mention, started in 1917 ("feed and flow" machine). Almost simultaneously the window-glass production was mechanized (cylinder machine, J. H. Lubbers, 1903, introduced about 1905). Again a later development, the steel process (Colburn, Fourcault), should be mentioned here. A minor innovation was migration (from Pittsburgh to Indiana and Ohio), mainly motivated by the desire to use natural gas. While value added (in the group of stone, clay, and glass products) increased, between 1899 and 1914 by 204 per cent, employment fell strongly and *permanently*. For instance, employment in the bottle (and jar) industry was, after a spectacular increase of physical output, even in 1925 only three-quarters of what it had been in 1899. In other respects the case

[1] As regards prices of crude oil, this was in spite of the fact that production was highly competitive—in fact, various circumstances, natural and legal, combined to make it almost perfectly so and to force everybody to produce what he could. The Standard Oil concern never controlled more than 33.5 per cent of output (1898), and mostly much less (in 1907, for instance, 11 per cent). Its position rested entirely on the pipe lines and on refineries. That is why pipe-line companies were subjected to the obligations of common carriers in 1906.

[2] As mentioned in the preceding section, production of natural gas started in the middle nineties on the increase that was to carry consumption, mainly for industrial purposes, to 1,918 billions of cubic feet. In 1900 it was 509 billions. A number of innovations in the industry make it necessary to include it in the list of those that contributed to the third Kondratieff, particularly to its second and to postwar Juglars.

[3] See G. E. Barnett, Machinery and Labour, 1926.

was normal. We find quite as much increase in physical output and quite as much fall in price as we have a right to expect (in our period; later on, 1919, a restriction of output agreed on by the industry prolonged the life of the "hand branch," see Jerome, *op. cit.*, p. 99).

This is interesting, because the industry was by no means untouched by the merger movement or by the tendency toward giant concerns irrespective of mergers. The American Window Glass Company, which controlled a considerable part (nearly three-fourths) of the capacity, was incorporated in 1899. The first thing it did, however, was to reduce prices drastically. No doubt this move was not only interpreted by observers, but even motivated by the executive, as an attack on actual and potential competitors, intended to cut throats and to establish a monopoly. But the point is—barring the question, already treated by Marx, of how far motivation is relevant to the social meaning of behavior —that even if such monopoly position had been attained, *i.e.*, if the result had really been to leave but a single seller in the industry, that seller could never have behaved according to the theoretical schema of monopoly without losing that position. The implications of this resolve the paradox of modern industry, which, while struggling for monopoloid control, yet surpasses all historical records in efficiency as measured by physical output, as well as the other paradox that, monopolistic tendencies notwithstanding, our schema fits statistical fact not less well in the period of "big business" than it did in more competitive times (see Chap. X, Sec. D). Other branches of the glass industry also display instances of the tendency toward the big concern (Pittsburg Plate Glass, 1895; National Glass (tableware), 1899).[1]

We pass by paper. There was little change in production functions—though much expansion of output—except what is implied in the use of hydroelectric power and in some interesting amalgamations (such as the International Paper Company in 1898 or the American Writing Paper Company in 1899). We also pass by printing. Hoe's revolving-cylinder press had won out by the sixties; it was developed later on; color printing and typography came in the eighties and nineties, as did the Mergenthaler linotype and the Lanston monotype and automatic type casting, but the advance beyond that belongs to the downgrade of the third Kondratieff. Finally, we pass by the developments in the chemical industry: progress in the production of heavy chemicals, use of electricity, mergers.

We must, however, make a remark on cement, developments in which induced enthusiasts to speak of a cement age. As a matter of fact, the

[1] The American pottery industry, though expanding behind the walls of the tariff was, in this period as it had been before, "inefficient and slow to improve." See H. J. Stratton, Technological Development of the American Pottery Industry, *Journal of Political Economy* for October 1932. Things did change after the war, but not very much.

increase in output is as striking as the fall in price that accompanied it, in spite of the protective duty, the absence of perfect competition, the violent booms during which it occurred, and the fact that owing to the contemporaneous innovations in building (steel-concrete) the demand curve for its product shifted upward still more than it would have done under the mere influence of general conditions of prosperity. The rise of the industry dates, as was mentioned in the preceding section, from the fifth and sixth Juglars of the second Kondratieff and development simply continued during the period under review. The first stride had been made in the middle eighties, when the price of Portland cement started on its downward course in response to a fall in costs and output began to increase. About 2.7 million barrels were produced and the factory price was $1.61 in 1897. Output was over 88 millions, and price was $0.93 in 1914—still lower, in fact, if improvement of quality is taken into account. Absence of distress in the industry suggests that money costs per unit must have fallen, and fallen fairly generally for the large majority of firms, to something like the German level. An innovation of the last Juglar of the preceding Kondratieff, the rotary kiln—which conquered, and increased in size, as soon as it became more economical through the use of powdered coal—and more powerful grinding machinery must be responsible. Competition by natural and slag cement may have had something to do with the promptness with which the benefit was handed over to the consumer. Many new firms—but no giants—emerged, and we can repeatedly follow up progress from higher prices, which threatened the manufacturers' margins, to lower prices a few years later, which did not.

How remarkable that is and how closely it was associated with the conditions characteristic of a new and innovating industry we can see from a comparison with the cotton industry. This also expanded, cotton consumption roughly doubling in the period. Nor was innovation absent. The Northrop-Draper loom came into its own in this period and the Crompton (1905) and Knowles (1910) looms were then new. Ring spindles were improved with considerable success as to the reduction of cost and, as mentioned before, electricity lent its aid. Yet the price of print cloth rose from 1900 to and above the level of the second half of the eighties: the character of the old established industry that is drawn along by the environment asserted itself. There were some amalgamations—New England Cotton Yarn Company; American Thread Company; also an attempt to form a cartel: Fall River print-cloth pool, 1898 to 1901—but they do not call for comment. The feature in woolen textiles was the large worsted mill—the carded-wool industry declined even absolutely—but, partly because of the high price of the raw material, there were no developments that need detain us. Silk

made considerable headway, largely by innovations which, in part at least, overcame the difficulties incident to the American labor situation; but this was only continuation of what had been achieved before.

Of course, all the industrial processes of the time reflect themselves in the development of iron and steel. But they were to a much lesser degree initiated by it than the processes of, say, the eighties. We have already noticed the relation—a relation of give and take—between electricity and steel and the role of the latter in the merger movement[1] and we will but add a few outstanding facts. In mining, the old iron-ore districts declined and the Lake Superior ores dominated the market. The innovation was the development of the Mesabi range after the technological and transportation problems incident to the quality and the location of that ore had been successfully overcome. Also the period saw the rise and decay of the tendency toward complete vertical integration—although integration to the extent of combining mining, railroads, docks, and fleets proved successful and may be considered responsible for part of the great increase in productive efficiency that occurred—and several attempts at organization of the trade. The really decisive fall in the prices of ores occurred, however, before our period.[2] Prices of pig iron rose very considerably and the inference that there was no great reform in its production function is borne out by the history of the industry, which, as far as direct use of iron is concerned (wrought iron), naturally declined. Output of pig iron rose in the Kondratieff upswing, but not much more, even in the high tide of prosperity, than it did in the eighties. This is due, of course, to the fact that the same quantity went so much further than before.[3]

All the significant progress was in steel. The open-hearth process, the use of scrap, basic steel, and alloys are the main headings. The first three can hardly be called novelties. Moreover, in the case of the open-hearth process, it was largely consumers' demand, particularly from producers and users of structural material, that gave it the victory over the Bessemer process. New plants—the Gary plant, for instance—hence adopted it as a matter of course, although, for many individual producers, it still involved innovation to dismantle their Bessemer plant and to throw in their fortunes with the (basic) open-hearth process. It

[1] The reader's attention should be drawn to Chaps. III and IV of the third volume of Mr. V. S. Clark's work, which contain histories of a number of leading steel concerns that are full of interest from the standpoint of the cyclical process, particularly those of the Lackawanna, the Bethlehem, the Republic, the National, and the United States Steel.

[2] This illustrates one of the ways in which a wave of development prepares the ground for the next. But it should be noticed that this is not identical with the observation, made by some theories of the *perpetuum mobile* type, that the low depression prices of raw material induce recovery.

[3] That fact must be borne in mind in judging "retardation," see Chap. IX.

should be observed in passing that the open-hearth process, working with scrap, gave a new stimulus to the smaller concern, because the economies of large-scale production were much less than in the Bessemer plant. Alloys, which were to gain such great importance, were practically new. They had scored their first successes in the eighties, especially for forgings (crankshafts for the Boston Elevated, for instance, or the moving parts of the pumps of the Calumet and Hecla mines).

The important development, however, with which the Bethlehem steel was particularly associated, came in our period. High-speed cutting steel for the machine shop and various other specialties, for motor-cars, railroads, oil drills, and so on, were beginning to play a role. Still, however important these developments and however great their quantitative contribution to the Kondratieff, it was, nevertheless, one more case of the great things having been done. The quantity of crude steel consumed increased fully as much as we should expect it to do in a Kondratieff prosperity, but the behavior of prices clearly does not place steel production in the van of innovation. In the case of specialties this behavior may enter into the class of prices of branded articles and also veil an actual fall per efficiency unit. In other cases, for example the standard one of the price of rails, which stood at 28 from 1902 to 1915, it may be due to another type—akin to the cartel or NRA type—of monopoloid situations,although rails had displayed a tendency to rise before 1901. In other cases there was competition enough to enforce a fall if conditions of production had warranted it. Yet none ensued, except such as would occur in the course of Juglar situations.

Copper mining illustrates very well some of the ways of innovation. In fact it would be interesting to go back to much earlier times in order to show what role copper played in the evolution of capitalism, particularly in Germany and in England, where it was associated with important innovations in mining (for instance, with the use of gunpowder in blasting, of steam for pumping, and others). Its American history begins in Michigan (Keweenaw peninsula, 1854). Output increased rapidly—there was plenty of demand in the fifties from the brass and copper works in Connecticut (kitchen utensils; brass and copper tubing; both not unimportant innovations), from producers of oil lamps and burners, shipbuilders, and so on. By the sixties, a considerable industry had developed, which profited greatly from the war, and the products of which began to compete with iron—as iron, a century before, had almost crowded out copper in Europe. Professor Taussig is presumably right in his opinion (Some Aspects of the Tariff Question) that it owed but little to the special bill of 1869, which gave it additional protection. The Calumet and Hecla mines got into their stride in that year and figured in the subsequent boom. The annual average price of copper in 1872

almost reached the annual average of 1864, and then fell, with sharply marked Juglar fluctuations, to 1894. This fall, which was greater than that of the price level, was as much due to innovations of the downgrade type (power drills, high-power explosives, all sorts of mechanizations) that reduced costs so as to enforce a policy of "nursing demand" in order to extend old and create new uses, as it was to new competition from the Arizona and Montana mines that were discovered in the seventies. Output of the Montana mines (Butte, vein ores—expensive to win but of high copper content—the basis of the position of the Anaconda concern) outstripped that of the Michigan mines in 1887. These new sources of supply were one of the by-products of railroad developments, both in the sense that the railroads induced their discovery and in the sense that they made exploitation possible, since there was no fuel for smelting and refining in their neighborhood.

The great increase in output during our period, at the very beginning of which there was a copper boom that culminated in 1899 and was followed by another from 1904 to 1906, was induced, however, by the developments of the electric industry and, later on, of the motorcar industry. Already in the eighties the innovation of hard drawing of copper wire had established that contact which then became the dominant factor in the demand for copper. At the same time electricity had contributed the new method of refining which in the course of the nineties reduced costs to about half. New discoveries (porphyry ores) in Utah, Nevada, New Mexico, Alaska (1900 to 1911), the great expansion in Arizona which began in the middle nineties, and various improvements in mining methods complete the list of innovations. Interpretation in the light of our model is obvious; the competitive struggles with iron (for example, early telegraph wires were made of iron) and aluminum are particularly interesting. The foundation in 1899, and the success from 1899 to 1901 and again from 1905 to 1907 of a holding concern primarily aiming at control of prices with a view to creating short-run monopoly situations (Amalgamated Copper) deserves notice precisely because it affords one of those rare instances to which the ordinary theory of monopoly approximately applies. It also illustrates the conditions, the limitations, and the essentially temporary character of all such cases and the difference between them and the ordinary industrial combines.

The only other subject we can afford to touch is aluminum. Both its commercially successful methods of production are branches of electrical metallurgy (the brothers Cowles; Héroult-Hull). Their invention in the eighties led to quick expansion in the last Juglar of the second Kondratieff, and prices fell to one dollar per pound by about 1890. The two firms in control of the industry (The Pittsburgh Reduction, later American Aluminum Company and the Cowles Electric Smelting

Company, Cleveland) afford as instructive a case study as the single seller of later date does under similar conditions. Prices continued to fall and in the middle nineties had reached the level at which mass production for structural purposes became possible. The use for railroads, motorcars, and electrical appliances, in the food industries, in chemistry, and so on, begins in our period.

8. As usual, we cannot hope to explain every individual spurt and breakdown by the factors which enter into our model. All the latter can do for us, is to describe the industrial processes that underlie such spurts and breakdowns and create conditions that favor their occurrence. Enough facts have been presented to justify the statement that those 16 years were a period of rapid industrial evolution, tapering off at the end, displaying all those characteristics that we imply when speaking of a Kondratieff prosperity, and centering in the electrical innovation with all that was induced by it. On referring to the sketches of industrial histories that he has just perused, the reader will also have no difficulty in satisfying himself that this Kondratieff prosperity naturally divides up—within the developments associated with electricity, which went on with hardly any break—into two periods each characterized by industrial processes of its own, the first primarily by mergers, the second primarily by the automobile industry, though both were also influenced by other items, among them some that were merely "completing." The processes of the second period are discernible by 1907, but do not dominate the economic situation before 1909, though the processes of the first period had clearly come to a provisional stop before. These facts can be expressed in our language by saying that we have before us a complete and an incomplete Juglar, the end of the latter being submerged in the effects of the war.

But, worse than usual, the picture of general business situations during several years completely fails to bear out the expectations which, on the evidence from industrial history, we should form as to their complexion, so much so as to make the dating of cyclical phases uncertain. The nature of the difficulty is well brought out by the behavior of time series. On the one hand, prices, output, pig-iron consumption, clearings, and so on reflect very well, as will be seen in the following chapters, the general features of a Kondratieff prosperity and also the division into two subperiods. If we eliminate trends, as the Harvard service does, the Kondratieff effect is lost, but that division stands out quite strongly: two sequences of well-marked Kitchins are separated by an abrupt trough in 1907–1908. On the other hand, this trough is irregular from the standpoint of our schema, as well as from the standpoint of industrial history. For 1907 we should have expected the situation which we do not find before the second half of 1909. Hence our schema does not explain that crisis—

not, at all events, for the precise date at which it occurred and at which either continued revival or prosperity ought to have commanded the scene.

The writer wished to put the case thus strongly in order to enable his readers to record it against the three-cycle schema. He does not do so himself, however, because those irregularities seem to him adequately accounted for by a factor which in the preceding historical report has repeatedly been stressed, *viz.*, the course of events in the financial sphere, which in the period under discussion acquired an abnormal importance. We have seen that one class of the innovations that carried that Kondratieff prosperity and in particular its first Juglar—mergers—tended more than others to induce disturbances of a purely financial nature. We have also seen that the banking system failed to function according to design. The practices of the trust companies in fact revived, in a modernized form, the wildcat banking of the thirties of the nineteenth century. But recklessness in the handling of the most difficult part of a bank's business—that part which has to do with the financing of innovation and of speculative transactions incident to innovation—was not confined to them. Even the national banks maneuvered themselves into positions of strain, almost from the start, and were repeatedly unable to respond to current requirements, because they had lent on new securities that syndicates were unable to place. Both at the time and later, responsibility for this state of things was attributed to the absence of a central institution and to the legal framework within which the banking system had to work, reserve requirements in particular. This, however, was putting the cart before the horse. It is true that adequate machinery did not exist for the handling of a crisis after the event. But this has nothing to do with the way in which the conditions of strain arose. On the contrary, the *strain restrained* what otherwise would have gone on entirely unbridled.[1] If any lesson can be drawn at all from the experience of those days, it is exactly opposite to the one that recommended itself both to the banking community and to the public mind. Blaming the brake for the results of reckless driving is, however, part of the political psychology of cycles.

This factor did more than disturb the surface. It is understandable that, in an atmosphere in which everyone lived on, and worked with, what as yet were future possibilities, the industrial process also should be profoundly affected. Remembering this, we shall now venture upon an interpretation of events year by year.

[1] A contemporary observer (R. W. Lawson, The New York Banks and the Treasury, *Bankers' Magazine* for November 1902) seems to have made the same point, when he wrote that the real question was not whether banks remained or did not remain within the 25 per cent requirement, but "what they did with the other 75 per cent," although this evidently was not the most felicitous way of putting it.

Eighteen ninety-eight makes a very normal first year of a Kondratieff prosperity. But a significant reaction to a pace, particularly in the financial sphere, which was clearly abnormal and very strongly displayed the features that we subsume under the heading Secondary Wave, occurred as early as February 1899, and liquidation, not quite confined to the financial sphere, lasted to the end of May (death of Flower, May 12).[1] Another setback came in December—call money at 186 per cent on the eighteenth of that month actually had a sobering effect for a year, although caused by English troubles; it threw much light on the situation—but industry did not slacken until the middle of 1900. This completes the prosperity of the first Juglar, the recession of which should, according to our schema, display much the same symptoms, because of the location of that Juglar in the Kondratieff. So it does through 1902, witness the "steel famine." The wheat harvests of 1901 and 1902 were favorable external factors. But the way was studded with financial vicissitudes of which that outbreak of speculative frenzy that has already been noticed (centering in the Northern Pacific corner) and the reaction thereto were the most important. However, while upsetting the international money market and the normal functioning of the domestic banking system, they did not blot out the industrial rhythm. What can be interpreted as a regular Juglar depression, mitigated by the underlying Kondratieff swell, set in at the beginning of 1903 and lasted till nearly the end of 1904, the so-called "rich men's panic" being its complement in the financial sphere. Recovery followed, and under the circumstances there is no reason to wonder at its violence, which may be held to account for a short reaction. The latter or the recovery from it would then complete that Juglar's third Kitchin. This carries us to about the middle of 1906.

Then followed indeed a strong upswing in the second half of 1906, sustained though on a stationary level until the autumn 1907; but it does not link up with any new processes in industry and suddenly gave way to what looks like deep depression for the rest of the year, followed by an only less sudden recovery in 1908. The year 1909 dis-

[1] Also, notes of warning were sounded, coming perhaps from what the writer has an unscientific propensity to call serious banking quarters. It is a question of some interest why these, or their exponents in the press, were not more outspoken and why, when they spoke, they talked about the Philippines and other irrelevant elements of the situation, instead of those that were relevant. The answer—of some importance for the mechanism of crises—is that they could not speak frankly. If we visualize in a practical spirit the network of duties and interests in which any businessman finds himself enmeshed, we shall understand that plain speech would have implied stricture on groups who were able to make their resentment felt, and would have given offense to a public bent on speculating, which would have blamed the warning banker for any untoward event that might have followed.

plays all the features of a regular prosperity milder in character than that of the first Juglar, which we should expect from its location in the Kondratieff, although we should not have expected, and must trace to aftereffects of preceding irregularities, the early relapse in 1910 and 1911. 1912 was a year of good business and is true to form, and in 1913 and 1914 the system was sliding into what bears interpretation as a regular Juglar depression.[1] Although not wholly, irregularity is, therefore, mainly confined to 1907 and 1908, *i.e.*, to the crisis of 1907 and its aftermath. This crisis is an intermezzo, which falls outside of our schema. It should be added that, once we accept that explanation of it which is offered here, it becomes as understandable that the setting in of the industrial processes that carried the second Juglar should have been deferred by it, as the same effect would have been understandable if, instead of the crisis, a natural catastrophe or a social disturbance of sufficient magnitude had occurred. For the crisis would, not less than events of the latter type, interfere with entrepreneurial activity by destroying the neighborhood of equilibrium from which alone it starts. Also, it would follow that we should not accept at face value what looks like an overgrown Kitchin—extending, if we count from trough to trough, from 1904 to 1908—but rather allow the dent in 1906 to split it so that the first Juglar ends in (the middle of) that year.

We will not go into the details of the crisis of 1907 or into the technique, such as it was, by which that crisis was handled. But, since our diagnosis attributes its violence and its location in time entirely to the doings in the financial sector, both defense and explanation seem to be called for. As to the first, a survey of events since 1898, the elements of which have been presented above, clearly yields supporting evidence. In particular, it should be observed that the manner in which the financial engine was from the start handled by the groups and individuals at or near the steering wheel, while perfectly adequate to produce breakdowns, at the same time produced, for those groups and individuals, results which offered ample enticement to repeat abuses on an ever-enlarging scale. That a major breakdown, when it eventually occurred, did not remain confined to the stock exchange and to the banks, but also paralyzed the economic process, is not surprising. But the short duration of this "depression," as well as the fact, repeatedly pointed out by Mr. Carl Snyder, that it was not nearly so deep as we might infer from indices that heavily weight the output in the most affected sectors, and as we might expect from the violence of the financial catastrophe, lend support

[1] Our sketch should be compared to Mr. Thorp's description of the individual years. From 1898 until 1908, both included, the grading "prosperity" occurs five times, and four more times with qualifications; from 1909 to 1914, three times and in no case without qualification. This expresses well the difference between the two subperiods.

to our view that it was not a depression in our sense at all. Nor can it be urged, as an argument against the above analysis, that the crisis was international. For Germany and a few other countries, such as Egypt, a very similar state of things can be shown to have existed and to have produced, largely autonomously, similar results, synchronization of which is easily accounted for by existing financial relations. As regards the rest of the world, which was much less affected, these relations—and infection by the speculative excesses in America—are sufficient to account for such crises as occurred. In fact, foreign capital played a considerable role in the American stock exchange and money market at the critical time.

If, then, this diagnosis seem acceptable, it follows that, barring those surface phenomena that characterize any crisis, there is no analogy between 1907 and either 1873 or 1929. This is indeed obvious from the character and duration of the depressions that ensued in the two latter cases. There is more similarity between 1907 and 1857. We should not attach much importance to such details as that each of these cases centered around a conspicuous failure (in 1907 that of the Knickerbocker Trust on Oct. 22). But it is more relevant that both occurred in the first half of the Kondratieff. The reader should observe how many of the actual facts of both cases are covered by this formula, and how well the similarities between them and the differences between these two and other cases are expressed by it. The analogy should not, however, be pressed too far. The location of both crises in their Kondratieffs is not exactly the same. That of 1857 occurred at a later stage and hence it can, to a much greater extent, be explained by the underlying phase of the evolutionary process. But the ever-forgotten lesson about what causes such spectacular breakdowns of the capitalist engine and how they could be prevented or mitigated is the same in both, and in fact all, cases.

[1] The writer does not intend to suggest that the Knickerbocker failure *started* anything. On the contrary, it made astonishingly little impression and no panic ensued even on the stock exchange. This was due not only to the support which was forthcoming in the stock market and to the action taken by the Treasury and by a leading banker, but also to the whole previous course of events in the stock market. There was a bear position—even a bear market—from the very beginning of 1906. When the strong fall had run its course to March 1907, the market rallied again until the second week of April. After that there was, it is true, a practically uninterrupted decline to Nov. 22, but with decreasing sales. A short-lived rally followed, then a small relapse, then again a rally, followed by a still smaller relapse—all in December. Stock prices increased in the first half of January 1908, then fell, to about the middle of February, after which a vigorous recovery set in—a very pretty example for what we have called Hesitations and for the truth that stock exchange vicissitudes cannot by their own momentum and in the absence of deeper causes develop into catastrophes.

Explanation is due because our diagnosis explains the occurrence of the crisis of 1907 by a disturbance of the normal working of the cyclical process of evolution, which was not attributable to an external factor but to the systematic abuse of the financial apparatus. Speaking of a disturbance of the capitalist process by a factor that arises out of that process itself obviously raises a methodological question. It has, however, been pointed out in our discussion on mergers in what sense it seems justifiable to do so. Any economic or social system has its logic and the standards inherent to that logic. Effects due to action conforming to this logic and those standards are one thing, effects of deviations from them another thing. In matters of human behavior, both conforming and deviating action must be separately taken into account, for both are equally real. This should also explain why we can speak of abuse as distinguished from use of institutions without thereby committing ourselves to a moral—or any other—value judgment. The former term is intended merely to indicate the fact that the behavior deviates from standards which follow from the structure of an economic system. Of course, if features, which as a matter of fact are morally disapproved, are being called "deviations from the logic of system," this may imply apologetics as regards that system itself. Neither defenders of capitalism nor defenders of socialism are ever free from temptations of this kind. But for us the only question that matters is whether or not that distinction is supported by the facts and in turn serves to elucidate them. If this be answered in the affirmative, "faulty" handling of institutions may induce breakdowns exactly as an external factor, and disturbance of this nature can autonomously arise in the financial as in any other sphere of economic activity.

9. In both England and Germany, all the facts that we have in mind when speaking of a Kondratieff prosperity and of a beginning Kondratieff recession were clearly present during these 16 years. The shorter fluctuations in those countries roughly coincide with the American fluctuations. The fundamental similarity, or rather sameness, of the underlying industrial process is beyond the possibility of doubt. We shall use our sketch of American evolution as a background and confine ourselves to noticing briefly the more important features.

The English case presents the striking contrast pointed out in the introduction to this section. Whatever the deeper cause or causes, the nature of the difference stands out when we glance at the curves of percentage changes in pig-iron or steel production, which rise but weakly in 1898 and display much less vitality throughout. The strong increase of capital export (according to Mr. C. K. Hobson's figures) complements this. Foreign, in particular colonial, enterprise and lending was in fact the dominant feature of the period. Rubber, oil, South African

gold and diamonds, Egyptian cotton, sugar, irrigation, South American (Argentinian) land developments, the financing of Japan and of colonial communities (municipalities, especially Canadian) afford examples for the way in which England, more than through domestic development, took part in the industrial processes which carried that Kondratieff prosperity. The London money market concerned itself in fact mainly with foreign and colonial[1] issues to an extent never equaled in England or in any other country. The great issuing houses in particular almost exclusively cultivated this business, managing, sometimes rigging, the market for it, and practically abstained from the issues of domestic industries. The railways, nevertheless, kept their contact with, and old established industries resorted to, the London money market, but new industrial companies account even in years of great activity, such as 1897, 1898, 1907, 1911, and 1912, only for a minor part of the total of capital applications.[2]

It is true that the impression we thus get is somewhat misleading. Industrial concerns found their supply of capital primarily in provincial centers, to some extent on the provincial stock exchanges, but to a much larger extent in the inherited accumulations of wealthy families that preferred the private company or even partnerships. Induced expansion was financed largely from profits: the Colwyn report mentions, for instance, that, ex income tax, 96 million pounds were reserved by companies out of profits (in the income tax sense), amounting to 312 million pounds in 1912. Some financing of industrial concerns was done also by the trust and investment companies, which considerably grew in importance. But however much may thus be explained by English conditions and habits, it still remains true that the main reason why we find so little public financing of domestic innovation is that there was not much to finance.

We will recall a few familiar facts about rubber.[3] The great innovation in this field was rubber planting (the manufacture of rubber products,

[1] The Trustee acts of 1889 and 1893, and the Colonial Stock Act (1900) extended the powers of trustees to invest trustee funds in the stocks of English municipalities and colonial governments. Owing to the importance of trustee funds in a country of old wealth, these measures were highly significant.

[2] See Lavington, English Money Market, Powell, Evolution of the Money Market. The familiar picture stands out well in the pages of the *Economist* or the *Financial News*.

[3] The author acknowledges indebtedness to Akers, C. E., The Rubber Industry in Brazil and the Orient (London, 1914); Figart, David M., America and Rubber Restriction, pamphlet (New York, 1926) and The Plantation Rubber Industry in the Middle East (Bureau of Foreign and Domestic Commerce, *Trade Promotion Series*, No. 2, Washington, 1925); Fraser, C. E., and G. F. Doriot, Analyzing Our Industries (New York, 1932); Lawrence, J. C., The World's Struggle with Rubber (New York, 1931); National Bank of Commerce, New York, India Rubber (mimeographed, 1919); Orton, William, Rubber—A

as has been pointed out before, was by then an old-established English industry, which indeed went on developing during that period but does not call for comment). In 1876 seeds of the hevea tree were smuggled to England from Brazil, which then was, and to the end of the first decade of the twentieth century remained, the chief producer of crude rubber. Nothing came from it for a quarter of a century, although the superiority of the plantation product in cost (also cost of transportation) and quality (purity) must have been obvious and although the price fluctuated about a rising trend, a good example for the ways of innovation. The chief difficulty to overcome was the considerable investment required and the long period of gestation: the interval between planting and the first crop of latex is between 4 and 7 years, full yield is not reached until the tree is 10, and maximum yield not until it is over 20 years old. Enterprise started in the last years of the century, but as late as 1905 all plantations in existence produced only 150 long tons, as compared with Brazil's more than 30,000. Then came the new demand from motorcars and the plantation boom which centered in 1910. It was a purely English achievement, all plantations being British-owned until 1912, when Dutch planting began. But by 1910 already a considerable percentage of that British ownership was Asiatic (native and Chinese) and these non-English Britishers behaved in exactly the same way as Brazilian coffee planters. Since the area available was practically unlimited, we can discern the roots of the postwar situation already at that time. Prices fell abruptly after 1910 (in consequence of acreage planted long before the plantation boom, which also broke the Brazilian rubber corner of 1909) in the course of a competitive process which was, on the one hand, practically to crowd out wild rubber and, on the other, to eliminate profits: within our period profits and dividends fell from their maximum in 1910 until war demand temporarily pulled them up a little.

In many respects, this history is typical and extremely easy to interpret in the sense of our model, the nature, emergence, and disappearance of profits, in particular, being illustrated to perfection. The small contribution to the first Juglar and the considerable contribution to the second Juglar of the English Kondratieff and its financial complement are as clear as the relation to one of the "carrying" innovations of the period, motorcars. But three remarks suggest themselves. First,

---

Case Study, *American Economic Review*, December 1927, pp. 617 *ff.*; Rowe, J. W. F., Studies in the Artificial Control of Raw Material Supplies—No. 2, Rubber, London and Cambridge Economic Service, *Special Memorandum* 34, March 1931; U. S. Bureau of Foreign and Domestic Commerce, *Trade Information Bulletins*, 27, 180; Whittlesey, Charles R., Governmental Control of Crude Rubber (Princeton thesis, 1931); Wilhelm, Donald, The Story of Rubber, *World's Work*, January 1927; House Hearings, 68th Congress, Jan. 6–22, 1926.

the element of antirational behavior was present to an abnormal degree, not only with native planters—this element of the case came into still greater prominence after the war, when all the native planting in the Dutch Indies asserted itself[1]—but also with English promoters and capitalists. That the rubber boom should have been staged—on Mar. 16, 1910, over 112 million pounds were cleared on rubber shares (see Orton, *op. cit.*, p. 623)—when it was "evident that the 1910 acreage in full bearing was capable of giving double the total world supply of that year" (*ibid.*, p. 627) and that capital issues should have reached a maximum in 1911, cannot be brought within rationality by however great a stretch of the imagination as to the elasticity and the prospective upward shifts of the demand curve or as to possible reductions in cost. Second, the case, involving export of capital into noncapitalistic areas, might easily be misused as a verificatory instance of the Neo-Marxian theory of Imperialism: capital in flight from shrinking rates of surplus value prevailing in an old capitalist country, seeking new opportunities for the exploitation of labor in semicivilized or uncivilized countries. Of course, there is nothing in this. Capital in this case went to Malaya, not because of any such economico-sociological mechanism, but because the hevea tree grows there and not in Norway. Third, the English producers' and consumers' goods that were directly required in order to carry out this innovation were inconsiderable. With the exception of the increase of rubber imports at falling prices, the process touched England only through the financial sphere. Both the rise of the New and the decline of the Old (Brazil) occurred abroad. Hence many of the phenomena that normally accompany innovation were absent in England, while others asserted themselves in a different way. This does not affect the explanatory schema, but must be taken into account in applying it.

Several other examples of enterprise of this type that could be adduced were not wanting in boldness and success. But at home entrepreneurial activity in the fundamental lines distinctly stayed behind America and Germany. The motorcar industry lacks anything that could be compared to the Ford achievement, chemistry—in spite of developments in the old-established inorganic field and with an exception to be mentioned presently—anything that would bear comparison with German progress. Electricity affords one of the few cases in which performance of the private entrepreneur was so inadequate as to invite, on the obvious

[1] It has been stated that capital requirements were considerable. But this is true only for large-scale plantations. Small-scale planting by, say, the Javanese natives requires hardly any capital at all, and is done without any rational regard to labor cost. Moreover, the writer's personal impression was (1930) that any attempt at regulation of output would have been misunderstood and resisted by the natives and that the compulsion by which alone it could have been made effective, might have made unmanageable what, in that year at least, seemed to be a delicate political situation.

merits of the case acknowledged by all parties, government initiative and public planning. In the eighties there had been a considerable development in electrical lighting, which went on in our period, as did the business in maritime cables. There was not much innovation about this. Production of current by public supply systems, the great new thing, developed slowly and in 1913 reached only 2½ billion kilowatt-hours, the capital invested being about 60 million pounds. The iron and steel, paper, and chemical industries allowed themselves to be electrified, however. There was, also, a considerable production by industrial consumers, in many cases extremely wasteful of coal. Production and export of electrotechnical commodities was not very important, but the electric tram and the underground, in part by municipal enterprise, made their main stride during the period. The result of disappointing experiences during the war was the Electricity Supply Act of 1919. Relatively more important—by comparison with this country and Germany—were developments in old industries. Breweries and bicycle concerns continued their expansion, which was noticed in the preceding section. The beginning of the century witnessed great activity in store and trading companies, and there was a building boom. But these and other items come much more within the categories of growth and of induced expansion than within that of innovation.

Here it is convenient to assemble the comments to be made on the production of rayon, that branch of the chemical industry which illustrates so well the manner in which chemical—like electrical or railroad—innovation revolutionizes large sectors of the economic organism that seem to be past innovation stage. We will throw our three countries into one unit for the purpose and discard, for brevity's sake, the short-staple fiber (which is chemically the same thing as rayon but differs from it in that threads are cut to the length of cotton and wool fibers and then made into yarn on the usual textile machinery) and special products, such as artificial horsehair. Development of the technology goes back to Réaumur (1734), and to the discovery, by Schönbein, of nitrocellulose and collodium (1845). A practicable nitrate process, then worked out by the Swiss Audemars and perfected by Swan, is to this day the basis of all the methods of production. The products were used, on a very small scale, in gas lighting. The entrepreneur—and a very characteristic type of entrepreneur—who solved the commercial and organizational as well as some additional technological problems and made the product a success was Count Chardonnet. By definitively establishing the nitrocellulose process and setting up factories in France and Switzerland, he became the founder of the industry—the New Man in whose wake the host was soon to follow—in a fuller sense of the word than almost any other.

Induced improvement and alternative methods came in due course: the cuproammonium process (M. Fremery, Urban, Bronnert, 1899; the German variant called Glanzstoff, produced by the Vereinigte Glanzstoff Fabriken A. G., Elberfeld, a subvariant being theThiele-Bemberg process, J. P. Bemberg A. G., Barmen) the raw material of which is however, the same as that of the nitro-cellulose process and of the most recent, the acetate, process—namely, cotton and cotton waste. The English variant, the viscose process (Bevan, Beadle, and Stearn), works with cellulose as a raw material and, owing to its cost advantage, is the method most widely used in all countries. The fundamental entrepreneurial idea was at first simply to produce cheap "silk" for the masses. Hosiery and plush-goods, accordingly, account for 55 per cent of the consumption in 1913 (as compared with 25 per cent in 1924), when total world production was estimated by the United States Tariff Commission at about 29 million pounds, and prices moved in strict covariation with those of silk. This was the case until 1924. By that time, however, rayon had emerged from the modest role of a cheap substitute for silk and conquered a wide field in its own right.

The innovation under discussion is only in a technological, but not in an economic sense, correctly described as the introduction of a new raw material. For it was primarily finished or semifinished consumers' goods that were offered to the public, not a raw material that was offered to the existing textile industries, although the cotton, silk, and woolen industries all availed themselves of it to some extent (25 per cent of the rayon production was in 1913 taken by silk and cotton weavers and manufacturers of woolen goods, 34 per cent in 1924). The process of competition with the Old and of absorption into the system must be viewed in the light of the fact that rayon producers were primarily textile manufacturers of a new type. But their new products not only met a demand schedule for textiles that was constantly shifting upwards but also conquered ground that was no man's land before and a net addition to the textile field. Quite apart from the fact that the decisive improvement in quality and the great quantitative expansion were downgrade developments, the impact of the innovation on the existing industrial structure was, therefore, mild and would have been so even if possible depressive effects had not been lost in the war boom. The course of prices calls for an additional remark. Up to the war—which raised them to an all-time peak, from which they fell almost uninterruptedly, though with cyclical fluctuations, toward the trough of the world crisis, passing the prewar level about 1924—they reflect the oligopolistic situation characteristic of a new industry. On the one hand, the really successful concerns were few and, patents and experience giving them a decisive advantage over would-be and actual competitors, felt secure, for the

time being, in the possession of the field. On the other hand, that field had to be developed, and the product, as stated above, was looked upon as a substitute.

These circumstances—and others, such as the absence of major fluctuations in the raw materials—were responsible for the orderly advance we observe, which lost nothing in vigor by being cautious. There was, for those concerns, little motive to fight each other and to spoil each other's markets and there were, hence, no dramatic spurts and breakdowns. Though exceptional, the case thus affords a good instance of the essentials of innovation free from extraneous or accidental distortions. Entrepreneurial profits in the successful cases were high and quickly supplied the bases for very sound financial positions, while in the long run the interest of consumers was possibly better served than it would have been by either perfect competition—which would have issued in a disorganized market—or by planning of the cartel type. We will add at once that postwar developments display substantially the same characteristics. In this country, for instance, the profits of the American Viscose attracted scores of rayon-producing enterprises, but only three, all of which were affiliated with and backed by European concerns, attained commercial success, and two of them (Celanese and Industrial Rayon), accounted, together with American Viscose, for about 90 per cent of the total American production, which by 1929 was more than twice as great as the Italian. With the typical downgrade expansion of output went a no less typical fall in profits which, however, still remained abnormally high to 1930.

Our sketch suffices to show that England's economic history from 1897 to 1913 cannot, owing to the comparative weakness of the evolution (in our sense) of her domestic industries, be written in terms of our model —the only case of this kind within the epoch covered by our material. Instead, we have a picture of induced developments and growth—which, let us note once more, may reasonably be held responsible for some conceptions formed by English economists both of the economic process and its monetary complement—financed by the returns to accumulated wealth partly invested abroad and, because the feeders of the system were spread over the whole world, particularly sensitive to foreign booms and slumps, which, during those years tended to become the dominant factor in the English business situations. Other disturbances, such as the Boer War or labor difficulties, assert themselves much more strongly than they would have done in the presence of vigorous evolution of domestic industries. Recovery from the depression of the last Juglar of the second Kondratieff was strong and displayed, as we have seen, some of the features that were to be prominent for some time after (mining boom, brewery boom, building boom). It is therefore doubtful

whether we are within our rights in describing 1897 as the last year of recovery rather than as the first year of the new Kondratieff.[1] If, however, we put our trust in pig-iron production, prices of consols, and the like, and decide in favor of the former alternative, we then get two years and a half of a prosperity, from the beginning of 1898 to the end of the second quarter of 1900.

Another prolonged spell of prosperous business starts in the autumn of 1909 and continues to the autumn of 1913. But both were periods of all-round activity in domestic industries—those which lagged behind doing so for "external" reasons, such as strikes, crop failures in the countries to which they exported, hostile tariffs, and so on—largely conditioned by foreign progress and almost wholly unconnected with major innovations at home. And the crash of 1907, as well as the spurt which preceded and the depression which followed it, with its unemployment peak in the third quarter of 1908 and the rapid recovery therefrom, obviously was the response of the world's greatest banker, investor, trader, shipper, and so on to events which did not originate with him. In this sense only, we may speak of two Juglars also in the English case: a complete one, from 1898 to the middle of 1906—with a prosperity phase lasting to the middle of 1900, a recession lasting through 1902, a depression covering 1903 and 1904, and a somewhat dubious "third Kitchin"—and an incomplete one, rising in the middle of 1909—with a prosperity phase lasting to the summer of 1911, a recession phase covering the rest of that year and 1912 and 1913, depression setting in at the beginning of 1914,[2] while, here again, 1907 and 1908 constitute an intermezzo.

10. As striking as the contrast between the United States and England is the similarity between the former country and Germany. It becomes still more impressive if viewed in connection with the differences in the national situations, the social frameworks, and the attitudes of both nations. Several symptoms of these differences have been mentioned before, such as armaments, measures of social betterment (Sozialpolitik), and fiscal policies. We will mention one more, the Stock and Produce Exchange Act (Boersengesetz) of June 22, 1896. It prohibited not only forward trading in grain but also the analogous forms of speculation (*Terminhandel*) in shares of mining and manufacturing companies, and beyond that it imposed various restrictions on those speculative activities which remained legal, with a view to discouraging stock

[1] Mr. Thorp designates 1897 as a year of prosperity without qualification.

[2] *Cf.* Professor Spiethoff's comments, *op. cit.*, pp. 56–59, and Mr. Thorp's Annals. The latter author notices the "slackening of the rate of progress" in 1911. That neither of the two years that at the time were hailed as record years, 1906 and 1912, was a year of "prosperity" in our sense is, if we bear our terminology in mind, no reason for objection, although our dating may be open to all sorts of doubts on other grounds.

exchange speculation in general. This legislation may not have attained its objects—all of them, at least—but the official expression of moral disapproval of gambling conveyed in it is, nevertheless, highly significant[1] and may have done something to restrain excesses, which never went to the same lengths as in this country. Absolutely, however, they were important enough to count as a major factor in the sequence of business situations. A public that had both the means and the inclination to speculate was led on by a *haute finance*, that chronically was under the compulsion of unloading securities, much in the same way as in the United States. Even individual stimuli bear some resemblance. For instance, although the foundation of the Stahlwerksverband (March 1904) did not, like that of the United States Steel Corporation, entail a great financial transaction, and although it did not mean the same thing industrially, it yet gave a speculative impulse. Although there was no Harriman campaign, yet phenomena not unlike some of the incidents of that campaign were produced by the offer of the Prussian Ministry of Commerce (July 1904) to buy out the shareholders of the Hibernia mining company (payment to be made in Prussian consols), the various implications of which—possibility of a struggle for control and others—induced a violent boom in the shares of coal and iron concerns. Nor does the analogy stop at individual instances. The underlying industrial processes also were similar and there was, moreover, both a tendency toward the formation of giant concerns and a larger merger movement, although the former shows less conspicuously owing to the fact that its work in the railroad field had already been (practically) completed by government enterprise, and although the latter did not pervade the whole of the industrial organism.

Financial practice differed—more on the surface than fundamentally—because of the dominant position of the great "industrial" banks of the type previously described. Long before the beginning of our period, they had established that position and their methods. They directly participated in, and "patronized," enterprise, floated and promoted, frequently taking the initiative, developing the technique of harnessing acceptance credit to the purpose of financing long-time investment. But the only major bank failure that resulted was that of the Leipziger Bank (1901). No other big bank ever got into serious straits, or even showed the scars of occasional wounds. This was due not only

[1] The attempt to put a stigma on private speculators is particularly obvious from the registration clause. Of course, it was not difficult to thwart the legislative intention by cash transactions and also by resorting to foreign centers. The clauses concerning speculation in grain (and products of milling) were, moreover, based on popular views about the role of speculation in the pricing process that were palpably wrong. These and other aspects do not interest us here. All that matters is the spirit of that legislation.

to their size and standing, but also to the fact that their business, however much at variance with English principles, was, or during our period became, substantially sound in our sense: as a rule they financed reasonable propositions, which they carefully studied and which they were able to see through. As far as this goes, German banking in the latter part of that period perhaps affords the best illustration of the role of banks in the process of evolution and, incidentally, an answer to the argument that this role must always be associated with abuses necessarily productive of breakdowns.[1] It was different outside the sphere of the leading banks. Mortgage banks were a particularly weak spot. In 1900 the Preussische Hypothekenbank and the Deutsche Grundschuld Bank failed and so did others in 1901—illustrating the consequences of lending on mortgage without paying attention to purpose. Before breaking down, however, the speculative builders and their financial sponsors who lent on the anticipated increments of values, achieved a great stride on the road to modern housing conditions.

As clearly as in the United States, electricity stands out as the dominant factor in the industrial processes of that epoch. Both directly and by what they induced all over the industrial field, the power plants and the electrical industry shaped the fundamental conditions and the pulse of general business. In fact, the behavior of symptomatic quantities was linked up with them by the banking opinion of the time—the behavior of the rate of interest, for instance, with the capital requirements of electricity and electrification. The latter—definitive penetration of industry (much less of agriculture) by electricity—got under way after 1909; during the first Juglar, lighting and electric trams were as yet the most important items. It must be remembered that, although technologically the stage had been fully set before, a number of problems solution of which was essential to large-scale success were as yet unsolved: at the beginning of the period, long-distance transmission (O. Miller, 1891) was still confined to modest tensions; electrochemistry was in its infancy; electrical steel production (1899) was not yet invented; the

[1] The point would merit elaboration. For business at large, if not for the stock exchange, those banks after 1902 proved a source of strength in difficult situations and a moderating influence in prosperity. To some extent at least, they were also successful in discouraging fraudulent or reckless promotion. And they could not have done this if they had kept aloof in the manner of English banks of deposit. Although a respectable list of mistakes and of cases of doubtful practice could, nevertheless, be drawn up, revision of much of the criticism leveled against those institutions and their unique method of combining "regular" banking with the financing of long-period investment seems in order. It is, perhaps, not too hazardous to say that the war interrupted a development that might have led to as efficient a "control" of business fluctuations as can be hoped for from any banking system. Some, although not all, aspects of this link up with mere size of the individual banking unit and with branch banking.

relative merit of different kinds of current was under research; water power (which in Germany came later than in this country) was undeveloped; the competitive position to steam was unfavorable; cost as yet was so high that only those sources of demand could be tapped which were comparatively insensitive to price.

The first Juglar largely removed these obstacles and also witnessed initial vicissitudes. Enterprise centered in electrical manufacture and it was by manufacturing concerns and their banking associates that the development of the supply of current was promoted and financed. A first outburst of activity, much like some of the American railroad booms, went beyond the immediately possible and landed the industry in a critical situation as early as 1900. Bankruptcies and mergers (A. E. G.—Union; Siemens and Halske—Schuckert and Co.) cleared the ground and advance was speedily resumed. The merger movement went on, however (*e.g.*, Felten and Guilleaume—Elektrizitäts-Gesellschaft vormals Lahmeyer 1905; this combination entered the A. E. G. concern in 1910), and the new giants then continued to conquer, in some cases beyond the electrical field—the A. E. G., for instance, acquiring interests not only in trolleys, supply concerns, and so on, but also in banks and nonelectrical industries. The contours of postwar concentration and postwar communities of interests (Interessengemeinschaften) thus became visible, particularly among the heavy industries, which were to develop into such entities as the Stinnes concern (Siemens—Rheinelbe—Schuckert—Union; Elektro-Montan Trust). Though some concerns (Bergmann Elektrizitätswerke, A. G.; Brown-Boveri, A. G.) and hundreds of electrotechnical firms remained independent, the electrical industry may be said to have been dominated, at the end of our period, by A. E. G. and Siemens. These two evolved a *modus vivendi* by division of labor (heavy current—light current industry; but also territorially) and cooperation and, jointly and individually, also established new relations with foreign concerns. A comprehensive international electrocartel seemed a possibility in 1914.

The crux of electrical enterprise was "power finance." Only the largest concerns were up to the task of developing the production of current, and even those knew no more urgent problem than that of making it financially self-supporting and independent. Together with their banks, manufacturing interests controlled about 40 per cent of total "public" supply as late as 1914. They created finance and holding companies and issued bonds or debentures secured on the works built or to be built. One of those companies, intended for international business from the outset, was the "bank" for Electrical Enterprises in Zurich; another, the A. E. G. affiliate, the "bank" for Electrical Securities (Bank für elektrische Werte) in Berlin; a third, the Siemens

affiliate, the Continental Company for Electrical Enterprises in Nuremberg. But unlike America, Germany resorted to public enterprise, as well, at a comparatively early stage. Occasionally this led to conflicts but in general this form of "municipal socialism" (and also action by provincial bodies and states) was welcomed by the manufacturing industry. Publicly owned or "mixed" power concerns thus emerged, harnessing the credit of public bodies into the service. Local power stations and, with the development of long-distance transmissions, interlocal ones then rapidly displaced the isolated plants that dominated the picture up to the threshold of our period, and by 1900 most of the bigger and many small towns were served by stations that at least covered their areas. The number of works, nevertheless, increased from 265 in 1897 to over 4,000 in 1913, most of which were still small. The large-scale stations (Grosskraftwerke) did not emerge in our period; but the way was prepared for them, so much so that capacity installed in public supply stations, which was about 1½ million kilowatts in 1913, doubled in the subsequent decade, in spite of the war and its aftermath, while kilowatt-hours produced in the same time increased from 2.2 to 7.2 billions. Water power was developed to the extent of 700,000 kilowatts (in 1930, 1,200,000).

On this basis, production and export of electrical appliances embarked upon that triumphant career which is too well known to call for description. We know that by virtue of her tradition and environmental conditions Germany was particularly well prepared for that task. Electrical technology had, at the beginning of our period, become an applied science which it was possible to learn and to develop in laboratories and schools. A considerable part of the men who currently rose to fill the, very roughly, 40,000 to 50,000 leading or semileading positions in the industrial organism of Germany had that sort of training, at least to the extent of being able to understand and apply readily what was suggested by the scientific engineer, many being scientific engineers themselves. Many so easily found avenues to wealth and advancement within the existing big concerns that to try to set up new ones would have been mere waste of energy for them. Vigorous and varied enterprise thus went on under the almost immediate impulse of the technical departments of those concerns, the entrepreneurs being largely employees and monopoly positions of individual gadgets being incessantly won or lost in the course of a race which, though never displaying the formal properties of perfect competition, yet produced all the results usually attributed to perfect competition. At the beginning, cables, bulbs, and the like predominated; but the field broadened to practically all branches of industry within the period, at the end of which Germany accounted for about one-third of the value of the world's production of electrical

products (1913). There is no official estimate, but several private estimates agree on a figure between 1,200 and 1,300 millions of marks.

The immediate influence of this development on metallurgy and chemistry was less important than was its influence on the machine industry, for which dynamos, electromotors, transformers, and the fact that use of electric power required new types of machines in general meant a new epoch. But there were independent developments, also. The gas motor (Otto and Langen), well established before, extended its field of application, and the Diesel engine and the steam turbine came more slowly into their own. There were, besides, many innovations in the field of machine tools and of apparatus of all sorts. Enterprise retained many of the characteristics it had displayed of old. The small and medium-sized family firm, often rising (sometimes with the help, all too readily proffered, of ambitious managers of the big banks' branch offices) from an artisan's shop, still was its most common form, although there was a number of largest sized concerns even without the sphere of the big vertical combinations in the heavy industry. Value of output doubled within the first Juglar and value of exports of machinery (boilers and accessories included) was 1.145 billion, including electrical machinery 1.231 billion, marks in 1913. But the German automobile industry cannot by itself be listed as one of the major "carriers" of that Kondratieff upswing. Although one of the earliest in its field and technologically, at that time, in the van of progress, it did not, owing to the economic structure of its environment, reach the stage of mass production. Only 20,000 units (trucks included) were produced in 1913.

The success in the electrical field was matched by an analogous success in the chemical field—and by no means wholly in that part of it which experienced an access of new possibilities from electricity; on the contrary, the decisive achievements of electrochemistry in that period became, outside of the metallurgical field, quantitatively important only in the downgrade of the Kondratieff. The great new thing which, although foreshadowed in the preceding period, now broke into rapid development was dyes and pharmacological products. As in the industry of electrical appliances, it was the efficient "school" (Liebig, Hofmann, Kekulé, and others) that helped to shape a semiscientific type of entrepreneur, and again it was the attitude of this type rather than the capital required which facilitated the emergence of great concerns, in particular of the J. G. Farben ("Dye Trust"), which was to grow far beyond the chemical industry proper and to acquire mining, textile, and other interests. With the host of minor innovations—or those innovations which for the time being remained of minor importance or in the incubating stage—it is impossible to deal here. We will confine ourselves to stating the obvious fact that the chemical industry,

both by its capital requirements—its role as an employer of labor was small, though growing—and by its output, substantially contributed to the ignition of that Kondratieff prosperity. Neglecting everything else, we will add a remark on mining and the heavy industries.

Their impressive expansion, which was the subject of so much contemporary comment—pig-iron consumption per head rose from 133.3 kilograms in 1897 to 276.6 kilograms in 1913—was in part the reflex of mere growth, as may be inferred from the building activity of the period, the demand for railroad equipment, and similar indicators, which are, though not wholly dominated, yet strongly influenced, by that component. Several external factors helped, also. But the main impulse came from electricity and other innovations. Mining, iron- and steelmaking, and their technological neighbors thus primarily experienced an induced development, as they did in other countries. Oil production in Alsace and Hannover—almost entirely controlled by the Deutsche Erdöl Gesellschaft—was new, however, and it was in our period that the potash industry grew to full stature. Among the innovations in the iron and steel industry we will notice the progress in the utilization of coal, which reduced its consumption per ton of ore to about half. The importance of coal as a factor of location being thus lowered, the industry began to migrate, new works being erected, on the one hand, in the ore districts and, on the other hand, on the seacoast. But the principal innovation, to which many technological and commercial ones were subsidiary, was organization and concentration. This movement, led by a number of entrepreneurs of exceptional force, differed from, yet paralleled, the American. One difference was caused by the prevalence of family positions in the industry—practically all those entrepreneurs came from old iron and coal families—which made it unnecessary to appeal to banks and the public to anything like the same extent as in America. Another was due to the absence of any strong public or official opposition to cartels or simple price conventions, which hence could be resorted to in cases that in America would have necessitated the setting up of holding companies, even if nothing but "regulation" of markets was intended.

The difficulties of 1900, therefore, at first only resulted in the formation of syndicates for the control of output and prices. In 1903 the Rheinisch-Westphälische Kohlensyndikat was renewed and much extended in scope as well as membership, and so, in the same year, was the Rheinisch-Westphälische Roheisensyndikat. Even the Deutsche Stahlwerksverband, mentioned above, in 1904 was not much more than a selling agency for 27 big steel works, which accounted for over 80 per cent of the Western steel production and were soon joined by the leading outsiders. A similar organization of the steelworks of Upper Silesia

followed in 1905. Many other examples, among them international organizations such as the International Rail Manufacturers Association (1904) or the zinc convention (1909), could be quoted. All of them differed from the American Trust not only as to efficiency in attaining their objects, but in these objects themselves. They did not directly create giant units of control, but contributed, by their quota systems and, in the case of the iron and steel industry, by the exclusion from their control of that part of the output of coal and intermediate products that the works themselves consumed, an additional motive for amalgamations. They increased price rigidities more than giant units would have done, but dislocated subsequent stages of production probably less than they "stabilized" their own. An example, also interesting for other reasons, will illustrate the latter effect.

Lignite ("brown coal")[1] mining in the Rhineland was pulled out of the depression of the seventies by an innovation, briquettes, which remained throughout the prewar time, first for domestic and from about 1900 for industrial fueling also, the main product of the industry—the role of lignite as a raw material of the chemical industry was still confined to the laboratory—and the success of which, reflected in the spectacular increase of German "brown-coal" production, was among the major features of the period under discussion. Total German production increased from 29.4 million tons in 1897 to 87.1 million tons in 1913, total production of briquettes from 3.9 to 21.4 million tons. Owing to the accessibility and favorable location of lignite and to the resistance offered by consumers, what may be called the briquette boom of the last Juglar of the preceding Kondratieff issued into a depressed condition that lasted throughout the general recovery but cannot be said to have produced price wars or disorganization of markets.[2] This is the kind of thing which it is important to see in the setting of an industry's particular circumstances and not to mistake for an instance of a general tendency toward a permanent state of overproduction. Consumers' demand catching up and trolleys (*Kleinbahnen*) providing both another source of demand and cheaper transport facilities, we observe another boom and fully utilized capacity, but no appreciable rise in prices of briquettes, from 1897 to the end of 1899.

This perfectly healthy and, for a comparatively "new" industry, typical state of things was somewhat veiled by the complaints about over-

[1] In German, *Lignit* designates only one of several kinds of the Tertiary Coal that we mean by lignite here.

[2] The export to the Low Countries and Switzerland, which kept up well, gave a support to what was typically an oligopolistic situation (four briquette factories existed in the Rhineland in 1890), threatened by invaders. A cartel, only in part effective, was founded in 1893.

production and unfair competition that were the prelude to the formation of a pool (*Verkaufsverein*), which, therefore, did not arise from any breakdown of competition but could at the most be called a preventive measure. It put up prices immediately, then somewhat receded under pressure from outsiders and, having absorbed them in 1902, kept prices steady—although not inflexible; wholesale prices were between 8 and 9 marks per ton from 1902 to 1906, 10 marks from 1907 to 1912, and a little over 8 in 1913 and 1914—at a level which on the whole and considering the fall in costs due to mechanization and electrification of operations—output per workman increased about 33 per cent in the course of the first Juglar—must have been very remunerative, but naturally drew fresh capital into the field. New firms emerged even in the difficulties of 1901–1902 and then again in 1910. That excess capacity and "overproduction" ensued which is a characteristic feature of such attempts at organization, or, as they were euphemistically called, at "adaptation of production to consumption." Now the pool had from the first undertaken to buy the output of the constituent firms and, since the larger works had a strong interest to prevent a breakdown, they had occasionally, for instance in 1904, no choice but to render fulfillment of that obligation possible by reducing their own output in favor of the smaller ones.

The various aspects of such a policy need not detain us.[1] They are no less obvious in the case of the potash industry, in which the outcome was cartelization by law and price fixing by public authority (*Zwangssyndikat*, 1910), and which illustrates with particular clearness why and how cartelization helps to induce amalgamation. Neither this compulsory organization nor the voluntary one that preceded it is adequately described by the term *monopoly*. Neither output nor price behaved as the theory of monopoly would suggest. It is by no means obvious that in the long run they differed from what we could have expected them to be under conditions of perfect competition *working in an orderly way*. What those organizations aimed at was rather to bring about such orderly advance in an industry which was rapidly conquering new outlets and at the same time—like the American oil industry—exploiting a temporarily inexhaustible "natural agent." But while thus there was, owing to the particular conditions of the industry, a special case for organization for the purpose of avoiding breakdowns and waste and of preserving financial health, the premium that it put on concentration, *i.e.*, on vertical and horizontal extension of the unit of control, exerted its effect. Although there had been mergers before—the Westeregeln concern had

[1] For the facts of the case see Plönes, Die Uebererzeugung im Rheinischen Kohlenbergbau, 1935; Beisert, Die Entwicklung des Deutschen Braunkohlenbergbaus, 1910; Hotop and Wiesenthal, Deutschlands Braunkohle; Klein, Handbuch für den Deutschen Braunkohlenbergbau, 1914.

started on its campaign of conquest as early as 1900, also vertically by acquiring lignite interests—the movement got into full swing only after the potash act of 1910, and it was then that the big concerns emerged—those of the Deutsche Kaliwerke, of Wintershall, of Burbach, of Aschersleben, and others. That is what entrepreneurial activity mainly consisted of in this field. Consumption by German agriculture increased to more than five times from 1898 to 1913, while industrial consumption did not quite double.

The most obvious parallel to American development, however, is afforded by the heavy industry which also coupled its cartelization with concentration. Legal forms mainly consisted in purchase, fusion, and community of interests. Starting points are to be located not technologically or commercially but personally. Vertical concentration did not, for instance, proceed from some definite stage of the production process the particular conditions of which made it imperative or financially desirable, but indiscriminately and as the chance of personality determined, from the raw material, or from steel, or from the finished product. To quote a few examples: the Thyssen concern started from coal and acquired first ore interests in Lorraine, then steel- and ironworks; the Stinnes concern (Deutsch-Luxemburg) expanded, vertically and horizontally, from what also was primarily a coal basis; the Phoenix concern worked back to coal and later into the field of semifinished products; the Hoesch iron and steel concern acquired, among other things, a machine factory; Krupp bought additional ore and coal mines and, at the other end, the Germania Shipping Yard, as well as other manufacturing concerns; and so on. The positions thus created were mostly sectional. The Rheinisch-Westphalian and the Upper Silesian sectors, for instance, developed very few structural relations between each other. In almost all cases substantial gain in productive efficiency ensued, owing less to what we might call automatic savings incident to combination than to the replacement of less able by more able managers, who knew better how to "rationalize" production and carried out an indefinite number of improvements more quickly.

The history of most of the big concerns that emerged at that time displays—because of the particular type of entrepreneur that commanded the stage—the *will to performance* very much more obviously than does the history of parallel phenomena in countries or cases in which it is financial maneuvering that strikes the eye first. This once more teaches the lesson of the emptiness of the word *control*, as such, and the impossibility of analyzing concentration in terms of impersonal capital agglomerations and of the mechanical effects on output, prices, and social conditions it might have *ceteris paribus*. The new leadership made all the difference, even in cases in which amalgamation was not economical

on paper, *i.e.*, did not in itself imply any great economies of scale. The course of wages, more favorable than in England, does not indicate any monopolistic pressure. Output increased at a rate which makes it impossible to consider quasi-monopolistic restriction as the essence of the *effects*, whatever may have been the *motivation*. Those oligopolies, on the contrary, existed for expansion. They were driven along not so much by potential competition as by the possibilities of their own creation, and forced to adapt their price policy accordingly. At every step, save in high prosperity, this meant no doubt excess capacity, but it seems more realistic to look for explanation to the theory of the process of innovation rather than to either the static theory of monopoly or the popular theories of overinvestment. Prices of individual products were rigid in many cases. But prices in general were not. Those of ingots and steel billets, moving under the opposing influences (most of the time) of buoyant demand and falling unit costs, follow business fluctuations on a level far below that of the late seventies and early eighties. They moved upward in the vehement upswing of the late nineties to a peak in 1900 (107.2 marks per ton), down to 1904 (78.8), up to 1907 (96.7), down in 1908 and 1909, and then up again. These are the yearly figures of the official statistics. They suffice, however, to show that there was, in that case, no lack of flexibility. Dislocating effects from rigidity cannot, at all events, have been very great, contemporaneous complaints notwithstanding. Some stabilizing effects on the general business situation may perhaps—but this is very doubtful—be discerned in the comparative mildness of the crisis of 1907. Let us recall, however, that this sketch is merely intended to illustrate an analytic schema and does not pretend to offer the material for a general appraisal of the merger movement in the German heavy industries.

Dating of cyclical phases is not easier than we found it to be in the two other countries. It should, however, be observed from the outset that German participation in foreign enterprise and German enterprise abroad had by then sufficiently grown to make foreign booms and vicissitudes a nonnegligible factor in German business situations. Taking 1898 for the first year of the new Kondratieff can also be defended on time-series evidence, price level turning upward, for instance, in that year, and the price of consols having turned in 1897—although it would not be conclusive by itself. The state of activity in the capital market, in particular, could be justifiably pointed to in favor of an earlier date: companies with a capital of nearly 900 millions of marks were founded in the three years from 1895 through 1897.[1] There is, however, no doubt about the strong

[1] Professor Spiethoff, in fact, dates the Aufschwungsspanne from 1895. It must be remembered, however, that, according to his schema, part of our Juglar recoveries would come within his prosperities in any case. Mr. Thorp diagnoses 1895 as revival, 1896 as

tide of prosperity that lasted until the summer of 1900, or about its nature. Everyone, at the time, commented on electricity and Kleinbahnen. The picture loses nothing of its normality by the fact that in important lines, such as textiles, household consumption fell off, a phenomenon again observable in and after 1910. But the sharp reaction that followed and that lent the colors of depression to what, according to our schema, should be labeled as recession, requires explanation.[1]

Signs of an approaching turning point had shown themselves in 1899 when employment and building activity began to decrease, though commodity prices continued to rise to the third quarter of 1900, after which the general situation became steadily worse till toward the end of 1902—while, as will be recalled, it continued to be favorable in America. The pace of innovation and the dimensions of the Secondary Wave—the building boom, in particular—mainly account for this; but there were, also, troubles with finance and on the stock exchange of the purely speculative type. Business measurements do not quite bear out contemporary reports about unheard-of calamities. Price level declined but moderately, pig-iron consumption fell sharply but only during 1901, employment improved before the end of 1902, and the large number of failures again points toward reckless financing. Apart from building, the machine and iron industries were the chief sufferers; textiles displayed increasing activity as early as December 1901. But on the stock exchange there was undoubtedly a severe crisis. Speculative excesses of the public had already produced a crash in 1895. A vehement boom set in after it, which under the conditions of the time is not difficult to understand and which provided the basis for the plethora of new industrial capital issues noticed above; another billion followed in 1898 and 1899, and about 340 millions more in 1900. The Reichsbank's control over the money market was as yet very defective, and its position was rendered more difficult by the course of events in England. Its rate was 6 per cent from Oct. 3, 1899 to Dec. 18, 1899, and then went to 7 per cent, but returned to the former figure on Jan. 12, 1900, and to 5½ on Jan. 27. Stock prices which had—perfectly normally—weakened in the summer of 1899, then recovered until April 1900, when a serious breakdown occurred. With fluctuations that are partly accounted for by impulses from America, stock exchange business moved on a very low level until the autumn of 1902, thus bearing witness to the severity of the chastisement.

This diagnosis, which stresses the role of the consequences of stock exchange speculation, speculative building, and careless financing in the

mild prosperity, 1897 as prosperity without qualification. Effects of favorable external factors, such as the commercial treaties of the early nineties, also asserted themselves.

[1] Adherents of the harvest theory will stress the good harvest of 1898 and the bad one of 1901.

events of 1901 and 1902, derives additional support from the fact that later setbacks, which were much less associated with those factors, proved less difficult to overcome. But still those events constitute a deviation from our schema in that we find depressive conditions in a period that should have displayed the feature of a Juglar recession and, correspondingly, what seems a very normal recovery, starting without any new impulses, from an indefinite number of points, in reaction to the subnormal activity in 1903. Recession and depression were telescoped into one phase, and revival was prolonged accordingly. It gathered momentum in 1904 and went on with hardly any break during 1905 and 1906, general business activity simply feeding upon itself.

In the spring of 1907 the building and iron industries, at first without decrease of output, ran into losses. Later on came failures and a marked decrease in employment, but no spiral developed and important sectors were very little affected. Nothing really serious happened in the financial sector; as mentioned above, the strength of the great banks stood out well and there was not much to liquidate. Moreover, the stock exchange had undergone a purifying process at the beginning of 1904. In the autumn of 1907 it suffered a severe shock from America. But owing to the absence of previous excesses, readjustments did not amount to a slump. Professor Spiethoff is perhaps right in denying that there was any "crisis" at all. Everything straightened itself out within a year and a half.

A new stride in electrification and mergers carried the upswing which set in at the end of 1909. The four years following present all the features of a Juglar prosperity, slowly turning through recession toward depression. But diagnosis is made uncertain, owing to the presence of many disturbances, particularly of an international character, the precise importance of which is difficult to appraise. We should, for instance, expect a relatively small setback in 1911. As a matter of fact, however, there was a major slump, almost amounting to a crash, on the stock exchange in September of that year, and all sorts of irregularities—market rate above bank rate for instance—in the money market. This, of course, links up with the Morocco difficulties and with withdrawals of French funds. The influence of the Balkan War of 1912 was less obvious. By the autumn of 1914 the war boom was in full swing.