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THE GROWTH AND FLUCTUATION OF THE BRITISH ECONOMY 1790–1850

THE GROWTH AND FLUCTUATION OF THE BRITISH ECONOMY 1790–1850

AN HISTORICAL, STATISTICAL, AND THEORETICAL STUDY OF BRITAIN'S ECONOMIC DEVELOPMENT

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BRITISH BUSINESS CYCLES AND TRENDS

INTRODUCTION

PART I of this volume represents an attempt, on a broad analytic level, to explain the nature of British business cycles and trends from 1790 to 1850. These chapters draw heavily on the data and the conclusions of all other portions of the text. They constitute the most general and abstract results of the study. For that reason Part II of this volume is essentially prior to Part I: it was completed before Part I was undertaken, and Part I rests, in some considerable measure, on its conclusions. The highly technical and somewhat inaccessible character of the statistical analyses of Part II have, however, made the present order of presentation seem the more reasonable.

In Part II the technique of cyclical and trend analysis developed by the National Bureau of Economic Research is applied to some two hundred annual and monthly statistical series. A detailed account of that procedure is given in an introductory chapter to Part II. Its central aim is to extract and to measure the typical behaviour of a time series during the course of business cycles. Once the dating of business cycles has been decided upon, this technique answers the questions: On the average, how much, and in what direction did a series move in the course of each stage of business cycles? Did it move positively or inversely with prosperity and depression? Did it show a great or a small amplitude of fluctuation? Did its turning-points conform to business cycle peaks and troughs or did they lead or lag? Were its rates of movements continuous or did it tend to rise more (or fall less) in the early or the late stages of prosperity or depression?

This method provides not only a generalized view of typical behaviour, but it also measures, through average deviations, the statistical significance of any uniformities which may emerge. It yields, further, a measurement of the over-all trend of each series for the period analysed.

The National Bureau procedure, in itself, is not calculated to provide an 'explanation' of business-cycle or trend movements. It does, however, organize the statistical data into a form which defines precisely the questions that any generalized theory must answer.

The analysis of each series involves not only the presentation of the principal statistical findings but an interpretation of them. An attempt is made to explain, in a somewhat limited context, both the average behaviour and the exceptions to it. In these interpretations the *History* is heavily called upon. An effort is made to reduce the exceptions, and in some cases the average behaviour itself, to explicable historical incident; for, it is felt, only then can the usefulness of the statistical measures be judged.

The series are presented in five groups, under the headings of production, foreign trade, prices, finance, and labour. This classification conforms roughly to that used in Vol. I, Part I as a basis of organization for the *History*. Each group is presented as a chapter with an introduction. These introductions are designed to present and to explain, in a fairly non-technical vocabulary, the general characteristics of the group and the principal series within it.

Those readers willing to take on faith the detailed interpretations of the behaviour of individual series are urged, at least, to refer to the introductory sections. They contain most of the statistical conclusions which figure significantly in the analytic chapters of Part I.

In Part II of this volume the interpretation of the individual series is accompanied by charts of the original data, measures of average business-cycle behaviour, and charts of the average cyclical patterns. It proved impossible, for reasons of space, to present the detailed cycle-by-cycle measures for each of the series, but it is felt that the reader's understanding of the interpretations is not thereby impaired.

Part I of the present volume is devoted principally to a discussion of business cycles and trends. Conclusions based on the data of the entire study are presented: in broad terms an effort is made to examine and to evaluate the causal processes which yielded the fluctuations and trend movements that occurred. Here a full collaboration of theory, history, and statistics is attempted.

The first two chapters of Part I are devoted to the presentation of a theoretical structure designed to explain business-cycle behaviour in these years. Chapter III constitutes an exercise in verification. The behaviour of a number of the principal variables is first given as they would move if they conformed to the theoretical structure; and this norm is then tested against the actual movements in the course of each business cycle. Exceptions to the norm are then noted and, where possible, explained. Even if there were perfect conformity to the norm, this procedure would not prove the validity of the theoretical analysis; for judgements about causation remain a matter of broad historical and theoretical hypothesis, which no accumulation of statistical data, on whatever scale, can make final. This cycle-by-cycle mobilization of the statistical data in analytic form should, nevertheless, supply the reader with a first basis for the criticism of our hypotheses.

Chapters IV and V deal with the trends in output, prices, wages, and other variables. The purpose there also is to offer explanations which interrelate the behaviour of the various series. The economic impact of the years of warfare and the secular process of rapid industrialization are discussed in detail. In addition the judgements of previous economic historians of the period are examined, and criticized with respect to the adequacy of their data and their theoretical presuppositions.

PART I

GENERAL ANALYSIS

Chapter I

BUSINESS CYCLES IN GREAT BRITAIN 1790–1850

1. The Approach. Business fluctuations have thus far been regarded from two perspectives. The *History* (Vol. I, Part I) attempts to describe the movements of the economy as a whole. There each business cycle is viewed, essentially, as unique. The observation of uniformities in behaviour during different cycles is subsidiary to the process of recording, in considerable detail, the economic events which actually occurred in given time intervals. The abstractions of theory are employed principally as criteria by which the data may be selected, grouped, and shaped into a coherent narrative. Only such a framework would permit the interrelation of events, even on the low level of abstraction which characterizes the *History*. Part II of the present volume,[1] dealing with much the same material, attempts to isolate the uniformities of behaviour of individual series and groups (i.e. *Production, Foreign Trade*, &c.) in the course of business cycles. Divergences from the typical pattern are noted and explained wherever possible; but those explanations are confined, for the most part, to the conditions in particular markets. It is a kind of partial equilibrium analysis. The *History* is an analytic structure in that it attempts, as remarked above, to deal with the economic system as a whole; Part II of this volume is analytic in the different sense that, for each group of data, it establishes typical business-cycle behaviour, and examines the consistency of that norm.

Final judgement on the nature of business cycles in these years demands a weaving together of all the elements in the previous analyses. It requires a view of the economic system as a whole, a knowledge of each cycle as an historical unit, a measurement of the type and degree of uniformity in the cyclical behaviour of such quantitative data as are available. The purpose of Part I of this volume will be to organize the limited conclusions of the previous analyses on the highest level of generality consistent with the refinement of the data. The conclusions of the *History* lack such generality, while those of the statistical analysis are limited in scope to the individual series or group. The term 'business cycle' itself implies a co-ordinate movement among the economic variables; and we must now turn to an evaluation of the possible causal relations among them.

For this purpose the data—statistical and qualitative—are, in one sense,

[1] This section was completed before Part I was begun, though it is placed later in this volume for convenience. Part I rests, in part, on the findings of Part II.

negative in importance. Any hypotheses that are advanced must, of course, be consistent with their behaviour. They constitute the ultimate check. But, while they can disprove, they cannot prove the validity of any theory that is advanced. In the *History* it was possible to establish clearly the proximate cause of a bullion drain, an increase in grain imports, a rise in the price of raw cotton; in Part II of this volume a set of objectively calculated indexes measures the degree of uniformity of the behaviour of each series with respect to business cycles. Here the analytic level must be more broad. The restricted certainty of historical narrative and statistical averaging vanishes. One can merely present those judgements as to cause that are consistent with a maximum of the evidence.

The procedure here will be first to discuss generally what appear to have been the most significant types of causal relationship; and then, in a subsequent chapter, briefly to examine each cycle in the light of these hypotheses. In this manner, it is hoped, some fair balance may be struck between the over-generality of business-cycle theory and the sense of uniqueness which a reading of the *History* imparts.

2. Exports and Domestic Investment. The *History* is organized on the assumption that two factors, above all others, could usefully be said to have had causal significance in British business cycles during this period: the volume of exports and the volume of domestic investment.[1] From their movement it was possible to trace, in each cycle, increased or decreased demands in particular markets; as a first approximation, production, prices, and the demand for short-term money and for labour could be considered a function of their change.

The approximation, in these terms, is crude for two reasons at least. First, it takes no account of the supply factors influencing the variables. A given increase in exports might influence prices, interest rates, wages, and the volume of employment quite differently, depending on the amount of unemployed resources (and their relative cost) in the markets for raw materials, money, and labour. The assumption of fixed cost curves (i.e. of short-period conditions) is not a useful one in tracing a dynamic historical sequence. Second, and more important, this approximation supplies neither a conception of the interrelation of the variables through time nor an explanation of why exports and domestic investment should move cyclically. In no sense, then, does this hypothesis—useful as it may have been for the organization of a narrative—constitute a theory of business cycles. As a first task, nevertheless, it is worth reviewing briefly the evidence on the cyclical behaviour of these two factors.

The volume of domestic goods' exports, it was found, showed a high positive correlation with general business-cycle movements.[2] In only two years of increasing general prosperity did the series exhibit absolute

[1] The possible role of harvest fluctuations, changes in the rate of movement of consumers' income and in the effective volume of money will be discussed below.

[2] See below, p. 733.

decline—1823 and 1825.[1] The cyclical turning-point in 1825 has been judged to have come early in the year (May), so that the contraction in the annual figure is not necessarily counter to the general cyclical movement. The slight decline in 1823, after some three preceding years of general expansion, at a time when domestic investment was at a high level, was not on a sufficient scale to initiate a general business contraction.

In no case was there a decline in the volume of domestic exports during what has been designated as the first year of business recovery. The average rate of increase in the volume of exports is greater during the early stages of expansion (I–III) than the latter stages (III–V).[2] On the average, the impulse to industrial expansion from the side of exports waned as prosperity wore on. The conclusion that increased exports were an essential initiating factor in revival is supported by considerable qualitative evidence. The dependence of the cotton, and to a lesser extent, the woollen industry on export markets emerges consistently in the accounts of their fluctuation; and, especially in the early years of the period, when the capital goods industries were of lesser relative importance, industrial fluctuations consisted, to a very considerable degree, of fluctuations in textile output. In 1815 cotton, woollen, and linen manufactures constituted fully 76 per cent. of the value of total domestic goods' exports; iron goods but 6 per cent.; and by the forties the figures were still 63 and 10 per cent. respectively.

It has been concluded that business cycles in Britain, from 1790 to 1850, were, in large measure, a function of fluctuations in the export demand for textiles; and that such demands were relatively more important, for general prosperity, in the early than the later stages of revival. To some extent this fact precludes the construction of a complete theory of business fluctuations; for in such a theory an important variable cannot be left as a *deus ex machina*. Why, in short, did the demand from abroad for British textiles fluctuate cyclically? In part, of course, the export demand was not independent of conditions in Britain. Exports were financed almost entirely on credit, and increases in exports can be traced often to long- and short-term lending from Britain. The enterprise of merchants and bankers at various times thus helped to create the export demand. The export booms centring on Hamburg (1797–1802), on South America (1808–10, 1819–25), the United States (1832–6), and India and China (1842–5) cannot be understood without reference to British lending operations. And yet the theory must remain, to a limited extent, incomplete. For even in this period the rate of economic development and cyclical movements in other economies, originating outside the sphere of British enterprise, had repercussions on the demand for exports; and the origin of such demands has not been fully investigated in this study. The proper basis for a consideration of the

[1] The volume of total exports declined also in 1817, due to the falling off in the re-export trade after the return of peace, and in 1805, due to the difficulties in sending goods to the Continent.

[2] For a description of this arbitrary system of designation see below, pp. 666 ff.

issues raised here would be a simultaneous account and analysis of the world trading area.

The data on domestic investment—defined as the construction of fixed equipment of all kinds—are much less adequate than for the volume of exports. Nevertheless, it is evident that rapid increases in such construction tended to be concentrated in the latter stages of certain general business expansions. The following evidence lends support to this contention:

1. The canal building boom came in 1791–3, although recovery was under way at least from 1788; the large-scale floatation of new companies and the construction of industrial plant occurred largely in 1824–5, the final years of an expansion begun late in 1819; the railway building and joint-stock floatation of 1832–6 occurred principally in 1835–6; new enterprise in railway floatation was concentrated, during the boom of the early forties, in 1844–5.[1]

2. The following production series show a greater rate of advance in the later (III–V) than in the earlier (I–III) stages of general expansion: brick production, shipbuilding, Hoffmann's index of producers' goods output.

3. The concentration of increase in stage III–V is shared by the prices of iron, copper, and timber as well as by the index of security prices.

The generalized picture of expansion which emerges is of recovery begun by an increase in exports and, after a period, supplemented by large-scale domestic investment. It is probable, further, that these two sources of new orders to industry were related. The primary and secondary (multiplier) effects on total income, due to the increase in exports in the early stages of revival, helped to induce and to finance the later construction of capital equipment. The connexion was thus described by David Macpherson (1805) with respect to the boom with a peak in 1792:[2]

> Of the wealth accumulated in nine peaceful years of successful commerce, a very considerable proportion was invested in machinery and inland navigation; objects which . . . depend for their productiveness entirely upon the general prosperity and trade of the country.

3. Major and Minor Cycles. It must be evident to the reader of the *History* that this relation did not apply to all the business cycles that have been distinguished. Several business-cycle expansions were characterized by only very slight increases or even by absolute declines in series representing capital construction. The average duration of cycles in brick production and ship construction is much longer than for business cycles as a whole.[3] As noted earlier, all business cycles were marked by increases in the volume of exports. The relative movement of domestic investment thus offers a criterion for dividing the cycles into two groups: major cycles, defined as those marked by large increases in domestic investment as well as in the volume of exports; minor cycles, as those where large increases

[1] See Vol. I, pp. 35–7, 185–92, 253–9, 315–20.

[2] Quoted, ibid., p. 15.

[3] See Part II of this volume, pp. 703 ff.

in such investment cannot be traced, but during which the volume of exports increased. The following grouping results:[1]

TABLE 60. *Business-cycle Classification*

Major cycles	*Minor cycles*
1797–1803	1793–7
1808–11	1803–8
1816–19	1811–16
1819–26	1826–9
1832–7	1829–32
1842–8	1837–42

For this purpose the two cycles 1797–1801 and 1801–3 have been treated as a single unit. The general contraction in 1801 is a slight and somewhat obscure movement at best;[2] and recovery in 1802 appears to have taken much the same directions as in 1797–1800. The data available on the cycle with a peak in 1792 indicate that this business cycle may certainly be designated as a major cycle, since its final stages were marked by considerable increases in canal and factory construction and the usual response of brick production. The two major cycles during the war years (1797–1803 and 1808–11), and that immediately following the war (1816–19), are subject to some question.[3] Increased exports (to the Continent and South America, respectively) dominated the expansion phase of the former two cycles. There are evidences of an increase in domestic investment;[4] but there were no easily definable channels which dominated the interest of investors in the manner of the railway and joint-stock floatations of later cycles, or the canal building of the pre-war major cycle. To some extent capital export during the war played a role equivalent to that of domestic investment in 1824–5, 1835–6, and 1844–5. In general, domestic investment (except in special lines such as land inclosure, shipbuilding, &c.) was under a pall during most of the period.[5] The nature of war-time expenditure, however, made for a persistent flow of capital exports: 1797–1803 and 1808–11 are thus 'weak' cases of major cycles. The cycle 1816–19 is questionable principally because of its short duration, and because, aside from housing, large scale home investment is difficult to trace. The substantial increase in brick production, as compared to the moderate increase in the volume of exports, essentially justifies its classification as a major cycle. After 1819 there is little question as to the appropriate designation.

If the distinction drawn between major and minor cycles is just, one would expect certain of the variables to move with differing intensity and, in some cases, even in differing directions in their course. The following

[1] In this analysis the annual dating of cycles is employed. In several cases the monthly turning-point has been judged to have fallen within a year different from that given here.

[2] See Vol. I, pp. 342–53.

[3] For a more complete discussion of the evidence for classifying these as major cycles, see below, pp. 582–3, 589–92, 594–6.

[4] The increase of inclosures and brick production, and the construction of ships and docks, largely justify including these as major cycles, on the criterion of the volume of domestic investment.

[5] See below, Chap. V.

table indicates the average behaviour of some of the more significant time series in the course of the major and minor cycles:[1]

TABLE 61. *Averages and Average Deviations of Per Month Rate of Movement in the Reference-cycle Stages of Major and Minor Business Cycles*

		I–III	*III–V*	*V–VII*	*VII–IX*
Production					
Hoffmann's index of producers' goods production	Major	+0·4 (0·2)	+0·6 (0·2)	+0·3 (0·4)	+0·4 (0·5)
	Minor	+0·1 (0·3)	+0·4 (0·2)	0·0 (0·2)	−0·3 (0·4)
Hoffmann's index of consumers' goods production	Major	+0·5 (0·2)	+0·4 (0·3)	−0·4 (0·6)	−0·2 (0·6)
	Minor	+0·5 (0·5)	+0·4 (0·3)	−0·2 (0·2)	−0·3 (0·2)
Consumption of raw cotton	Major	+1·6 (1·0)	+1·7 (1·3)	−1·7 (1·1)	−1·3 (1·3)
	Minor	+1·3 (1·2)	0·0 (1·3)	−0·1 (1·4)	−1·5 (1·5)
Production of bricks	Major	+0·1 (0·2)	+1·6 (0·4)	0·0 (1·6)	−0·5 (1·8)
	Minor	−0·7 (0·7)	0·0 (0·4)	−0·6 (0·5)	−0·7 (0·4)
Tonnage of ships built and registered in the United Kingdom	Major	−0·7 (0·8)	+0·9 (1·0)	+1·0 (1·2)	+0·8 (1·5)
	Minor	−0·3 (1·2)	+0·5 (0·6)	0·0 (0·6)	−0·8 (1·0)
Foreign Trade					
Volume of total exports	Major	+0·9 (0·9)	+0·2 (0·3)	−1·4 (1·1)	−1·4 (1·1)
	Minor	+1·0 (0·5)	+0·4 (0·2)	−0·2 (0·5)	−0·1 (0·4)
Value of total exports	Major	+0·7 (1·0)	+0·4 (0·5)	−1·6 (0·8)	−1·8 (0·7)
	Minor	+0·9 (0·5)	+0·2 (0·4)	−0·6 (0·6)	−0·6 (0·6)
Volume of exports of cotton manufactures	Major	+1·6 (0·7)	+0·5 (0·3)	−1·5 (0·8)	−1·4 (0·8)
	Minor	+1·4 (0·4)	+0·7 (0·6)	−0·4 (1·2)	−0·1 (1·4)
Volume of exports of woollen manufactures	Major	+0·8 (0·5)	+0·5 (0·3)	−2·0 (0·8)	−2·0 (0·8)
	Minor	+1·0 (0·6)	+0·8 (0·8)	−1·0 (0·9)	−0·8 (0·9)
Volume of exports of iron, hardware, and cutlery	Major	+0·8 (0·4)	+0·3 (0·8)	−0·8 (1·8)	−0·8 (1·8)
	Minor	+1·2 (0·4)	+0·9 (0·6)	+1·0 (0·4)	+0·1 (1·1)
Volume of total imports	Major	+0·8 (0·4)	+1·4 (0·8)	−1·6 (1·0)	−1·7 (1·1)
	Minor	+0·7 (0·3)	+0·3 (0·3)	−0·8 (0·8)	−0·9 (0·7)
Quantity of raw wool imports	Major	+2·2 (1·7)	+3·1 (1·8)	−5·2 (3·2)	−4·8 (3·3)
	Minor	+2·7 (1·2)	0·0 (1·0)	−0·3 (2·9)	−3·1 (3·4)
Quantity of fir timber imports	Major	+0·9 (0·8)	+2·5 (1·4)	+0·2 (1·4)	+0·1 (1·5)
	Minor	−1·2 (0·5)	+0·3 (1·3)	−0·6 (2·2)	−2·7 (2·1)

[1] See Part II, Chap. VI of this volume for an account of the method by which reference-cycle behaviour is calculated for an individual cycle. These tables are derived from the reference-cycle analysis of the individual series. They indicate the average percentage movement per month in each of the four stages into which all business cycles have been arbitrarily divided. Stages I–III and III–V constitute the two phases of general prosperity; stages V–VII and VII–IX constitute the two phases of general depression. The distinction between movements in the two depression stages is not a very real one, since there are only three cases, in this period, of general decline persisting (in the annual figures) for more than one year (1806–8, 1839–42, 1845–8). As the average deviations indicate, the averages differ widely in the degree of uniformity they represent. Large average deviations, however, do not, in themselves, weaken the case for the distinctions made between major and minor cycle behaviour. No particular significance is attached to the absolute figures for the average rates of movement. It is the relative behaviour in major and minor cycles which we are attempting to isolate. To test the significance of our hypotheses we have chosen to examine (in Chap. III of this volume) the behaviour of the more important series in the course of each business cycle. This procedure is, in one sense, a refined substitute for an examination of deviations. The reader is urged also to consult the more detailed analyses of the cyclical behaviour of each series in Part II of this volume, where measures of deviation are presented and discussed at greater length; and ultimately he should return to the *History*.

TABLE 61 (*cont.*)

		I–III	*III–V*	*V–VII*	*VII–IX*
Prices					
Index of prices of domestic and imported commodities	Major	+0·1 (0·6)	+0·2 (0·3)	−0 3 (0·4)	−0 5 (0·3)
	Minor	+0·2 (0·2)	0·0 (0·4)	−0·4 (0·3)	−0·3 (0·4)
Index of prices of imported commodities	Major	0·0 (0·4)	−0·1 (0·3)	−0 7 (0·6)	−0·8 (0·6)
	Minor	+0·2 (0·2)	+0·1 (0·2)	−0·2 (0·3)	−0 1 (0 5)
Price of British bar-iron	Major	−0·2 (0·4)	+1·1 (0·9)	−0·5 (1·1)	−0 8 (1 1)
	Minor	−0·2 (0·4)	−0 1 (0 6)	−0 8 (0·5)	−0·6 (0·6)
Gazette price of wheat	Major	+0·4 (1·4)	0.0 (0·7)	−0·4 (1·1)	−0·8 (0 6)
	Minor	+0·6 (0·6)	+0·3 (0·7)	−0·6 (1·0)	−0·4 (1·3)
Finance					
Number of bankruptcies	Major	−1·2 (0·7)	+0·1 (1·5)	+3·6 (2·2)	+3·4 (2·4)
	Minor	−2·8 (1·6)	+0·4 (0·6)	+1·2 (0·7)	+0·9 (0·8)
Bullion in the Bank of England	Major	+1·3 (2·2)	−1·4 (0·9)	−1·2 (1·1)	−0 8 (1·1)
	Minor	+3·0 (1·8)	−1·9 (2 5)	+1·2 (3·1)	+1·7 (3 5)
Bills and notes discounted at the Bank of England	Major	−2·0 (2·6)	+1·6 (0·8)	+2·8 (2 7)	+1·1 (3·7)
	Minor	−4·8 (4·3)	+1·7 (1·5)	+0·1 (1·7)	0·0 (1·5)
Total bills of exchange created	Major	−0·1 (0·2)	+1·0 (0·2)	−1·2 (1·0)	−1·5 (0·8)
	Minor	0·0 (0 3)	+0·5 (0·3)	−0·2 (0·2)	−0·5 (0·3)
Market-rate of discount	Major	−1·0 (1·2)	+1·4 (0·2)	+1·9 (1·7)	−1·5 (1·8)
	Minor	−2·3 (0·0)	+4·0 (0·0)	−0·3 (0 0)	−2·2 (0 0)
Yield on 3 per cent. Consols.	Major	−0·6 (0·4)	−0·2 (0·2)	+0·6 (0 4)	+0·7 (0·4)
	Minor	0·0 (0·3)	+0·1 (0·3)	+0·2 (0·6)	0·0 (0·6)
Index of prices of shares, excluding mines	Major	+0·4 (0·2)	+1·1 (0·3)	−0·9 (0·5)	−1·0 (0·5)
	Minor	0·0 (0·4)	−0·3 (0·4)	−0·3 (0 3)	−0·1 (0 3)
Net public revenue from taxes	Major	−0·2 (0 6)	+0·2 (0·1)	−0 2 (0·1)	−0·2 (0·1)
	Minor	+0·3 (0·4)	+0·1 (0·3)	−0·1 (0·5)	−0 2 (0·4)
Labour					
Kondratieff's index of money wages in the textile industry	Major	−0·1 (0·3)	+0·1 (0·2)	−0·4 (0 4)	−0·3 (0·4)
	Minor	0·0 (0·3)	−0·1 (0·1)	−0·2 (0·3)	−0 1 (0 3)
Tucker's index of money wages of London artisans	Major	0 0 (0·1)	0·0 (0·1)	0·0 (0·2)	0 0 (0·1)
	Minor	+0·1 (0 0)	0 0 (0·1)	+0·1 (0·3)	0·0 (0·2)
Tucker's index of real wages of London artisans	Major	−0·1 (0·4)	0 0 (0·2)	−0 2 (0 3)	+0·1 (0·3)
	Minor	0·0 (0·3)	−0·1 (0·4)	+0·2 (0·2)	+0·1 (0·3)
Tea consumption in the United Kingdom	Major	+0·1 (0·6)	+0·8 (0·5)	−0·9 (1·1)	−0·9 (1·1)
	Minor	+0·2 (0·2)	+0·1 (0 2)	−0·2 (0·5)	0 0 (0·5)
Tobacco consumption in the United Kindgom	Major	+0·4 (0·2)	+0·3 (0·3)	+0·1 (0·4)	+0·1 (0·4)
	Minor	+0·1 (0·6)	−0·1 (0·1)	−0·1 (0·1)	−0·1 (0·2)
Wine consumption in the United Kingdom	Major	+0·8 (0·9)	+0·7 (0·4)	−0·9 (1·1)	−0·9 (1·1)
	Minor	−0·1 (1·1)	−0·2 (0·6)	−0·9 (0 8)	−1·1 (0 7)
Percentage of iron-founders unemployed	Major	−1·1 (0·8)	−0·9 (0·1)	+6·9 (1·3)	+7·3 (1·0)
	Minor	−1·2 (0·0)	−0·4 (0·0)	+2 4 (0·0)	−2·4 (0·0)
Poor-relief expenditures in England and Wales	Major	−0·7 (0·3)	−0·4 (0·4)	+0·4 (0·4)	+0·2 (0·3)
	Minor	+0·1 (0·3)	+0·2 (0·1)	+0·2 (0·4)	+0·2 (0·3)
Marriage rate in England and Wales	Major	0·0 (0·2)	+0·3 (0·2)	0·0 (0·2)	0 0 (0 2)
	Minor	−0·2 (0 3)	+0·1 (0·2)	−0·2 (0·4)	−0·2 (0·2)

The following significant distinctions in behaviour during the two types of cycles emerge from the table:

a. Production. The producers' goods index[1] rises much more rapidly in

[1] The tendency of the producers' goods index to lag at the peak, reflecting several of its major components, should be recalled. Since, by our measures, many contractions

the course of major than minor cycles, whereas the average behaviour of the consumers' goods index (largely textile exports) is strikingly similar in the two cases. The rate of increase of producers' goods output in stage III–V of major cycles is, further, greater than for consumers' goods in that stage. In all other expansion stages the consumers' goods index rises at a greater or equal rate. The production of bricks and the construction of new ships—like the producers' goods index—show greater increase in the major than the minor cycles. Cotton consumption (virtually net raw cotton imports) is an unsatisfactory measure of cotton manufacture. It shows (like other imports) a slightly greater rate of rise and fall in the major than in the minor cycles. The total volume of cotton exports (a better measure of cotton manufacture) exhibits very little difference in its average behaviour in the course of reference expansions, but the rate of decline in major cycle contractions (like cotton consumption) is markedly greater than in minor cycle contractions. The relative behaviour of these limited production data conforms, then, to the central hypothesis, notably the three series representing producers' goods. The Hoffmann consumers' goods index, based primarily on foreign trade series, in its lack of any sharp distinction also conforms.

b. Exports. The total volume of exports and the quantity of wool and iron exports show greater increase in the minor than in the major cycles, while, as noted above, the average rates of movement during major and minor expansions are similar for cotton exports. Due to the upward movement of export prices in the III–V stage of major cycles, the rates of rise for the value of exports are more similar during major and minor cycles than for the total volume, or for quantities of individual commodities. In all cases the rates of decline are greater in major than in minor cycle contractions.

c. Imports. The volume of total imports, as well as the quantity of cotton (i.e. cotton consumption), wool, and timber imports, rise more rapidly in major than in minor cycles. In all cases but timber (which exhibits a lag at the peak similar to that in the producers' goods production index, brick production, and shipbuilding) the decline is more pronounced in major than in minor cycle contractions.[1]

d. Prices. The weighted index of 'all' commodity prices shows a slightly

are only one year in length, the index, on balance, indicates net expansion during general business contractions.

[1] This is held to be due principally to the severity of the financial crises which marked the major cycle upper turning-points. These crises, at times, virtually denied the short-term funds necessary for continued imports (and exports); and, further, they helped to create a situation of falling prices which, so long as the fall was expected to continue, acted as a deterrent to new import commitments. The part played by the monetary mechanism in business cycle movements is discussed at greater length below. It is to be noted, however, that the increased flow of imports in the latter stages of expansion, at a time when exports were declining or increasing at a slackened rate, was one of the factors which, in itself, set the framework for the financial crises, through pressure on the balance of payments (see Part II of this volume, pp. 797–8 .

greater rise in the course of major than minor cycle expansions. If averages are taken from 1816 to 1848 a sharper distinction emerges in the behaviour of the total price index, with a concentration of rise in the III–V stage of major cycles evident.

	I–III	*III–V*	*V–VII*	*VII–IX*
Major . .	−0·2	+0·4	−0·4	−0·6
Minor . .	0·0	+0·2	−0·2	−0·3

The import price index exhibits little significant difference in behaviour in the course of the two types of expansion, although the rate of decline is markedly greater in the major cycle contractions. The price of wheat (and largely because of it, the index of 'all' prices) fails to exhibit a significantly greater rate of decline in major cycle contractions. Perhaps the most significant distinction, from the perspective of major and minor cycles, is the concentration of rise in the iron price in the latter (III–V) stage of major cycle expansions. A comparison of the value and the volume of total exports indicates that, on the average, export prices too (largely of manufactures) rose only during that stage of the major cycles.

e. Finance. The amplitude of movement of financial series and the severity of financial crises as measured by the behaviour of the series on the number of bankruptcies, the value of bills of exchange created, the yield on Consols, bills and notes discounted at the Bank, and bullion at the Bank, are clearly greater in the case of the major cycles. The market-rate of interest, which covers cycles only from 1826 to 1848, is distorted in stage III–V of minor cycles by the substantial rise in the interest rate in 1839.[1] The index of share prices (exclusive of mines) exhibits average rise only in the course of major cycle expansions; and that rise occurs principally in stage III–V. The average rate of decline during major cycle contractions is considerably greater than for the minor cycle contractions.

f. Labour. Tucker's money and real wage indexes reveal little significant difference in behaviour. The textile wage index rises on the average only in the III–V stage of the major cycle expansions. Tobacco, tea, and wine consumption exhibit markedly greater increases in the major than the minor cycles. As measures of money or real income, however, none of these series is very satisfactory.[2] Iron-founders' unemployment covers cycles only from 1832 to 1848, a period too short for useful generalization; but a markedly greater increase in unemployment appears in the course of major cycle contractions. Poor-relief expenditure, however, extends over a longer interval; and it shows a much greater rate of fall in major cycle expansions. In conjunction with the qualitative evidence of the *History*, this supports the view that unemployment fell more in the course of the major than the

[1] The financial crisis of 1839, due to the process of American financing, may be regarded, in a sense, as a postponed 'panic of 1836' (Vol. I, pp. 296–300).

[2] See Part II of this volume, pp. 949 ff.

minor cycle expansions. Over the whole period the net tax revenue yields no unequivocal distinction; but averages taken from 1819 to 1848, excluding the abnormal war period, yield the following results, which indicate a significantly greater response to major than to minor cycles:

Net Tax Revenue

	I–III	*III–V*	*V–VII*	*VII–IX*
Major . .	+0 3	+0·1	−0·2	−0·2
Minor . .	0·0	−0·1	0·0	0·0

The marriage rate exhibits, in net, a slightly greater rate of rise in major cycle expansions, but a lesser rate of decline in major cycle contractions.

The following empirical conclusions seem broadly to be justified:

1. Major cycle expansions were compounded of large increases in both the volume of exports and of new capital construction.

2. Minor cycle expansions were dependent basically on increases in the volume of exports alone, such increases, on the average, being at equal or even greater rates than during major cycle expansions.

3. Total production, employment, money (and probably real) income, prices, profits, and the aggregate financial variables responded with greater rates of movement to both major cycle expansions and contractions. In short we hold that the major cycles were generally more intense movements than minor cycles, and this we have traced to the relatively more important role of long-term investment in the former.

4. **Export Cycles.** The average duration of all business cycles, from 1793 to 1848, is 51·7 (15·1) months;[1] the average interval between major cycle peaks is 106·0 months.[2] If our hypotheses as to cause are correct, export cycles lasted above four years, while periods of large increase in domestic investment occurred at intervals of slightly under nine years. Why should this have been the case?

The major items of British export were manufactured consumption goods, largely textiles. Four factors at least would lead one to expect a powerful secular increase in the volume of consumption goods' exports:

1. The rapid expansion of world population and of British markets.
2. The tremendous secular fall in export prices.
3. The probable increase in *per capita* real income in British markets abroad, aside from the increase caused by the reduction in price of British manufactures.

[1] This figure is based on the annual data, where no justification could be found for marking off a reference cycle from 1846 to 1848. If the calculation is made on the basis of the monthly reference dates, the average duration of all business cycles from July 1794 to October 1848 is 46·5 (12·9) months.

[2] This average is derived by dividing the interval from 1792 to 1845 (53 years) by the number of major cycles that fall within that period (6), and expressing the resultant figure ($8\frac{5}{6}$ years) in months. The interval between major cycle peaks ranges from 7 years (1818–25) to 11 (1825–36).

4. The relative monopoly that Britain enjoyed in woollen, cotton, and iron manufacture, which ensured that the consequences of the other three forces would be felt in Britain.

The following are some of the more important reasons why that increase might be interrupted.

1. A decline might be caused by an actual blocking off of British goods from foreign markets. This, to some extent, explains the declines in 1803, 1807–8, 1810–11. Similarly, an interrupted flow of raw-material imports (e.g. cotton in 1808) might bring about a decline in production and in exports.

2. An increase in tariffs and/or an improvement in the technique of manufacture abroad might lead to a relative falling off in the demand for British goods. The latter, however, would probably result in a secular decline in the rate of increase or a lesser rate of increase than would have otherwise occurred, rather than an absolute short-period contraction.

3. A falling off in the real income of consumers of British goods (e.g. cyclical depression or bad harvests on the Continent or in the United States) might lead to a decline in the demand for commodities, British goods among them. Changes in the actual purchase by consumers of textile manufactures would be expected to show a relatively small amplitude; but fluctuations in their manufacture were accentuated by the procedure of export. British goods were exported by large-scale wholesale merchants. A time interval was involved before payment was received. These two facts necessitated judgement on the part of export merchants about the future demand in the various markets. The demand for British goods might be governed by the rate of movement of, or expected changes in, consumers' spending rather than by actual fluctuations in that variable. The large amplitude of rise and fall in exports during the cycle 1811–16 was determined largely by these considerations, although that is an extreme case.[1] The whole of the evidence, however, attests to the existence of a form of inventory cycle in British textile exports.

4. The fact that exports were paid for over time intervals and were conducted on a large scale by wholesale merchants involved credit transactions; and to some extent this made the volume of exports a function of money market conditions in Great Britain. A tight money market might cause a decline in exports, even though neither the demand for British goods nor necessarily their actual consumption (because of stocks held in foreign markets) had decreased. During severe financial crises—for brief periods—foreign bills of exchange were virtually not discountable at any rate. There was an element of this pressure on exports in such years as 1816, 1826, 1839, 1847.

5. The possibility of holding stocks of goods in warehouses, at home or abroad, made the volume of exports susceptible, as well, to price movements. A boom in Britain, causing, in its latter stages, a rise in wages and

[1] See Vol. I, pp. 118–21.

other costs, might produce a sufficient increase in export prices to cause foreign purchasers to postpone their orders.

6. Finally, the volume of exports was significantly influenced by the direction of British lending. Capital exports were successfully transferred in the form of goods, and, probably, to an overwhelming extent, in the form of British goods. The swollen exports to the Continent during the war years, to South America in 1808–10 and 1820–5, to the United States in the thirties, to India and China in the forties, cannot be dissociated from the lending of those periods; nor, of course, can the subsequent declines be viewed apart from the cessation of those lending operations.

The first two types of influence—including blockade, embargo, and tariff—are essentially random in character. They do not offer the basis for a theory of consistently recurring export cycles. The first applies, moreover, to forces operative only during the war period; while the importance of the tariff increases must be considered as strictly secondary. The fourth and fifth forces—suggesting a possible deflationary influence on exports from the side of British interest rates and prices—do relate export movements to domestic business cycles. They offer a possible reason for the tapering rate of rise in exports during the latter stages of expansion, and for the immediate sensitivity of exports to financial stringency; but by themselves these factors cannot pretend to explain movements of the large amplitude exhibited by exports. The application of this hypothesis alone would yield, abstractly, only slight fluctuations about the upward secular trend.

It seems to have been the case that the third and sixth factors listed were of the greatest significance: i.e. actual or expected fluctuations in the demand for British goods, whether caused by general movements independent of British cycles or by changes in British lending. The role of the latter, it will be seen, fits well into the explanation of other types of investment, which are treated below. But to the extent that export fluctuations arose from autonomous cyclical movements elsewhere, our theory must remain incomplete.

Although full information on business fluctuations in areas outside Britain would certainly be helpful, it is not, for these years, as serious a lack as might at first appear; for during the war years, with the exception of the South American boom (1808–10), the Continent was the focus of British exports, and fluctuations in the continental trade were not a function of autonomous cycles there, but rather of the flow of British capital and the effectiveness of Napoleon's blockade. Fluctuations in the United States (aside from the period of embargo and the War of 1812) were also largely dependent on the British and continental trade, so that no special difficulties in the interpretation of export movements arise until after 1815.[1]

[1] Exports to the United States failed to parallel those to the Continent (excepting 1808–14) only in the following years: in 1799 exports to the United States increased at a time when continental exports declined, due to the crisis in the Hamburg trade; in 1803,

From 1816 to 1850 the proportion of the total value of British exports sent to the Continent hovered around 40 per cent., running as high as 51 per cent. (1820) and as low as 35 per cent. (1836). Aside from the possible impact effect of increased continental exports in 1817 and 1820—first years of business revival for Britain—such exports were not among the more dynamic elements in the export trade.[1] They fluctuated markedly less than exports to the United States and South America, the other principal outlets for British goods. This is revealed in the following table indicating the percentage of the total value of British exports sent to the six continents in peak and trough years, from 1816 to 1845:

TABLE 62. *Percentage of Total Value of Exports*[a]

	Europe	*Africa*	*Asia*	*North America*	*South America*	*Australia*
T—1816 . .	45	1	7	40	7	—
P—1818 . .	42	1	9	37	11	—
T—1819 . .	48	1	8	34	9	—
P—1825 . .	38	1	9	33	19	—
T—1826 . .	44	1	14	29	12	—
P—1828 . .	37	2	12	20	27	1
T—1829 . .	40	3	11	18	27	1
P—1831 . .	36	3	10	30	20	1
T—1832 . .	42	3	10	21	23	1
P—1836 . .	35	3	11	28	21	2
T—1837 . .	45	4	11	16	22	2
P—1839 . .	38	3	12	22	22	3
T—1842 . .	50	3	14	12	18	2
P—1845 . .	43	3	17	18	17	2

[a] For a more detailed analysis of the movement of the value of exports to different areas in relation to British business cycles, see Part II of this volume, pp. 780–4. It was found that exports to the United States and to Central and South America exhibited extraordinarily high positive conformity to a I–V expansion pattern, movements being almost identical with British business cycles; i.e. they rise in stages I III and III–V and fall in stages V–VII and VII–IX. Exports to British North America and the West Indies show the same average pattern, with increases most consistent in stage III–V, probably indicating a dependence on British business conditions. Three of seven I–III stages exhibit declines, and two others show only a slight rise. The average pattern for the value of British exports to Asia is also best taken as I–V. But the indexes of conformity are relatively low, with fairly numerous deviations, especially in the early years. Exports to Europe rise consistently only in stage I–III. Their average pattern has been taken as one of VII III expansion, to which it exhibits moderate positive conformity. It seems to bear the least close relation to British business cycles of this group of series.

Without exception the proportion of the value of exports sent to the

due to the outbreak of war, continental exports declined while exports to the United States remained stable; in 1815, upon the end of the War of 1812, exports to the United States increased enormously, while the peak in continental exports came in the preceding year.

[1] The proportion of the value of exports to the Continent also increased between 1829 and 1830 (a first year of recovery) from 40·2 to 40·5 per cent., but it was the more substantial increase in North American exports (from 18 to 21 per cent.) which more largely accounts for such revival as occurred in that year. In both 1817 and 1820 the increases in the percentage of exports to the Continent were accompanied by increases as well to Asia and South America.

Continent was less in peak than in trough years. This is all but sufficient evidence for relegating such exports to a minor place in British business fluctuations after 1815, with the two possible but unimportant exceptions noted above (1817 and 1820). Each business-cycle expansion was accompanied by a large percentage increase, principally in one direction:

1816–18	South America	1832–6	North America
1819–25	South America	1837–9	North America
1826–8	South America	1842–5	Asia and North America

The three South American booms can be regarded as part of a single wave of British enterprise, begun with the freeing of the Spanish colonies in 1808 and reaching its climax with the enormous long-term floatations of government bonds and mining shares in 1823–5. Exports to Central and South America show a steady rise, distorted upward, of course, during the brief period of long-term lending. The interruptions in the rise from 1814 through 1829 occur during periods of financial stringency in Great Britain: 1815–16, 1819, 1826, 1829. Fluctuations in exports to South America do not appear to be independent of British cyclical movements, and their explanation thus awaits the formulation of a theory of domestic business cycles.

This view is reinforced when it is realized that (aside from the mining equipment of the twenties) consumers' goods—textiles largely—constituted the bulk of exports there. The amplitude of movement of the consumption of such goods in the course of business cycles might be expected to be moderate. And in view of the non-industrial nature of the Latin American economies, one could not expect cycles there stemming from large-scale fluctuations in fixed capital investment. At best one might find some kind of inventory cycle. It is, then, not surprising that we have concluded by regarding the large changes in Latin American exports as essentially a function of British economic conditions.

A greater degree of autonomy must be granted to fluctuations in the demand from the United States for British goods. The two economies, it is true, were connected by a sensitive web of credit relations; and the important part played by both short- and long-term British lending, especially from about 1830 to 1839, is evident.[1] And yet, to some extent an initiating role in British fluctuations must be granted to the United States in these years. The timing of business cycles was not, in all cases, during our period, identical, the clearest example of this being the major American peak in 1847, as opposed to the British peak in 1845.[2] But through the thirties especially, the economic fortunes of the two countries were closely connected; and the two British expansions (1832–6 and 1837–9) were, to

[1] See Vol. I, pp. 185–92, 215–21.

[2] Ibid., pp. 282–4. A minor peak for Britain in 1847 has been marked off in the monthly data, for which the great increase in exports to the United States is primarily responsible.

a considerable extent, dependent on the extraordinary American development of that decade. In the forties, however, the increase in the Asiatic trade and the construction of British railways overshadow the still considerable influence of increased American purchases; while in the twenties the Latin American markets were more significant for cyclical fluctuations, though they involved a lesser absolute amount of trade.

Aside from the influence of capital exports we have indicated reasons for expecting goods' exports to increase steadily except at times of British financial crises. After 1815 the principal instrument in the causation of decrease was taken to be the unavailability of short-term credit, which, under existing institutional arrangements, was calculated to impede the flow of goods abroad. The importance of this factor would be buttressed by the interconnexion of European and American money markets, and the (partially consequent) broad concordance of general cyclical movements in different areas, especially when such movements depended to some extent on the flow of British capital. Exports to the Continent, it is true, especially after 1819, show several instances of increase during contraction in Britain: 1829, 1832, 1837, and 1839–42. The decreases in 1826 and 1845–8 are, further, less than in exports to the two American continents. It is possible, in fact, that the falling prices that accompanied depression in Britain actually fostered such counter-cyclical increases. What emerges, then, is not strictly an endogenous theory of export cycles, but rather an irregular movement of an inventory type, compounded principally of the following elements:

1. A steady upward pressure, dependent on secular increases in population and income, and falling costs of production.
2. Abnormal increases and decreases about this trend stemming from the flow of British short- and long-term capital abroad.
3. Decreases (partially connected with 2) caused by financial stringency in Britain.
4. Cyclical movements deriving from autonomous fluctuations in other areas, principally in the United States, and possibly on the Continent; although changes in the value of exports to the Continent (after 1815) do not appear to have been very significant for British business fluctuations, despite their considerable absolute volume, while exports to the United States were heavily influenced by British lending, and thus may be regarded as partially a dependent variable.

It will be recalled that so far as business-cycle behaviour is concerned it was necessary to adduce reasons why exports should have increased in the early stages of all general business revivals. The answer becomes clear if one regards exports (aside from the influence of large capital exports) as normally in a state of increase in the expanding international economy of these decades, with its progressive refinement of methods of British manufacture. After financial panic had ended and prices and interest rates had

fallen, there were ready markets for Britain's manufactured consumption goods. Financial stringency in Britain was capable of reducing the flow of goods abroad to a subnormal level. If one assumes, as a first approximation, that the demand curves for British exports were shifting upward at a constant rate (or even that they were constant over short periods), the immediate and substantial revivals in exports in years following financial panic are largely explained as a kind of reaction to depleted inventories: e.g. 1794, 1812, 1820, 1827, 1838. The introduction of blockade and embargo, capital exports from Britain, and the rare influence of autonomous business cycles unconnected with British lending explain most of the other important contours of the export curves; while the lesser average rate of increase in stage III–V than in stage I–III may prove, on wider study of the world trading area, to have been a consequence of rising export prices and interest rates in the latter stages of expansion—a degree of prosperity in England not fully shared by all her export markets.

Two other factors may have helped to produce this slackening in the average rate of increase. There may have been some sort of inventory overstocking in the early stages of expansion with prices low, and expectations of a rise (or a cessation of fall) spreading with the return of recovery. The sharp rise of exports in a number of I–III stages represents the effort to fill stocks depleted by the immediately preceding financial crisis. It is quite possible that, with prices low and short-term financing easily available, the process of repleting stocks was carried on at a rate which could not be sustained in the face of a rising level of export prices. The declines in the total volume of exports in 1823 and 1825, the tapering rates of rise in 1839 and 1844–5, may contain an element of such inventory reaction. But in so far as the lesser rate of rise in stage III–V is due to the movement of total exports in peak years, it may be merely the spurious consequence of using annual data; for every peak year contained some months of declining business activity, and, since the flow of exports was immediately sensitive to the availability of short-term credit, the absolute declines in 1810 and 1825, and the slackened rate of rise in 1796, 1836, 1839, and 1845, may in fact indicate the beginnings of depression rather than forces operative in the latter stages of expansion. If the slackened rate of rise in stage III–V is viewed as resulting from rising export prices or inventory over-stocking, then the possible bias imparted by the use of annual data is a serious reservation. If, however, tight money conditions are held responsible, then the same instrument is assumed to be operative in the latter stages of expansion and the early stages of depression. Important evidence, however, for the role of British prosperity (i.e. rising prices and interest rates) in inducing an inventory reaction in stage III–V is the greater average rate of rise of imports in that stage. If the phenomena merely resulted from the immediate sensitivity of foreign trade to the fact that the peak years include some months of recession, then imports, too, might be expected to show a slackened rate of rise. There would appear to have been a greater elas-

ticity of demand for exports than for imports in the latter stages of expansion.

The following table indicates the years when the total value of domestic goods' exports declined and the principal areas responsible; i.e. areas showing a value decline of at least a half-million pounds. The table also shows by asterisks those cases where the decline in values was shared by the total volume figures. In six of fifteen cases, it will be noted, the decline in the total value was caused solely by the downward movement of prices.

TABLE 63. *Years of Decline in Real Values of Domestic Goods' Exports from the United Kingdom*[a]

Year	*Areas showing principal decline*	*(In £ millions)*	*Total volume declines also*
1807	Northern and southern Europe	2·3	*
	United States	0 5	
1808	United States	6 6	
1811	United States	9·1	*
	North and South America (exclusive of United States)	3·7	
	Northern and southern Europe	2 8	
1816	United States	3·7	*
	British North America and West Indies	3 7	
	Southern Europe	1·5	
	Northern Europe	0·6	
1817	United States	2·6	
1819	United States	4·5	*
	Northern Europe	2·0	
	Central and South America	1·6	
	Asia	1·2	
	British North America and West Indies	0 9	
	Southern Europe	0·7	
1823	Southern Europe	1·5	*
	United States	1·4	
1826	Central and South America	3·2	*
	United States	2·4	
	British North America and West Indies	1·2	
	Northern Europe	0·7	
1828	United States	1·2	
1829	United States	1·0	
	Asia	0·7	
	Central and South America	0·6	
1831	Central and South America	1·6	
	Northern Europe	1·1	
	Southern Europe	1 0	
1832	United States	3 6	
	Southern Europe	0·6	
1837	United States	7·7	*
	Central and South America	1·6	
	Asia	1·2	
	Southern Europe	1·1	
	British North America and West Indies	0·9	

TABLE 63 (*cont.*)

Year	*Areas showing principal decline*	(*In £ millions*)	*Total volume declines also*
1840 . .	United States	3·6	
	British North America and West Indies	0·6	
1842 . .	United States	3·6	*
	Asia	0·7	
	British North America and West Indies	0·5	
1846 . .	Asia	0·8	*
	British North America and West Indies	0·5	
1848 . .	British North America and West Indies	2·0	
	Northern Europe	1·9	
	United States	1·4	
	Asia	0·6	
	Foreign West Indies	0·5	

[a] Porter, *Progress of the Nation*, pp. 361–2. The series for the real value of domestic goods' exports by areas is available from 1805. The following figures for three years between 1790 and 1805 during which the volume of exports declined are from D. Macpherson's *Annals of Commerce*, iv. They are given in terms of the official value of exports, and include re-exports. They are thus not comparable to the figures presented above for the years after 1805, and further, the figures given below, although in the form of pounds sterling, represent an index of volume rather than a measure of value.

Official Value of Total Exports

Year	*Area showing principal declines*	*Amount of decline in £ millions*
1793 . .	France	1·0
	United States	0 8
1797 . .	United States	1·0
1803 . .	Germany	2·9
	Holland	2·7
	France	1·2

In specific instances it is apparent that what have been called inventory reactions cannot clearly be separated out from the influences of autonomous cycles outside Britain, of tight money conditions, and of the other factors which might induce a decline in the value of British exports. In one sense all declines, except those caused by an arbitrary blocking off of markets, may be considered inventory reactions, in that they arose from the market judgement that the flow of British goods at the immediately previous rate, at existing costs, would be excessive relative to the powers of absorption in the various markets.[1]

[1] The descriptions given by Tooke of the mechanics of both import and export markets make graphic the manner in which the existing level of stocks, in conjunction with current costs and the expected state of demand, determined the volume of foreign trade. A 'pure case' of an inventory reaction would be one *originated* within the export markets by a feeling that the movement of goods was at a rate which could not be sustained. The declines of 1816 and of 1823 are, respectively, severe and mild instances of this process, although such strictly market judgements played a part (along with money

Aside from the following examples, chosen arbitrarily on the basis of the absolute movement of the total volume and value of exports, there are many other cases of significant changes in the rate of rise and of absolute declines in specific markets which had general repercussions, but which occurred in years when the net movement was upward. The following instances are then not to be regarded as an exhaustive survey of the movements of British exports.

The previous analysis has considered various reasons why the upward movement of exports might be interrupted. We shall now attempt to identify which factor or group of factors was responsible for each of the declines from 1790 to 1850:

1793. Collapse of export boom to United States due in part to tightened money conditions in Britain, and, perhaps, inventory over-stocking. Outbreak of war.

1797. Monetary crisis in Britain and, again perhaps, inventory collapse in United States.

1803. Outbreak of war blocks off continental markets.

1807. Continental system tightens again at close of 1806, blocking off continental markets. Beginning of American difficulties.

1811. The Orders in Council, a tightening of the continental blockade, along with the collapse of the South America boom and the end of the brief period of open trade with the United States. There are elements here of tight money, over-extended credit, inventory over-stocking, and the arbitrary influence of war-time factors.

1816. Collapse, through inventory over-stocking, of the American markets, following upon the previous (1814–15) collapse of the continental markets. British exporters in all cases over-estimated the rate at which foreign markets, even though at peace, could absorb British goods.

1819. The collapse of the American and, to a lesser extent, the European markets in 1819 bears all the earmarks of an inventory decline, accentuated by monetary stringency in Britain. The end of an autonomous American expansion was closely interrelated with the British decline in 1819.

1823. This downward movement seems to have been a kind of inventory relapse, precipitated, perhaps, by fears of war on the Continent. Its general repercussions, however, seem to have been so slight that no reference cycle has been marked off from 1819 to 1823.

1825. Volumes, in net, decline in 1825 (reference-cycle peak, May), real values up due to net rise in average prices from 1824 to 1825.

1826. General influence of tight money in Britain. End of South American lending. Collapse of American prosperity interrelated with British business conditions.

1828, 1829, 1831, 1832. Lack of large increase in volume in any direction,

market conditions, the flow of long-term capital exports, &c.) in almost all the declines. For vivid descriptions of the inventory process see especially quotations from Tooke in Vol. I, pp. 34, 92–3, 113–17, 140–5, 174–81, 247–50.

accompanied by price declines, yield a fall in value, but a steady increase in quantities exported in these years. But volume of exports to the United States, especially (and to other areas to a lesser extent), shows absolute declines in several years, with effects on general British business conditions (notably 1829 and 1831). No important foreign lending in this period.

1837. Overwhelming importance of collapse of American prosperity and Anglo-American credit and long-term lending relations. Other declines probably related to resultant tight money conditions.

1840. Large decline in value to United States (after crisis of 1839). Rise in volumes but no large increases. Situation parallel to that in 1828–9, 1831–2.

1842. Sharp decline in the volume of exports to the United States, in addition to fall in prices, yields slight total net decrease, outweighing increases in volumes elsewhere. Essentially an autonomous movement from the United States, with probably an element of over-stocked inventories.

1846. General slight decline due to financial stringency in Britain, waning of general prosperity on the Continent. Speculative exports to Asia affected especially by tight money conditions.

1848. World-wide depression, revolutions on the Continent, tight money, inventory reaction from slight revival of early months of 1847, continued tight money conditions after panic of 1847 until latter half of the year.

On balance, then, we would take the view that the institutional framework within which British foreign trade operated decreed an underlying and persistent tendency for secular expansion in British exports to take the form of recurrent inventory cycles of relatively short duration. The interweaving of this pattern with economic forces of greater violence and the intrusion on foreign trade of autonomous political and military events yield an actual pattern for exports which is less regular and more mercurial than can be accounted for by an inventory cycle alone.

Chapter II

BUSINESS CYCLES IN GREAT BRITAIN (*continued*)

5. Cycles in Domestic Investment. Major cycle peaks in Britain from 1790 to 1850 appear to have occurred at an average interval of about nine years. The observation of more complete data, including the latter half of the nineteenth and the early decades of the twentieth century, has led to the almost universal acceptance of the empirical conclusion that cycles of a definable type, occurring at approximately such intervals, have been an enduring feature of industrial development in capitalist areas since 1790 at least.[1] Most business-cycle theories concern themselves, essentially, with this kind of cycle, although, in latter days, increased attention has been devoted to the mechanics of the shorter (*circa* 40 months) and longer (*circa* 55 years) cycles for which some evidence of periodicity exists. The material examined in this study is clearly insufficient for any final statement on the processes of causation in the middle-length cycle. The hypotheses advanced here are designed merely to explain the six cases that occurred in Great Britain from 1793 to 1848—the cycles with peaks in 1802, 1810, 1818, 1825, 1836, and 1845.[2]

The analysis thus far has defined two types of business cycles and isolated out various differences in the behaviour of the principal variables in their course. The minor cycle expansions have been principally identified with the primary and secondary consequences of the chronic increase in the exports of manufactured consumption goods, accompanied by slight increases or absolute declines in domestic investment. The major cycle expansions have been connected with waves of new capital construction in Britain as well as with export increases. The series which have been used to measure such construction (the Hoffmann index of producers' goods output, brick production, timber imports, ship construction) all also exhibit some response to minor cycle expansions, either in the form of slight rates of increase or lessening rates of decline; and this is important evidence that the minor cycles were movements more general than mere fluctuations in the export industries. But the behaviour of the statistical data, supported by a mass of qualitative information, suggests the crucial importance of attempting to explain the rhythm of domestic investment.[3]

[1] The cycle 1819–26 is sometimes referred to as the first 'modern' cycle. The justness of this contention is examined below.

[2] If the cycle from (*circa*) 1788 to 1793 is included there are seven cases of major cycles in our period.

[3] The theoretical literature which bears directly on the following passages is so voluminous that footnote references would be virtually without meaning. The framework out of which they are written, it is hoped, is a consistent one. The reader, however, may find that, as a formal structure, it falls rather more into one than another of the camps into which business-cycle theory has for long been divided; and that, further, this structure fails to employ some of the impressive refinements which the theorist has recently presented to the factual investigator. As for the first stricture, one can merely

A new ship or a factory or a canal or a railway—all these involve time intervals for both the period when they are under construction and the period over which they yield their services. Both periods vary widely with

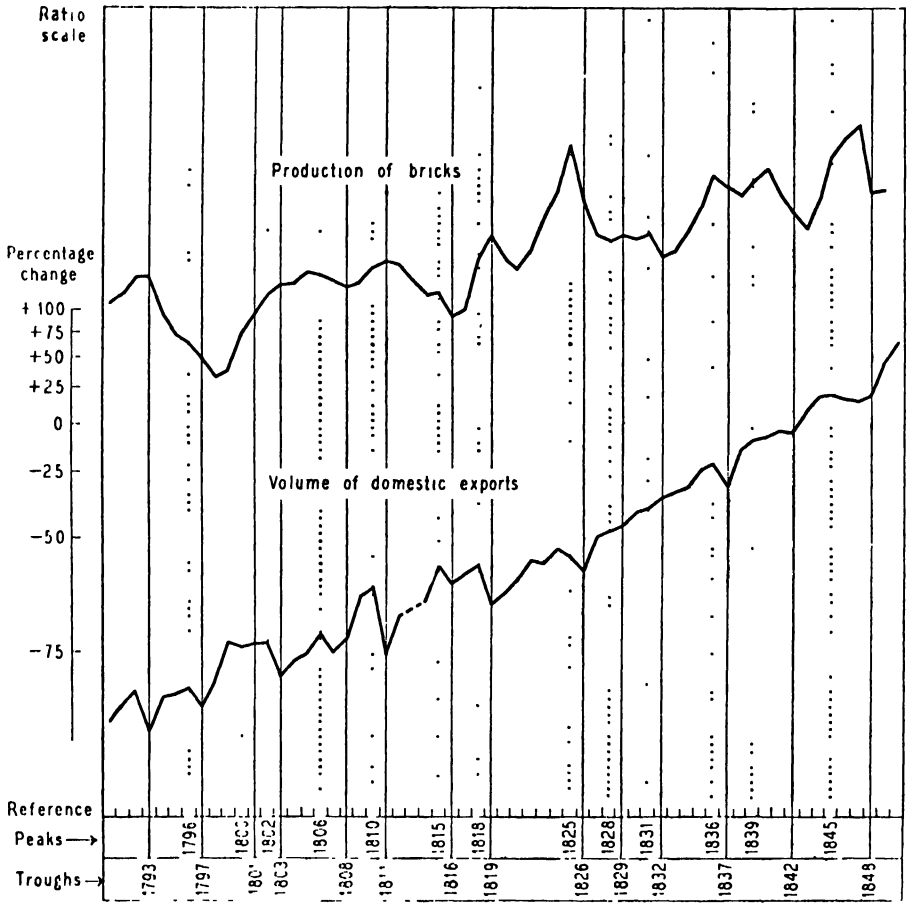


Fig. 101. The Rhythm of Investment and Export Fluctuations, 1790–1850

different kinds of capital goods, but they are longer than parallel periods involved in the acquisition of manufactured consumption goods—e.g. the intervals for which the American wholesale importer of British woollens had to allow between the transmission of his order and the receipt of goods, and the receipt of goods and their sale to retailers. Both in the transactions of foreign trade and in new capital construction the existence of such time

state the obvious—that the causal processes described here seem best to fit the limited evidence that has been collected and organized. The relative crudity of theoretical vocabulary - the second structure proceeds from a belief that in an historical analysis it is not a useful procedure to manipulate concepts more refined than the data justify; that theoretical 'boxes' which cannot be filled should not be employed in an investigation of this kind.

periods demanded judgement about the state of the market at some future date; but a longer view was required for and longer consequences stemmed from the latter.

As noted earlier, our data seem to indicate that increases in new capital construction tended to be concentrated in the latter stages (III-V) of major cycle expansions. Brick production, for example, actually declined in the first year of three major cycle expansions (1798, 1820, 1843) and rose only slightly in the other three cases (1809, 1817, 1833), at a much lesser rate than in the years immediately following (1810, 1818, 1834). A limited but extremely clear example of this pattern can be derived from the figures given by Baines for the number of cotton mills in the Manchester district at three-year intervals between 1820 and 1832:[1]

	Total factories	*Annual average increase*
1820 . .	66	..
1823 . .	72	2
1826 .	92	6⅔
1829 .	95	1
1832 . .	96	⅓

The greatest increase occurred in the latter stages of the major cycle expansion (1823-5). Increase in the two subsequent minor cycle expansions (1826–8, 1829–31) was negligible.

The period of revival which preceded the major bursts of new capital construction served three closely connected purposes: (*a*) it produced, in some sectors at least, a condition of full capacity, in the existing state of fixed resources; (*b*) it produced the expectation of a continued increase in output, which tended to make entrepreneurs willing to undertake long-term investment in plant; (*c*) it produced an increase in profits which, in an era when industrial financing figured only slightly in the capital markets, was often required before new construction could be undertaken.

We have seen why a given entrepreneur should undertake a new act of construction only when prospects for the fairly long future are good—usually after a preceding interval of increasing general prosperity. Why should this type of investment not have been undertaken on the same scale in the course of the minor cycle expansions? It will be noted that, with two exceptions, the major and minor cycles followed one another in sequence.[2]

[1] Op. cit., p. 395. Although the three-year estimates of the number of cotton factories in Manchester end in 1832, it is clear, from other evidence, that a large wave of construction and re-equipment in the cotton industry ran from 1833 to 1836. (See Vol. I, pp. 263–4.)

[2] The exceptions to the regular sequence are the two major cycles 1816–19 and 1819–26, and the two minor cycles 1826–9 and 1829–32. The abnormally short interval between the two major cycle peaks 1818 and 1825 may have been partially due to the short (two-year) expansion phase of the former. The relatively long interval (eleven years) between 1825 and 1836, likewise, may be, in part, traced to the abnormal length (six years) of the major cycle expansion 1819-25. The period 1829–32, with its steady increase in the volume of exports, may, from another perspective, be regarded as the period preliminary to the increases in

Again referring to the position of an individual firm, there may have been at least two reasons why capital expenditure should not be repeated at intervals as short as the average length of all business cycles. If, as has been assumed, the entrepreneur invested largely out of previously earned profits, then it is unlikely that he would have accumulated sufficient reserves by (say) 1828 to repeat his expenditure of (say) 1824. Even assuming constant annual profits, the expenditure on new plant was, in relation to the annual amount of net profits, probably sufficient to absorb savings over a period conforming roughly to the average interval between major cycles. There are, of course, reasons to believe that the profit rate was not constant. And there is, further, no very good reason to believe that the same cotton factories were expanded in, say, the thirties as in the twenties. Nevertheless, the absorption of previous savings for the community in construction concentrated over a short period appears to have precluded similar expenditure on the same scale for a considerable period of time. This notion of the relation between saving and investment is, in one sense, evidently antique; but it is our impression that it had some substance in the period considered here, given the institutions and procedures of investment.

Second, investment in new plant could not, of its nature, be undertaken in small increments. Assuming a constant rate of increase in output, an individual firm could not alter its fixed plant at a parallel constant rate, and if our data are at all reliable it would appear that increases in capacity, capable of dealing with the secularly increasing volume of output, tended to occur largely in a few years of each decade. Fluctuations in the construction of new plant were certainly greater in amplitude than fluctuations in current output.[1]

These extremely limited observations, in terms of an individual firm, may be summarized in the form of the following series of graphs. Fig. 102*a* represents the position of the firm in the early stage of a major cycle expansion (say 1823), when a condition of full capacity was being approached, in the existing state of fixed resources, and when accumulated profits and increasing optimism (both a product of previous recovery) were supplementing the technical motive (full capacity) for increasing plant. Perfect competition (i.e. a given price) and fixed prices for the variable factors of production are, for the moment, assumed. Fig. 102*b* represents the total market for the product of the industry. The quantity OQ is many times the quantity produced by the individual firm, $O'Q'$.

The firm then expands its plant. But other firms, too, acting under the same general motives, also expand plant;[2] so that, at the next minor cycle

investment in 1833-6, parallel, for example, to the period 1819-22 in the previous major cycle.

[1] See Part II of this volume, pp. 679 ff., for the relatively large average amplitude of brick production, ship construction, &c. The fact that, in some years, new construction in the cotton industry, for example, was negligible when total exports declined only slightly or actually rose is evidence of the same relation: e.g. 1829-32.

[2] For a discussion of the generality of this process see below, pp. 558 ff.

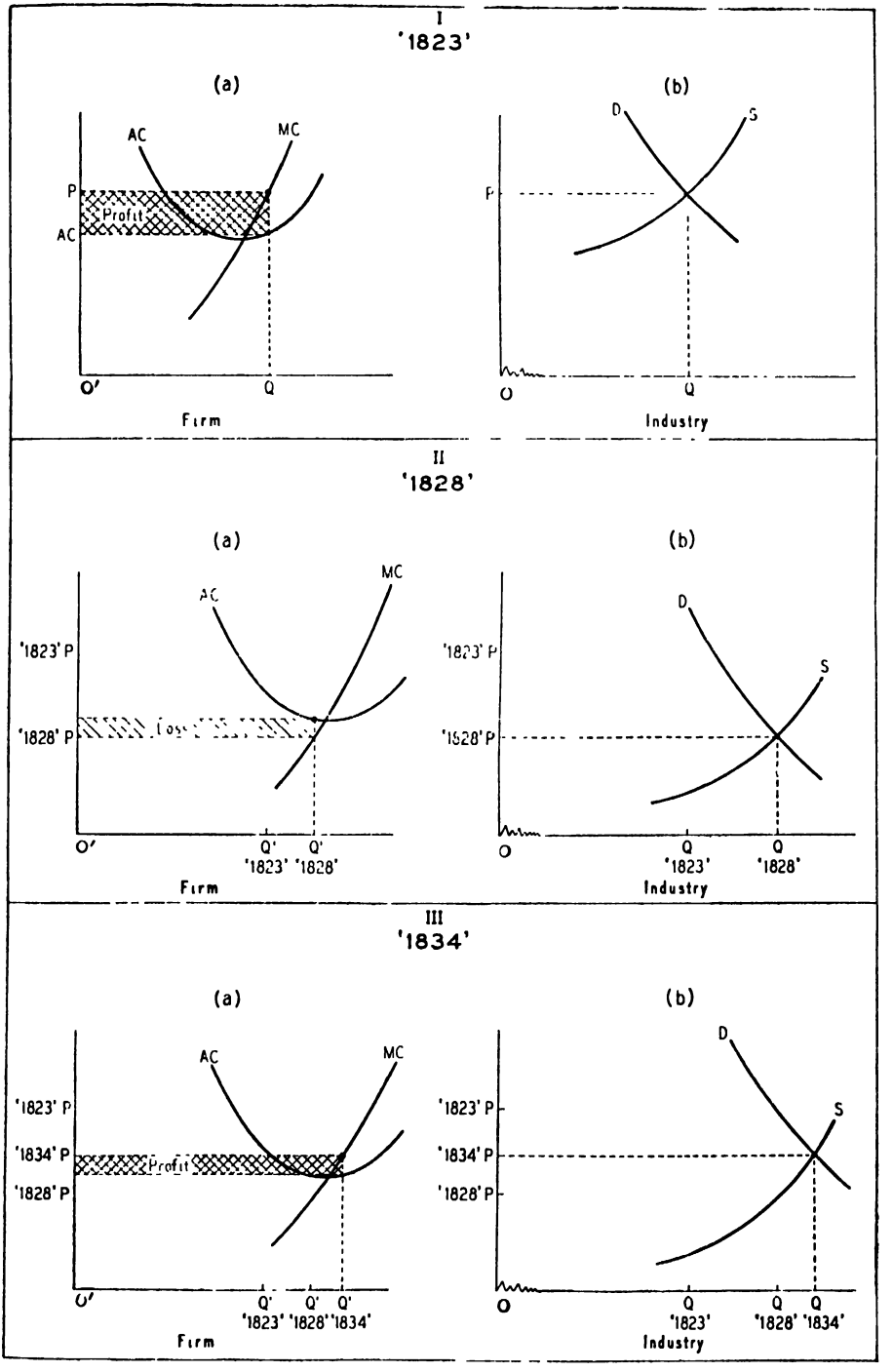


Fig. 102. Price and Output for Industry and Firm

The shaded area—the difference between average revenue (i.e. price) and average cost—indicates gross profits or losses.

peak (say 1828), we find the output of the industry and the firm greater and the price lower. Between 1823 and 1825, we shall assume, new plant is being built (helping to create the latter stages of major cycle expansion), but is not yet producing; and since, for the moment, fluctuations in demand are being ignored, we shall not attempt to represent the position in 1826 (depression) and 1827 (mild recovery). Our firm now finds itself producing a greater amount at a lesser price, and yet, because other firms have also expanded (and the total supply curve shifted down and to the right), average revenue is less than average cost. There is no incentive to expand.

We turn finally to 1834. Between 1828 and 1834 we can assume there has been little addition to fixed plant.[1] The secular increase in output has, nevertheless, continued. A positive profit margin has again appeared; and although the level of output is higher and of prices lower than in 1823, the essential impulses to expansion are the same (Fig. 102 III *a*, *b*).

Although this simplified view is in many respects unrealistic, it is a useful approximate description of the process which occurred between 1823 and 1834 in the cotton industry in Great Britain. The reader is urged to refer to the *History* for qualitative corroborative evidence.[2] Statistically the hypothesis can be checked only in the crudest manner. The volume of cotton exports (goods and yarn) shows, of course, the expected increase between the three dates (official value, in £ millions): 1823, 26; 1828, 34; 1834, 51. The price of manufactured cotton (average declared value of cotton piece goods' exports), however, did not rise, as our graphs would suggest, between 1828 and 1834 (pence per lb.): 1823, 9; 1828, 7; 1834, 6. But this does not mean that a positive profit margin did not exist in 1834; for we have assumed, in order to isolate the influence of plant expansion, that variable costs (in this case largely raw cotton prices and money wages) remained constant. Our knowledge of the industry is not sufficient to justify an exact calculation of profit margins. Porter, however, presents a series designed to indicate the difference between the price of raw cotton and of manufactured yarn, changes in this difference being taken to represent the effect of 'successive improvements' in the method of manufacture.[3]

This margin exhibits a clearly marked rise from 1821 (9·5*d.* per lb.) to 1823 (11·4*d.* per lb.). The decline, especially after the middle of 1825, is unbroken by any protracted upward movement, the margin reaching 5·4*d.* by the close of 1832. The series relating to cotton twist unfortunately is not available after 1832. There are, however, somewhat similar annual figures

[1] In fact a wave of new construction in the cotton industry was under way in 1833, after some seven years of increase in cotton exports, with no substantial addition to fixed plant: 'In England the great increase (in power looms) took place during the years of speculation, 1824 and 1825, and comparatively few power-loom mills were built betwixt that time and 1832. But in 1832, 1833, and the former part of 1834 (the time of writing) the trade has been rapidly extending; many mills have been built, and many spinners have added power-loom factories to their spinning mills' (Baines, p. 236).

[2] Vol. I, pp. 196–7, 221–6, 263–4.

[3] Op. cit., pp. 186–7.

on calico.[1] A crude 'profit margin' can be calculated by subtracting the costs of weaving and of raw cotton from the selling prices. The resultant series exhibits a net rising tendency from 1820 to 1825, an almost unbroken fall to 1832, a steady rise to 1836, and an unbroken fall to 1842, when a rise coincides with the beginnings of the next major cycle. There is, then, some slight statistical basis for the graphic representation of profit margins in the three symbolic years. The qualitative evidence of the *History*, to which the reader has already been referred, is even more persuasive.[2]

The somewhat abstract picture of fluctuations in industrial construction presented thus far is one of irregular increases in the fixed capital of an industry designed to meet a more steady secular growth in demand and output. The latter stages of major cycle expansion emerge as the interval between the decision to construct and the moment when the new fixed resources begin to produce. The period of relative quiescence in new construction (e.g. 1826–32) represents the interval necessary for the secular increase in demand to 'catch up' with the previous extension of plant. The upper turning-point came, in fact, before all the acts of new investment were complete; and the level of employment in several minor cycles was supported by the completion of projects inaugurated in the preceding boom. Our theory of the upper turning-point does not depend, then, on a fall in profits brought about by the actual introduction of new equipment; although knowledge of the scale of investment in certain lines could, and did, affect expectations of profit from further investment, even though the investments already undertaken were not yet in full operation. Our view is dependent on this latter factor combined with the consequences for costs of relatively full employment, partially created by the domestic industrial investment of stage III–V of major cycles.

This analysis, further, does not depend on establishing an average duration of the useful life of a machine similar to the average duration of major cycles; although it is clear that machine replacements are, to a considerable extent, postponable and that they, too, would tend to occur at their

[1] Ibid., p. 187.

[2] The process traced here was accurately described by a contemporary, Kirkman Finlay, in 1833. He attributed the decline of profit margins in the cotton industry in the years preceding 1833 'certainly not to any want of demand, . . . but to an extremely extensive production with reference to the demand, arising out of a great competition, doubtless caused by the high rate of profit in former times, which, by attracting a large amount of capital to the business, has necessarily led to the low rate of profit we now see' (Evidence before Committee on Manufactures, 1833, p. 35). A decade later (1843), at a moment parallel to 1833 in its relation to the previous major cycle, the position of the iron industry was described as follows. 'Capital, accumulated annually from extensive orders and large sales, was laid out in building new furnaces, opening fresh mines, exploring mineral districts hitherto untouched. The large fortunes already secured in times when the foreign markets were all our own, and the produce at home scarcely sufficient for the demand, arrested the eager eyes of small capitalists, and induced the formation of companies, into which the whole livings of professional men and private individuals of comfortable means were recklessly cast—each member of every company so formed expecting to be at least a Bailey, a Guest, or a Crawshay, if not eventually a Peel or an Arkwright. . . . The result is a collapse of the whole trade—a fatal reaction —doubt and dismay.' (See Vol. I, pp. 320 ff.)

greatest rate at the same time as new construction, since the relevant motives are similar. Periodicity does, however, depend on the relation between the rate of growth of output and the extent of new construction in the course of each major cycle; i.e. a lesser period of new construction (e.g. 1816–18) might be followed more quickly by a second wave of such construction (e.g. 1823–5) than a greater wave (e.g. 1833–6). There is, in short, some reason, on this view, for connecting the duration and intensity of depression in new investment with the duration and intensity of the previous boom, assuming a constant secular rate of growth. But we can offer no inherent reasons for the nine-year average interval between major cycle peaks.

As noted earlier, the data indicate that rapid increases during the latter (III–V) stage of major cycle expansions can be traced in railway construction, shipbuilding, brick production, timber imports, and the Hoffmann index of producers' goods output. The principal periods of expansion in iron manufacture and in coal and iron mining also seem to conform to this pattern, although the evidence is less detailed.[1] Finally, the behaviour of the security index and the timing of periods of great capital market speculation and of capital exports indicate the same sequence. The principal question still remains: why should the movement that has been described in terms of the individual firm have been general, both with respect to investment in a given industry and for the economic system as a whole?

It will be recalled that the greatest average rate of increase in both the volume and the value of exports occurred in the early (I–III) stage of business cycles. This involved a general increase in incomes, under the assumption that no countervailing deflationary force was operative. If, as was the case in the early stage of all major cycle expansions, the money market was easy, it is not surprising that an attitude of confidence with respect to future profits should develop. This increase in entrepreneurial daring (both in industry and in the long-term capital market) can be traced clearly in the major cycle expansions of the last three decades of the period. Although the acts of new investment were undertaken by individuals, the impulses which caused them to act were general; and further, their individual responses had similarly general repercussions on output, prices, the demand for money, expectations, &c. Out of these repercussions, it will be seen, flow the causes of the upper turning-point and depression. Even in the relatively atomistic economy of Britain in the early nineteenth century, entrepreneurs made their judgements about the future on the basis of pervasive conditions. In the nature of that institutional fact they were led, broadly, to keep in step.

6. Business Cycles and the Money Market. The present stage of the argument can be summarized in the statement of three necessary conditions for the development of an investment boom:

[1] See Vol. I, Pt. I, § 5 (*Industry and Agriculture*).

1. The lapse of a time period from the previous investment boom sufficient to permit a 'catching up' of total output with existing fixed resources.
2. An increase in the volume and value of exports.
3. Easy money conditions in the short- and long-term capital markets.

The conception of 'easy money' in the long-term capital market is not a simple one. It is essentially the condition on the supply side of the long-term market equivalent to condition (1), given above. The clearest evidence for it is a bidding up of the price of Consols in the early stage (I–III) of major cycle expansions, giving way gradually to a dissatisfaction with the resultant low yields and the growth of a speculative spirit. If profits accumulated over a considerable period were converted, during the latter stages of a major boom, into fixed equipment, even assuming a constant annual profit margin, a time interval would be necessary before further similar accumulations were available. When new investment involved public floatation the process is even more clear; for sums were called up for some time after commitment was made. Many of those who purchased Latin American mining shares in 1825 were still making payment three years later. A similar procedure was followed with respect to railway shares.[1] Whether long-term investment was financed out of previously accumulated income or out of current income over a considerable time period, it is evident that it precluded new long-term commitments on the same scale in 1828 as in 1825, 1839 as in 1836, 1847 as in 1845. This process was, of course, reinforced by the decline in commercial and industrial profits, the fall in the value of new investments, by bankruptcies, and the other phenomena of severe depression that characterized such years as 1826, 1837, and 1848. Thus on both the supply and the demand sides of the market for long-term investment, reasons can be found for a type of periodicity longer than that for business cycles as a whole, i.e. including minor cycles.

We have avoided thus far any detailed discussion of the role of money in our system of cycles. This proceeds from the judgement (which also affected the organization of the *History*) that monetary phenomena can be most usefully regarded, in this period, as a reflection of more deep-seated movements. This is not to deny any autonomous influences from the side of the money supply. We have already referred, for example, to the importance of financial stringency in affecting the flow of both imports and exports. And there can be little doubt that easy money market conditions were required before general prosperity could develop.

It is difficult, indeed, to trace a direct relation between the availability of short-term capital and the impulse to long-term investment. A part of the influence was certainly psychological. The possibility of discounting easily and cheaply tended to suffuse confidence throughout the financial and commercial world; while rising money rates and a general tightening

[1] See Vol. I, p. 439.

of credit had an adverse effect on confidence that transcended the slight rise in costs they represented.

The principal monetary series show, with a high degree of consistency,[1] the following behaviour in the course of business cycles.

1. Early prosperity (I–III). A fall in Bank discounts and a rise in the bullion reserve; a decline in the long- and short-term interest rates; a lesser decline in inland bills of exchange than in Bank discounts or a slight rise. It is probable that book credit and foreign bills of exchange discounted increased as well as cash transactions, although there is no continuous evidence on these more normal means of financing.
2. Late prosperity (III–V). A rise in Bank discounts and a fall in the bullion reserve; a rise in the short-term market rate followed by a rise in the Bank rate (after 1823) and in some cases the yield on Consols; a sharp rise in inland bills of exchange and probably in other forms of credit.
3. Early depression (V–VII). A continued rise in Bank discounts and interest rates; a continued fall in the bullion reserve; a sharp decline in inland bills of exchange and probably in the more normal forms of credit.
4. Late depression (VII–IX). A fall in Bank discounts and interest rates; a rise in the bullion reserve; a continued decline in inland bills of exchange, and probably in other types of financing—a return to easy money.

This pattern is remarkably consistent for both major and minor cycles, although there is a striking difference in the intensity of movement. The discussion immediately following, however, will refer only to the monetary process in the major cycle expansions and crises.

It is clear from the history of the various financial crises that the movements in early depression (V–VII) represented a kind of liquidity panic, following upon a general loss of confidence. Individuals and private bankers sought to make their position as liquid as possible, commodity and security prices (Consols as well as the more speculative issues) fell, and the Bank of England was forced to bear a much increased proportion of short-term financing. Stringency of this kind was certainly an important part of the process whereby the inflated values of the latter stages of prosperity were reduced.

For purposes of business-cycle analysis the crucial monetary issue is the possible part played by the tightening of the money market during the latter stage (III–V) of major expansions in bringing about the upper turning-point. An answer to this puzzling question can best be achieved by examining more closely the reasons for the tightening of the money market in this stage. They may be grouped as follows, with regard to the supply (i.e., bullion reserve) and demand sides of the money market:

[1] For a cycle-by-cycle test of consistency see below, pp. 577 ff.

1. The bullion reserve (i.e. the ultimate money supply) was decreased by drains to the interior, to meet the requirements of increased output at the higher prices which characterized the III–V stage of major cycle expansions, and, more important, by drains abroad, due to the persistent tendency for the balance of trade to decline in that stage.[1] Payments abroad on foreign securities previously purchased also contributed at times to the loss of bullion at this point.[2]
2. The demands for money (i.e. discount facilities) to finance an increased value of foreign and home trade.

Both types of pressure on the money market can be connected with the processes of prosperity. To the extent that the value of raw material and foodstuff imports rose more rapidly than the value of exports, Britain's prosperity was, in a sense, outrunning prosperity elsewhere, and the fall in the bullion reserve represents the classic check of an international metallic standard system.[3] The increased credit demands of stage III-V, indicated by the rise in the value of inland bills of exchange, the Bank's discounts, and short-term interest rates, were clearly a function of the previous prosperity process. But these relationships do not, in themselves, justify a monetary theory of the upper turning-point.

A tightening money market was merely part of the setting, not the single prime mover in the reversal of the prosperity process. No monetary agency decreed general credit constriction. For in 1825, 1836, and 1845 there were clear evidences of bottlenecks in one or more of the principal British industries. If the upper turning-point were essentially a monetary phenomenon there would be no reason why full employment of resources should be reached at the same time in the factories of Manchester and Birmingham as in the financial institution of Lombard Street. The reserve proportions of the Bank of England and the various private agencies were highly elastic. It required some factor strictly outside the British monetary mechanism to convert the slight tension (in money and other markets) during the latter stages of prosperity into the panic of early depression: a fall of prices in the large speculative markets or on the Stock Exchange, the collapse of a boom abroad, the shutting off of export markets, a rise in

[1] See below, pp. 797-8.

[2] In a somewhat similar manner the money market was depleted by the procedure followed in the calling up of railway shares. Funds were transferred from private accounts to the government agents who held the sums on behalf of the railways. This temporary sterilization of money was an important factor in the panic of 1847 (see Vol. I, pp. 332-3).

[3] An important reservation, however, must be entered with respect to grain imports, which fluctuated inversely with the domestic harvest, rather than positively with business cycles; and grain imports were, at several points, crucial to the adverse shift in the balance of payments late in prosperity (see below, pp. 792–4). More broadly the III–V adverse shift in the balance of payments would be the expected result of major cycle prosperity if it were not fully shared in Britain's foreign markets. And, since no other area in those years was industrialized to the same extent as Britain, or had equal facilities for investment, it is, prima facie, plausible that the balance of payments should have weakened when Britain was enjoying such periodic bursts of intense prosperity as those of 1824-5, 1835-6, 1844–5.

costs relative to prices, a growth of bankruptcies,[1] and the other familiar phenomena of such periods. All these were capable of reversing the current state of expectations and, in a real sense, initiating depression. It is true they all had, as well, repercussions in the money market, which spread and accentuated the downward trend. But the major money market crises must be regarded as a result, not a cause, of the upper turning-point for the economic system as a whole.

Rising interest rates in stage III–V, like rising prices, merely symbolized an approach to an unstable position of industrial full employment characterized by rising prices and wages. The level of costs was one of the determinants of the expected yield on new investment. It is our judgement that it was from fundamental changes in the environment for new investment rather than from merely a short-term credit shortage that the turning-point resulted. Like the supply of labour or of commodities or of accumulated savings, the short-run money supply set a limit to the extent to which expansion could proceed. But that limit was essentially an elastic one, more elastic, in fact, than for other factors. So long as confidence prevailed the money supply was ample.

The major cycle upper turning-points, it is maintained, were brought about by a variety of factors arising out of full employment in one or more markets, and by a changing view of the prospects for further investment in the main lines of development which formed the pillars of the latter stages of the major cycle expansions. The decisions to investment taken by individuals under common impulse towards the close of stage I–III created (in the rising prices and interest rates, the depletion of investable resources, and the falling off in the rate of increase of exports of stage III–V) a situation capable of being reversed by any blow to the confidence on which the supporting credit structure was built; and the commercial, industrial, and monetary relations of the latter stages of prosperity themselves fostered such blows to confidence.

This generalized view leaves unexplained the minor cycle upper turning-points, when depression began before most of the usual symptoms of full employment were evident. The proximate causes for these reversals varied. But the minor cycles, it will be recalled, were essentially periods of stagnant or even declining new domestic investment. Prices and profit margins were falling or rising on a scale or in a manner that did not carry conviction to the investor. The investing public and, to some extent, the banking system were still involved in the types of investment which characterized the previous major cycle expansion.[2] Recovery was limited to certain (usually export) branches of industry; and this condition resulted directly from the

[1] A rise in bankruptcies consistently anticipates the upper turning-point (see below, pp. 885 ff.).

[2] This was especially the case in 1839 and 1847. The lesser crises of 1836 and 1845 only partially liquidated the credit structures based on American loans and British railway floatations, respectively (see Vol. I, pp. 296–300, 329–36). In 1828 the investing public had not yet recovered from the South American and domestic floatations of 1823–5.

aftermath of the previous major cycle expansion and crisis. Under such circumstances the system was still extremely sensitive to any blow to confidence. A decline in exports initiated autonomously from abroad, political unrest, commercial failures, large grain imports—these, among other factors, were capable of precipitating a relapse. On the average the monetary aspects of such crises were less severe than those which characterized the early stage of depression in major cycles, and this fact fits rather well our conception of the limited nature of minor cycle expansions.

7. Harvests, Grain Imports, and Business Cycles. All the phenomena which we have chosen thus far to regard as basic were reflected in the behaviour of the monetary variables, but the role that has been assigned to the monetary system is essentially one of spreading and accentuating impulses developed elsewhere. One of the more significant illustrations of this role is the manner in which changes in the domestic harvest yield had their effect on the economy as a whole.

The demand for wheat in Britain can be assumed to have been fairly inelastic. An abundant harvest resulted in a sharp fall in the wheat price, and it aroused bitter complaint from the agricultural interests. To some extent good harvests may have caused an increase in the real income of consumers as a whole; for the evidence available would seem to indicate that money wages moved less than the wheat price or than indexes of living costs, changes in which stem largely from changes in the wheat price.[1] Such increases in real income, induced from the side of the cost of living, may also have permitted entrepreneurs to lower money wages without great difficulty. But the influences on industrial profit margins of possible changes in demand (through real wages) or of changes in costs (permitted or necessitated by changes in real wages) were relatively slight as compared with the consequences of changes in grain imports on the money market and, thus, on general confidence, long- and short-term lending and the whole industrial and commercial system.

Through this medium the low wheat prices of 1797–8, 1820–3, 1832–5, and 1842–3 helped to foster the ensuing major cycle expansions.[2] Conversely, the high wheat prices (and increased imports) of 1795–6, 1800–1, 1810, 1817–18, 1824–5, 1836–7, and 1846–7 clearly contributed to the pressures on the money market in those years. Finally, there was a significant chronic deflationary pressure from this source in the minor cycle intervals from 1826 to 1832 and 1837 to 1842.

It is difficult indeed to evaluate the causal role of harvest fluctuations in business cycles. The variation in sums spent on wheat imports were on a scale sufficient to be counted, at times, an important variable;[3] and the relation between business cycle movements and wheat imports is a fairly consistent one. Abstractly one might present a theory of business cycles based solely on the periodicity of harvests; i.e., good harvests (and low

[1] See below, pp. 827 ff.

[2] For further discussion see below, p. 854.

[3] See below, pp. 792–4.

imports) setting in motion the sort of major cycle expansion processes described, through the medium of the money market, with bad harvests cutting off such expansions. In the periods of minor cycles one might assume chronically bad harvests and a balance of payments and money market close to the margin of adverse pressure and stringency.

The evidence on harvests, however, is not sufficiently consistent for such an hypothesis; and, further, many important factors are known to have been operative outside the influence of the domestic wheat yield. It is certain, nevertheless, that harvest fluctuations played a significant contributory role throughout this period; and that at several points they were probably decisive in the timing of broader economic events. The conception of the rhythm of the major cycles presented earlier leaves place for a considerable elasticity in the timing of the turning-points; i.e. no single factor was both necessary and sufficient in the determination of such points. In some measure the precise moment of all turning-points was a matter of historical accident. That recovery began in 1832 and 1842, for example, may, to a considerable degree, be traced to the abundant harvests of those years, with their full panoply of technical and psychological effects. Similarly, the degree of tension in the money market was heightened and, perhaps, the moment of crisis brought sooner, in such years as 1810, 1818, 1825, 1836, and 1847, than would otherwise have been the case.

The consequences of a rise in food prices (when it happened to coincide with the latter stages of a major cycle prosperity) were exacerbated by the impulse they imparted to the working classes to increase their money wages, in the existing state of relatively full employment. The resultant increase in costs and industrial unrest might well be an important factor in the reversal of prosperity. This type of influence might also be of importance in the latter stages of depression or the early stages of revival, when an abundant harvest might permit a relatively frictionless reduction in money wages.

We have regarded the movements in the wheat price and grain imports as essentially a function of short-run changes in the supply of British wheat. This is based on the assumption that the elasticity of demand for foodstuffs dependent on grain was low, both with respect to prices and to income; we have treated grain imports as the margin of supply necessary to meet a virtually constant (or steadily increasing) demand. This, broadly, is the impression one gains from the history of the period and the behaviour of the available statistics. It leads directly to the conclusion that the rise in wheat prices and grain imports in the latter stages of prosperity was essentially unconnected with the general rise in incomes evident at such times.

We are taking into account an exogenous factor, which acted, of course, through the familiar mechanisms already described. Whether the fairly high conformity of British harvests and grain imports to business cycle movements is a matter of coincidence or related to the consistent periodicity of certain patterns of rainfall or sunspots is a question outside the imme-

diate scope of this study. But we have judged fluctuations in the harvest yield a significant contributory factor in business cycles, although one which affected the timing rather than the essential nature of the processes at work.

8. Consumers' Income and Business Cycles. A variety of possible relations between changes in consumers' income and business cycle movements has been developed in the theoretical literature. It has been suggested that expansions end because the processes of prosperity in a capitalist economy tend to cause a distribution of income such that consumers' expenditure, in some sense, fails to keep up with the capacity to produce. A more sophisticated form of this argument regards new investment as a function of the rate of change of consumption; and by assuming a slackening rate of increase in consumers' spending in the latter stages of expansions (due to the tendency of consumers to save an increasing proportion of a rising income), an absolute decline in investment emerges, and the cumulative processes of depression follow. A quite contrary line of argument regards the upper turning-point as caused by over-expenditure on consumption goods causing a shortage of labour, materials, and liquid capital available for the capital goods' industries. Almost all theories of business cycles introduce the process whereby changes in consumers' spending (through changes in employment and money wages) reinforce the impetus to expansion and contraction, after the turning-points have been decreed by other relations.

Our data are inadequate for any proper testing of any of these hypotheses. Not only are the measures of money and real wages, of national income, and of unemployment limited, dubious, or non-existent, but they cover, at best, Great Britain or areas within it. The importance to Britain of exports, partially dependent on autonomous forces abroad, further limits the scope of useful analysis. A few comments, however, can be made.

The central conception of business cycles presented here involves, as it were, fluctuations in new investment, above and below a more constant output curve for manufactured consumers' goods. In the course of the latter stages of major cycle expansions, fixed equipment, it is held, was being increased more rapidly than the rate of growth of total output. The tendency for a larger amplitude of fluctuation in investment than in the consumption goods' industries is a familiar and general phenomenon in industrialized capitalist economies. And it is on this fact particularly that under-consumptionist theories of the business cycle fasten. They would recommend a more rapid increase in consumers' income during expansion, a lesser increase of income to those who initiate and finance the acts of new investment.

The elimination of business cycles in this period would have involved, by definition, a smoother flow of new investment, and, especially, a better balanced flow of investment among the various alternative outlets. But if our analysis is correct, irregularity in the flow stemmed from the fact that

the decisions to invest were taken by individuals under common impulse, rather than from any particular distribution of income. So long as men could defer spending, or borrow from one another or from banks for the purpose of investment, so long as they acted on the basis of similar judgements on the present and future course of events, so long as the decisions they took did not yield their consequences instantaneously, business cycles of some kind would have existed.

The strongest evidence for a relationship between consumers' spending (outside Britain) and new investment is the cyclical behaviour of the volume of exports (largely manufactured consumption goods) relative to that of new investment. On the average, in major cycle expansions, a sharp increase in exports in stage I–III was followed, in stage III–V, by a rapid rise in new investment; while exports in stage III–V exhibited a slackening rate of increase. Merely on the basis of this evidence one might formulate a theory of the business cycle on under-consumptionist lines; i.e., the increase in new investment (III–V) could be regarded as a function of the previous (I–III) increase in exports; and the decline in new investment (V–IX) could be regarded as a function of the declining rate of increase in exports (III–V), the latter declining rate being attributable to a maldistribution of income in foreign markets.

This sort of formulation does not accord with the explanation of the typical sequence of events presented earlier. Changes in the rate of movement of the volume of exports were connected essentially with the complex of institutional relations that governed foreign trade and lending rather than with actual changes in the consumption of British goods, although such changes were also taken into account. An arbitrarily altered distribution of income, under the existing procedures of investment, would have, perhaps, changed the timing and amplitude of cycles, but would not have eliminated them.

The contrary line of argument, which holds over-expenditure on consumption goods a cause of the upper turning-point, is not, essentially, a theory of the business cycle. It implies merely that an altered stream of distribution might postpone the full employment situation in the capital goods' industries which, this view implies, precipitates crisis and depression. It would be interesting, but virtually impossible, to trace in these years competition for raw materials, labour, and capital among the various industries. It is plausible, of course, that the monetary strain would have been less in the latter stages of prosperity had not the import of tea, coffee, sugar, and other articles of consumption increased, and if the textile industries had been producing less for home and foreign markets. The prices of construction materials and labour and of liquid capital would also have risen less had the impulses to new investment been less widely spread. But the coincidence of timing in different types of new investment is of the essence of the system we are describing. An arbitrary redistribution of income designed relatively to reduce consumers' expenditure would not

(just as in the case of the under-consumptionist argument) have altered the basic sources of fluctuation.

The third possible role of changes in consumers' expenditure—in reinforcing the upward and downward processes—can be related to the conception presented here. Because the data on production (aside from exports) are inadequate, no good statistical evidence can be advanced, aside from the testimony of the tax yield, and, less persuasively, the volume of imports of articles of consumption. These show clearly the response of consumers' income to business-cycle movements (i.e. a I–V expansion pattern). And the increase in the home consumption demand must surely have raised the demand curves facing domestic industry.

But the most important link in our theory is that between the rise in incomes in the early stages of prosperity, due to the primary and secondary effects of export increases, and the subsequent waves of new investment. We have previously emphasized the effects of this process on the expansion of a single firm; but all forms of investment were not financed out of the profits of the individual firm. The large waves of speculative investment, especially, involved the participation of many persons of the middle classes whose incomes were not derived from the profits of industry; and as time went on this 'democratization' of the capital market increased. Thus, through direct increases in consumers' expenditure and through the creation of investible surpluses, cyclical movements, inaugurated from outside the area of domestic consumers' income, were probably reinforced by resulting changes in those incomes.

It is, further, important to note that the whole conception of industrial investment advanced earlier is based on a relation between the progressive expansion of demand in the manufactured consumption goods' industries and the impulse to expand fixed resources. Periodicity in that system, however, was not traced basically to short-period changes in the rate of rise of consumers' demand, but rather to its secular rate of increase, in conjunction with the host of factors on the supply side of the various markets which determined, in each case, the moment of the turning-points and the intensity of expansion.

9. Secular Changes in the Nature of Business Cycles, 1790-1850. In this discussion major and minor cycles have been, for the most part, regarded as recurring phenomena of essentially the same type. The *History*, however, revealed clearly the sense in which each cycle was unique, and it showed, further, the arbitrariness even of defining some time periods as cycles. In the following chapter we propose to re-analyse the historical evidence, in compressed form, in relation to the hypotheses that have thus far been advanced. But a prior and more general question is whether, in the sixty-year period surveyed, the essential nature of business cycles changed.

We have treated, for example, the minor cycles of 1793–7 and 1839–42 as individuals of the same species. We know, nevertheless, that the British

economy altered perhaps more radically in these sixty years than at any other period in its history. And the very existence of business cycles, in the modern sense, has been questioned before 1825.[1] It is broadly our conclusion that the cycle which occurred from (*circa*) 1788 to 1793 (peak 1792) was of much the same nature as the major cycles with peaks in 1825, 1836, and 1845; but that the peculiar conditions of the war years distorted this pattern. That distortion can be defined as the channelling of new investment into government securities which involved, in this case, heavy capital exports at the expense of domestic investment.[2] Increases in capital exports through the medium of loans, subsidies, and military expenditure abroad were, it is judged, relatively more important in the expansions from 1797 to 1802 and 1808 to 1810 than in the later major cycles.

But even if the major cycle sequence (i.e. of rapid increases in domestic investment following upon previous increases in exports) can be established in the pre-war cycle (*circa* 1788–93), the differences in degree between that cycle and those of the twenties, thirties, and forties are impressive. The area of large-scale new investment in 1791–2 was, apparently, confined to canals, turnpikes, and, to some slight extent, industrial building and equipment; and certainly involved (even relative to the lower level of the population and the national income) fewer persons and a lesser volume of expenditure than the widely spread new floatations of 1824–5, 1835–6, and 1844–5.

The parallel in industry to the widened scope of new investment in the capital market was the more rapid increase after 1816 in the output of iron (and producers' goods generally) than in consumers' goods, especially cotton textiles. For this the development of the railways must be held responsible in a large measure. But, as well, it was in the latter rather than the earlier three decades of the period that the mechanization of industry proceeded most rapidly. And the demands for iron for the manufacture of machinery, along with demands for gas mains, bridges, and even iron ships, gave investment and the balance of the economy as a whole an increasingly 'modern' cast.

This trend, of course, had important repercussions on the nature of business cycles. A boom based overwhelmingly on the speculative export of manufactured consumption goods alone might exhibit the principal monetary characteristic of the major cycle, e.g. the South American boom of 1808–10. But the over-stocking of inventories which would probably accompany it could be expected to be worked off more quickly than the over-construction (relatively to the secular increase in demand) that

[1] The probable source of this widely held belief is the statement of Karl Marx in the introduction to the second edition of *Capital* (ed. Kerr, Chicago, 1908, i. 18): 'Modern industry (1820–30) was only just emerging from the age of childhood, as is shown by the fact that with the crisis of 1825 it for the first time opens the periodic cycle of its modern life.' Engels, in his preface to the first English translation (ibid., p. 31), refers to 'the decennial cycle of stagnation, prosperity, over-production and crisis, over recurrent from 1825 to 1867'.

[2] See below, pp. 646 ff.

accompanied the later major cycle expansions. The behaviour of the volume of cotton exports as compared, for example, to brick production graphically reveals this distinction. The increased industrialization of the British economy might be expected, then, to yield more clearly marked major cycles in the latter than in the earlier years. And this is, indeed, the case.

It is only with some effort of faith and imagination that the cycles 1797–1803, 1808–11, and 1816–19 can be classed as major cycles. Of the two war-time major cycles the weaker is 1808–11, when the South American colonies suddenly appeared as an answer to Napoleon's blockade. In 1807 frustrated British investors created a minor domestic joint-stock floatation boom.[1] But the more glamorous attractions of Brazil superseded such outlets in the three following years. Brick production and timber imports, it is true, exhibit a considerable response to this boom, and there is a characteristic rise in the price of iron bars. In 1809–10, turnpike bills and inclosures suddenly increased from their low levels of the years after 1802. Shipbuilding and dock construction also moved forward more rapidly than in the previous eight years.[2] But to a considerable extent the 'major cycle' element in this boom was investment in the South American trade—a process of capital export through short-term lending.[3] The underlying rhythm of domestic investment can, nevertheless, be discerned.

In the cycle 1797–1803, exports to the Continent, financed partly by British government loans and subsidies there, played a role similar to South American exports in 1808–11. But the powerful increase in brick production and in the construction of ships, docks, canals, and new factories make the case for the major cycle designation fairly persuasive.[4] It is again probable, however, that the export trade was more important, relative to the volume of domestic investment, than in the later major cycles; although it is quite impossible objectively to measure the relationship.

Perhaps the least convincing of the major cycles is 1816–19. The principal evidence for its designation is the sharp rise in brick production after six years of almost unbroken decline. The increase in the volume of exports, on the other hand, is relatively slight, the 1818 peak figure for the total volume of exports being lower than at the previous peak in 1815, the figure for domestic goods' exports being at about the same level. The price of iron and the security index also respond in a manner more typical of a major than a minor cycle; and there is some increase in canal, railway, and navigation bills.[5] The economy, as a whole, however, had not yet adjusted itself to peace-time channels of new investment, and prosperity was short-lived. Iron producers were turning from the manufacture of cannon to gas

[1] See Vol. I, p. 94.

[2] Idem.

[3] In the major cycles of the twenties and the thirties there was also a substantial element of capital exports – to South America and the United States, respectively. The judgement made here is one of degree, namely, that the boom of 1808–10 was relatively more dependent on foreign trade, as against domestic investment, than the later major cycle expansions.

[4] See Vol. I, pp. 35, 69.

[5] See Vol. I, pp. 147–51.

mains, but the transition was completed only in the subsequent cycle (1819–26).

Railway construction on a large scale in the thirties and forties tended, also, somewhat to alter the cyclical pattern. The building of a railway required a considerable time period. The new lines undertaken in 1836 and 1845 were actually under construction in subsequent years. General business activity was thus sustained at a higher level in 1836–40 and 1845–8 than would have been the case if the period of gestation for railways had been shorter. This fact helps to explain the pronounced lags of brick production and the producers' goods index in those years. The rising importance of domestic investment probably explains, as well, the increased amplitude of interest rate movements in the money market from 1824 to 1850.[1]

Aside from the increased role of domestic investment in business cycles —which is symbolic of the secular growth of the whole economy—no significant alteration in their typical behaviour can be detected in our data. Certain individual series, it is true, exhibit changes in the average duration and amplitude of their cyclical movement in the course of this period; e.g. after 1816 the average duration of cycles in producers' goods' output increased, as did the average amplitude of movement of brick production. But these changes, and most others of significance, stem from what we have regarded as the central qualitative change in business cycles, the relative growth of domestic investment. The aggregate foreign trade series, further, exhibit a lesser amplitude of movement after 1816 than during the war years. But this can be traced to the sudden and abnormal limitations of blockade and embargo which occurred chronically from 1793 to 1815 rather than to any secular alterations in the relations between Britain and her foreign markets. The existence of the war period makes dubious any generalizations about changes in the amplitude or duration of business cycles as a whole. And, even aside from this limitation, there are no continuous data on unemployment; while the Hoffmann index of total output cannot be regarded as an adequate measure of short-period changes in that variable; and these are, presumably, the series most relevant to a measurement of the 'amplitude' of business cycles.

In fact the average duration of all business cycles marked off by reference dates (monthly) seems not to have altered significantly:[2] from 1794 to 1819 their average duration is 43·3 (8·3) months; from 1819 to 1848, 49·7 (17·4)[3] months. Professor F. C. Mills has advanced the hypothesis that, from 1831 to date (1926), the duration of British business cycles was on the average longer than from 1790 to 1831.[4] This he relates to an alleged

[1] See below, pp. 915 ff.

[2] Although the standard error test is of limited validity in dealing with this type of data, when it is applied it indicates that the difference in the averages is such that it might have resulted from chance factors.

[3] The large average deviation results from the extraordinarily long cycle, 1819–26.

[4] 'An Hypothesis concerning the Duration of Business Cycles', *Journal of American Statistical Society*, 1926, pp. 447–57.

slackening rate of increase in the industrialization of the economy. Although the period 1831–50 is too short adequately to test this hypothesis, the results are as follows when compared with the average duration of reference cycles for the whole period: 1794–1848, 46·5 (12·9); 1829–48,[1] 45·0 (14·0); 1832–48, 48·5 (13·5). A distinction between the latter two decades of our period and the four earlier ones is patently not justified on this evidence; and, more broadly, no secular change in duration in the course of the whole period emerges from an analysis of the intervals between reference dates.

There are, as noted earlier, no simple means available for measuring the amplitude of business fluctuations as a whole. It seems evident, however, that the growing relative importance of capital investment and of the coal and iron industries must have involved an increase in the proportion of the total population affected by business fluctuations. The capital industries, further, were subject to fluctuations in output of greater amplitude than the textile industries, which depended on the demands in the export trade rather than on the more irregular flow of domestic investment. If these hypotheses are justified, then total output and employment must have increased in their amplitude of movement in the course of our period, especially in its latter three decades when the expanding role of domestic investment clearly emerges.[2]

10. Summary. We are now in a position to present a generalized view of cyclical behaviour in these years. This may be done most simply by brief descriptions of what we have regarded as the typical processes of major and minor cycles.

We begin at the terminal trough of a minor cycle (e.g. 1797, 1832, 1842). There have been no large increases in investment for several preceding years. The financial crisis which accompanied the minor cycle upper turning-point has ended. Prices and wages have been falling. The natural tendency of the money market is towards ease, and this trend may be accentuated by an abundant harvest and a consequent decline in wheat imports,

[1] Since we have not marked 1831 as a cyclical trough, averages have been taken for both 1829–48 and 1832–48. Mills's calculations were made on the basis of Thorp's *Annals* which, in failing to represent the recovery of 1838–9, implies a single cycle from 1832 to 1842. This inaccuracy probably accounts for Mills's selection of the thirties as the point where the average duration of business cycles lengthened.

[2] The behaviour of the index of business activity presented in App. B, Vol. I, Pt. I, supports this contention. The amplitude of movement from trough to peak and from peak to trough in each of the major cycles follows:

Trough to peak		*Peak to trough*	
1797–1802	15·1	1802–3	4·2
1808–10	12·7	1810–11	10·8
1816–18	24·6	1818–19	11·3
1819–25	45·7	1825–6	39·7
1832–6	41·8	1836–7	29·0
1842–5	49·3	1845–8	50·0

An increase in the amplitude of movement is evident when thus measured. The upward trend would be more continuous but for the movement of the security price index, which, owing to the inclusion of mining shares, exhibits an abnormal movement of tremendous amplitude in 1824–6, which somewhat distorts the index in the cycle 1819–26.

as it was at this point in at least four of the six major cycles. We can assume, in the absence of the various impeding factors considered earlier, a rise in the volume of exports. Since it was in the nature of financial crisis in Britain (with its full repercussions) to lower exports below the normal requirements of foreign markets, the assumption of a rise in the period after crisis is not unreasonable. The increase in exports is viewed as the primary impulse to expansion, and this increase stems from secular forces of expansion outside the British economy.

In the early (I–III) stage of expansion, owing to considerable unused resources and the lack of any powerful speculative movement in the commodity markets, prices rise little, if at all. There may be brief upward surges, especially in the highly organized markets of imported commodities, but these are not likely to be sustained. More typically a mere slackening in the rate of decline can be expected. Iron prices, however, since no large volume of domestic investment is yet under way or in prospect, will continue to decline. Although the effective volume of money will probably increase (best illustrated, among our limited series, by inland bills of exchange), discounts at the Bank of England decline, as do the yield on Consols and the market-rate of interest. Cash and book credit are the principal monetary means of exchange at this point, and there may be considerable dishoarding. The money supply, too, may be increased by the accumulations of individuals and firms, not yet willing to invest on long term. The rising price of Consols may be taken to reflect the return of such cautious funds to the market. Both imports and exports (like the indexes of consumers' goods and total output) rise, but the latter more than the former. This is mainly due to the decline in wheat imports. Recovery in exports could thus be expected to be more rapid, at this stage, than in imports. If prices do not move in such a way as to counter the relative movement of the volumes, an improvement in the balance of trade will result, helping further to ease the money market. Bankruptcies, of course, would continue a decline probably begun in the latter stage of the previous depression. The index of producers' goods output rises slightly or continues to decline, like brick production, since, in this abstract formulation, recovery is assumed to be confined to the export branches of British manufacture, including a large area of the textile industries, but relatively small areas of the coal, iron, and shipbuilding trades.

This interval of rather limited recovery has several important consequences. In the areas directly affected it pushes the use of fixed resources fairly close to capacity; for, it will be recalled, new investment in plant and machinery has not been pursued on a large scale in the several years immediately preceding the up-turn, although the upward trend in output has continued. In conjunction with continued easy money conditions, an increase in profits during the early stage of revival and the general expectation of a continued increase in output cause considerable industrial investment to be undertaken: the installation of new machinery and replace-

ments, the construction of new factories and furnaces, the opening of new coal and iron mines.

In the long-term capital market the increase in incomes and confidence, having for some time yielded a bidding up of the price of Consols and other fixed interest-bearing securities, now induces private investors to search out and to accept when presented more speculative types of securities, domestic and/or foreign, requiring commitment over increasingly long future time periods. This general revival in investment of all types, undertaken at roughly the same time, coupled with a continued increase in the volume of exports, moves the whole system closer to full employment, especially the capital goods industries which were still relatively depressed in the previous stage.

Prices and wages rise. The market-rate of interest rises and borrowers begin to come to the Bank for discounts. The Bank rate may also rise, lagging, however, behind the market-rate. The competition of the more speculative types of securities forces a slackening in the rate of rise in the price of Consols, and usually an absolute decline in the more intense period of speculation. Imports increase sharply owing to the industrial demand for raw materials, and the increased consumers' demand for tea, tobacco, &c. It is likely that the generally speculative atmosphere in the money and capital markets will induce a speculative movement in one or more of the commodity markets, accentuating the rise in the volume and value of imports. Due to the rising prices of manufactured consumption goods and the tightening of the money market, exports will, however, continue to increase at a lesser rate than in the previous stage, or may even show absolute decline; for certain export markets may not fully share Britain's powerful recovery at this point, so that, at the rising prices of exports, the rate of increase in the volume of exports in stage I–III may not be sustained in stage III–V. This may serve somewhat to reduce the stimulus to increased output and industrial investment, but it will certainly put further pressure on the balance of payments and the money market. This pressure may be accentuated by an inadequate domestic harvest and consequently increased grain imports, and/or by possible payments abroad on new capital exports. The index of producers' goods output and brick production, however, rise strongly, as do the security index, iron prices, and inland bills of exchange.

This situation has created a number of factors capable of precipitating a general downward movement. Prices have risen and the foreign markets, at least, have exhibited a reluctance to continue to increase their purchases at the previous rate. The money market has tightened, forcing up interest rates and making short-term loans subject to closer qualitative scrutiny. In addition, the psychological effects of this tightening will cause industrialists and merchants to begin to limit their debtor commitments. In the long-term market the more speculative new issues, whose prices have risen on the basis of the most optimistic expectations, may now weaken, as the

first dividends fail to justify prevailing share prices. Further, a time interval existed between the moment when individuals committed themselves to purchase new securities and the moments when payment, in fact, was made. The calling up of payments is likely, at least temporarily, to tighten the money market, and possibly to induce a more sober view of the expected yield of the new issues. In the imported-commodity markets speculation has probably led to a piling up of stocks and, in the existing state of monetary tension, a price collapse is probable. Within industry some of the new plant and machinery undertaken at the beginning of stage III–V may be completed, causing a shifting down of the supply curve of the industry, increased competition, and possibly falling prices. And, in general, the bright prospects which induced earlier acts of investment are likely to be dimmed by later knowledge of the scale on which investors as a whole have taken action to exploit them, and perhaps by more sober knowledge of the returns actually to be expected. Marginal costs, further, are still rising (i.e. wages and raw material prices) and industrial profit margins may be reduced for those firms that did not introduce new fixed facilities (and thus lower their fixed and average costs). If capital exports have been undertaken on a large scale in any particular direction that area, too, is probably in an extended credit position and over-stocked with British goods. Crisis in Britain may be induced by crisis abroad, with consequent bullion withdrawals, falling exports, &c. Some of the newly floated domestic firms may quickly fail—bankruptcies, on the whole, could be expected to rise in the course of this stage.

All these factors, arising from relatively full employment of resources and/or of liquid capital might precipitate a loss of confidence, a further tightening of the money market, and a sharp decrease in exports, total production, and employment. All involved credit relations, and the impact of a reversal in any one of these markets would be reflected, accentuated, and spread through the medium of the London money market and the provincial banking system. And they would have their impact on a situation where the prospects for further investment in the main accepted lines are likely to have been dimmed not only by a rise in costs but also by *new* information on the scale of exploration of those lines and the *real* prospects for return.

A time period might appear between the moment when the first clear-cut reversal occurred (e.g. in the imported-commodity markets, or on the Stock Exchange, or in one or more export markets) and the moment when a universal rush for liquidity occurred, and the downward movement was made general. For the financial crises were a quite different phenomenon from the general tightening of credit in the latter stage (III–V) of prosperity.

In the period immediately after the upper turning-point (V–VII) private credit agencies attempt to reduce their liabilities, and the Bank of England is forced to bear the brunt of such short-term financing as takes place:

Bank discounts rise sharply, as do the Bank and market-rates of interest. Consols are dumped in an attempt to get cash, and their yield also rises. Bullion is drawn off to the country as private bankers attempt to make their position more secure. Inland bills of exchange are, to a much lesser extent, also resorted to in times of crisis as a means of conserving cash, but, in net, they can be expected to decline in this stage.

Exports and imports, the index of consumers' goods output, commodity and security prices, employment, and wages decline sharply. Brick production and the index of producers' goods output, however, may continue to rise, although at a lesser rate, or fall less than other branches of output. This results from the considerable period of gestation of some of the types of new investment undertaken in the latter stage of the previous expansion.

Both imports and exports decline, although it is likely that the decline in the latter will be greater, for the intensity of the depressing forces in Britain will not be fully matched in other areas. The consequent fall in the trade balance may be accentuated by large grain imports if the bad harvests of the previous stage continue. During this interval of crisis, falling prices and a falling volume of trade reduce the pressure on the money market. The trade balance may begin to improve. When panic has ended, it is likely that the money market will become easy, bankruptcies will cease to rise, and the monetary setting will be laid for some recovery in both imports and exports. Recovery will, in fact, be based, when it comes, on the fact that the decline in exports and imports had brought them below the current (secularly expanding) level of consumption, and inventories had been drawn down.

In the I–III stage of the ensuing minor cycle expansion, although the export markets as a whole may resume their advance at the same rate as in the I–III stage of the previous major cycle, the British economic system will exhibit a quite different response to this impulse. In industrial areas the expansion of plant, now largely completed, leaves some excess capacity even in the export industries, where steady advance has resumed. There is little incentive to new industrial investment. Similarly, individuals, industrialists, and the long-term capital market generally are in no position to supply the funds for new investment. Payments are still being made on previously purchased securities, individual investable reserves are low, industrial profit margins, which supplied such funds, are still falling. The probable disappointment with the types of securities that dominated the previous boom will add a psychological barrier to these. Even if the impulse to expansion from the side of exports is unbroken, a considerable time interval must elapse before investment can be resumed on a large scale. Brick production will continue to sag and the production of capital goods generally will rise at a much lesser rate than in the major cycles, despite the powerful secular forces at work.

Aside from the possibility of an inventory relapse in one or more of the British export markets, we have advanced no inherent reasons why minor

cycle expansions should end; for, by definition, they end before full employment conditions have been reached in industry as a whole. Numerous factors, however, some still connected with the processes of the previous major cycle, may precipitate a general relapse: abnormally large grain imports and consequent monetary stringency, a secondary wave of bankruptcies resulting from only a partial liquidation in the major cycle crisis, an autonomous cycle in one of the export markets, political unrest, the abortive collapse of a commodity price speculation, among others.

The precise timing and intensity of minor cycle expansions and contractions cannot be easily generalized. They are periods of low profit margins, industrial and speculative pessimism, and partial unemployment. The volume of total exports and output may continue to increase, and particular industries may advance rapidly. The secondary repercussions of the continued increase in the volume of exports may be more or less great; but the recurrence of a general wave of new investment awaits, above all, the passage of sufficient time to permit a catching up of secular growth with the expansion of fixed plant, and the accumulation of investable cash reserves. The exact moment at which such a general recovery gets under way depends on the existence of a number of conditions, none of which is both necessary and sufficient.

Chapter III

BUSINESS CYCLES IN GREAT BRITAIN (*continued*)

11. The Theory and the Cases. The theoretical framework presented in the previous chapter derives obviously from a generalized view of the data, weighted and related from the perspective of what seem to us the most reasonable theoretical propositions. It is evident, however, that the variables did not behave, in all cases, as these propositions would lead us to expect. Individual major and minor cycles conform in varying degrees to the theoretical norms.

The accompanying table broadly indicates the manner in which eighteen of the principal economic variables might be expected to behave in the course of major and minor business cycles in the light of the analytic hypotheses. This table does not, of course, indicate fully the differences in the degree of movement which might be expected to occur in the two types of business cycles. The reader is referred to the table showing the average rates of movement in stages of major and minor cycles (see above, p. 536) and to the more detailed analyses of Part II of this volume. Cycle by cycle we shall now check their actual behaviour against this standard. The graphs represent, for each cycle, the movement of the series in reference-cycle stages.[1] In the accompanying tables a simple check means that the movement of the series in that stage of the individual cycle conforms to the expected pattern of behaviour. Exceptions are noted by asterisks and are discussed in the subsequent sections of the text. The checks and asterisks refer to the movement of the monthly data when they are available, otherwise to the annual data. In a number of cases the annual data yield exceptions, whereas the more sensitive monthly figures conform. Such instances are noted by an asterisk within a check and are discussed briefly in the text. In those few cases where the annual data conform but the monthly data do not, the more exact monthly figures take precedence and an asterisk is placed in the table.

1793–7. Virtually all the irregularities in this cycle may be traced to war conditions. The strain of war financing at a time when Britain was still on a bullion standard caused the Bank arbitrarily to limit its private discounts, especially in 1796. This appears as a very slight rise (III–V), in a stage when a sharp rise might be expected. The irritation of the London merchants at the limitation of the Bank's advances is evidence of the artificial restraint imposed at that time. The decline in the bullion reserve (I–III), the halt in the Bank's discounts in stage III–V, the lesser rise of the volume of imports in stage III–V, the failure of the yield on Consols to decline in net during the early stages of recovery, can all be traced fairly

[1] Reference-cycle stages are stages of general business expansions and contractions; for a detailed explanation see Part II of this volume, Chap. VI.

TABLE 64. *Expected Cyclical Behaviour of Annual Series during Successive Stages of Major and Minor Cycles*

	I–III		*III–V*		*V–VII*		*VII–IX*[a]	
	Major	*Minor*	*Major*	*Minor*	*Major*	*Minor*	*Major*	*Minor*
Volume of total exports	Up	—	Up less than I–III	Up	Down	Up less than III–V, or down	Down	Up less than III–V, or down
Hoffmann's index of consumers' goods production	Up	—	Up	—	Down	—	Down	—
Hoffmann's index of producers' goods production	Down, or up less than III–V	—	Up more than I–III	Up slightly, or down less than I–III	Down, or up less than III–V	Down	Down	Down
Production of bricks	Down, or up less than III–V	—	Up more than I–III	Up slightly, or down less than I–III	Down, or up less than III–V	Down	Down	Down
Volume of total imports	Up	—	Up more than I–III	Up less than I–III or down	Down	—	Down	—
Quantity of wheat imports[b]	—	—	Up	—	—	—	—	—
Balance of trade[c]	Up	—	Down	Down slightly	Down	—	Up	—
Gross barter terms of trade	Up	—	Down	Down slightly	Down	—	Up	—
Bills and notes discounted at the Bank of England	Down	—	Up	—	Up	—	Down	—
Bullion in the Bank of England	Up	—	Down	—	Down	Down slightly, or up	Up	—
Yield on 3 per cent. Consols	Down	—	Down less than I–III, or up	—	Up	Up slightly	Down	—
Market-rate of discount	Down	—	Up	—	Up	Down	Down	—

Index of prices of imported commodities	Slightly up, or down	—	Up	—	Down	—	Down	—
Price of British bar-iron	Down or slightly up	—	Up	Up slightly, or down	Down, or up less than III–V	Down	Down	—
Number of bankruptcies.	Down	—	Up, or down less than I–III	—	Up	—	Up less than III–V, or down	—
Index of prices of shares	Up, or slightly down	Down	Up more than I–III	Up slightly	Down	—	Down less than V–VII	—
Total bills of exchange created	Down, or up slightly	—	Up more than I–III	—	Down, or up less than III–V	Down	Down	—
Percentage of iron-founders unemployed	Down	—	Down	—	Up	—	Up	—

[a] In the annual data, stage VII–IX cannot be distinguished from stage V–VII except in three cycles (1803–7, 1837–42, 1842–8).

[b] Since we have regarded the yield of the domestic harvest as a factor essentially independent of business cycles, the theoretically expected movement (III–V) does not carry the same analytic implication as those of other variables. Only stage III–V is formally checked, although the possible role of wheat imports is noted in the text for other stages. The checks indicate that wheat imports rose in stage III–V, contributing to the growing monetary stringency which generally characterized that interval.

[c] The figure for the gross barter terms of trade is used for the period before the balance of trade estimates become available (1790–1803). In the period for which both are available they exhibit a marked likeness in the year-to-year direction of movement, but differ in their trends.

N.B. A dash indicates that the expected behaviour is the same in the minor as in the major cycles. This refers only to the direction, not necessarily to the intensity of movement, which, in most cases, is greater in major cycles.

TABLE 65. *1793–7 : Minor Cycle*

Series	*I–III*	*III–V*	*V–IX*
Volume of total exports	✓	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	✓
Hoffmann's index of producers' goods production	✓	✓	✓
Production of bricks	✓	✓	✓
Volume of total imports	✓	✓	✓
Quantity of wheat imports	—	✓	—
Gross barter terms of trade	✓	✓	✓
Bills and notes discounted at the Bank of England (monthly)[a]	✓	✓	*
Bullion in the Bank of England (monthly)[a]	*	✓	✓
Yield on 3 per cent. Consols	*	✓	✓
Index of prices of imported commodities	✓	✓	*
Price of British bar-iron	✓	✓	*✓
Number of bankruptcies	✓	✓	✓

[a] These series are available, in continuous form, only from 1794. It is thus impossible to employ them in the annual analysis, where 1793 is the cyclical trough. They can, however, be used monthly in the reference-cycle analysis, since the reference trough has been designated as June 1794.

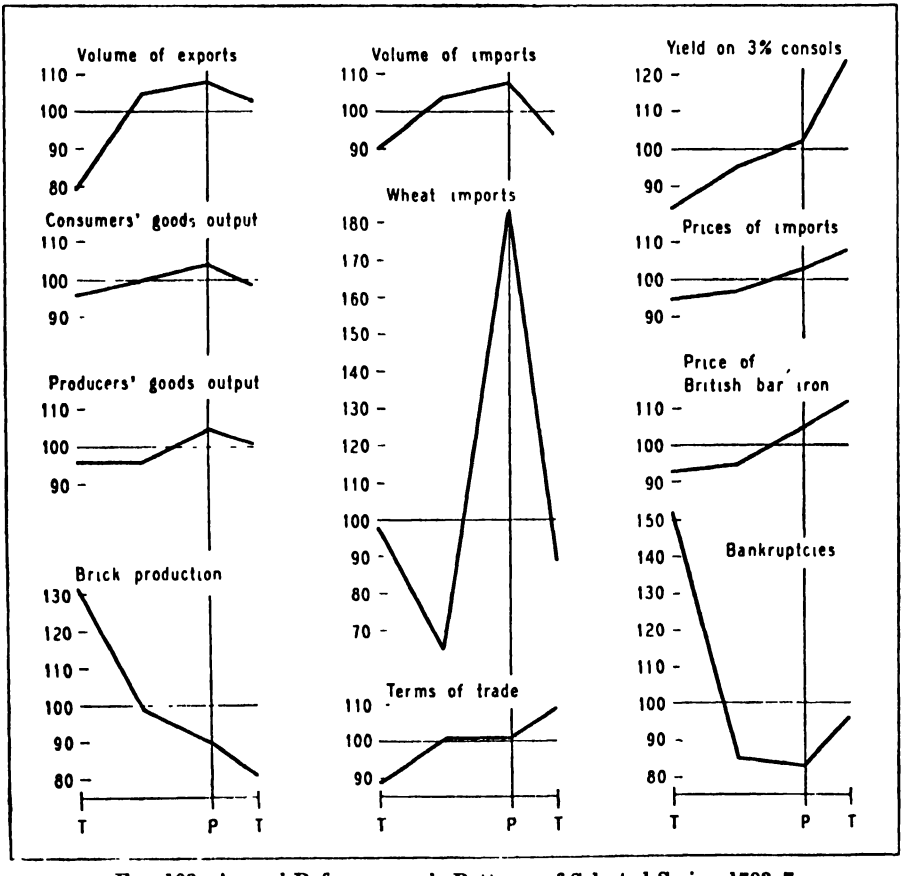


FIG. 103. Annual Reference-cycle Patterns of Selected Series, 1793–7

directly to the monetary repercussions of the war, which, at this stage, was being financed overwhelmingly through lending operations. The net rise in imported commodity prices in stages V–IX (as well as the abnormally sharp rise in stage III–V) was due, not to increasing demands, but rather to war-time restrictions on the supply of imported commodities and a rise

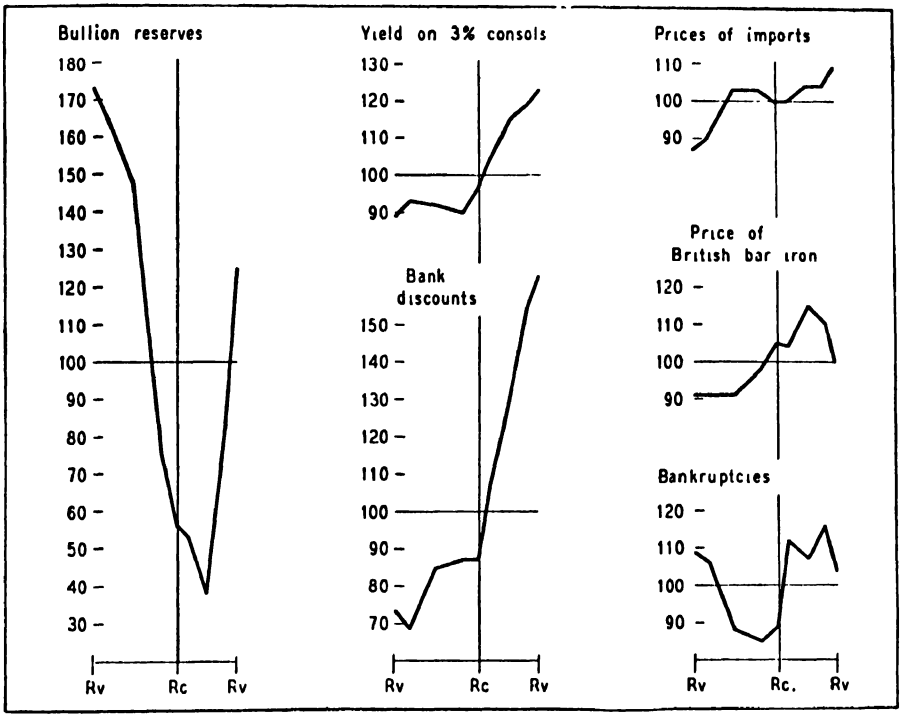


FIG. 104. Monthly Reference-cycle Patterns of Selected Series, 1794–7

in freight and insurance rates. In this period, when the iron industry was heavily dependent on foreign supplies, the iron price was subject to the same influences. Large wheat imports contributed to the pressure on the money market in stage III–V. The continued rise of Bank discounts (although at a slackened rate) in stage VII–IX stems probably from the continued rise in prices and from the abnormal burdens thrust upon the Bank by the country banks' failures and loss of confidence caused by the departure from the bullion standard. The unbroken decline in brick production and the relatively slight rise in bankruptcies (V–IX) are to be noted as significant minor cycle characteristics which appear clearly in this case. The abnormally strong rise in the index of producers' goods output, at a time when brick production falls uninterruptedly, probably results from an increase in shipbuilding for war purposes and to carry on the expanding West India trade from which the Continent was cut off by the war.

TABLE 66. *1797–1803: Major Cycle*

Series	*I–III*	*III–V*	*V–IX*
Volume of total exports	✓	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	✓
Hoffmann's index of producers' goods production	✓	*	*
Production of bricks	✓	✓	✓
Volume of total imports	✓	*	✓
Quantity of wheat imports	—	*	—
Gross barter terms of trade	*	*	*
Bills and notes discounted at the Bank of England	*✓	✓	✓
Bullion in the Bank of England	✓	✓	✓
Yield on 3 per cent. Consols	✓	*	✓
Index of prices of imported commodities	✓	*	*
Prices of British bar-iron	✓	*	*
Number of bankruptcies	✓	✓	✓

1797–1803. The peak year in this cycle was 1802, a brief interval of peace. This accounts largely for the counter-cyclical fall in the yield on Consols and in commodity prices (including iron) in stage III–V. Their rise in stages V–IX is to be attributed to a resumption of hostilities rather than to prosperity conditions, although the Consol yield might be expected to rise during the early stages of depression in any case. The fact that stage I–III includes the years 1798–1800 conceals the characteristic decline in Bank discounts which, in fact, took place during the early stage of revival (1798). The sharp rise of prices in this period would also tend to make for an earlier-than-normal rise in Bank discounts. The inadequate harvests of 1799–1800 and the good harvests of 1801–3 explain the contrary-to-normal movement of wheat imports and the gross barter terms of trade in stages I–III and III–V. The more rapid decline of exports than imports in stages V–IX (a fall in the gross barter terms of trade) resulted from the sudden blocking off of the continental export markets (1803), while Britain's access to imports was less drastically affected. Brick production and the index of producers' goods output exhibit typical lags at the peak. The latter is, at this point, so unreliable an index that the greater rate of its rise in stages V–IX than I–V is not, in itself, to be taken as a serious irregularity.[1] Similarly, the greater rate of increase in stage I–III than III–V (due to the absolute decline in 1801) is not so great as to be significant. In its very slight rise in 1798 the index, in fact, does exhibit one of its typical cyclical characteristics.

[1] See Part II of this volume, pp. 692–5. So far as we have been able to discover, the rise in this index in 1803 is due to a rise in coal shipments to London in that year. This series is not a very satisfactory cyclical indicator.

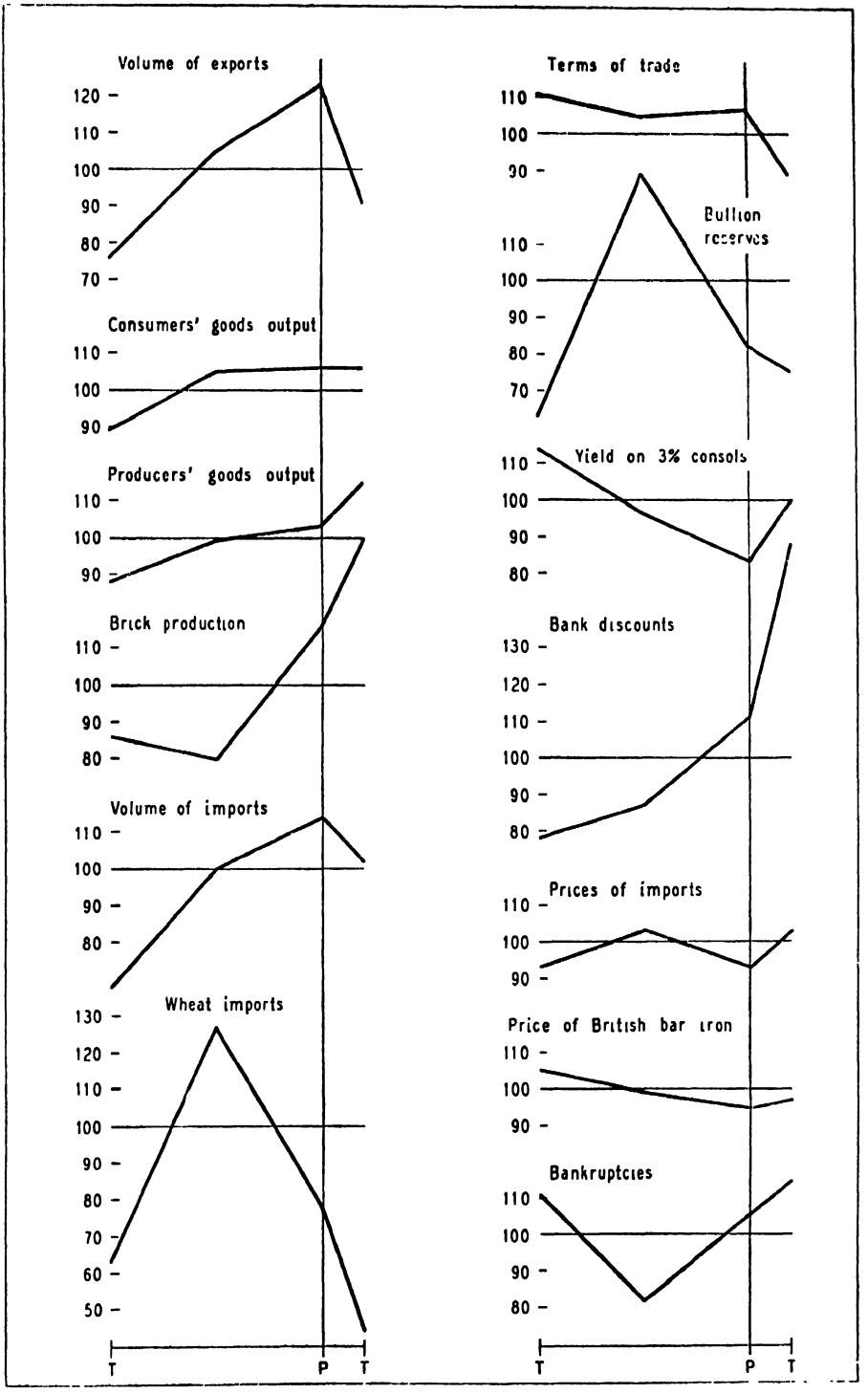


FIG. 105. Annual Reference-cycle Patterns of Selected Series, 1797–1803

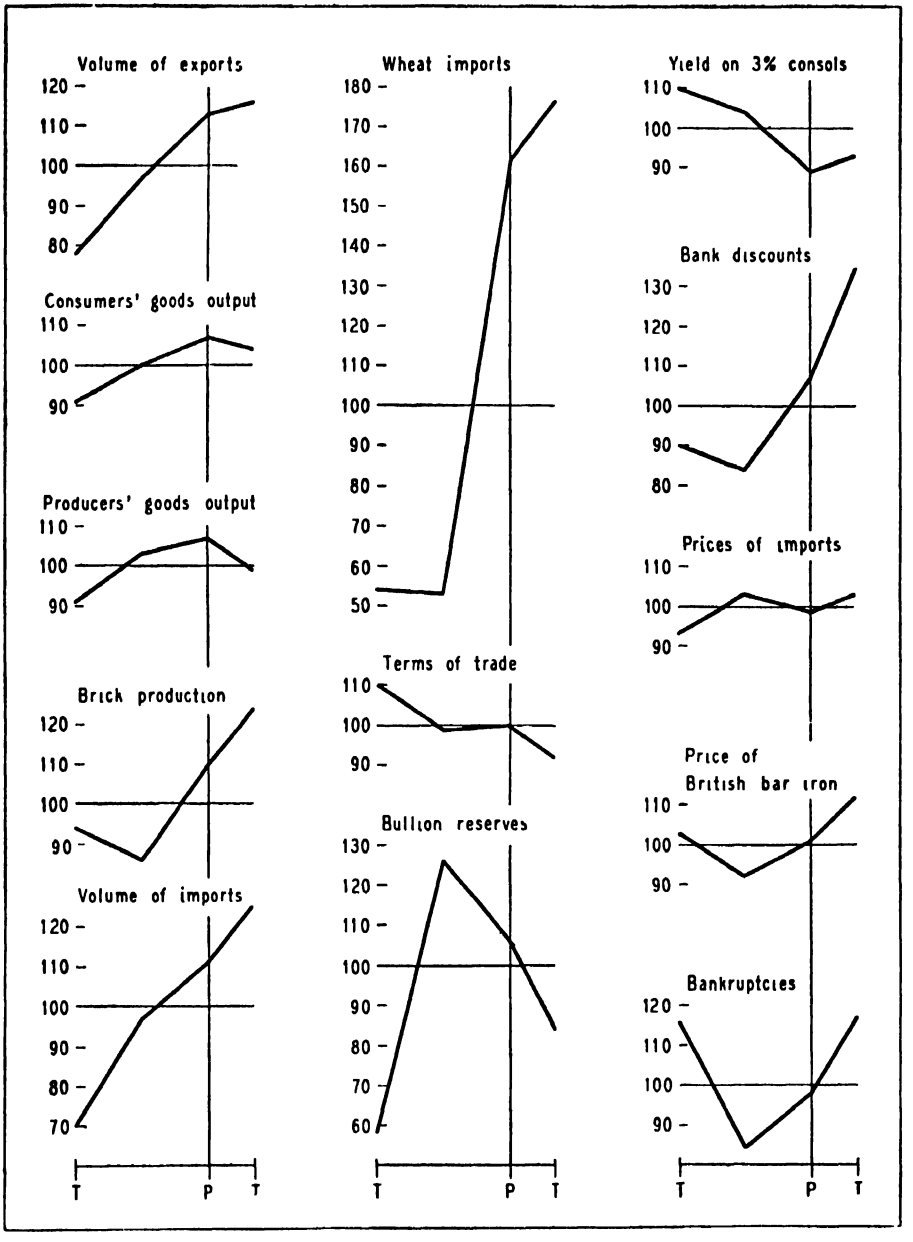


FIG. 106. Annual Reference-cycle Patterns of Selected Series, 1797–1801

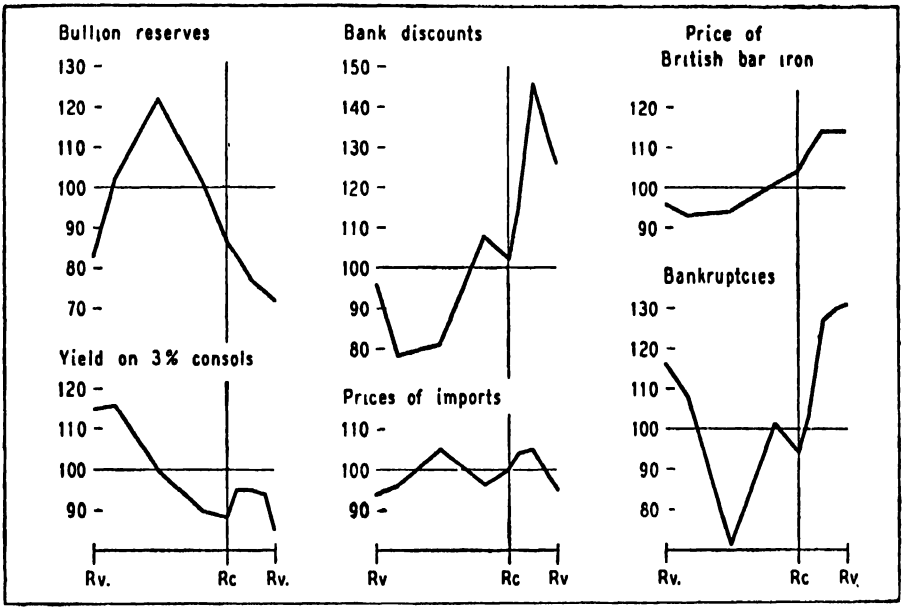


FIG. 107. Monthly Reference-cycle Patterns of Selected Series, 1797–1801

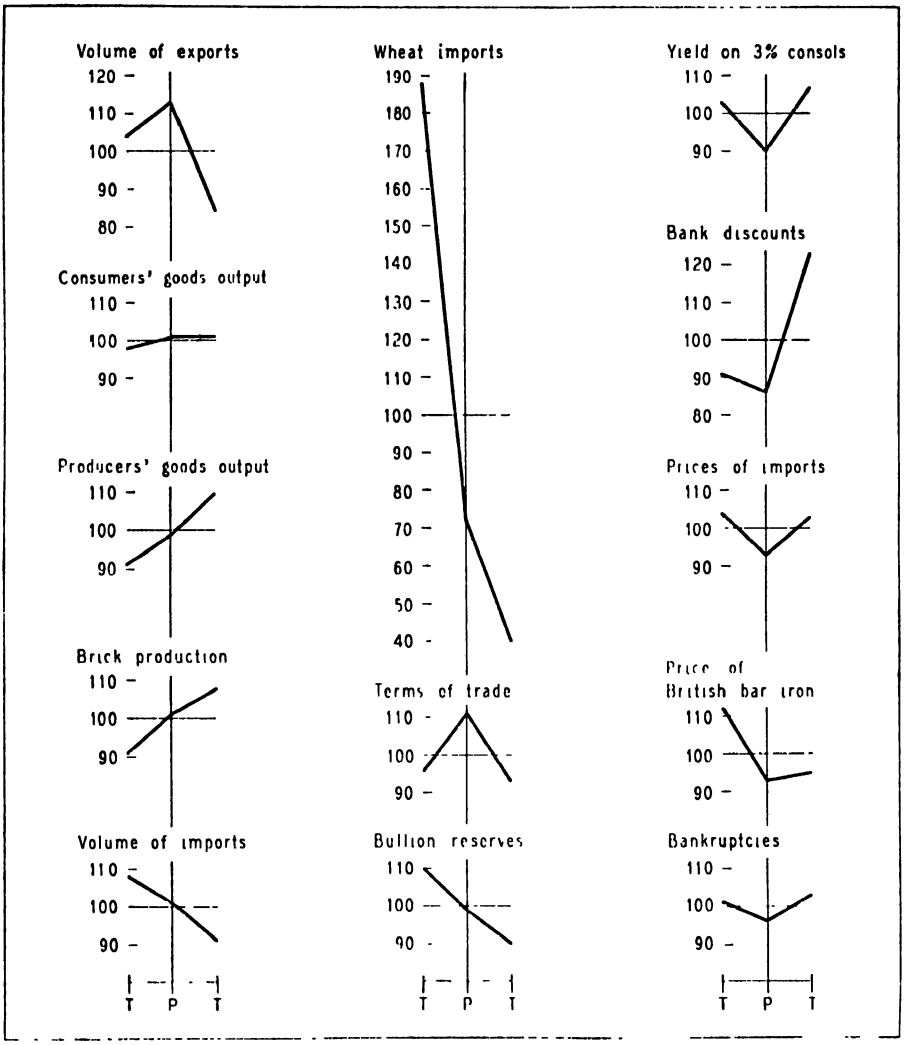


FIG. 108. Annual Reference-cycle Patterns of Selected Series, 1801–3

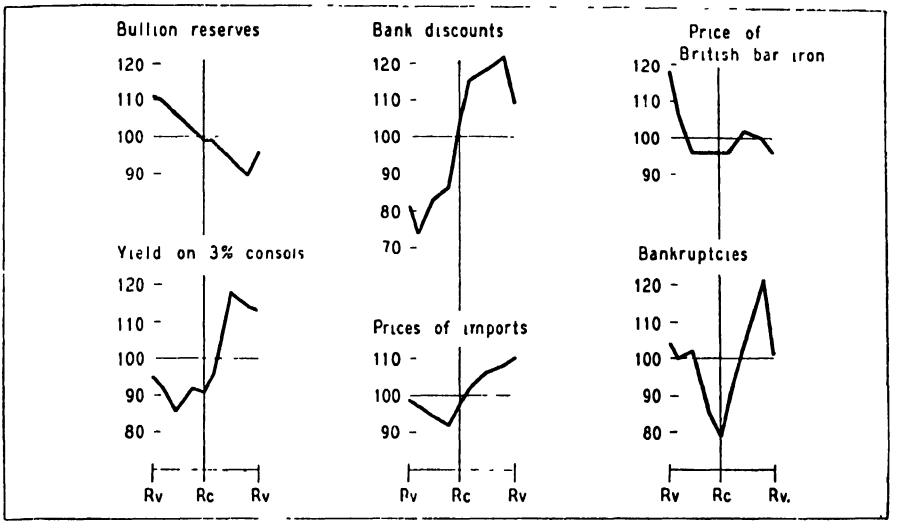


FIG. 109. Monthly Reference-cycle Patterns of Selected Series, 1801–4

TABLE 67. *1803–8 : Minor Cycle*

Series	*I–III*	*III–V*	*V–VII*	*VII–IX*
Volume of exports	✓	✓	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	*	✓
Hoffmann's index of producers' goods production	✓	✓	✓	*
Production of bricks	✓	✓	✓	✓
Volume of total imports	✓	✓	✓	✓
Quantity of wheat imports	—	*	—	- -
Balance of trade	*	*	✓	*
Bills and notes discounted at the Bank of England	✓	✓	*	✓
Bullion in the Bank of England	✓	*✓	✓	*✓
Yield on 3 per cent. Consols	*✓	*	*✓	✓
Index of prices of imported commodities	✓	✓	✓	*
Price of British bar-iron	✓	✓	✓	✓
Number of bankruptcies	✓	✓	✓	✓

1803–8. This cycle is in many ways irregular. It was brought to a close by a tightening of the blockade, which had been fairly loose from 1804 to 1806. The government's expenditure abroad was moderate, and an increasing proportion of the total war expenditure was derived from taxation. These two facts account largely for the decline in the yield on Consols, although the monthly pattern exhibits traces of more normal cyclical behaviour. The movement of import prices, however, again reflects the war's effect on supply conditions, notably the rise in 1808 (VII–IX) which stemmed from the American embargo as well as the Continental System. The fall in the price of bar-iron reflects a waning demand (as one would expect in a minor cycle) at a time when Britain had virtually freed itself of dependence on iron-ore imports. The fall of the trade balance in stage

I–III and its rise in stage III–V fit well the movements of wheat imports: its decline in stage VII–IX (like that in 1803) may be taken as a consequence of an abnormal restriction on exports.

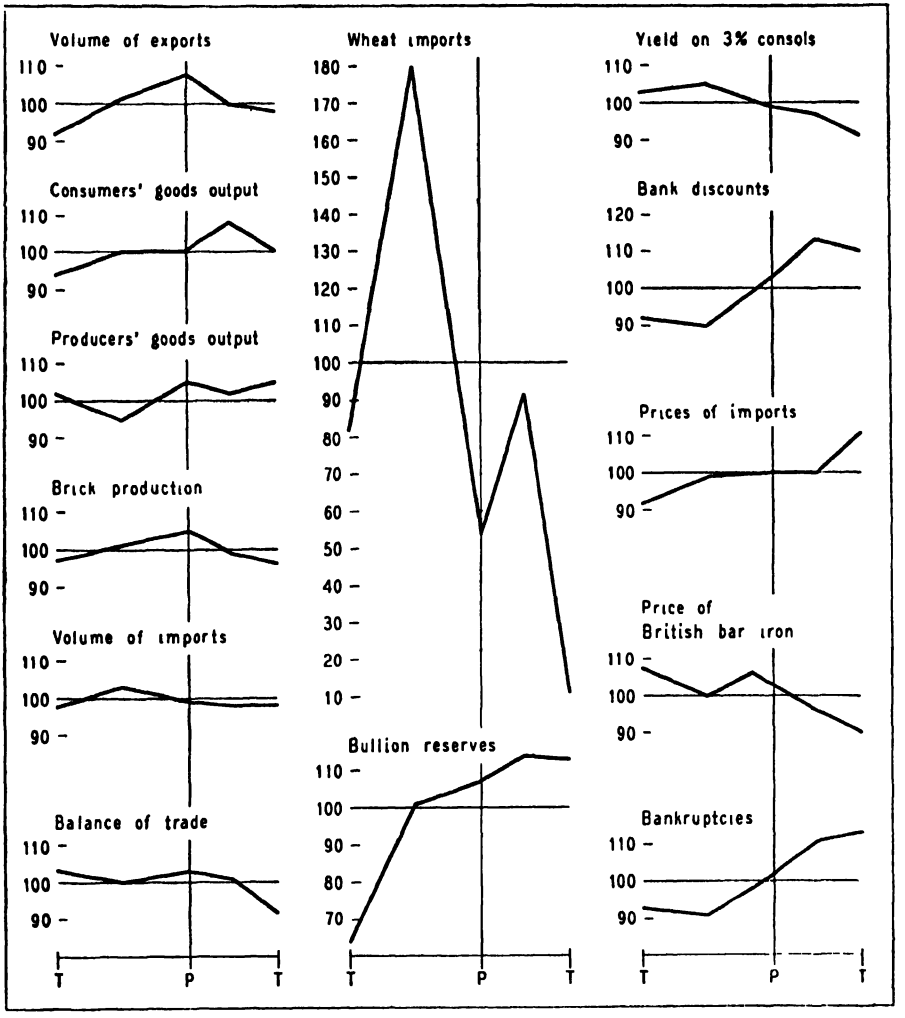


FIG. 110. Annual Reference-cycle Patterns of Selected Series, 1803–8

The rise in Bank discounts in stage V–VII is probably not the result of a typical movement during financial crisis, for there was no protracted stringency in 1806–7. It reflects rather the mild commodity and joint-stock floatation boom of 1807.[1] This hypothesis is supported by the rise in the Bank's bullion holdings in stages III–VII, when a decline might normally be expected. The counter-cyclical decline in bullion in stage VII–IX (1808)

[1] See Vol. I, pp. 83–7, 94–7.

was almost certainly a consequence of the sudden large increase in expenditure abroad, in the Spanish campaign of that year.[1]

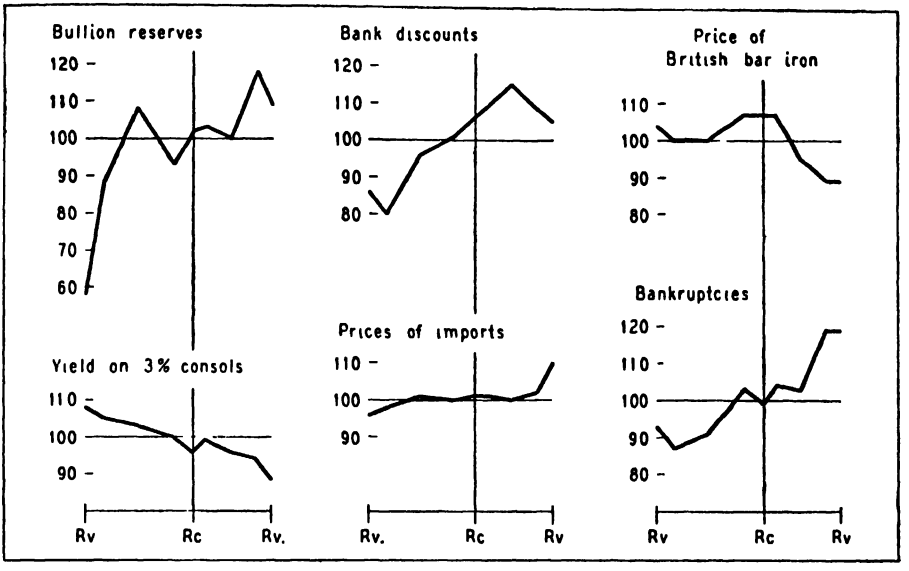


FIG. 111. Monthly Reference-cycle Patterns of Selected Series, 1804–8

The rise in the index of consumers' goods output in stage V–VII (1807) is a result of a rise in cotton imports, not shared by the cotton export series, and probably not by production. This represents, probably, an inventory reaction; for in 1804–6 cotton exports rose steeply, cotton imports declined, contributing, incidentally, to the counter-cyclical decline in total imports in 1806. The rise in the index of producers' goods output in stage VII–IX (1808) seems to have been shared by coal and iron shipments as well as by shipbuilding (the principal components of the index at this point). A partial explanation of this irregularity is the fact that the lower turning-point is calculated to have come fairly early in 1808 (May). It is probable that the net rise resulted from increases in the latter months of the year. The early response of capital goods production to revival does, nevertheless, constitute an irregularity.

1808–11. The principal exceptions in this rather weak case of a major cycle result from the early upper turning-point in 1810 (March): the net decline in exports and import prices in stage III–V, the abnormally sharp rise in bankruptcies (III–V), and the failure of the Bank's discounts to continue to rise in stage V–VII. The movements of import prices, bankruptcies, and discounts are more regular in the monthly patterns. The continued but lesser rise in the producers' goods index and brick production in stages V–IX probably represents the normal lag. The rise of the

[1] Ibid., pp. 103–7. The decline appears in the monthly data only in stage VIII–IX.

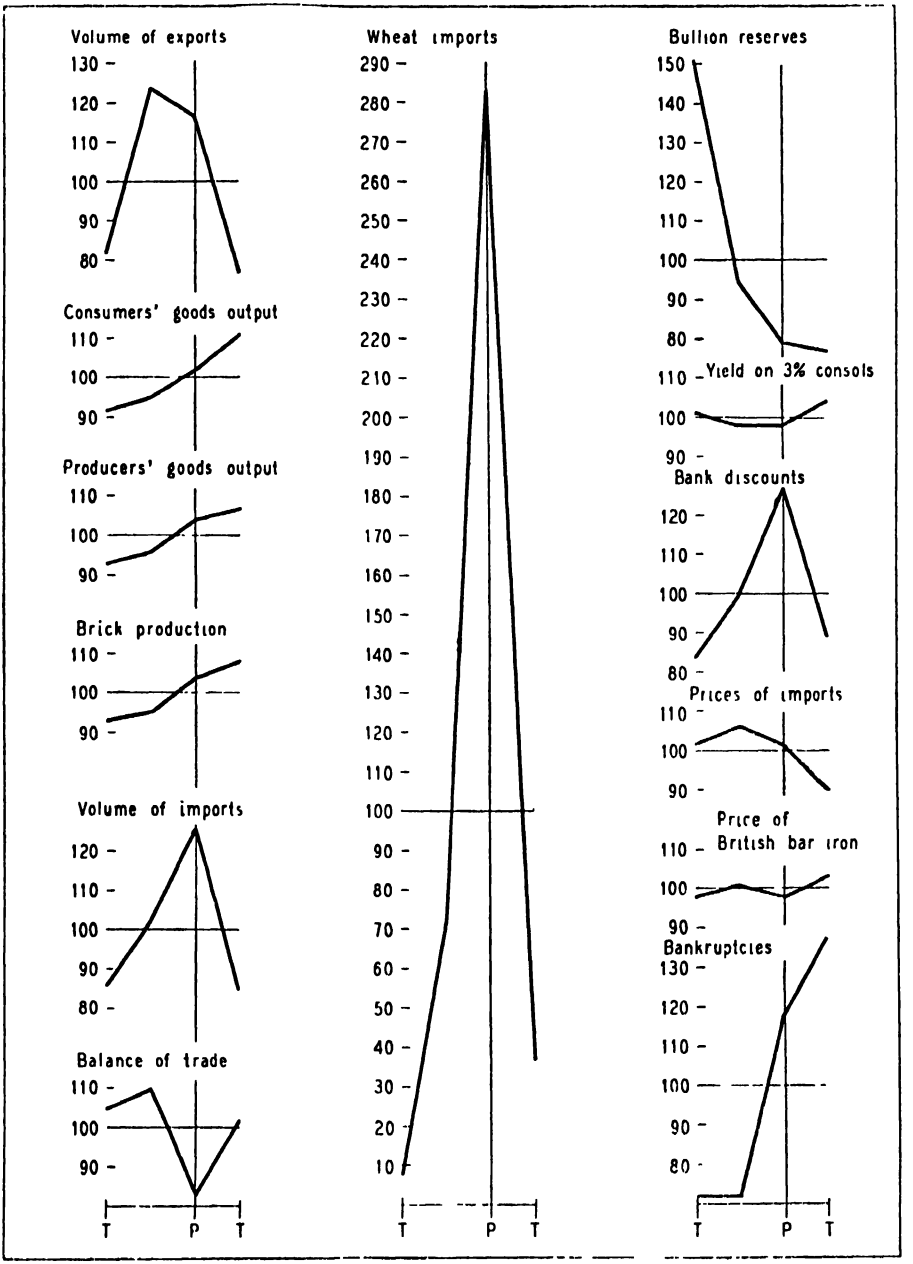


FIG. 112. Annual Reference-cycle Patterns of Selected Series, 1808–11

TABLE 68. *1808–11 : Major Cycle*

Series	*I–III*	*III–V*	*V–IX*
Volume of exports	✓	*	✓
Hoffmann's index of consumers' goods production	✓	✓	*
Hoffmann's index of producers' goods production	✓	✓	✓
Production of bricks	✓	✓	✓
Volume of total imports	✓	✓	✓
Quantity of wheat imports	–	✓	–
Balance of trade	✓	✓	✓
Bills and notes discounted at the Bank of England	*	✓	✓
Bullion in the Bank of England	*	✓	*
Yield on 3 per cent. Consols	✓	✓	✓
Index of prices of imported commodities	✓	*✓	✓
Price of British bar-iron	✓	*	*
Number of bankruptcies	✓	✓	✓

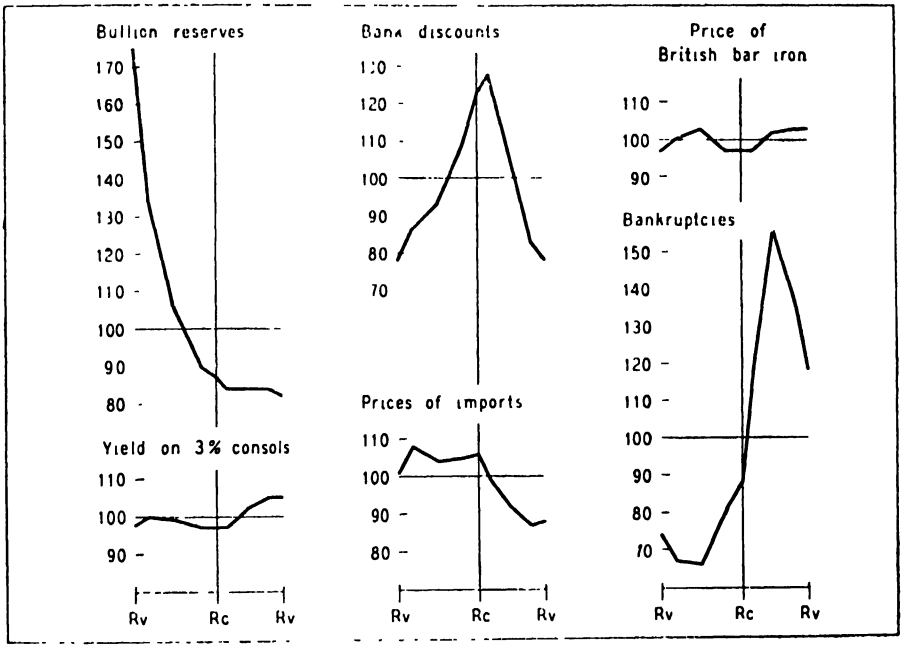


FIG. 113. Monthly Reference-cycle Patterns of Selected Series, 1808–11

consumers' goods index, however, seems a simple error in the data, for none of the textile foreign trade series, which principally compose it at this point, rises in 1811. So far as we have been able to discover, the irregularities in the price of iron bars was connected with no cyclical movement, but rather with a re-establishment of monopoly controls, which temporarily lapsed in 1810.[1]

The continued decline in the Bank's bullion holdings in 1811 (V–IX), despite the conventional rise in the trade balance, can be traced to the

[1] See below, pp. 847–8.

heavily increased war expenditure abroad. Wheat imports moved in such a way as to accentuate the financial difficulties of 1810 (III–V) and to hasten a return to financial ease in 1811. The immediate (i.e. I–III) rise in the Bank's discounts indicates the strength of the South American boom, which quickly sent borrowers to the Bank, as well as the abnormally active part played by the Bank in the financing of this expansion.

TABLE 69. *1811–16 : Minor Cycle*

Series	*I–III*	*III–V*	*V–IX*
Volume of exports	✓	✓	✓
Hoffmann's index of consumers' goods production	*	✓	✓
Hoffmann's index of producers' goods production	✓	✓	✓
Production of bricks	✓	✓	✓
Volume of total imports	✓	✓	✓
Quantity of wheat imports	—	*	—
Balance of trade	✓	*	✓
Bills and notes discounted at the Bank of England	✓	✓	✓
Bullion in the Bank of England	*	*✓	✓
Yield on 3 per cent. Consols	*	✓	✓
Index of prices of imported commodities	✓	*	✓
Price of British bar-iron	✓	✓	✓
Number of bankruptcies	✓	✓	✓
Index of prices of shares	✓	✓	✓

1811–16. The decline in the consumers' goods index in stage I–III results from a fall in raw cotton imports during the War of 1812. It is not shared by cotton exports, and almost certainly not by cotton production. The steady rise in the trade balance resulted from an abnormal speculative increase in exports, at a time of rather limited domestic prosperity (witness brick production, producers' goods output, the security indexes, and the price of iron bars). This rise was aided by good harvests and low wheat imports from 1812.

As in the case of 1810, the monthly turning-point came early in 1815 (March). Thus in the annual patterns the Bank's discounts and the yield on Consols fail to reveal their expected increase after the upper turning-point. The more sensitive monthly series move conventionally. The fall in the Consol yield, however, even in the monthly pattern (VI–IX), reflects the coming of peace rather than a general return to easy money conditions. The fall in bullion in stage I–III resulted from the heavy war-time expenditures abroad in 1812, at a time when the export markets were still relatively slack and wheat imports were large. The abnormal rise in bullion [(III–IX) annually, (V–IX) monthly] is connected both with the rise in the trade balance and the cessation of war-time expenditure abroad. The leads exhibited by security, imported commodity and iron prices, result from the collapse, in 1814, of the speculative boom based on the Continent. The opening up of the American trade in 1815 alone justifies placing the peak in that year.

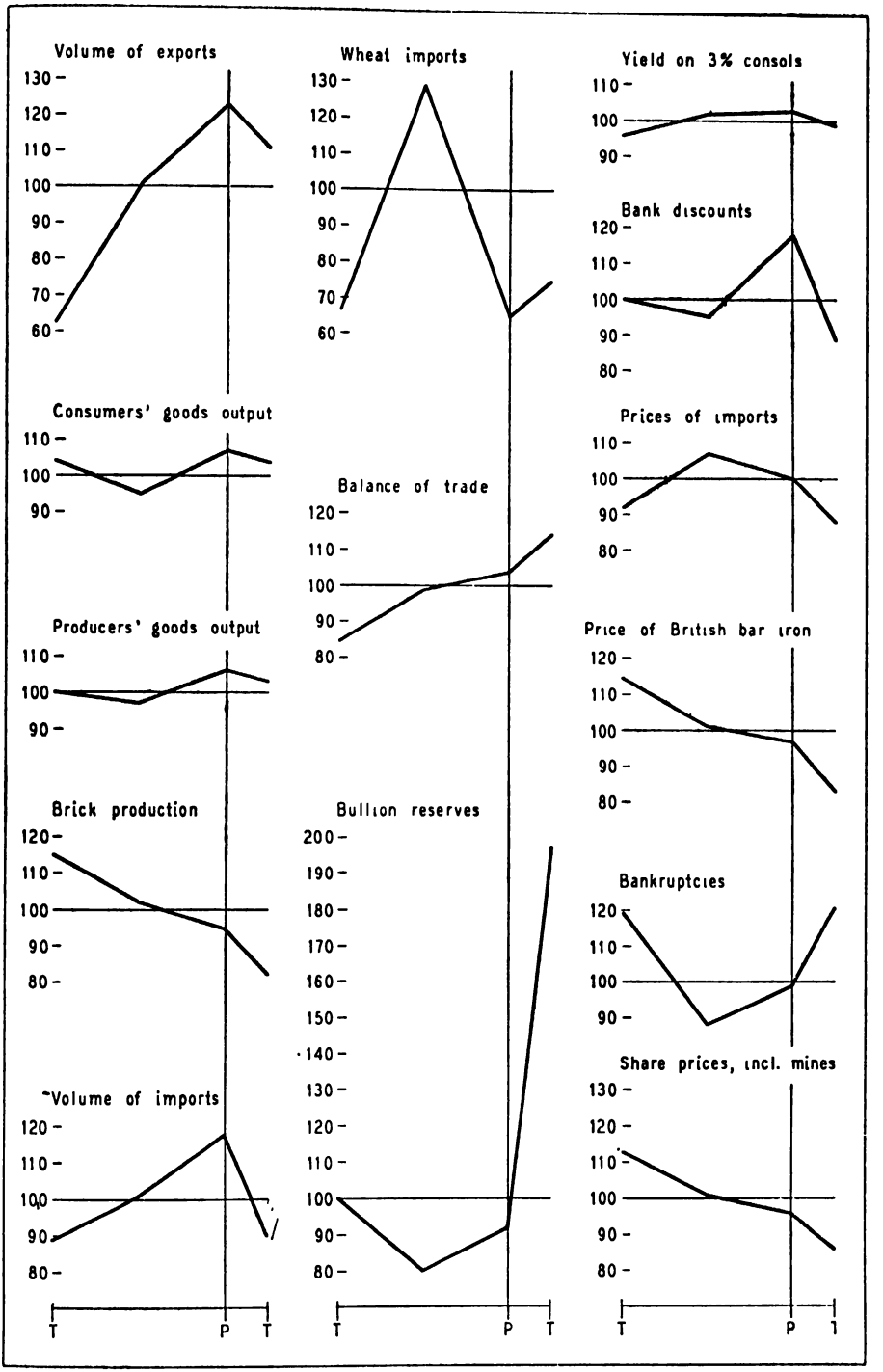


FIG. 114. Annual Reference-cycle Patterns of Selected Series, 1811–16

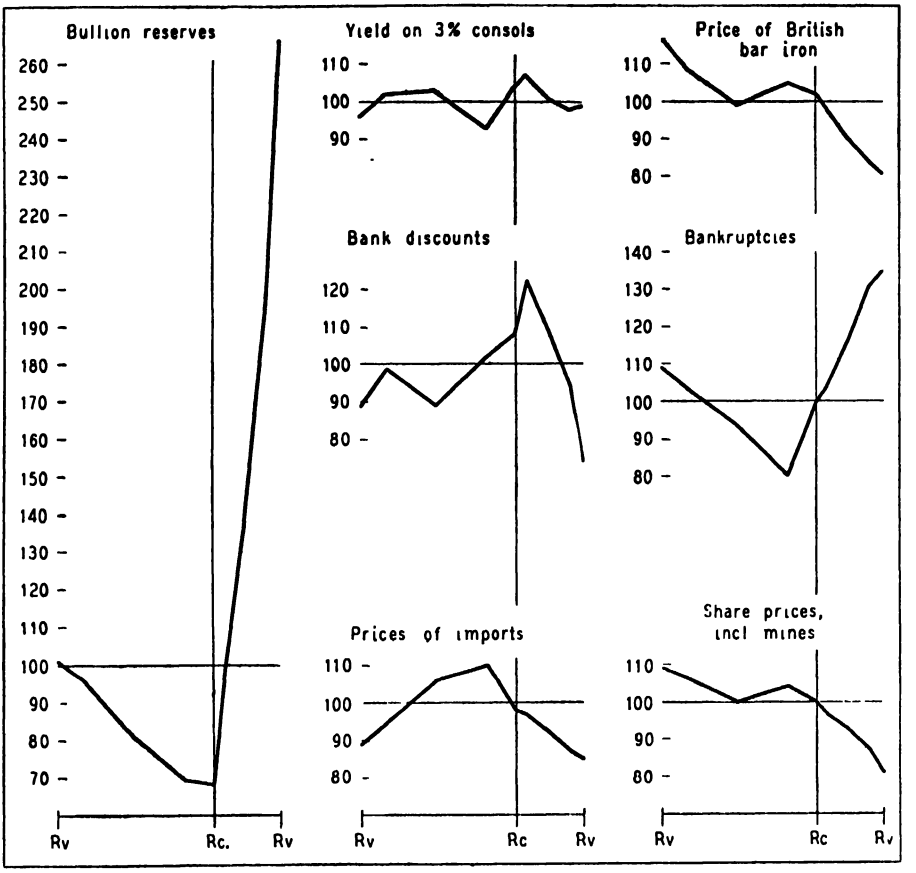


FIG. 115. Monthly Reference-cycle Patterns of Selected Series, 1811–16

TABLE 70. *1816–19: Major Cycle*

Series	*I–III*	*III V*	*V–IX*
Volume of exports	*	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	✓
Hoffmann's index of producers' goods production	✓	✓	✓
Production of bricks	✓	✓	✓
Volume of total imports	✓	✓	✓
Quantity of wheat imports	—	✓	—
Balance of trade	*	✓	✓
Bills and notes discounted at the Bank of England	✓	✓	✓
Bullion in the Bank of England	✓	✓	✓
Yield on 3 per cent. Consols	✓	*✓	✓
Index of prices of imported commodities	✓	✓	✓
Price of British bar-iron	✓	*	*
Number of bankruptcies	✓	*✓	✓
Index of prices of shares	✓	✓	✓
Total bills of exchange	✓	✓	✓

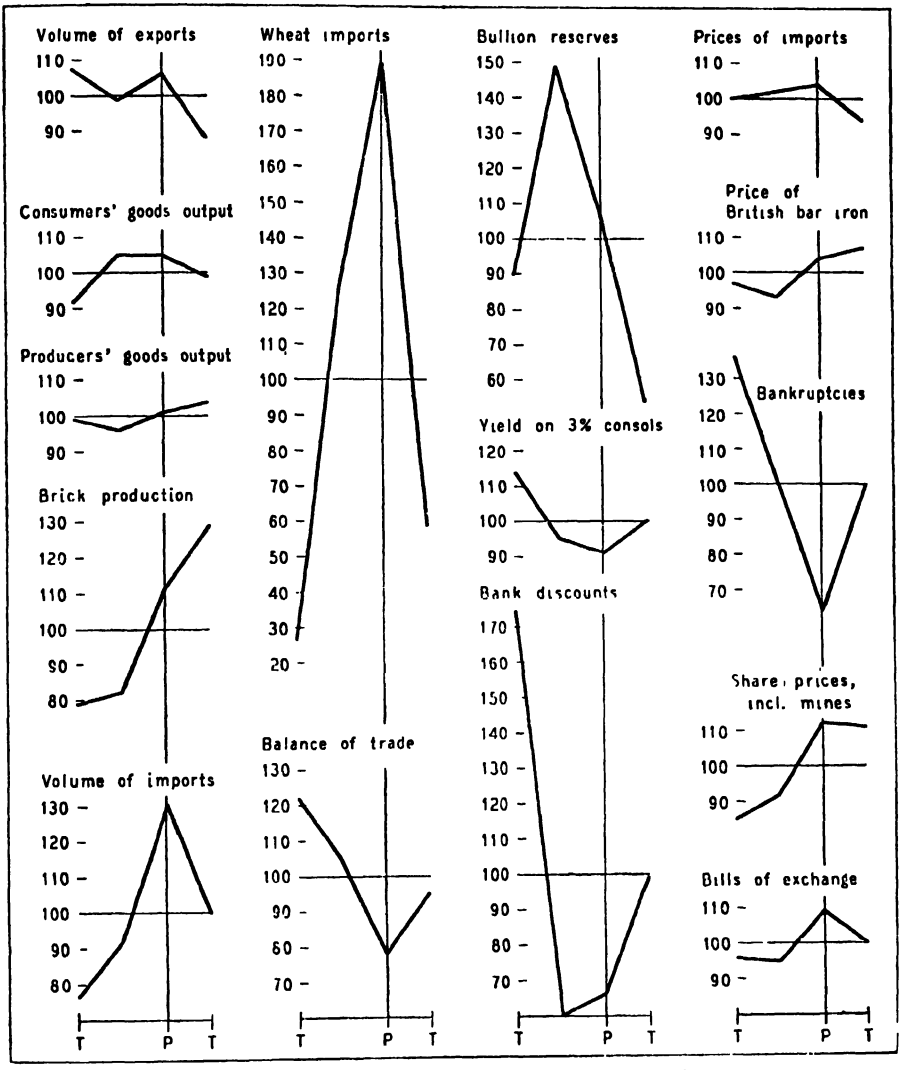


FIG. 116. Annual Reference-cycle Patterns of Selected Series, 1816–19

1816–19. The fall in the total volume of exports in stage I–III (1817) is due to a decline in re-exports. The volume of domestic goods exports increased. The large increase in wheat imports in 1817 helped to create the

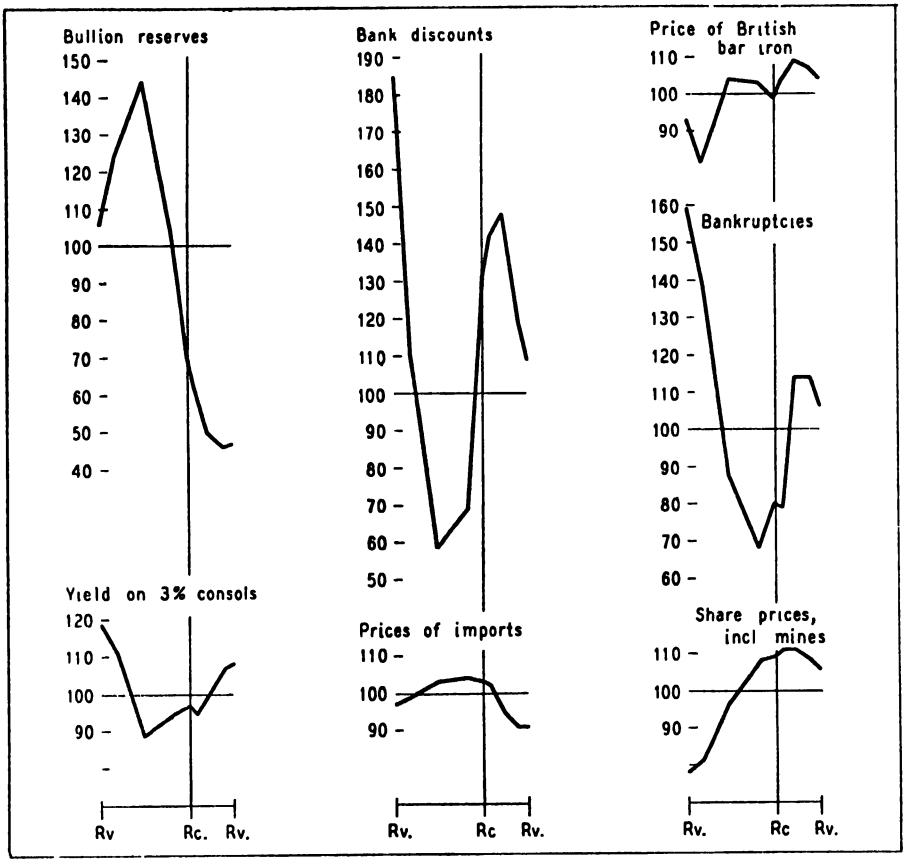


FIG. 117. Monthly Reference-cycle Patterns of Selected Series, 1816–19

counter-cyclical adverse trade balance of stage I–III, which partly explains the relatively short period of expansion in this cycle. The yield on Consols rises, as expected, in stage III–V in the monthly pattern, but falls when annual data are used. Similarly, bankruptcies exhibit their lead at the peak in the monthly but not the annual patterns.

The abnormal rise in the iron price in stage V–VII results from a sudden increase in the demand from France in 1819, rather than from the general lag in capital goods output, as reflected in the producers' goods index and brick production. The movement of the iron price in stages I–III and III–V is regular in the annual data, but the monthly figures exhibit a decline before the cyclical peak. For this minor abnormality we can offer no explanation.

TABLE 71. *1819–26: Major Cycle*

Series	*I–III*	*III–V*	*V–IX*
Volume of exports	✓	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	✓
Hoffmann's index of producers' goods production	✓	✓	✓
Production of bricks	✓	✓	✓
Volume of total imports	✓	✓	✓
Quantity of wheat imports	—	✓	—
Balance of trade	✓	✓	✓
Bills and notes discounted at the Bank of England	✓	✓	✓
Bullion in the Bank of England	✓	✓	✓
Yield on 3 per cent. Consols	✓	*✓	✓
Index of prices of imported commodities	✓	✓	✓
Price of British bar-iron	✓	✓	✓
Number of bankruptcies	✓	✓	✓
Index of prices of shares	✓	✓	✓
Total bills of exchange	✓	✓	✓

1819–26. This model instance of a major cycle exhibits but one exception, in the annual patterns: the failure of a rise in the yield on Consols to appear before the upper turning-point. The monthly data, however, do show a halt in the fall in the Consol yield in the stage preceding the upper turning-point. The abnormally sharp fall in the Consol yield during expansion was due largely to the re-financing operations of the government. Wheat imports moved in such a way as to contribute to the easy money conditions of stage I–III and the stringency of stages III–VII. The rise in bullion and fall in Bank discounts in the latter stage of contraction emerge clearly in the monthly, but not in the annual, patterns.

TABLE 72. *1826–9: Minor Cycle*

Series	*I–III*	*III–V*	*V–IX*
Volume of exports	✓	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	✓
Hoffmann's index of producers' goods production	✓	✓	✓
Production of bricks	✓	✓	*
Volume of total imports	✓	✓	✓
Quantity of wheat imports	—	✓	—
Balance of trade	*	*	✓
Bills and notes discounted at the Bank of England	✓	*✓	*✓
Bullion in the Bank of England	✓	✓	*✓
Yield on 3 per cent. Consols	✓	✓	*✓
Index of prices of imported commodities	✓	✓	✓
Price of British bar-iron	✓	✓	✓
Number of bankruptcies	✓	✓	✓
Index of prices of shares	*	✓	✓
Total bills of exchange	✓	✓	✓
Market-rate of discount	✓	*✓	*✓

1826–9. The counter-cyclical movements of the annual patterns for the market interest rate, Bank discounts, and bullion disappear when the

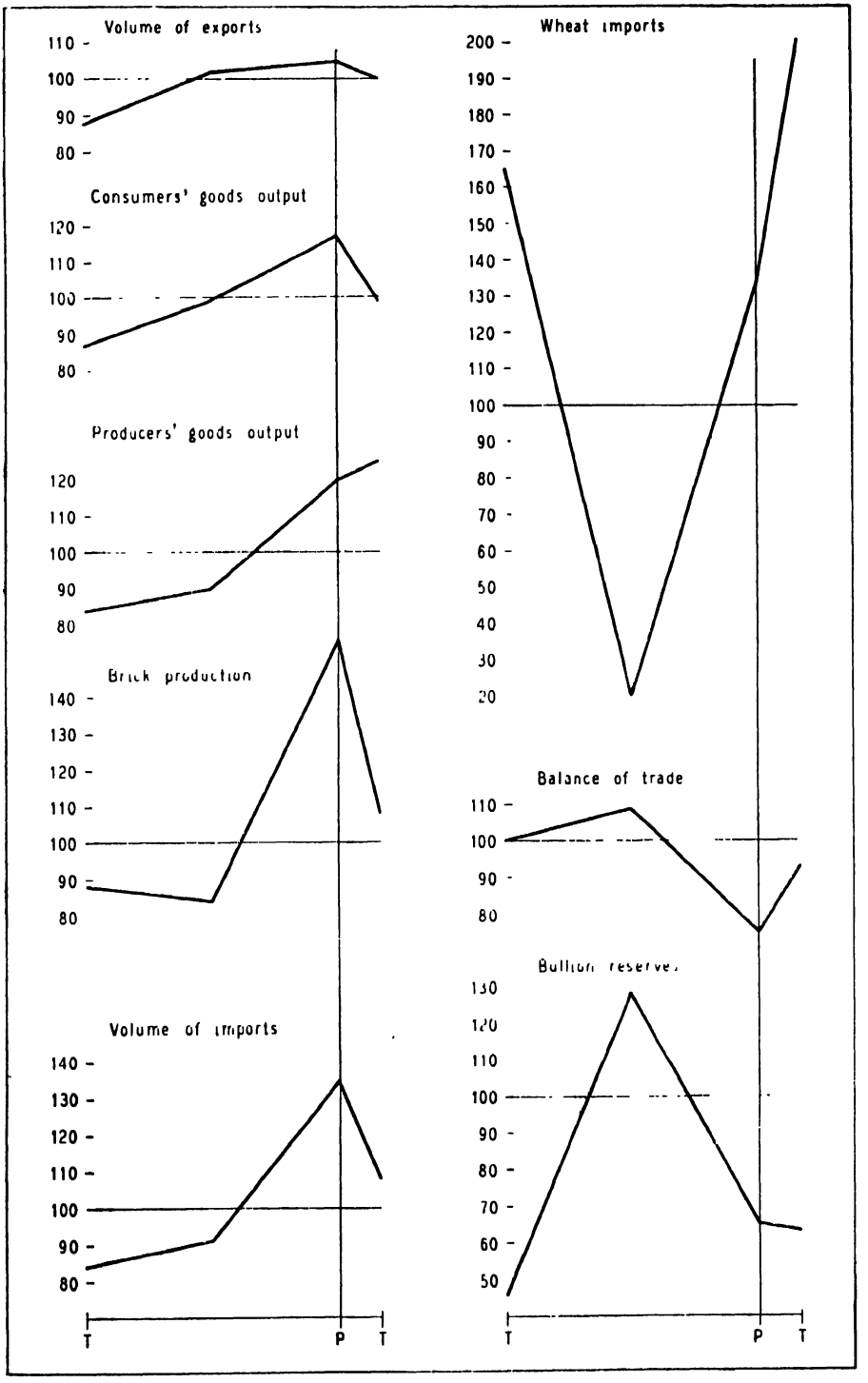


FIG. 118. Annual Reference-cycle Patterns of Selected Series, 1819–26

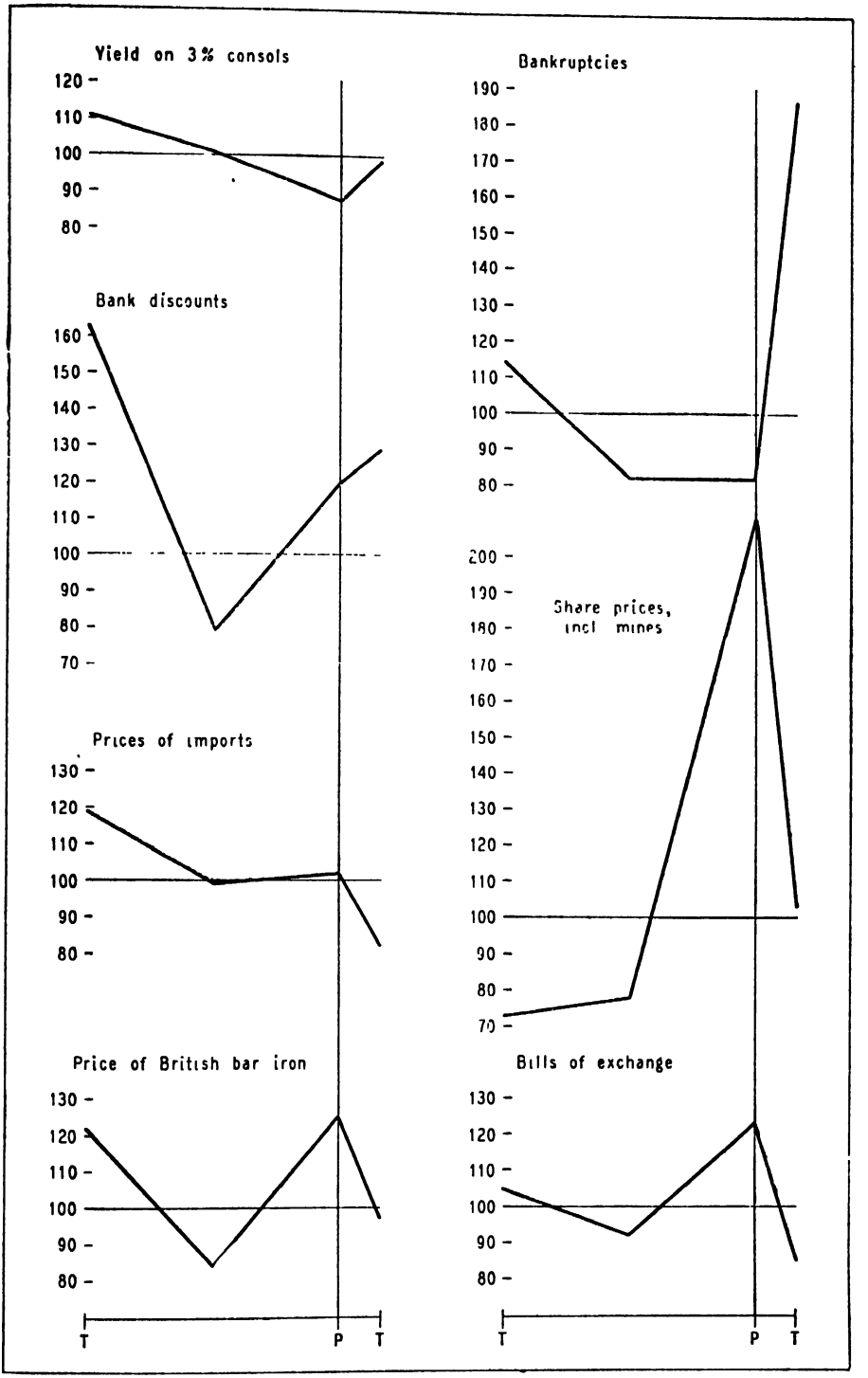


FIG. 118. Annual Reference-cycle Patterns of Selected Series, 1819–26

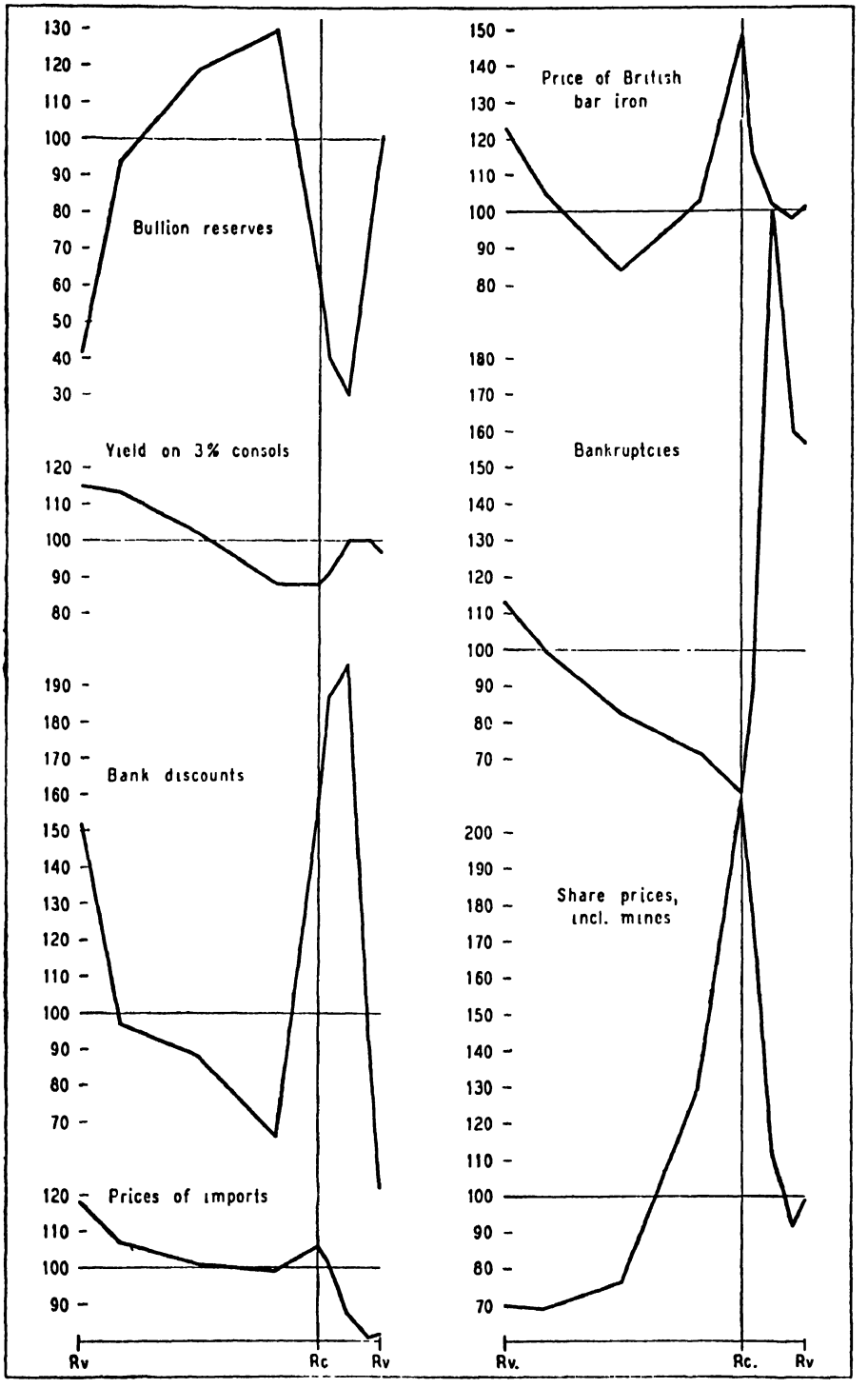


FIG. 119. Monthly Reference-cycle Patterns of Selected Series, 1819–26

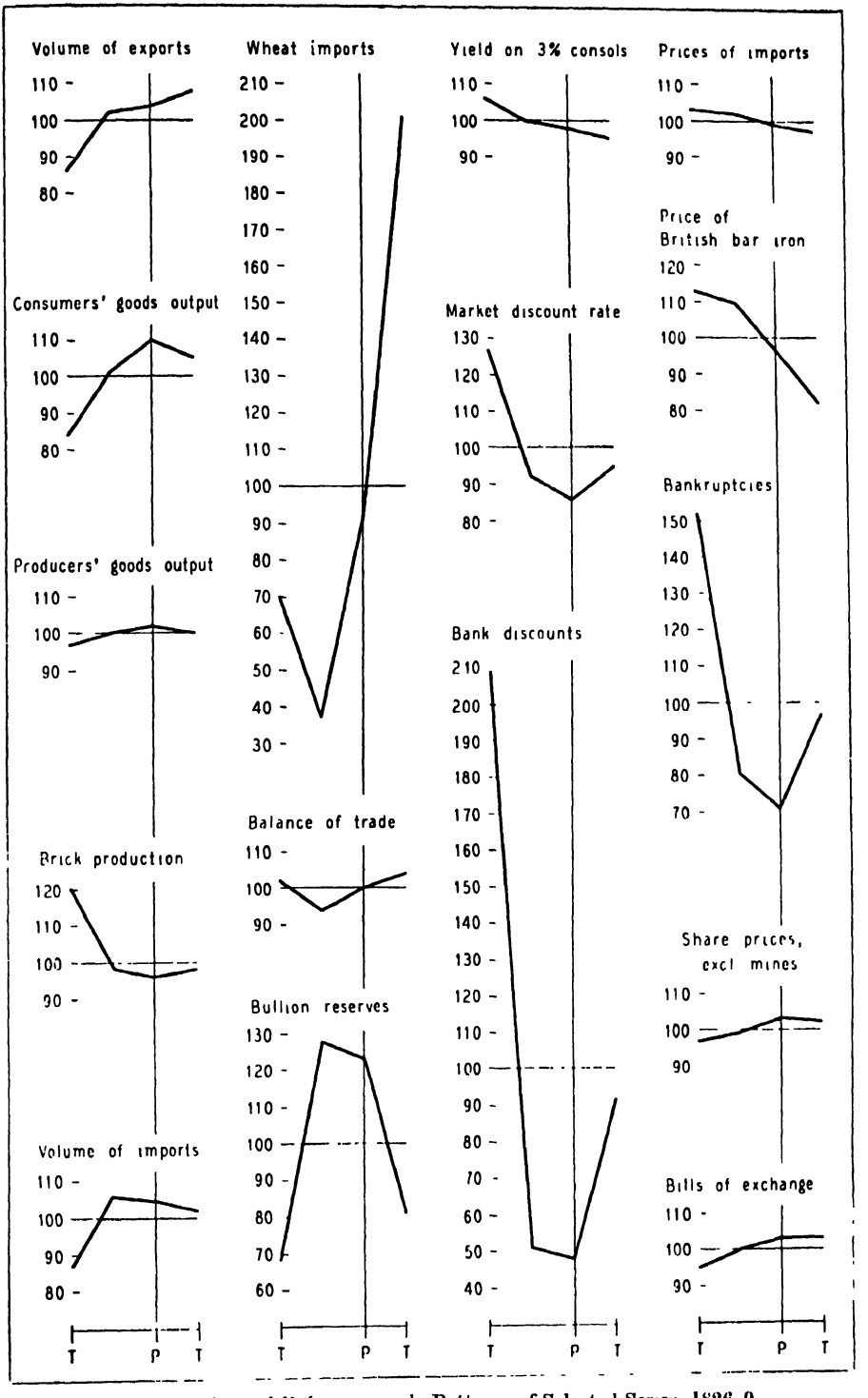


Fig. 120. Annual Reference-cycle Patterns of Selected Series, 1826–9

monthly data are used. The rapid decline in discounts (V–IX) indicates the relative mildness of the crisis of the early months of 1829, and the consequently quick return to easy money conditions. The sluggish behaviour of the Consol yield, as compared with the market-rate, emerges clearly: the rise in the latter is paralleled by a mere cessation of fall in the former

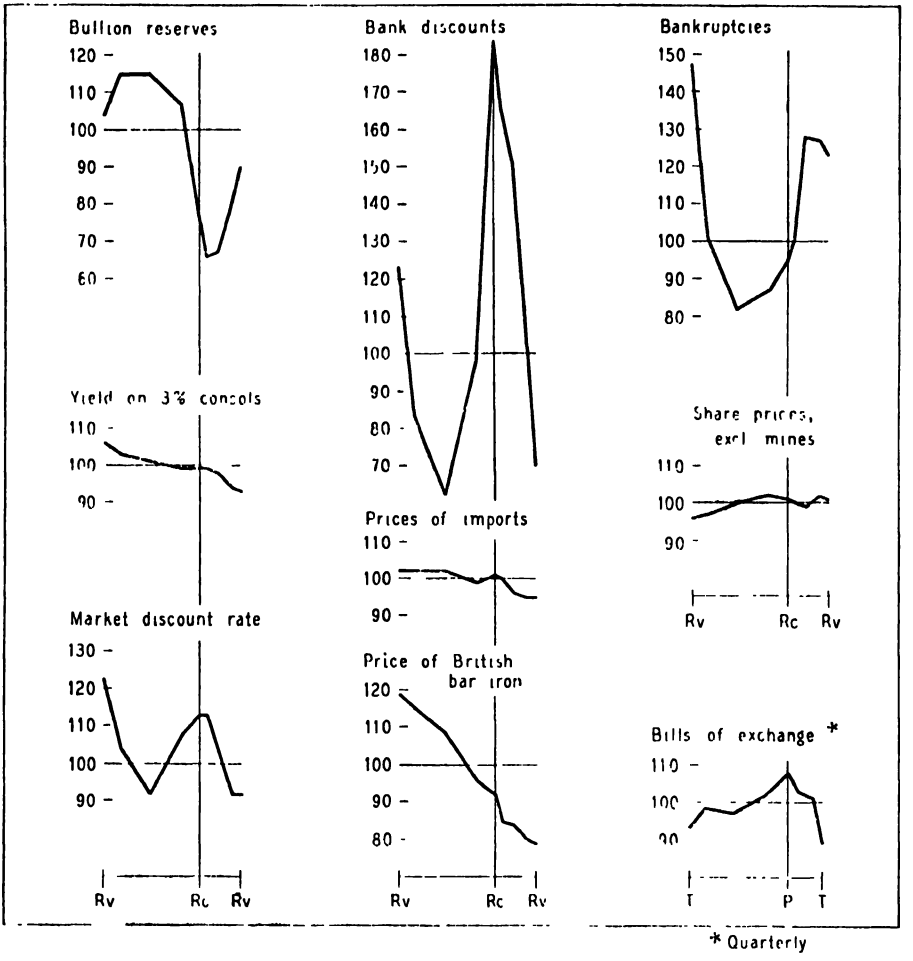


Fig. 121. Monthly Reference-cycle Patterns of Selected Series, 1826-9

(monthly). The heavy wheat imports of 1828–9 were among the factors which caused an early reversal of the brief expansion, despite a decline in total imports and an improvement in the trade balance in those years. This resulted largely from a decline in raw cotton imports, which, in turn, was connected with the American financial difficulties of the period. A part of the pressure on the British money market, however, arose directly from the American situation, despite the favourable net movement of the

balance of trade. The slight increase in the securities index and in producers' goods output are not sufficient to be counted exceptions to the minor cycle pattern. The slight rise in 1829 (V–IX) in brick production may be regarded again as evidence of that series' conventional lag.

TABLE 73. *1829–32: Minor Cycle*

Series	*I-III*	*III-V*	*V IX*
Volume of exports	✓	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	✓
Hoffmann's index of producers' goods production	✓	✓	*
Production of bricks	✓	✓	✓
Volume of total imports	✓	✓	✓
Quantity of wheat imports	—	✓	-
Balance of trade	*	✓	✓
Bills and notes discounted at the Bank of England	*	✓	✓
Bullion in the Bank of England	✓	✓	✓
Yield on 3 per cent. Consols	✓	✓	✓
Index of prices of imported commodities	✓	✓	✓
Price of British bar-iron	✓	✓	✓
Number of bankruptcies	✓	✓	✓
Index of prices of shares	✓	*	✓
Total bills of exchange	✓	✓	✓
Market-rate of discount	✓	✓	✓

1829–32. The chronic liquidity panic, caused by political agitation, which ran from the close of 1830 to the final passage of the Reform Bill, probably accounts for the abnormally sharp fall in the securities index and for the rise in the Consol yield in stage III–V. The latter stages of contraction, when the passage of the Reform Bill had already been assured, saw a rapid easing of money conditions and some recovery in security prices. The large wheat imports of 1831 contributed, along with several other factors, to the pressure on the bullion reserve, aiding in the fall (III–V) in the trade balance. The heavy increase in cotton imports in 1830, after two previous years of decline, largely explains the slight net weakening of the trade balance in that year (III-V). The counter-cyclical rise of the index of producers' goods output in 1832 is due to a slight recovery in iron shipments and in shipbuilding, probably concentrated in the latter months of the year (lower turning-point, July).

Bank discounts conform perfectly in the annual patterns, but there is a counter-cyclical I–III rise in the monthly data. This results from the fact that stage I–III measures, in the annual pattern, the movement from the average figure for 1829 to the average figure for 1830; while the monthly pattern begins with the figure for December 1829, the cyclical trough. Bank discounts began slowly to rise in the early months of 1830, although the average figure for 1830 is below that for 1829. The early response of Bank discounts to general recovery may possibly have been connected with the fact that the elimination of small country bank notes (1826) had

thrust a somewhat greater burden of normal financing on the Bank than had previously existed; although this explanation must be offered only very tentatively.

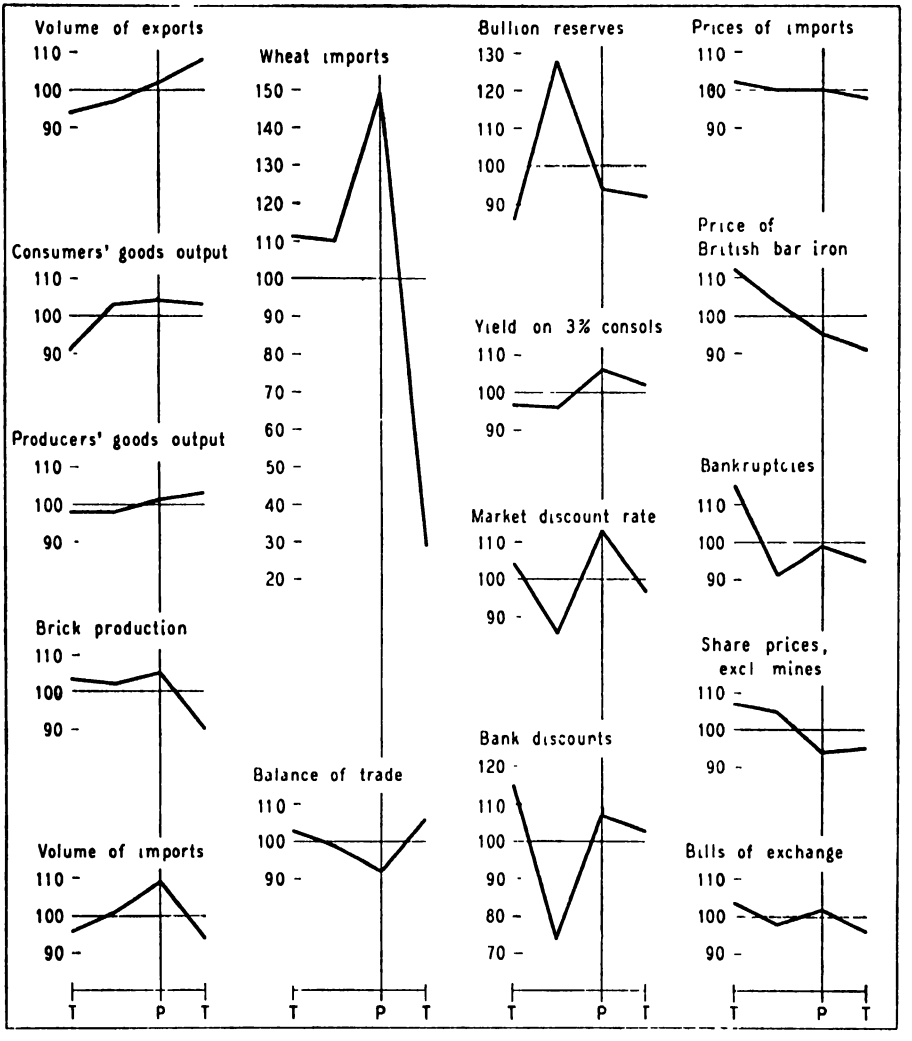


FIG. 122. Annual Reference-cycle Patterns of Selected Series, 1829–32

This minor cycle seems to bear the same relation to the period 1833–6 as the interval 1819–22 bears to 1823–5; i.e. it caused an increase in exports and, probably, in total output sufficient to create an almost full use of resources in the existing state of fixed plant. Large-scale new factory construction was already under way in 1833, prices and interest rates were rising. The deflationary forces of 1831–2, however, were stronger than the mild set-back of 1822–3.

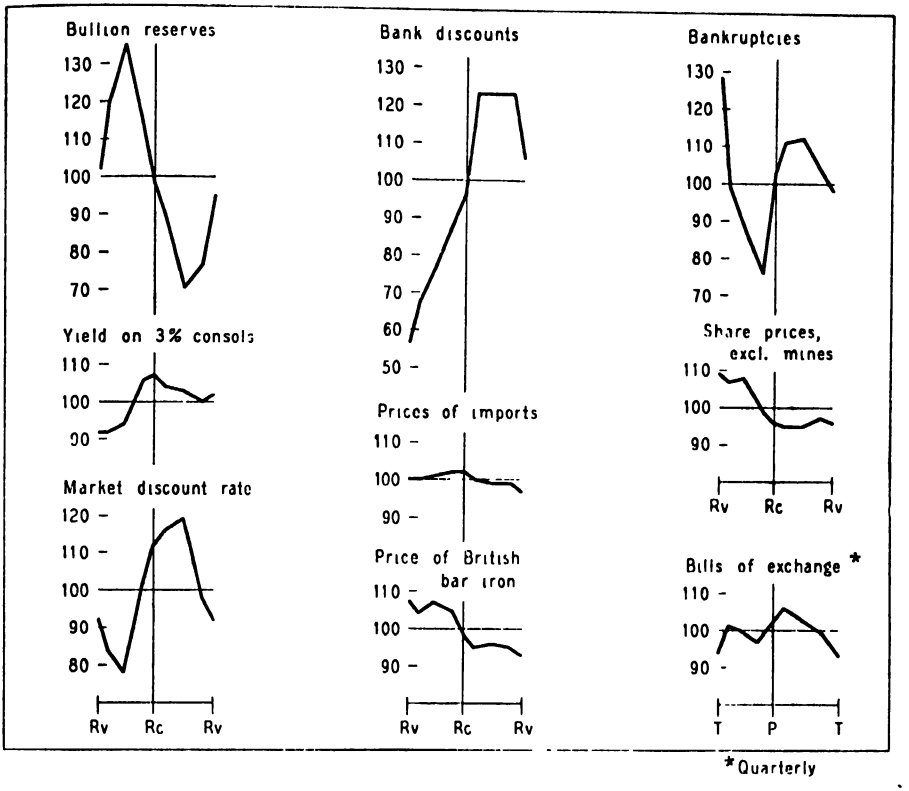


FIG. 123. Monthly Reference-cycle Patterns of Selected Series, 1830-2

TABLE 74. *1832-7: Major Cycle*

Series	*I–III*	*III–V*	*V–IX*
Volume of exports	✓	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	✓
Hoffmann's index of producers' goods production	✓	✓	✓
Production of bricks	✓	✓	✓
Volume of total imports	✓	✓	✓
Quantity of wheat imports	—	✓	—
Balance of trade	✓	✓	*
Bills and notes discounted at the Bank of England	✓	✓	✓
Bullion in the Bank of England		✓	*✓
Yield on 3 per cent. Consols	✓	✓	*✓
Index of prices of imported commodities	✓	✓	✓
Price of British bar-iron	✓	✓	✓
Number of bankruptcies	✓	✓	✓
Index of prices of shares	✓	✓	✓
Total bills of exchange	✓	✓	✓
Market-rate of discount	*✓	✓	✓
Percentage of iron-founders unemployed	✓	✓	✓

1832–7. All irregularities in the annual data disappear in the monthly patterns, in the cases where the more detailed statistics are available

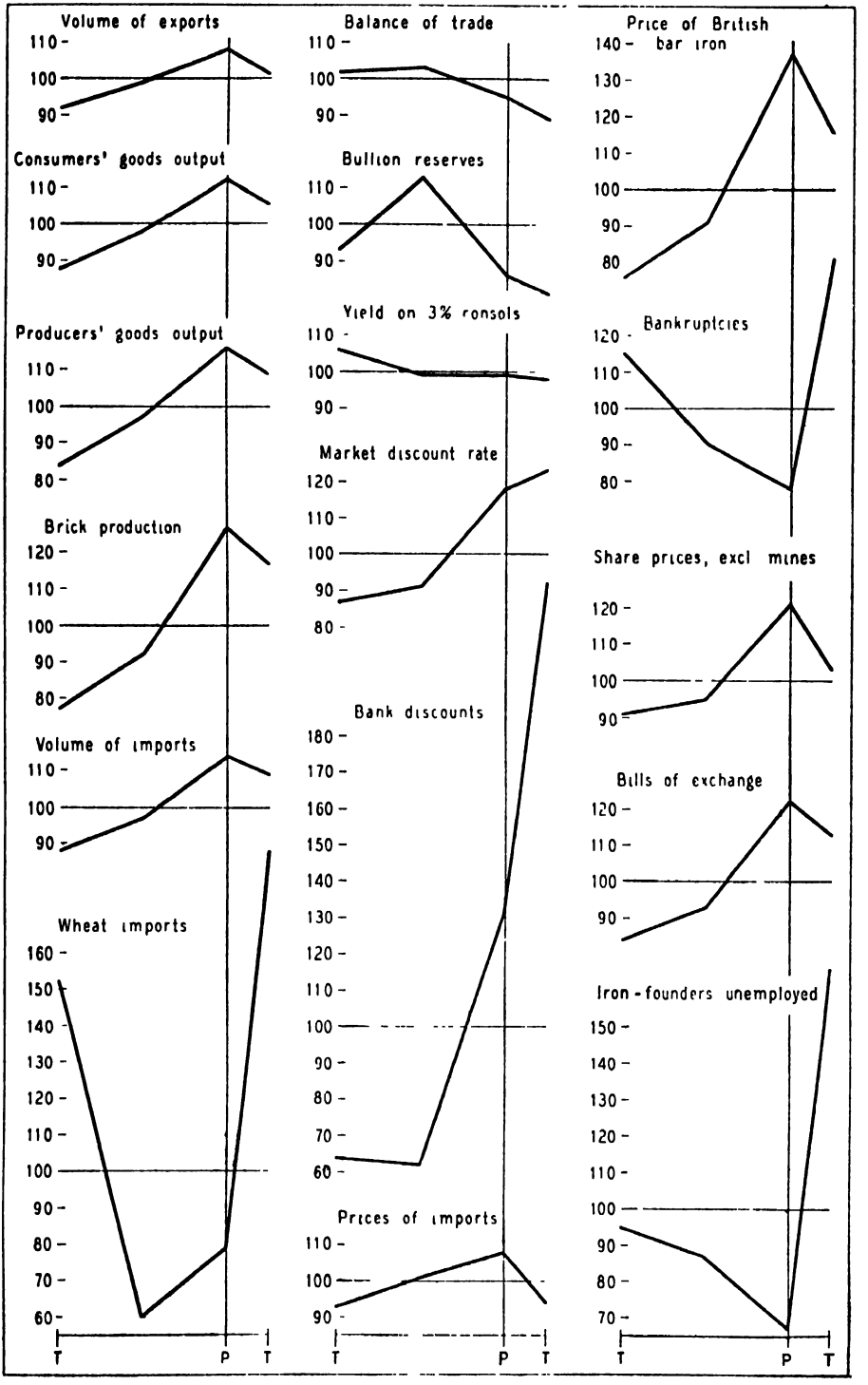


Fig. 124. Annual Reference-cycle Patterns of Selected Series, 1832–7

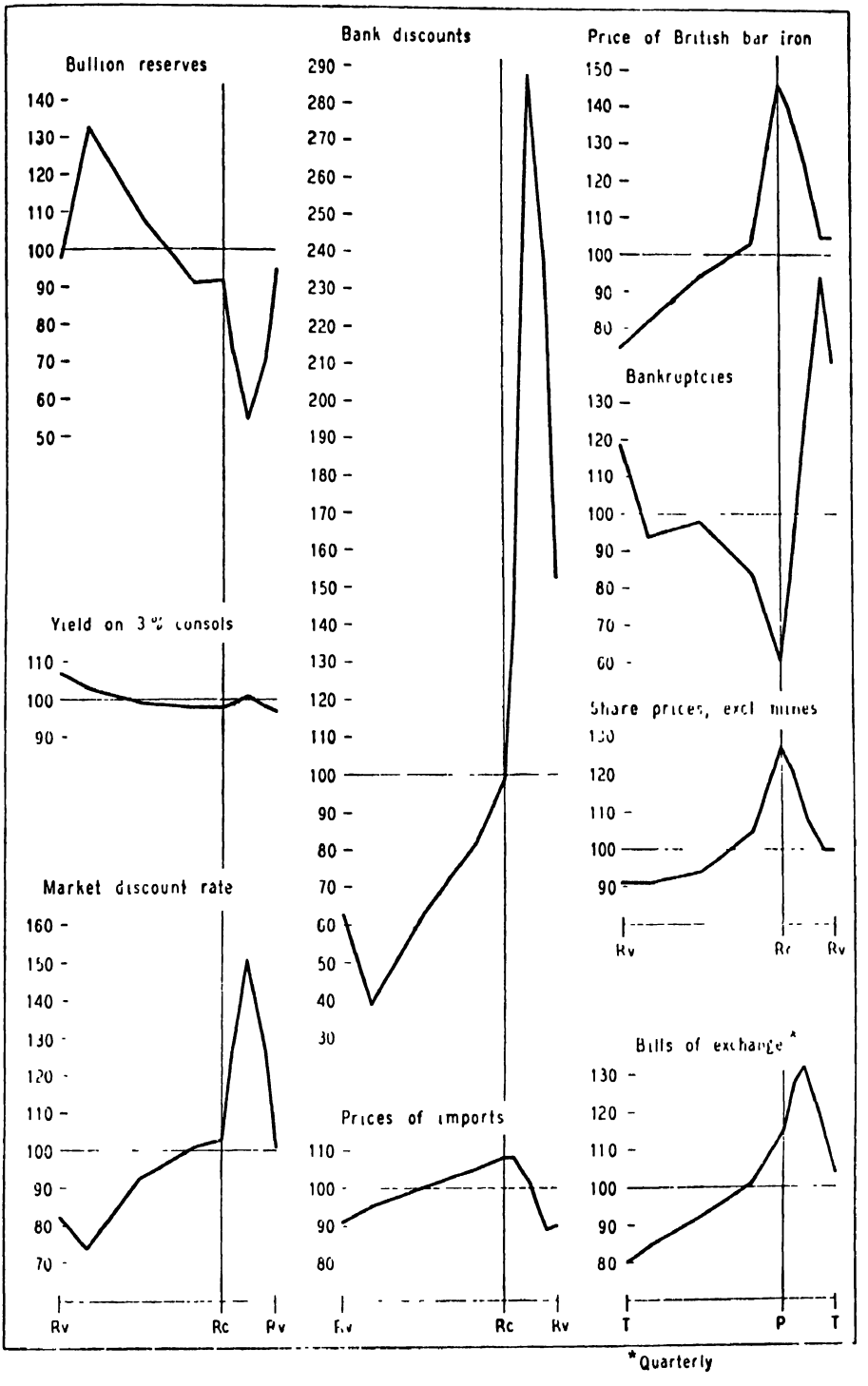


Fig. 125. Monthly Reference-cycle Patterns of Selected Series, 1832 7

(bullion, Consol yield, market interest rate). The only significant failure to conform is the fall in the trade balance in 1837 (V–IX), although at a lesser rate than in III–V. This resulted from the catastrophic decline in exports to the United States at a time when large grain imports, at high prices, were required. The speculative credit basis of the Anglo-American trade in these years made exports even more sensitive to monetary stringency than was normal. The failure of an increase in bankruptcies, or a slackening in their rate of decline, to anticipate the upper turning-point may, possibly, also be regarded as an exception, although it is of an extremely minor order.

TABLE 75. *1837–42: Minor Cycle*

Series	*I–III*	*III–V*	*V–VII*	*VII–IX*
Volume of exports	✓	✓	✓	✓
Hoffmann's index of consumers' goods production	✓	✓	✓	✓
Hoffmann's index of producers' goods production	*	*	*	✓
Production of bricks	✓	✓	✓	✓
Volume of total imports	✓	✓	*	✓
Quantity of wheat imports	—	✓	—	—
Bills and notes discounted at the Bank of England	✓	✓	✓	✓
Bullion in the Bank of England	✓	✓	✓	✓
Yield on 3 per cent. Consols	✓	✓	✓	✓
Index of prices of imported commodities	✓	✓	✓	✓
Price of British bar-iron	*	✓	✓	✓
Number of bankruptcies	✓	✓	✓	✓
Index of prices of shares	*	*	✓	✓
Total bills of exchange	✓	✓	✓	✓
Market-rate of discount	✓	✓	✓	✓
Percentage of iron-founders unemployed	✓	*	✓	*

1837–42. The abnormal strength of revival (1837–9) in this minor cycle is reflected in the index of producers' goods output, the iron price, and even brick production. The continued rise of the producers' goods index in stage V–VII (1840–1) may be regarded as a normal lag, in this instance traceable to a shipbuilding boom which ran from 1836 to about 1840. A similar lag is evident in the relatively slight decline of brick production in that stage. The counter-cyclical rise of total imports in the same interval resulted from a large increase in raw cotton imports in 1840; for, in the previous year, the Anglo-American financial crisis had caused an exceedingly sharp counter-cyclical decline, and stocks were depleted. The rise in prices in stage III–V (1839) is more powerful than in most other minor cycles. The resuscitation of lending arrangements with the United States (1838–9) and the completion of railways, and other new construction undertaken in 1835–6, account largely for the abnormal strength of this minor cycle revival. Tight money conditions (III–V) probably explain the failure of the rise in the securities index to continue beyond the early (I–III) stage of revival. The counter-cyclical rise in iron-founders' unemployment in 1839 (III–V) is to be traced probably to the early turning-point in that

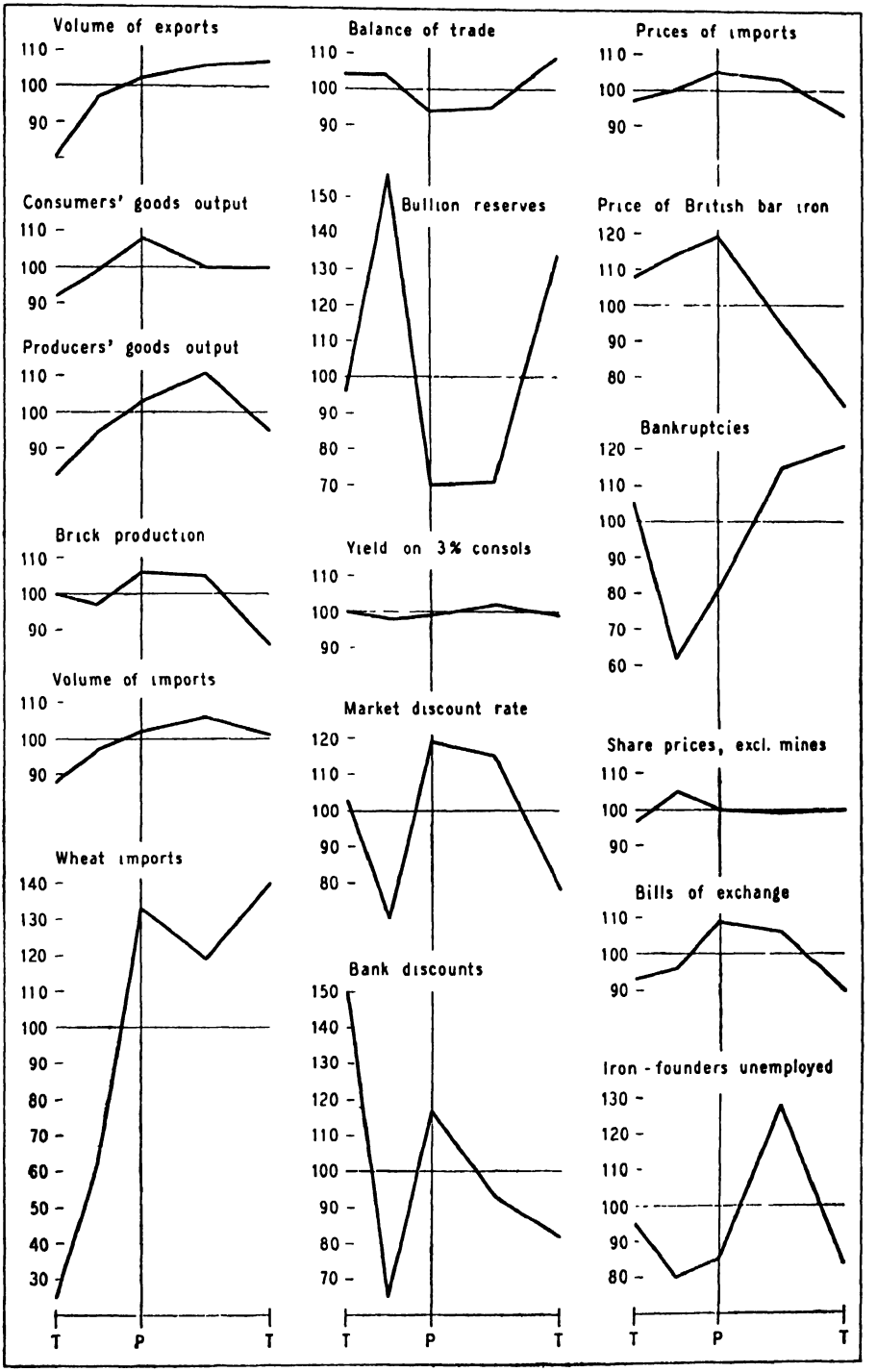


FIG. 126. Annual Reference-cycle Patterns of Selected Series, 1837–42

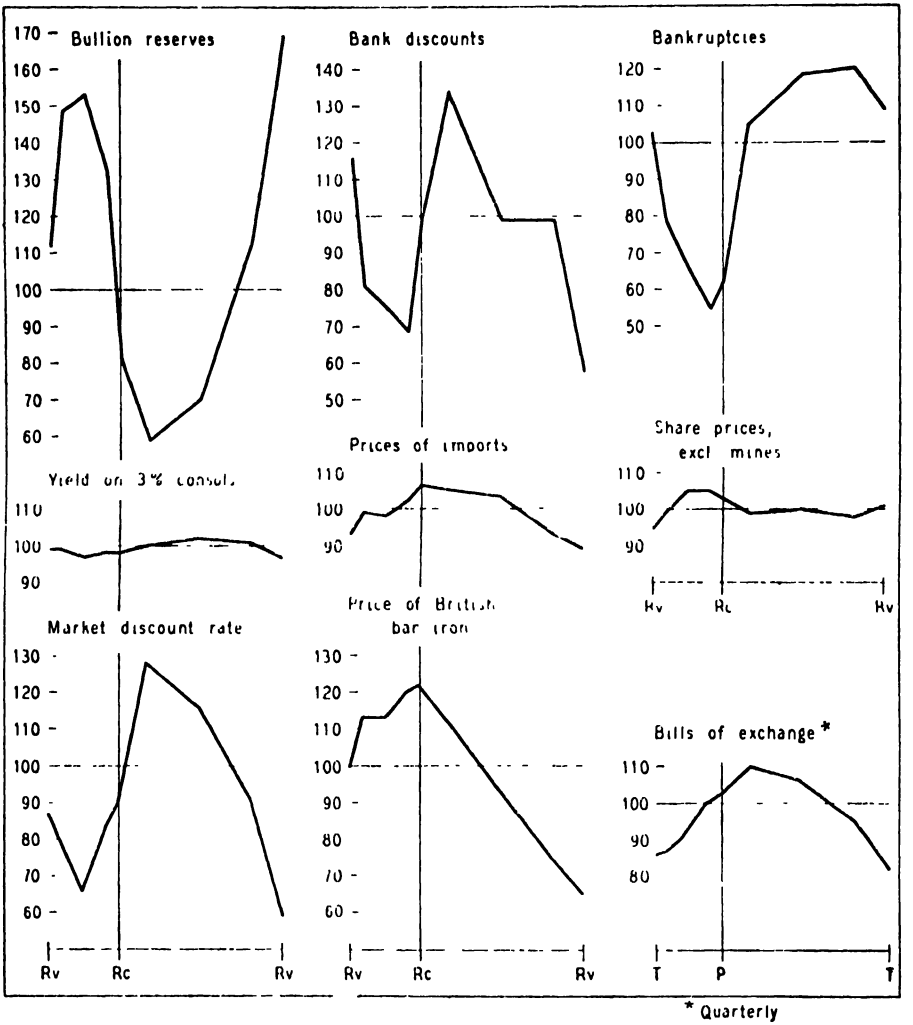


Fig. 127. Monthly Reference-cycle Patterns of Selected Series, 1837-42

year (March). The substantial net decline in 1842 (VII–IX), however, cannot be traced to the monthly dating, for November 1842 has been marked off as the cyclical trough. Since the volume of iron exports, iron prices, and estimates of total iron output decline in 1842, no explanation can be offered for this anticipatory fall in iron-founders' unemployment.[1]

TABLE 76. *1842–8: Major Cycle*

Series	*I III*	*III V*	*V–VII*	*VII IX*
Volume of exports	✓	✓	✓	*
Hoffmann's index of consumers' goods production	✓	✓	✓	*
Hoffmann's index of producers' goods production	✓	✓	*	*
Production of bricks	✓	✓	✓	✓
Volume of total imports	✓	✓	✓	*
Quantity of wheat imports	-	*	–	--
Balance of trade	✓	✓	✓	*
Bills and notes discounted at the Bank of England	✓	✓	✓	✓
Bullion in the Bank of England	✓	*✓	✓	✓
Yield on 3 per cent. Consols	✓	✓	✓	*
Index of prices of imported commodities	✓	*	✓	✓
Price of British bar-iron	✓	✓	✓	✓
Number of bankruptcies	✓	✓	✓	✓
Index of prices of shares	✓	✓	✓	✓
Total bills of exchange	✓	✓	✓	✓
Market-rate of discount	✓	✓	✓	✓
Percentage of iron-founders' unemployed	✓	✓	✓	✓

1842–8.[2] The rise in the index of producers' goods output in 1845–8 (V–IX) can be traced to the continued construction of railways inaugurated in 1844–5, whose relatively long period of gestation accentuates the usual lag.[3] The lags in brick production and in the iron price may be similarly explained. The rise in the consumers' goods index in 1848 (VII–IX) can be traced to increased raw cotton imports which were depleted in the financial panic of the previous year. That movement also accounts for the rise in total imports in 1848, while the tremendous increase in grain imports in 1847 accounts for the upward movement at that time as well as the sharp fall in the trade balance.

The relatively minor role of increased foreign trade and capital exports during the boom of 1842–5, in addition to the tariff reforms of the early forties, probably explains the failure of import prices to rise during general prosperity. In the annual pattern a fall in the Bank's bullion reserve fails to anticipate the upper turning-point. The monthly figures, however,

[1] See Vol. I, Pt. I, pp. 291–3.

[2] In the monthly data a cycle has been marked off from Sept. 1846 to Sept. 1848. The annual data do not reveal a significant break in the contraction from 1845 to 1848; but the monthly banking series, bankruptcies, and prices reflect a brief interval of revival in the latter months of 1846 and the early months of 1847 (peak, Apr.).

[3] It is probable, as well, that the somewhat dubious estimates of iron output used by Hoffmann distort his index in these years, especially the figures for 1847 and 1848 which are, almost certainly, too high.

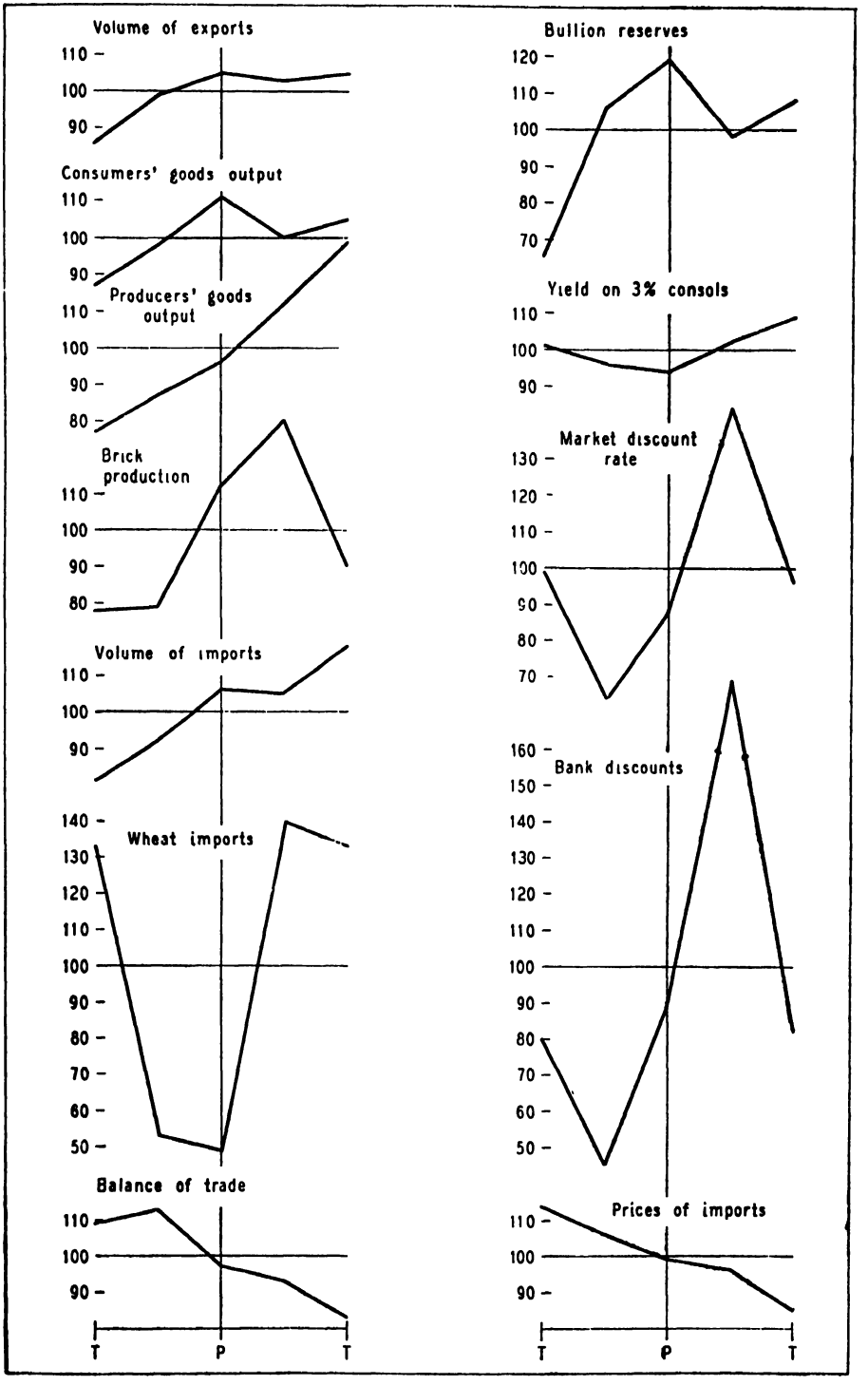


FIG. 128. Annual Reference-cycle Patterns of Selected Series, 1842–8

exhibit a net III–V contraction. The relatively easy money conditions which prevailed through the early stage of expansion were aided by a sharp decline in wheat imports, due to abundant domestic harvests. The Consol yield, as in several other cycles, lags behind the market interest

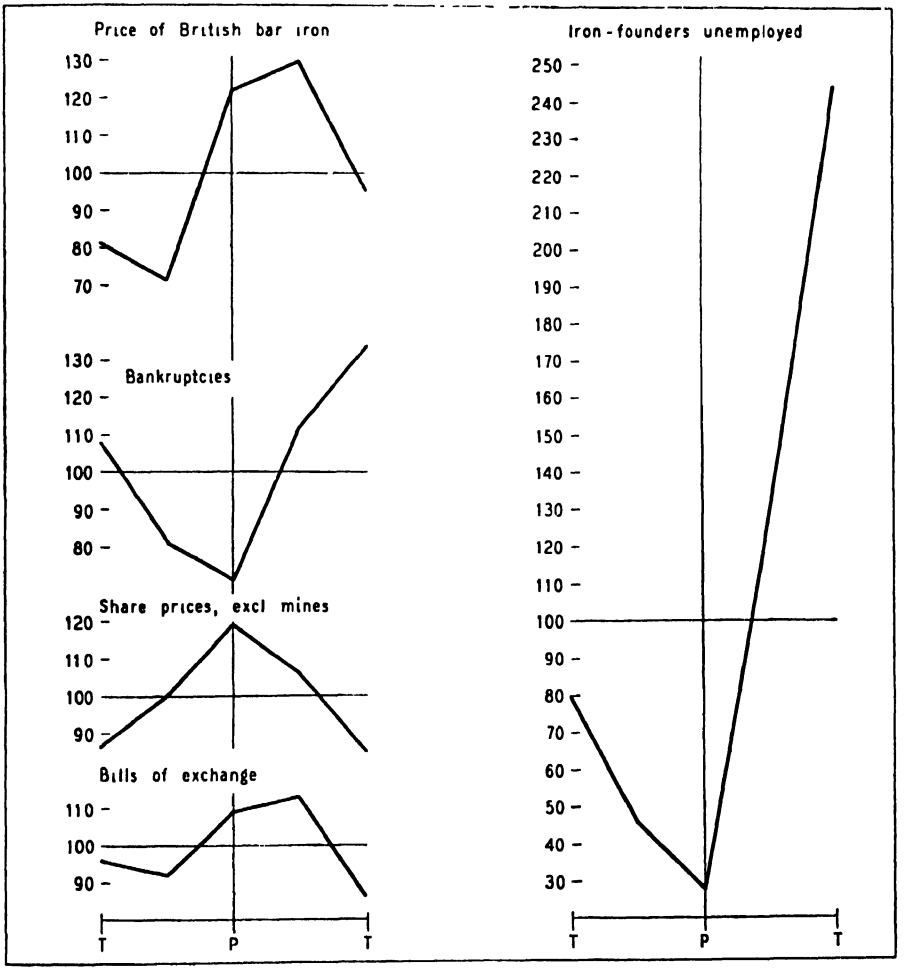


FIG. 128. Annual Reference-cycle Patterns of Selected Series, 1842–8

rate in its rise and exhibits the usual lesser amplitude of movement. The rise in the yield on Consols in 1848, at a time when the market-rate was already falling from its peak in the panic of 1847, is due to the political fears engendered by the continental revolutions of 1848 rather than to strictly economic factors. The rise in the volume of total exports in 1848 is so slight that it hardly constitutes a counter-cyclical movement. Its possible stimulatory effects were weakened by a fall in the prices of exports

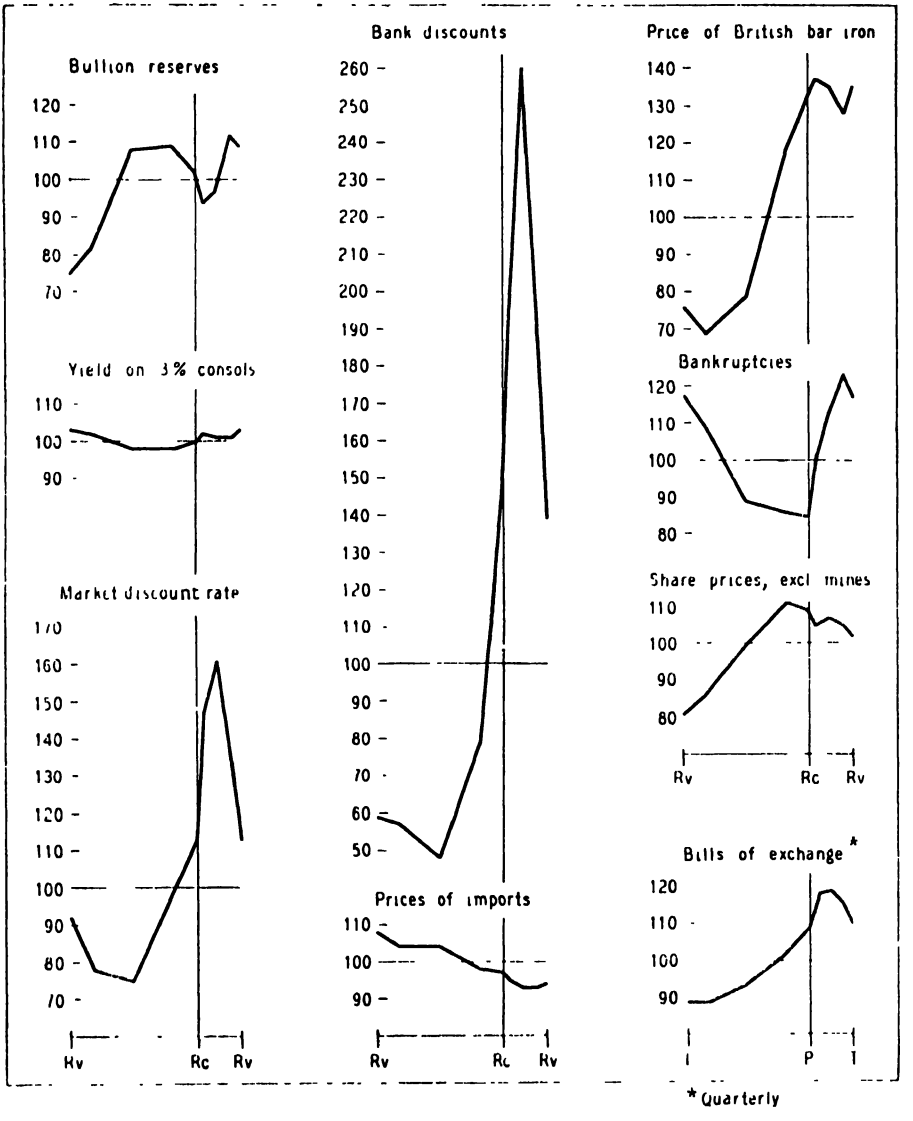


FIG. 129. Monthly Reference-cycle Patterns of Selected Series, 1842 6

sufficient to yield, in net, a sharp decline in the real value of exports; i.e. the gross money income derived from the export trade.

The significance of these exceptions for the validity of the theoretical framework is, in a sense, a matter of individual judgement. They have been considered by us to be, for the most part, essentially random in character, i.e. variations within the general framework which do not violate its basic structure. It has been heartening to find that so many of the exceptions

disappeared when monthly data were available, although such data cover only a limited area of the economy. It should be remembered also that only a limited number of variables have been tested, and they have been tested only with reference to the direction of their movement. Admittedly the differences in the intensity of movement among the various cases of major

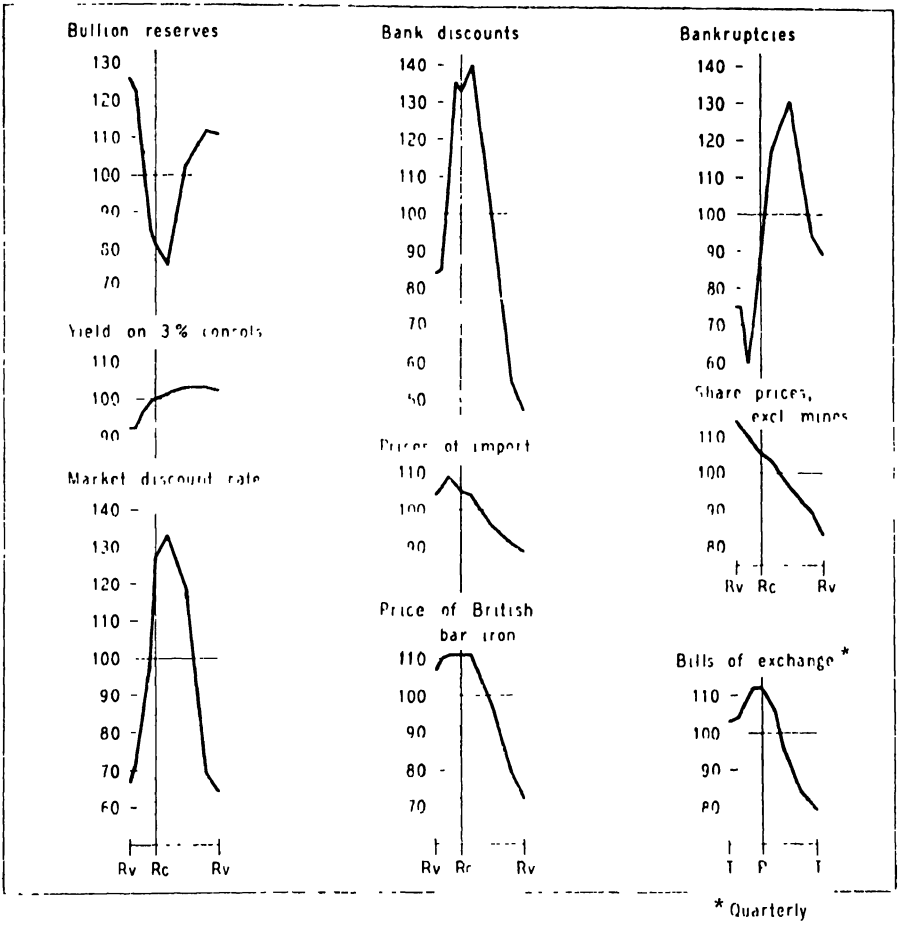


FIG. 130. Monthly Reference-cycle Patterns of Selected Series, 1846-8

and minor cycles are considerable. To some those differences may seem sufficiently impressive to cast doubt on the usefulness of the whole distinction between major and minor cycles. Further, it may be possible to explain the typical movements of the variables from a theoretical perspective unlike that employed here—one, for example, which places a greater emphasis on the role of the monetary system or on domestic and foreign harvests or on changes in the income of British consumers, or its rate of movement. Such alternative systems have been considered and rejected;

but we can pretend to no absolute validity for the analytic structure chosen. We have attempted merely to examine the evidence available and to present, on the broadest possible level of analysis, those hypotheses which seem to explain a maximum of that evidence.

APPENDIX

SIR WILLIAM BEVERIDGE ON 'THE TRADE CYCLE IN BRITAIN BEFORE 1850'

SOME years ago Sir William Beveridge ventured the view that before 1858, it is impossible 'to find a cyclical fluctuation of trade in the sense in which such fluctuation is found later, as an influence dominant alike over finance and trade in the narrow sense and over industry and the whole economic life of the nation'.[1] Examining the course of Shannon's figures for brick production, published in 1934, however, Sir William observed that cyclical fluctuations, distinctly modern in rhythm and amplitude, were evident in that series. He was thus led to compile an index of industrial activity employing, in addition to brick production, some twenty-eight other series, covering all or part of the years 1785–1849. His statistical and analytic results are presented in the issue of *Oxford Economic Papers* for February 1940.[2] Unfortunately this article did not become available to us before our analysis of business cycles and the three chapters of this volume devoted to them had been completed. This Appendix, nevertheless, will attempt to examine his sources and procedures, and to compare his analytic results with our own.

1. Sources of the Raw Data. The sources relied upon by Sir William in compiling his index are, with the exception of Wilson's unpublished Gladstone prize essay (1936), readily accessible and well known. The individual series are not, however, all equally reliable.

(1) The series on timber imports from 1785 to 1831, for example, represents imports from British colonies and from the Baltic, and not total imports into the United Kingdom, although these data are available in a parliamentary report. The data on timber imports after 1831 are also superior in the Parliamentary Papers to those in the sources used by Sir William.

(2) The use of net iron imports as a substitute for iron-production figures from 1790 to 1828 is extremely questionable. As Sir William himself states, the trend of net imports of bar-iron is markedly downward during this period when British iron production was developing rapidly. There can be little justification for regarding the movements of iron imports as representative of British iron production during these years even when trend is eliminated. The quantity of iron exports, which is available for the greater part of this period, would have served the purpose better; but it, too, is highly unrepresentative.

(3) The ship-production series from 1799 to 1811 used by Sir William was considered defective by us. This series was obtained from Porter, who entitles it the ship production of the British Empire. Actually the figures refer to the British Empire, exclusive of Ireland. More important, however, the fluctuations in the tonnage built in the Empire do not regularly coincide with the movements of the

[1] *Unemployment: A Problem of Industry* (1930 edition), p. 342.

[2] 'The Trade Cycle in Britain before 1850', pp. 74–108.

series for the United Kingdom. Beveridge does not indicate that the data do not cover total shipbuilding, but only that part of tonnage built which came under British registry. From 1814 on Porter's figures for shipping built in the United Kingdom show slight discrepancies from the correct figures as shown in the Annual Finance Accounts and are not strictly homogeneous throughout.

(4) The coal shipments series used by Sir William constituted only a small proportion of total seaborne coal (data for which are available after 1819), which in turn reflects very imperfectly the total domestic and industrial consumption. Indeed, the greater part of the industrial consumption of coal is not represented in the shipments series. At best it covers the use of coal as a consumers' good.

(5) The Cornwall copper-production series is not a completely reliable substitute for the copper production of the United Kingdom, especially after 1820, when figures for the United Kingdom are available.

(6) The two glass-consumption series are quantities produced charged with excise. Their fluctuations are, in large part, responses to alterations in the duties levied, not in business conditions. Further, since the duty was levied on hundredweights of the fluxed materials, and not on quantities of the finished product, glassware was made in lighter weights each time the tax rate was raised. The same quantity of fluxed material produced a greater quantity of glasses and bottles. Thus the trend of the weight of the glass did not rise significantly, although the trend of the amount of finished product was much steeper.

(7) The inclusion of the tonnage of ships in foreign trade which cleared the ports of the United Kingdom among the series representing 'Other Industries' seems unjustifiable; Sir William lists it as representing the shipping industry. He does not state whether the series includes all ships or merely British ships cleared. Assuming that only the latter are included, it is not clear why the tonnage of British ships entered the ports of the United Kingdom, as well as of those in the coasting trade, should not have been added to the tonnage cleared to obtain a series really representative of shipping. Before 1814 the figures do not refer to the United Kingdom, as the table listing sources indicates, but only to Great Britain, including the coasting trade with Ireland which is excluded thereafter.

If it was not Beveridge's intention to reflect the condition of the shipping industry, but rather of the export trade, however, the direct use of the series on the volume of exports would have been more satisfactory. The shipping series is, at best, a clumsy and insensitive measure of gross exports.

(8) Five of the six textile series included are based on imports of the raw materials. Beveridge observes that, on the whole, the series represent a relatively early stage of production. It has been shown, however, that the fluctuations in imports during the period are essentially inventory in nature, and not closely related to movements in production. The average duration of specific cycles in the Beveridge textile sub-index is 43·5 months, closer to the 40-month average duration of cycles characteristic of imports than to the 54-month average duration of specific cycles in production series. The movements of export series, however, reflect the cycles in production activity much more faithfully. The series on textile exports would, in our view, have yielded an index with movements more nearly approximating those of production.

(9) Railway construction, 1832–50, is represented by mileage *authorized*—despite the lag of several years between authorization and completion—and is assigned the unreal weight of one.

2. Construction of the Index. The total index of industrial activity is a weighted arithmetic mean of twenty-nine series, representing twenty separate industries. Six of the series account for 71 per cent. of the weights: cotton, wool, and leather contribute a total of 28 per cent., the distribution of which is varied at different periods; bricks and tiles are weighted 16 per cent.; coal, 12; and shipping cleared, 15. The weights were assigned according to guesses as to the number of persons employed in each industry. Aside from the criticisms given above as to the representative character of the series (with respect to actual production), the weights are open to some question. Beveridge, however, has calculated the index in unweighted form, and finds that the timing of turning-points differs little.[1]

The total index is dominated in its turning-points by the series with the largest amplitudes of movement, notably brick and ship production. If, in fact, each of the components justly represented the amplitude of movement of production (and employment), this criticism would not be justified. But this is not the case for shipping cleared, as an over-all measure of the export industries; coal shipments as a measure of coal output; the textile import series, as a measure of employment in the cotton and woollen industries. From these flaws most of our criticisms of Beveridge's conclusions proceed.

3. The Method. In his attempt to trace the relation between the movements of the index of industrial activity and other economic variables Beveridge employs correlation analysis. This method involved the elimination of trend, both in the basic index and in the series with which it has been compared. The necessity for eliminating trend in this type of analysis is clear: otherwise series with widely divergent short-term movements, but similar trends, may yield spuriously high positive correlation; while closely related series, with divergent trends, could not properly be associated with one another. The actual figures used in correlation analysis—deviations from trend—must, then, be a function, in part, of the statistician's judgement, depending heavily on the trend or trends he reads into the original series. They cannot be objective in the same sense as the raw data. Thus the trend-eliminated series that constitute Beveridge's working data exhibit specific cycle movements which, in a number of cases, are produced by alterations in the rate of movement rather than by absolute change. Commodity prices, for example, fall away chronically, from 1814 to 1850, while production exhibits, in almost all its branches, a powerful secular increase. The high correlation that Beveridge finds between prices and his index of industrial activity fails to make clear that the response of commodity prices to increasing prosperity (especially its early stages) was, in many instances, merely a slackened rate of fall rather than an absolute increase.

Correlation analysis, further, involves a comparison not only of the direction of movement of two series but also of their relative rates. One cannot separate out the extent to which the timing of two series may coincide, but their rates, at various stages of the business cycle, may differ; and such differences are of obvious significance in all theoretical analyses. Beveridge, for example, finds only a low positive correlation between the volume of exports and his index of industrial activity. In some part this stems from several divergences in timing. But, more important, it results from a sharp divergence between the typical

[1] There are eight cases of disagreement in turning-points between the weighted and the unweighted total indexes of industrial activity.

rates of movement of the two variables at different stages of the business cycle. And this significant relation is swallowed up in a 'low positive correlation'.

There are other familiar objections to this type of analysis:[1] straight-line correlation may obscure more complex relations; the establishing of leads and lags by trial and error may yield nonsense correlations; the method does not allow for different timing relationships at different points in the course of the business cycle. In fact, of course, Beveridge has not put forward his analysis as anything but an experimental opening of a new area. He urges the necessity for closer statistical and historical investigation.[2] While we regard the National Bureau procedure as superior on many counts, it is evident that correlation analysis permitted Beveridge to expose the probable existence of several relationships tending to indicate both the 'modern' characteristics of business cycles in this period and some of their unique features. And this was his central purpose.

4. Cyclical Behaviour. Beveridge's total index, when analysed with respect to our reference dates, exhibits moderately high conformity to reference expansions and very high conformity to reference contractions and to all business cycles. But for its failure to decline in 1803 the conformity indexes for contraction and for all business cycles would be perfect. The total index, however, differs from our reference dates at many turning-points:[3]

Reference dates		*Beveridge dates*	
Trough	*Peak*	*Trough*	*Peak*
1793		1795	
	1802		1803
1803		1804	
	1806		1805
1811		1812	
	1815		1813
1819		1821	
	1828		1827
	1839		1838, 1840
1842		1843	
	1845		1846

The most consistent relationship between this series and our reference dates

[1] For recent discussion of correlation analysis, see J. M. Keynes, 'The Statistical Testing of Business-Cycle Theories', *Economic Journal*, xlix, Sept. 1939, pp. 558 68; J. M. Keynes and J. Tinbergen, 'On a Method of Statistical Business-Cycle Research', loc. cit., Mar. 1940, pp. 141 57.

[2] Op. cit., pp. 80 and 102. It may be worth pointing out that, for purposes of historical investigation, the National Bureau procedure has one striking advantage over correlation analysis. In the course of its application the behaviour of a series is examined with respect to timing, amplitude, and rate of movement in each business cycle. The pattern of its behaviour is, in fact, drawn in each case. This means that the instances which conform to average behaviour and those which contribute exceptions or deviations can be immediately and precisely identified. The significance of the average is thus clear. These individual patterns, further, provide, when assembled, an important and wieldy body of exact evidence about any individual business cycle, not only making possible the theoretical analysis of the typical relations emerging from the averages, but also permitting the examination of the actual relation among the variables in any given case.

[3] For a more detailed analysis of the cyclical behaviour of the Beveridge total and sub-indexes of industrial activity, see below, pp. 681, 685, 710-15.

is the tendency of the former to lag at both peak and troughs, principally of major cycles. This stems essentially from the heavy weight given to brick production, shipping built, and to shipping cleared. The construction sub-index in general might be expected, according to the hypotheses advanced in the preceding chapters, to exhibit this characteristic; and its exceedingly large amplitude relative to the other two components is calculated to dominate the turning-points of the total index. The movement of brick production, for example, largely determines the late turning-points of 1795, 1812, 1821, and 1843. Similarly, the failure of contraction to emerge in 1803 and 1840 is evident in that series. Finally, the inaccuracy, according to our view, of the minor cycle turning-points in 1805–6, 1813–15, and 1839–40 may be traced, in part, to the behaviour of the construction index at those times. Thus we would regard the Beveridge index as being only a rough year-to-year measure of cyclical movement, containing a consistent bias with respect to reference dates.

It is significant of the bias of this index that Beveridge has fastened exclusively on the presence of the major cycles. These he has defined as well-marked fluctuations with 'crests at 1792, 1803, 1810, 1818, 1825, 1836, 1846, and depression at 1797, 1808, 1816, 1821, 1832, 1843'.[1] But for the fact that we have defined 1802 and 1845 as the proper peaks, these coincide exactly with our designation of major cycles. Since the existence of large-scale capital investment was the principal criterion for defining such cycles, it is only natural that they should emerge clearly from Beveridge's series, heavily biased as it is with construction data. It is interesting, too, that he has not attempted to define the minor cycles and that they do not appear unequivocally in his total index. The considerable expansion, for example, which we have traced from 1811 to 1815, based overwhelmingly on large increases in the export and the re-export trade, cannot be properly distinguished, nor can the cycles 1793–7, 1803–8. The textile sub-index, however, represents these cycles fairly clearly; although the presence of heavily weighted import series for cotton and wool make for 'inventory' cycles of shorter average length than reference cycles.

5. Beveridge's Correlation Analysis. Using his total index as a touchstone Beveridge has employed a straight-line correlation analysis with respect to financial data, exports, commodity prices, and marriages. He also has compared the behaviour of the sub-indexes. He finds, first, that the textile industry tended to lead all others at revival and, to a lesser extent, at peaks.[2] This conforms to our findings. It was concluded by us that recovery began, in most cases, throughout our period, with an increase in exports, centring, of course, in the cotton and woollen manufacturing areas; while, at peaks, the export (i.e. textile) markets were more immediately sensitive to the reversal of prosperity than the construction industries, where the relatively long period of gestation of certain types of investment made for a lag.

With respect to amplitude among the three sub-indexes, construction is greatest, 'other industries' least.[3] The heavily weighted shipping cleared series, as well as coal shipments and leather production, largely accounts for the small amplitude of the latter. But for the presence of shipping cleared the 'other industries' sub-index might be regarded as indicative of the output of manufactured consumers' goods for domestic markets. The leather series is of that type, and the coal series as well, since it does not include the bulk of the output used

[1] Op. cit., p. 78. [2] Ibid., p. 80. [3] Ibid., pp. 79–80.

in the manufacture of iron. The justification for including shipping cleared, in an index of this kind, is, however, not clear.[1] The relative movements of the textile and construction sub-indexes, of course, are in accordance with our analysis of individual series and with contemporary experience.

Comparing the total index of industrial activity with Silberling's index of commodity prices, Beveridge has found a poor correlation until 1815, and a rather high correlation thereafter.[2] When analysed by the method of the National Bureau, it will be recalled, the Silberling index exhibited only moderately high conformity to a I–V expansion pattern. A direct comparison between the statistical measures yielded by a correlation analysis and those which emerged from the procedures of the National Bureau is impossible. But it is worth pointing out that the bias of Beveridge's index, with respect to our reference dates, is one calculated to yield greater conformity to Silberling's price index; for, we have found, commodity prices, like the Beveridge index, tended to lag somewhat behind cyclical troughs, and to show their greatest rate of increase in the latter stages of expansion (III–V).[3]

Beveridge's analysis of Bank discounts, short-term interest rates, and bankruptcies does not differ strikingly from ours. He finds for discounts and interest rates a lag behind the index of industrial activity which appears, in the annual National Bureau analysis, as typically III–VII expansion.[4] His view of bankruptcies, too, as concentrated in the latter stages of expansion and the early stages of contraction, is also in accordance with our, differently derived, findings.

A correlation analysis of the price of Consols leads Beveridge to the conclusion that they partake, in this period, rather more of the quality of stock than bond prices. Contemporary analysis, regarding the Consol yield as a measure of the long-term interest rate, would look for a rise in the yield and a fall in the price of Consols to accompany general business expansion. And there can be no question that Consols represented, relatively, a more important area of new investment, even after the end of the wars (1815), than they did later in the nineteenth century. In the annual analysis a V–I expansion pattern best fitted the Consol yield; and this is roughly the result indicated by Beveridge's moderately high negative correlation between business activity and the Consol yield.[5] On closer examination, however, he has found an increase in positive correlation as a lag is introduced; while our monthly analysis of the Consol yield reveals an average IV–VII expansion pattern. This means, in effect (in both types of analysis), that the Consol yield behaved rather like the short-term interest rates, rising, however, somewhat later in the course of the expansion. Only in the intervals of the most extensive speculation did the price of Consols fall away. It continued to fall during the periods of financial crisis, a circumstance which, in the annual figures, causes the appearance of a rising yield during depression. Its rise, paralleling later experience, consistently preceded (when examined monthly) the upturn in general business activity, marking a return to easy money conditions.

[1] For the cyclical behaviour of this variable, and its limitations as a measure of gross foreign trade or the volume of exports, see below, pp. 799–800.

[2] Op. cit., pp. 85–6.

[3] Prices as a whole did not lag behind our reference peaks and the fact that the Beveridge index does exhibit some lag at peaks might be expected somewhat to counterbalance the better correlation at troughs.

[4] Op. cit., pp. 87–90. The lag of his turning-points behind our reference dates would, of course, tend to weaken this lag.

[5] Ibid., pp. 92–3.

The lagging tendency of the Beveridge index with respect to our reference dates, as in the other cases, somewhat weakens this rather modern pattern of behaviour.

Perhaps the most surprising of Beveridge's results is the poor correlation he finds between the volume of exports and his total index of industrial activity.[1] From 1785 to 1814 the correlation is 0·46; from 1815 to 1849 the figure falls as low as 0·28. This low conformity is in contrast to later experience. Two facts determine the low conformity, as opposed to the high conformity to reference dates that emerged from our analysis: the tendency of Beveridge's index to lag behind our reference dates; and the characteristically greater rate of increase in the volume of exports during the early (I–III), rather than the late (III–V) stages of expansion. When analysed by the National Bureau method the Beveridge index showed, on the average, like construction series, a greater III–V than I–III expansion rate. Since correlation analysis involves a comparison not only of the direction but also of the rate of movement, the conformity of the volume of exports to the Beveridge series would be impaired. Beveridge points out that, as the century wore on, capital goods became increasingly important in the constitution of British exports as compared to textiles, which dominate the exports of 1790–1850. And it is probable that later in the century, when Britain was sending abroad an enormous volume of railway iron, the average pattern for exports diverges less, in its rate of movement, from the pattern of construction series. In general, it is our view that the Beveridge indexes do not take into account fully enough the significance of textile exports to the British economy during the period over which they have been constructed. The poor correlation he finds is best to be regarded as between new construction and the volume of exports, rather than between general business fluctuations and the volume of exports.

Finally, Beveridge has analysed the relation of the number of marriages in Great Britain, his index of industrial activity and wheat prices for the period 1785–1849, and for two sub-periods, 1785–1814, 1815–49. He obtained simple coefficients of correlation between each of the three elements compared, and coefficients of partial correlation between each pair of elements, assuming that the third element was held steady. For the period as a whole partial correlation analysis yielded a high negative correlation between wheat prices and marriages, with industrial activity held steady; a fairly high positive correlation between industrial activity and marriages, with wheat prices held steady; and an equally high positive correlation between industrial activity and wheat prices, with marriages held steady.

Thus Beveridge's conclusions are not materially different from those reached by us in interpreting the cyclical behaviour of the marriage rate on the basis of our statistical technique.[2]

[1] Ibid., pp. 90 1. Beveridge believed that his data until 1814 were the volume (i.e. official value) of exports; after that date, the declared value. In fact, his source gave official values throughout the period although it erroneously classed the data after 1814 as real values.

[2] See below, p. 969.

Chapter IV

SECULAR TRENDS, 1790–1850

1. The Problem. The period 1790–1850 in Great Britain holds a peculiar place in economic history; for, if 'the industrial revolution' can be considered to have taken place at all, it occurred during those years.[1] At the time of the Crystal Palace Exposition, in 1851, the changes in industrial technique, social structure, and political conception implicit in the inventions of the late eighteenth century had taken fairly definite shape. Technical progress, of course, went on, as did the wider trends which characterize the first half of the nineteenth century. But it was symbolic that, from 1850 to 1873, a principal avenue of new British enterprise was the building and financing of railways abroad. The repeal of the Corn Laws and the British railway boom of the forties dramatize equally the completion of a long process; that is, as well as any historical process may be said to be completed.

There are, however, more precise grounds on which some sort of historical division can be made at or about the year 1850. Indexes of non-agricultural prices reveal, uniformly, a secular decline from about 1815 to the middle of the century. They then show a sharp rise in the early fifties, sustained irregularly until 1873. The indexes may differ in the point at which the fall begins, in the degree of the net decline, and in the number and amplitude of the breaks in the decline; but the secular rise and fall in commodity prices is an established and long-recognized historical fact.

From the perspective of monetary theory it is a central fact. For monetary theory, at least in its orthodox nineteenth-century formulation, was focused primarily, if not exclusively, on the forces affecting the general price level, somehow defined. It was that sort of approach, also, which sanctioned the division of the period 1790–1850 at about the year 1815. From 1790 to about 1815 (1814, in most cases) the price level shows a secular increase in indexes of this type. Such division is fortified statistically by the movement of the interest rate, as measured by the yield on Consols. Although its peak comes in 1798, fairly early in the period, it does not reveal a marked secular decline until after 1815.

The interval 1790–1815 coincides roughly with the era of the Napoleonic Wars. Even without the prima facie evidence of prices and the interest rate, the fact of prolonged warfare would justify separating out those years. Specifically, war brought varying limitations in both import and export markets; a diversion of capital to military purposes, agriculture, shipping,

[1] The date of departure might, of course, be extended back to the close of the American Wars (1783), or even earlier. When the concept is employed at all, however, the terminal date is rarely placed beyond 1850. In a larger sense, however, it is evident that the process of innovation and institutional adjustment to an increasingly industrial society has gone on continuously, if not at a constant rate, down to the present.

docks, and to other ends made profitable and necessary by the war-time environment; a heavily unbalanced budget, loans and subsidies abroad; a withdrawal of labour for military service; an abandonment of the gold standard (from 1797) and many other economic changes. Although the degree of abnormality has often been over-estimated, it might, in view of these conditions alone, be proper to segregate the war years for the purposes of secular analysis.

The problem to be dealt with here is, however, broader than the explanation of long-term price movements. As in the *History*, the view taken will be of the whole economic system. Prices are regarded not necessarily as of lesser importance or of lesser interest, but as a function of more profound movements, affecting supply and demand conditions in individual markets. The purpose here will be to measure the secular movement of the major series relating to output, prices, interest rates, the money supply, and real wages; to present and to evaluate the principal explanations previously given for these movements and the relations among them; and finally to offer what appear to be the most reasonable hypotheses in the light of the statistical measures, the short-period history, and current economic theory.

2. The Facts. The annual average percentage rate of increase has been used as a measure of secular trend.[1] To eliminate as nearly as possible peculiarities unique to specific years, these rates have been calculated between the average figures for 1791–5, 1813–17, 1845–9. Where the data are available for the entire period figures are given comparing the trend between the first and the second, the second and the third, and the first and the third averages. Where the statistics are not continuous the rates of increase have been calculated for periods most nearly comparable.

The following are some of the more obvious movements revealed:

1. *Population.* Rose at an increasing rate to 1811–21; rose at a decreasing rate thereafter.[2] It rose slightly more rapidly in the first than in the second period.

2. *Production.* Rose more rapidly in the second than in the first period. Producers' goods output increased more rapidly than consumers' goods, and relatively more rapidly in the second than in the first period. The textile production index in the second period, however, increases more rapidly than producers' goods output, although it increases less rapidly than during the first period. A net rise in brick production occurs only in the second period.

3. *Prices.* Rose in the first and fell in the second period with the exception of cotton prices, which, in net, fell in both periods, but more rapidly in

[1] For each series an annual average figure was first calculated for the three periods 1791-5, 1813–17, and 1845-9. Average rates of change were then calculated, using the compound interest formula: $F = I(1+x)^n$, where F is the average for the terminal date, I the average for the initial date, x the rate of change, and n the number of years between the centre years of each five-year average.

[2] The annual average percentage rates of growth by decades, based on census returns, are as follows: 1801–11, 1·3; 1811–21, 1·7; 1821–31, 1·5; 1831–41, 1·4; 1841–51, 1·2.

TABLE 77. *Average Annual Percentage Rate of Change*

	1793–1815	*1815–1847*	*1793–1847*
Population			
Population of England and Wales	1·5 (1801–15)	1·4	1·4 (1801–47)
Production			
Hoffmann's index of consumers' goods production	1·9	3 2	2 7
Hoffmann's index of producers' goods production	2·3	4·3	3·5
Hoffmann's index of total production	2·0	3·5	2·9
Kondratieff's index of textile production	2·7 (1803–15)	5·2	4·5 (1803–47)
Production of bricks	0·0	2 8	1·6
Woollen broad cloth milled in the West Riding	2·4	—	—
Woollen narrow cloth milled in the West Riding	−0·4	—	—
Production of iron	4·4 (1796 1818)	6 5 (1818–47)	5·6 (1796–1847)
Production of coal	1·6 (1793–1816)	3·4 (1816 46)	2·6 (1793–1846)
Prices			
Index of prices of imported commodities	1·7	−2 8	−1·0
Index of prices of domestic commodities	1·8	1·1	0·1
Gazette price of wheat	2·2	−1·4	0·1
Price of British pig-iron	0 8	−1·5	−0·5
Price of Sunderland coal	1·6	−1 9	−0·6
Price of cotton piece goods' exports	—	−4 5	—
Price of raw cotton, including duty	−0·5	4·7	−3·0
Foreign Trade			
Volume of domestic exports	3·8	3·8	3·8
Volume of total imports	2·6	3·6	3·2
Volume of total exports	4·1	2 8	3·4
Value of domestic exports	1·4 (1807 15)	0·8	0·9 (1807–47)
Volume of exports of cotton manufactures	10 6	5·1	7·3
Consumption of raw cotton	5·5	6 3	6·0
Volume of exports of woollen manufactures	1 6	2·4	2·1
Volume of exports of iron, hardware, and cutlery	1·6	5·6	3·9
Quantity of wheat imports	4·1	5·6	5·0
Volume of re-exports	—	0·3	—
Finance			
Bills and notes discounted at the Bank of England	8·1 (1795–1815)	−2·6	1·4 (1795–1847)
Total bills of exchange created	—	0 3 (1818–47)	—
Market-rate of interest	—	1·3 (1832–47)	—
Yield on 3 per cent. Consols	0·8	−1·1	−0·4
Total public and private advances by the Bank of England	5 7 (1795–1815)	−3·9 (1815–46)	−0·2 (1795–1846)
Bank of England notes in circulation	3·9	−0·8	1·1
Bullion in the Bank of England	0·3 (1796–1815)	3·2	2·1 (1796–1847)
Index of prices of shares (excluding mines)	—	0·6	—
Index of prices of shares (including mines)	—	1·5	—

TABLE 77. *Average Annual Percentage Rate of Change (cont.)*

	1793–1815	*1815–1847*	*1793–1847*
Labour			
Tucker's index of money wages of London artisans	1·8	−0·4	0·5
Tucker's index of real wages of London artisans	−0·5	0·7	0·2
Tucker's index of the cost of living of London artisans	2·3	−1·0	0·3
Bowley's index of agricultural money wages	2·4	−1·0	0·4
Kondratieff's index of money wages in the textile industry	--	--0·5	—
Tea consumption in the United Kingdom	1·3	2·1	1·8
Wine consumption in the United Kingdom	- 2 0	0·9	−0·3
Tobacco consumption in the United Kingdom	—	1·4 (1817–47)	—
Tobacco consumption in Great Britain	1·3	—	—

the second. The price of wheat and the domestic price index show a slight net rise over the whole period, and, in general, fall less in the second period than do other prices. The greatest decline took place in the prices of raw cotton and cotton goods.

4. *Foreign Trade.* Exports of domestic goods increased uniformly. Exports including re-exports rose more rapidly in the first than in the second period. Imports increased more rapidly in the second than in the first period. The rate of growth of cotton goods' exports declines in the second period, that of iron and woollens' rises in the second period.

5. *Finance.* Bullion in the Bank of England rose much more rapidly in the second than in the first period. The Bank of England note circulation, however, rose in the first and declined in the second period, as did bills and notes discounted at the Bank and total advances. The yield on Consols rose in the first, declined slightly in the second period. The market-rate of interest (on best three months' bills) rose from 1832 to 1847, but this figure does not represent the secular trend, which was slightly downward. The securities' indexes rose in the second period, owing largely to the upward bias imparted by railway share prices.

6. *Labour.* Money wages rose in the first, and fell slightly in the second period. Retail prices rose more rapidly than money wages in the first and fell more rapidly in the second period, yielding, in net, a fall in real wages in the first, a slight rise in the second period. This is corroborated by the relatively greater rise in tea and tobacco consumption in the second than in the first period.

These figures and generalizations are to be used with the utmost caution. The rates of growth represented were by no means uniform within each period. They represent an average rate of change between two points; but the greater part of the movement can, in some cases, be associated with changes occurring over a very limited number of years. Even when clear and consistent secular trends can be distinguished, the average, centring

on 1815, may not represent the actual turning-point in the trends. In a few cases, further, the intervals chosen for comparison catch individual series in an abnormal position. These measures, then, even for purposes of secular analysis, cannot be considered as a substitute for the careful short-run examination of the individual series of Part II of this volume.

3. The Explanations: The Money Supply and Changing Costs. The movements which attracted the most extensive attention, both in their own day and in retrospect, were the secular rise and fall in general prices. Analyses of these movements have been, broadly, of two types: those which looked to the monetary mechanism as the controlling influence, and those which focused on changing cost factors in individual markets.[1] The dichotomy parallels the two theoretical approaches to the analysis of prices that have existed side by side since the eighteenth century. The first involves the use of some form of quantity theory equation; the second concerns itself with supply and demand conditions in individual markets.

The relation between them, as they apply to the problem of general price movements, may be briefly stated as follows. The monetary approach holds that an increased or decreased supply of money, in so far as it affects the money demand for commodities in general, is the crucial element in the determination of the level and the trend of prices as a whole. When applied to an advanced economic system, operating under a metallic standard, in which the major fluctuations in the effective amount of money take place through various credit agencies, the analysis centres on the relative elasticity of the supply of money from the banking system; and it comes to rest on the amount of bullion reserve and the reserve proportion maintained at the central bank.

A rising price trend is explained by an influx of bullion to the central bank's reserve or a relaxation of the reserve limitations such as takes place when the bullion standard has been altered or abandoned. Either process, it is maintained, may lead to a more rapid increase in $MV+M'V'$ than in T. Similarly, failure of the central bank's reserve to increase at a sufficient rate may, in conjunction with a more rapidly increasing T, yield a falling price level. This approach usually assumes a constant relationship between the amount of the central bank's reserve and the total credit money supply, although it can be modified to take changes in that relationship into account.

From the point of view of price analysis it places an overwhelming emphasis on changes in the monetary demand for commodities in individual markets. It implies that, when the bullion supply is increasing 'abnormally',[2] or when an abandonment of the standard removes the check of

[1] There has been at least one attempt to interpret price movements during this period in terms of a more general theory of fluctuations, that of J. A. Schumpeter, *Business Cycles*. His views will be examined below.

[2] 'Normally' may be defined as the rate which would maintain a constant price level, so that, in a sense, the whole argument is tautological. Any movement in prices may be ascribed to the 'abnormal' behaviour of money.

a rigid reserve proportion, periods of prosperity (i.e. an increasing money demand) are permitted to continue longer, and that, since easy money conditions are quickly attained, depressions are shorter. When the bullion reserve is declining or increasing 'subnormally', prosperities are aborted, depressions extended. This view of the banking mechanism is implicit in the bullion-prices hypothesis, when applied to an advanced economy. Changes in costs enter the picture only through their influence on T.

The most familiar explanation of the rising price trend from 1790 to 1814 runs in terms of a war-time inflation of demand, countenanced by a banking system freed from a metallic standard in 1797. For the secular decline in the second period, the return to a gold standard at the pre-war parity, coupled with a lesser increase (from 1821 to 1848) in the bullion supply than in T, is held responsible. Analyses of this kind have varied considerably in the detail and in the subtlety of their statement. Some writers have been aware of the mechanism assumed, others have been satisfied with the broadest kind of correlation.

The following are typical examples of this type of explanation:

For the period 1790–1814:

It cannot be denied that the extraordinary issue of Bank of England notes and private bank notes in England, during the suspension of specie payments drove out a large mass of metallic currency . . . and to this cause we must assign some part of the elevation of prices.[1]

[The Bank Directors] failed sufficiently to limit the quantities [of notes] which were put in circulation, with the result that the country began to suffer from the evils of a depreciated currency. . . prices were inflated, and the exchanges with foreign countries tended to be unfavourable.[2]

The chief sources of inflation were . . . the constant pressure of the government on the Bank to assist in its war-time financing, and the operations of the horde of largely unregulated country banks.[3]

For the period 1815–1850:

The long-continued decline in the English price level after resumption is probably to be accounted for by a failure, for the world as a whole, of the production of gold to keep pace with the growth of commerce and industry.[4]

The thirty years succeeding 1821 saw a rapid increase in the nation's productive capacity which far outran the available means of exchange, [with a] consequent fall in prices.[5]

[1] W. S. Jevons, *Investigations in Currency and Finance* (1909), p. 123. Jevons seems at times to consider the value of gold as a price distinct from the reciprocal of the price level; at others they appear to be synonymous. He is, too, extremely cautious in his explanation of the price movements he was measuring. He admits the various cost factors emphasized by Tooke, but does not attempt to bring together the two modes of analysis.

[2] W. Cunningham, *The Growth of English Industry and Commerce*, III. 699.

[3] J. W. Angell, *The Theory of International Prices*, p. 42.

[4] J. Viner, *Studies in the Theory of International Trade*, p. 185.

[5] W. T. Layton and G. Crowther, *The Study of Prices*, p. 66.

With the return of an effective system of gold monometallism during the 'twenties, the United Kingdom had finally hitched its economic chariot to the *metallum solis*. It is not possible to establish easy and exact connections between gold supplies and prices in gold-using countries, especially when those countries are changing tariffs which vitally affect their price levels and modifying their banking practice, as the United Kingdom was between 1830 and 1849; but there is little doubt that the general falling trend of gold prices, between the decade 1820–30 and the gold discoveries of 1848–51, was evidence of a relative shortage in the world's supplies of gold, in relation to the world-demand for it in currency and in the arts.[1]

Thomas Tooke's *History of Prices* is, of course, the classic response to this line of argument in both the first and the second secular periods.[2] His approach differed in at least two major respects. He made no distinction in vocabulary between the analysis of the long- and short-term movements; and he insisted on examining the movement of individual prices as they were affected by supply and demand conditions unique to their markets. But he did not shrink from generalizing his analysis:[3]

> The relatively high prices of articles divested of taxation, and not the objects of immediate war expenditure, in the interval from 1793 to 1814, may be ascribed to the following general circumstances:
>
> 1. The frequent recurrence of seasons of an unfavourable character, there having in that interval been no fewer than eleven[4] seasons in which the general produce of corn, but more especially of wheat, was deficient. Of those seasons, some were of a desolating character, extending over the greater part of Europe; and, during the earlier part of the war, there were scarcities of corn also in the United States of America.
>
> 2. The destruction of a great source of supply of transatlantic produce by the revolution in St. Domingo, which rendered sugar and coffee, and most other West India produce, scarce and dear during the earlier part of the war.
>
> 3. Obstructions and prohibitions of export from the Continent of Europe, more especially during the latter years of the war, of articles of which, whether as raw materials of our manufactures, or naval stores, or food, we stood in urgent need.
>
> 4. The increased cost of importation, by higher freights and insurance incidental to a state of war generally, and aggravated in an extraordinary degree by the peculiar character of commercial hostility and exclusion which marked in so striking a manner the latter years of the war.
>
> 5. The difference of exchange, which in the last five years of the war averaged 20 per cent., thus adding so much to the cost of all imported productions, and which, as it diminished the cost of all our exportable produce by so much to the foreign consumer, renders the depression of price of the latter description of productions, between 1808 and 1812, in so far the more remarkable.

[1] J. H. Clapham, *An Economic History of Modern Britain*, i. 507. See also G. Cassel, *The Theory of Social Economy*, p. 475.

[2] For a clear statement of Tooke's attitude towards the monetary explanation, see *History of Prices*, i. 1–6.

[3] Ibid., ii. 346–9.

[4] '1794 and 1795; 1799 and 1800; 1804; 1807 to 1812, inclusive.'

6. A higher rate of interest, in consequence of the absorption of the war loans of a considerable proportion of the savings of individuals; such higher rate of interest constituting an increased cost of production.

The causes of the decline, and of the lower range of prices, which dates from 1814, and has continued (after an intermediate rise in consequence of the great scarcity of 1816–17, which extended over Europe) to the present time, may be classed under the following heads:

1. A succession of more favourable seasons, there having been in the last twenty years, namely, from 1818 to the present time, only five seasons in which the produce of wheat was decidedly deficient;[1] and in none of them was the inclemency of the season, or the scarcity resulting therefrom, at all comparable to some of those which occurred during the war; nor was there any one of them that extended over Europe. This prevalence of favourable seasons, and the total exemption from such desolating seasons as 1816, and some previous ones, have developed the effects of an extended and improved cultivation in this country, and in many other parts of the commercial world.

2. The removal of obstacles from the several sources of foreign supply; a great extension of some of them; and the discovery of new ones.

3. A great reduction of the charges of importation, by the low freights and insurances incidental to a state of peace; and the improved, and cheaper, and more rapid internal communications.

4. A rise of the foreign exchanges, in consequence of the cessation of the great foreign war expenditure, and the consequent reduction of the cost of all imported commodities.

5. Improvements in machinery, in chemistry, and in the arts and sciences generally, all tending to reduce the cost of production of numerous articles, or to provide cheaper substitutes.

6. A reduction of the general rate of interest, and a more extensive application of individual accumulations to reproduction at a diminished cost.

The monetary argument, then, holds an inflated demand for commodities responsible for the rise in prices to 1814, a demand inhibited by an inadequate money supply for the fall thereafter. Tooke, in both periods, holds changing cost situations primarily responsible (excepting the influence of taxation and the limited group of prices affected immediately by the demand for military supplies). The monetary approach finds difficulty in incorporating changing cost conditions into the analysis because they do not appear directly among the terms of the quantity theory equation. It is clear, however, that a reduction in real costs was of the essence of 'the growth of commerce and industry', 'the rapid increase in the nation's productive capacity'—in short, the increase in T. Implicit in the monetary analysis of the price decline in the second period is the judgement that the price level *should* have remained stable, and that the downward trend is to be explained by reference to an 'inadequate' money supply.

In the effort to include the patent fact of lowered real costs, some writers

[1] '1823 and 1828 to 1831 inclusive.'

have attempted the use of an eclectic, but unco-ordinated vocabulary that refers on the one hand to increases in T, on the other to lower costs. Marshall, in replying to questions addressed to him by the Commission on the Depression of Trade (1886), seemed to detect some elements of such double-counting in Tooke's mode of wording:[1] 'He has not made it clear that diminution of the cost of production of commodities must not be counted as an additional cause of a fall in prices, when its effects in increasing the supply of commodities relatively to gold have already been allowed for separately. This is a point of some difficulty, and its interest is theoretical rather than practical.' This difficulty in theory, with the dual vocabulary it represents, explains largely the failure of controversialists to find common ground, both in the period 1815–48 and 1873–96.[2]

4. The Explanations: Long Waves. Analyses which focus on price movements alone leave unexamined, or at best inadequately examined, other changes taking place in the economic system. The story of technological progress was left to the historians of the 'industrial revolution', the analysis of short-term movements was left to Tougan-Baranowsky and the other continental historians of crises, and, in latter days, to a wider group of statisticians. The most important attempt to account for secular movements of the economy as a whole is to be found in the concept of long waves.

The clearest statement of the case for the existence of long waves is that of Kondratieff.[3] Examining a variety of series for Great Britain, France, Germany, and the United States, he concludes that there were, between 1780 and 1920, two and a half waves:[4]

First long wave: '1. The rise lasted from the end of the 1780's or beginning of the 1790's until 1810–17. 2. The decline lasted from 1810–17 until 1844–51.'

Second long wave: '1. The rise lasted from 1844–51 until 1870–75. 2. The decline lasted from 1870–75 until 1890–96.'

Third long wave: '1. The rise lasted from 1890–96 until 1914–20. 2. The decline probably begins in the years 1914–20.'

The empirical evidence is summarized by him as follows:[5]

(1) The long waves belong really to the same complex dynamic process in which the intermediate cycles of the capitalistic economy with their principal phases of upswing and depression run their course. These intermediate cycles, however, secure a certain stamp from the very existence of the long waves. Our investigation demonstrates that during the rise of the long waves, years of prosperity are more numerous, whereas years of depression predominate during the downswing.

[1] *Official Papers by Alfred Marshall* (1926), p. 5. Tooke, in fact, was one of the lesser offenders in this respect.

[2] For the discussion of a parallel theoretical difficulty in the analysis of the price decline from 1873 to 1896 see W. W. Rostow, 'Explanations of the Great Depression', *Economic History*, Feb. 1940.

[3] N. D. Kondratieff, 'The Long Waves in Economic Life', *Review of Economic Statistics*, 1935, pp. 105–15 [translated and digested by W. F. Stolper, from 'Die langen Wellen der Konjunktur', *Archiv fur Sozialwissenschaft und Sozialpolitik* (1926)].

[4] Ibid., p. 111.

[5] Idem.

(2) During the recession of the long waves, agriculture, as a rule, suffers an especially pronounced and long depression. This was what happened again from the beginning of the 1870's onward; and the same can be observed in the years after the World War.
(3) During the recession of the long waves, an especially large number of important discoveries and inventions in the technique of production and communication are made, which, however, are usually applied on a large scale only at the beginning of the next long upswing.
(4) At the beginning of a long upswing, gold production increases as a rule, and the world market [for goods] is generally enlarged by the assimilation of new and especially of colonial countries.
(5) It is during the period of the rise of the long waves, i.e. during the period of high tension in the expansion of economic forces, that, as a rule, the most disastrous and extensive wars and revolutions occur.

It is to be emphasized that we attribute to these recurring relationships an empirical character only, and that we do not by any means hold that they contain the explanation of the long waves.

Schumpeter, accepting the existence of the phenomenon, attempted, in his *Business Cycles*, to explain the long cycle, which he christened 'the Kondratieff'. His purpose was to supply an interrelated account of long movements in the principal economic variables: prices, output, employment, money wages and real wages, interest rates, and security prices. He devoted considerable attention to the period 1790–1850, roughly 'the industrial revolution Kondratieff'; and his conclusions are worth examining in detail.

The theory of the long wave, as developed by Schumpeter, has, at its core, the process of innovation, i.e. the actual introduction (not invention) of new industrial techniques.[1] The term may be broadened, however, to include the opening up of new areas. Schumpeter associates the first long wave with the inventions involved in the Industrial Revolution; the second with the spread of the railways ('steam and steel'); the third with the development of electrical power, chemistry, and associated technical changes. The 'prosperity', or upward phase, of the long wave is the period when the innovations are being introduced, the 'depression' of downward phase occurs when the innovations are being consolidated and refined—when the economic system as a whole is adjusting itself to the new set of situations created by them.

The type of major innovations that characterizes the long cycle, however, is not brought into being within a short period of time; and, moreover, it is introduced in irregular forward movements. This discontinuous progress, he holds, lies at the basis of cycles with a periodicity averaging about nine years. These, in the vocabulary of Schumpeter, are called Juglars. On the basis of extensive empirical evidence, a third type of cycle, running about forty months from trough to trough, is introduced—

[1] Schumpeter, i, especially chap. iv.

the Kitchin.[1] These three kinds of undulation, combined with a variety of possible random movements, define the contours of economic change in Schumpeter's system.[2]

A full restatement and analysis of this system would be out of place here. Its implications, however, can be fairly well discerned in Schumpeter's interpretation of the period 1790–1850. Before examining that interpretation it may be worth summarizing the principal interrelations which are assumed to exist within the long cycle: the mechanics, as it were, that Schumpeter has given to Kondratieff's empirical model:

1. *Prosperity and Depression.* The upward phase of the Kondratieff is characterized by a predominance of years of 'prosperity', the downward phase by predominating 'depression', measured, presumably, in terms of employment. In the upward phase of the Kondratieff the Juglar prosperities are sustained by the process of innovation; in the downward phase, the lack of new investment opportunities prolongs the Juglar depressions.

2. *Prices.* These rise in the upward phase of the long wave, fall in its downward phase. When the innovation is being introduced—during the period of gestation—credit is expanded and the demand for goods is increasing, but the innovation's cost-reducing effects are not operative. In the downward phase the cost-reducing effects of the innovation are supplemented by a waning entrepreneurial impulse to expansion. Price movements, then, are linked to the innovation process.[3]

3. *The Interest Rate.* Short- and long-term rates, industrial profit margins, and stock prices reveal, like commodity prices, the long cycle. These phenomena, too, are linked with the innovation process, which, in its upward phase, is highly speculative, attracting, at first, only the most enterprising of pioneers. Their reward is a high profit return. Later, when the new field becomes more highly competitive, the return falls. During the downward phase of the long wave profitable outlets for new investment are relatively scarce, and the fall in 'the interest rate' is reinforced by the waning strength of the Juglar prosperities.

4. *Production.* The rate or increase of total production would appear to be fairly steady. There is, however, some tendency for a more rapid increase of producers' than consumers' goods output in the upward phase of the

[1] This type of cycle is conventionally associated with inventory fluctuations. It can be traced most strikingly, in this period, in the volume of imports, and, more especially, imports of raw cotton (see below, p. 788).

[2] See diagram, Schumpeter, i. 213. Purely on the basis of empirical evidence, Schumpeter concludes that each Kondratieff contains six Juglars; each Juglar, three Kitchins (pp. 173–4).

[3] Temperamentally, Schumpeter is opposed to the gold-prices hypothesis (i. 233 n.) and does not give it a central place in his analysis of secular price trends. He insists, moreover (ii. 472–3) that even if $MV+M'V'$ are affected by the gold supply, T is determined essentially by the working of the three-cycle system; and thus 'that whatever the behavior of gold, unless it should happen to be exactly compensatory, the finger prints of the Kondratieff must show on price-level graphs, although more or less blurred by gold production'. Schumpeter thus does not relate gold discoveries to the long-wave scheme, leaving them a potential, but secondary *deus ex machina*. For a typical hedge on the gold issue see ii. 570–1.

Kondratieff, a reverse situation in the downward phase—'the time of harvesting the fruits of innovation'.

5. *Employment and Real Wages.* Unemployment tends to be greater in the downward than in the upward phase of the long cycle, because the prosperity phase of the Juglars is shorter (relatively to the depression phase) than in the upward phase of the Kondratieff. Real wages, however, tend to rise—like the production of consumers' goods and for the same reasons—more rapidly in the downward phase of the Kondratieff, despite greater average unemployment.

Schumpeter presents, then, a pattern of relationships among economic variables stemming from a single, central process. For the years 1790–1850 that process can be defined as the introduction and absorption of new industrial techniques, especially in the manufacture of textiles and iron. Following Spiethoff, rather than Kondratieff, Schumpeter ends the first long wave in 1842, as opposed to 1848–9, the low-point for most price indexes.[1] It is, however, for our purposes, more convenient to include the last Juglar (troughs in 1842 and 1848, peak in 1845) within the period under examination. Schumpeter and others who have used the concept of the long wave have not marked off the dates rigorously:[2] 'they are not only tentative but also by nature merely approximate. A considerable zone of doubt surrounds most of them.'

The procedure here will be first to examine the behaviour of the principal series in the light of Schumpeter's hypotheses, and then to corroborate, modify, or supplant the explanations he offers. At the same time, the validity of the gold-prices thesis will be examined, as well as that advanced by Tooke.[3]

5. Prosperity and Depression Phases. Perhaps the most widely accepted hypothesis concerning the long wave—aside from the price movements which principally inspired its definition—is that, in some sense, the upward phase is chronically 'prosperous', the downward phase chronically 'depressed'.[4] The proposition was put forward by Spiethoff;[5] and it has been given the tentative sanction of the National Bureau of Economic Research.[6]

[1] Schumpeter, I. 164 and 170.

[2] Ibid. I. 170.

[3] Tooke's emphasis on changing cost conditions can be associated, clearly, with Schumpeter's broader thesis: the former's 'improvements in machinery, in chemistry, etc.' is not far in its emphasis and in the causal line it traces from the latter's 'absorption of innovations'.

[4] For a typical example of the manner in which the generalization about a falling price level for 1815 to 1850 has tended to become a generalization about the prevalence of depression, see Viner, p. 218.

[5] 'Krisen' in *Handworterbuch der Staatswissenschaften*, VI. 36 and 60.

[6] Wesley C. Mitchell, *Business Cycles*, pp. 407–12. Dr. Mitchell's analysis is set up in terms of secular price movements, not the broader concept of long waves. The dates, however, conform exactly, as one might expect, to those for the long waves. It is maintained that in the periods of upward price trend, years of prosperity predominate over years of depression; in periods of declining price trend, years of depression predominate over years of prosperity. Willard Thorp's *Annals* have been used to define the relatively cyclical position of each year. The measurement is given an extra-

The average amount of unemployment would supply, perhaps, the best single measurement for this proposition. Such data are, however, not available for the period 1790–1850. We shall use here, first, the reference dates for general business activity that we have established, based on an analysis of available statistical and qualitative evidence. A 'year of prosperity' will be defined as one falling in the interval between a cyclical trough and a cyclical peak; for example (trough in 1832), 1833, 1834, 1835, and 1836 (peak) will be considered 'years of prosperity'. A similar procedure will define 'years of depression', for example (peak in 1839), 1840, 1841, and 1842 (trough) will be considered 'years of depression'.

The years 1790 and 1850 were, roughly, in a similar cyclical position. They stand in the same relation to the previous troughs, (*circa*) 1788 and 1848, respectively. Measurements between them are therefore not seriously biased. From 1790 to 1850 (61 years) there were 42 years of 'prosperity', 19 years of 'depression', giving the proportion of 68·85/31·15 for 'prosperity' to 'depression'. That ratio—somewhat greater than 2 to 1—represents for the whole period the relative prevalence of years of increasing activity over years of declining activity.

The problem of measuring this proportion for the two secular periods is, however, made difficult by the need of taking into account a possible bias involved in the choice of dates. The net result indicated in the following proportions seems to show, in all cases, a slightly greater proportion of 'prosperity years' in the first than in the second period:

	'Prosperity' proportion	*'Depression' proportion*
1790–1815[a] . .	73·1	26·9
1815–50 . .	66·7	33·3
1793–1816[b] . .	66·7	33·3
1816–48 . .	63·6	36·4
1790–1813[c] . .	70·8	29·2
1813–50 . .	68·4	31·6

[a] This measure is severely distorted by the dates chosen—the first period ending with a peak, the second beginning with a depression year and ending before a peak is reached (1854).

[b] These periods run from trough to trough in each case, and the relative proportions are perhaps the least exceptionable, although in both periods the number of depression years is somewhat over-estimated.

[c] Here 1813—a year comparable in its cyclical position to 1790 and 1850—has been taken as a secular turning point. The resultant proportions seem fairly accurate.

This type of measurement is obviously unsatisfactory. It makes extremely doubtful assumptions about the uniformity of amplitude of different

ordinary bias due to the fact that the upward secular trends run roughly from cyclical troughs (1790, 1849, 1896) to cyclical peaks (1815, 1873, 1920); so that each upward secular phase contains an 'extra' cyclical boom, each downward phase an 'extra' slump. Whatever the validity of the hypothesis in general, the measurements given are clearly unfair. And, furthermore, we are in disagreement with Thorp's *Annals* at several points, in his characterization of specific years (see Appendix C, Vol. I, Pt. I).

cycles, and about the rates of movement from trough to peak and from peak to trough. In general, for example, it took longer for the economic system to move from deep depression to full employment than from full employment to deep depression. A somewhat better index of relative prosperity can be derived from the business-cycle chart we have constructed which rates each year from 0 to 5, on the basis of all the available quantitative and qualitative data.[1] The average cyclical standings for the two periods, measured as in the previous case, are as follows:

	Average cyclical standing
1790–1815 . .	2·40
1815–50 . .	1·96
1793–1816 . .	2·10
1816–48 . .	1·95
1790–1813 . .	2·38[a]
1813–50 . .	1·96
1790–1850 . .	2·14

[a] The greater disparity between the two secular periods measured by average cyclical standings (with 1813 as the turning point) than by 'years of prosperity' is due to the fact that the boom with a peak in 1815 is considered a minor cycle prosperity; 1815 is rated only 3.

The second of these proportions—where the periods are, in each instance, measured from trough to trough—is probably the most accurate estimate.

It is clear that depression did not 'predominate' in the second period. There are, it is true, relatively more 'depression' years than in the first period, and a slightly lower average standing according to the cyclical measures we have employed; but it is the slightness of the difference that seems most striking.[2] It is a difference which clearly does not justify the hypothesis of chronic cyclical depression from 1815 to 1850.

The lower 'prosperity' proportion and lower average cyclical standing which emerge for the second period are due principally to the fact that each of the major booms (peaks in 1825, 1836, 1845) was followed by an interval of irregular recovery and relapse (1826–32, 1837–42, 1846–8).[3] The peculiar nature of these three periods constitutes the basis for any generalizations about chronic depression, whether due to a gold shortage or a waning stimulus to enterprise.

A short-period analysis of the post-crisis periods reveals that, in fact, they were largely a consequence of the previous prosperities, not the result of a prevailing deflationary force. Investors were nursing their wounds from losses, respectively, in South American mining shares and domestic

[1] For an account of the construction of this chart, see Appendix B, Vol. I, Pt. I. 0 represents deep depression; 5 represents full employment; the other figures represent the intervening positions.

[2] If the secular periods are measured with 1811 as the turning-point (i.e. 1790–1811, 1812–50) the 'prosperity' proportion becomes slightly greater for the second period. Three 'prosperity' years shifted from the first to the second period are sufficient to reverse the relative proportions.

[3] The year 1818 may be counted a major peak and the period 1819–22 an interval of slow recovery. From the low point in 1819, however, there was no general relapse until 1825. There were such secondary relapses in the other cases: in 1829 and 1831, in 1839, in 1847.

joint-stock floatations (1826–32), American state and federal bonds (1837–42), and British railways (1846–8). Such prosperity as occurred after the peaks was based largely on a continued expansion of exports and the completion of projects inaugurated in the previous boom.

The fact of these booms, which, in each case, proceeded to full employment, is perhaps the most striking evidence against the gold-shortage hypothesis. A banking system lacking adequate bullion reserves would have been forced to curtail expansion before it reached the full employment that was experienced in 1824–5, 1835–6, 1844–5. And, as we have seen, crises, when they came, do not seem to have been inaugurated primarily from the supply side of the market for loanable funds. These booms, further, do not conform to Schumpeter's conception of the waning strength of the Juglars during Kondratieff depression. Their strength, in fact, when measured by the amplitude of movement of the most relevant series, appears to increase.[1]

The higher average cyclical standing for the first period is based to a considerable extent on the extraordinarily high average standing for the period from 1800 to 1810. None of those years is rated as complete depression and the average figure 2·9 results. Between 1802 and 1809–10 (an interval comparable in its relative cyclical position to 1825–36 or 1836–45) there were no extremely prosperous years; but such information as is available seems to indicate no unemployment as severe as in 1811, for example, or 1816. This may simply be due to scanty data; or it may, more probably, be considered a consequence of the continued inflationary fiscal policy of the government. There was no authority, after the crises of 1825, 1836, and 1845, willing and able to spend borrowed funds on a considerable scale; and no large army mobilized. Government spending must, of course, be used with great caution as an explanation of events during the war years. It does not explain everything; and it must be considered in the full context of the peculiar manner of its operation. In general the pattern of cyclical behaviour for the economy as a whole is strikingly similar for both secular periods. The persistence of loan-financed government expenditure, without reference to expected private profit possibilities, offers, nevertheless, the most reasonable explanation for the apparent slight relative cushioning of depression during this period. It should be emphasized immediately, however, that war-time spending is not being advanced in this form as a general explanation for price, production, and other secular tendencies from 1793 to 1815.

The following conclusions may be drawn:

1. In both periods years of increasing activity predominated over years of declining activity.
2. The slightly greater proportion of 'depression' years in the second period was due to three intervals of prolonged unemployment.

[1] See above, p. 571, n. 2.

3. In each case these periods can be associated with a previous boom, not with a long-term depression force.
4. The fact of these booms itself tends to undermine the gold-prices hypotheses; and it indicates the need for some sort of modification, at least, of Schumpeter's view of the nature of investment in the Kondratieff recession and depression.
5. The average cyclical standing is slightly higher for the war years than for the period after 1815. The failure of deep and protracted depression to appear may, broadly, be attributed to the phenomenon of persistent loan-financed government expenditure. There would appear to be little justification for attributing it to the Kondratieff prosperity process.

6. Prices. The movement of price indexes from 1790 to 1850 would, prima facie, seem best to justify the assumption of a single long wave. The price index of imported commodities rises fairly steadily to a peak in 1814.[1] The secular decline thereafter is interrupted from 1832 to 1839: but a clearly marked secular low point is reached in September 1848. The general character of this movement is shared by a number of non-agricultural domestic products; these, however, for the most part, show a secular peak earlier than 1814 (see table opposite).[2]

The domestic price index, weighted heavily with wheat, is less satisfactory. It rises from 1792 to a peak early in 1801. There is a second, lesser peak in August 1812, from which the index declines sharply to 1822 (interrupted, 1816–18). The level of May 1822, however, is not reached again until 1849–50, so that no secular decline is exhibited between 1822 and 1848. This is due primarily to the behaviour of the prices of agricultural produce which did not fully share the secular decline of imported and non-agricultural domestic commodities.

The explanation of the general movement resolves itself into the problem of weighting and relating the possible causal forces. Three forces have already been suggested. From 1790 to 1814 they are:

1. An inflated demand due to the combination of war-time expenditure and an abandonment of the bullion standard.
2. A rise in costs due to obstructions in supply conditions, &c.
3. The Kondratieff factor, i.e. the tendency of prices to rise during the period when innovations are being introduced, but before they yield lower costs and increased output.

[1] Silberling's price index also shows a secular peak in 1814. Jevons's index, however, places 1811 as the secular turning-point.

[2] The lowest or highest price falling within the three intervals indicated has been listed. In all but two cases these constitute secular high or low points. If the given price prevailed for more than one month, the latest month is given. It is to be noted that the average price of British exports of domestic goods, calculated from official and real value figures, and representing largely manufactured products, began to decline as early as 1803 (see below, pp. 833 ff.).

	Low point 1790–5	*High point 1799–1815*	*Low point 1843 50*
Alum (£ per ton)	(July 1790) 12 6	(Mar. 1815) 31·0	(Dec. 1849) 8·2
Camphor (pence per lb.)	(July 1794) 34·5	(Mar. 1799) 249 0	(June 1848) 10·0
Coal, Sunderland (*s.* per chaldron)	(July 1791) 31·2	(Mar. 1809) 80·0	(July 1850) 20·8
Copper, British manufactured (pence per lb.)	(Sept. 1791) 9 2	(July 1806) 20 0	(Nov. 1848) 8·5
Hides for dressing, British (pence per lb.)	(May 1794) 12·2	(Apr. 1805) 24·0	(Jan. 1849) 7·2
Iron bars, British (£ per ton)	(Mar. 1790) 15·1	(Jan. 1802) 22·0	(July 1843) 4·5
Iron pigs, British (£ per ton)	(July 1790) 5·5	(Feb. 1802) 8·5[a]	(Feb. 1844) 3·0
Lead pigs, British (£ per ton)	(June 1795) 17·2	(July 1806) 42·5	(Nov. 1849) 15·9[b]
Leather butts, British (pence per lb.)	(Apr. 1790) 13·8	(Oct. 1812) 29 0	(Jan. 1849) 15 0
Oil, linseed, British (£ per ton)	(Oct. 1792) 26 5	(Feb. 1809) 158·0	(Jan. 1849) 22 0
Oil, rape, British (£ per ton)	(Sept. 1790) 27·5	(July 1812) 80·0	(July 1846) 32·0
Oil of vitriol, British (tenths of pence per lb.)	(Jan. 1792) 27·5	(Jan. 1798) 65 0	(Nov. 1850) 10 0
Sal-ammoniac, British (*s.* per cwt.)	(Feb. 1795) 112 0	(June 1814) 270 0	(Apr. 1849) 32 5
Soap, British yellow (*s.* per cwt.)	(Sept. 1791) 53 0	(Feb. 1809) 116·0	(Dec. 1850) 37·0
Soap, British mottled hard (*s.* per cwt.)	(Sept. 1791) 58·0	(Feb. 1809) 126·0	(Dec. 1850) 39·0
Starch, common English (£ per ton)	(Mar. 1790) 54·0	(Apr. 1801) 230·0	(Dec. 1850) 36·0
Tallow, English, town, unmelted (*s.* per cwt.)	(July 1791) 40·8	(Mar. 1814) 113 0	(Aug. 1850) 35 5
Tin, British block (*s.* per cwt.)	(June 1791) 76·0	(July 1814) 176·0	(Sept. 1843) 59·0

[a] Pig-iron reached a price higher than that of Feb. 1802, in 1819 (8 8) and 1825 (12 5).
[b] Pig-lead reached a price lower than that of Nov. 1849, in 1832 (12·0).

From 1814 on these forces are assumed to be operative in the opposite direction, i.e. the banking system is chronically tight, costs are falling, the fruits of the previous innovations are being gathered.

From the perspective of Schumpeter's model the Napoleonic Wars constitute a serious external influence, and he applies only hesitantly the formal pattern of the long wave:[1] 'external factors exerted paramount influence until, roughly, 1820'. One can trace, nevertheless, a fall in cotton prices, from 1799, and in the price of bar-iron from 1802. These movements can be associated with the expansion of the two industries, and, in the former case, with the new supplies made available by the introduction of the cotton gin in the United States (1793), and the partially consequent

[1] Op. cit. i. 254–8.

rapid expansion of cotton growing there. It would appear that cost-reducing effects of innovations emerged long before the introduction of the new processes had been completed. The average prices of British domestic goods' exports, further, decline steadily from at least as early as 1803. This is not in conflict with Schumpeter's view of the long wave;[1] but it has a consequence he does not make completely clear.

By his calculation the Kondratieff peak comes about 1802, the prosperity phase having begun in 1788.[2] The downward trend of prices continues through the recession phase (1802–16), the depression phase (1816–30), and the recovery phase (1830–44) at least. Except in the prosperity phase of the Kondratieff, the price level, theoretically, should fall. For this reason Schumpeter makes much of the early decline in cotton and iron prices (1798–1802)[3] and attempts, in the second Kondratieff, to establish a falling price tendency from the middle of the 1850's, dismissing (as he does 1814) the more conventional turning-point, 1873.[4]

The most obvious weakness in the long-wave conception as applied to the period 1790–1814 is that there are factors operating which adequately explain price movements, without the introduction of the Kondratieff process. This much, however, can be said for it: that although no important element in the price rise can be attributed to the so-called prosperity process of the Kondratieff, the downward movement of the prices of cotton and iron, at least, may be connected with previous innovations; i.e. with the Kondratieff recession and depression processes. But from 1790 to 1814 that is a small part, indeed, of the story.

[1] The long wave, abstractly, is described in terms of a sine curve. The curve has four phases: Prosperity, Recession, Depression, and Recovery, marked off at the points of inflexion, the maximum and minimum. Exactly what movements that curve is meant to describe is not made clear. 1788 falls on an upward inflexion point; 1802 is the maximum; 1816 the downward inflexion point; 1830 the minimum, 1844 the upward inflexion point, marking the beginning of the second Kondratieff.

[2] Op. cit. i. 296–8.

[3] The behaviour of the prices of raw and manufactured cotton would appear, prima facie, to be important evidence for the Kondratieff prosperity process. The secular trend from 1790 to 1799 is clearly upward in the former price, and it turns downward within a few years of the calculated Kondratieff peak (1801–2). It is probable that manufactured cotton prices moved similarly in those years. This movement Schumpeter would explain presumably by reference to the rapid expansion in output in the industry before the fruits of the machinery and factories could be garnered in lower costs and before cotton cultivation in the United States had expanded to accommodate itself to the potentialities of the cotton gin. When the movements of the cotton price are closely examined, it appears that no very pronounced trend is evident in the fluctuations from 1790 to 1796. The sharp rise from 1796 to 1799, moreover, is to be explained by obstructions to import, high freight and insurance rates, and a partially consequent speculation in cotton both in England and in Hamburg. The pressure towards such speculation is indicated by the fact that the average import in 1793–8 was less than in the five years preceding 1793. War conditions were starving both the British and continental cotton textile industries. Admittedly those industries were expanding. But there is no reason to believe that the period of gestation of either British factories or American cotton farms was so great as to have yielded such an extensive or protracted rise in price under peace-time conditions. (See Tooke, *High and Low Prices*, Pt. IV, pp. 21–3, and below, pp. 837–41.)

[4] Op. cit. ii. 571–2.

There seems to be no doubt that the prices of many imported commodities were affected by the rise in freight and insurance rates, and the irregularity of supply conditions, due to the wars. The supplies of naval stores from the Baltic areas, moreover, were subject not only to greater transportation costs and to the Napoleonic blockade, but to the competing demands of the warring powers. A further influence, from the side of demand, so far as the British commodity markets were concerned, was the virtual monopoly position enjoyed with respect to colonial produce. The peculiar feature of Britain's foreign trade during the war years (as compared with the period 1815–50) was the growth of re-exports. Domestic goods' exports (in quantity) increased on the average (1793-1815) at the rate of 3·8 per cent. per year: exports including re-exports at 4·1 per cent. The booms with peaks in 1800–2 and 1815 were based, in a large measure, on such trade; while the collapse of the boom in 1809–10 was due very largely to a tightening of the Continental System and a blocking off of re-export markets. British traders had counted heavily on the continental centres for the disposal of large quantities of imported colonial produce.

The direct effects of government expenditure for war materials at home were confined to a relatively small number of articles. Iron is conventionally mentioned, and the difficult position of Birmingham, from 1815 to about 1823, would lead one to infer a considerable previous dependence on government orders. The woollen industry, too, was affected, as was shipbuilding. The abnormal demand for various naval stores—tar, hemp, turpentine, timber, &c.—has been referred to above.

The demand for goods—domestic and colonial—arising from the north German ports, further, was not independent of the government's war-time operations. The large loans and subsidies granted, especially to the German principalities, were used in a considerable measure to finance purchases of British goods and to pay the profits made in the re-export trade. The loans and subsidies constituted a major outlet for British savings during the war years, and the consequences for the balance of payments were fairly normal; i.e. the greater part of the transfer was made in goods, not in bullion.

It was noted earlier that the prices of many non-agricultural domestic commodities reached their peak earlier than 1814. This fact may be related to the previous expansion of fixed resources in home industry, as was certainly the case in cotton and iron. But, in part, the earlier high point for domestic manufactured goods is to be explained by reference to the peculiar nature of the cyclical expansion from 1811 to 1815. That boom was based very largely on a stimulus from exports and re-exports and on expectations of foreign markets that peace would make available. There was relatively little new enterprise at home. To a considerably lesser extent, the South American boom (1808–10) was of the same kind. It involved the shipment of huge quantities of British manufactured goods; but there was no increase in factory construction and other forms of new domestic investment comparable to that during the major booms of the twenties, thirties, and forties.

It is not surprising, then, that the rise in import prices was not fully shared by non-agricultural domestic commodities, even aside from the rising costs of freight, insurance, &c., which affected the former, but not (directly) the latter.

Aside from the increased cost of imported goods, domestic prices were influenced by a rise in taxes and a rise in wage rates during the war years. The increase in money wages was made necessary, of course, by the inadequacy of harvests at home and an uncertain grain-supply from the Baltic, as well as by the rise in other imported food prices. Although it is probable that, over the whole war period, real wages declined, nevertheless, the sharp increase in money wages that did occur contributed to the general price rise in domestic manufactured products. The rise in interest rates and the relative depreciation of the pound on the foreign exchanges were, as Tooke notes, similar cost-raising factors.

The part played by the money supply in this price rise cannot adequately be dealt with at this point.[1] In general it may be said that the banking system, behaving, for the most part, passively,[2] supplied the commercial, industrial, and government demands that confronted it. The bullion reserve (1796–1815) increased at the rate of 0·3 per cent. per year, the Bank's note circulation (1793–1815) at 3·9 per cent., total advances at the Bank (1795–1815) at 5·7 per cent., bills and notes discounted (1795–1815) at 8·1 per cent. This could not have occurred without the measure of elasticity permitted by the abandonment of the standard in 1797, and the expansion of country banks.

This cataloguing of factors affecting different types of prices does not, of course, meet the requirements of a general theory of the price level or of output and employment. General propositions in such terms await the examination of the other variables. It is, however, necessary before any broader generalizations can safely be made. The peculiar factors affecting prices in the first secular period may be grouped and summarized as follows:

Special Factors

Supply

1. A rise in interest, freight, and insurance rates; a rise in the cost of foreign exchange; a rise in money wages.
2. A fall in the real cost of producing various domestic manufactures, which yielded, despite influences in the other direction, a net decline in price for certain products as early as the decade 1799–1809.
3. Chronically bad domestic harvests. Irregular access to foreign sources of supply for grain and other foodstuffs and raw materials.

[1] See below, pp. 655 ff., for a more complete discussion.

[2] In 1795-6 there is evidence that the Bank, pressed by the government, and still operating under a bullion standard, was forced positively to restrict private advances. There seem to be no other such instances during the war years. At times of general commercial and financial crises the Bank tended to increase rather than restrict its private advances.

Demand

1. Abnormal demands from the government for various domestic products necessary for carrying on the war.
2. An increased demand from the Continent for British exports and re-exports; in addition, an increase in British import prices of Baltic naval stores and grain due to the competitive bidding of the French and other warring powers.

General Factors

1. An inflationary fiscal policy in Great Britain, increasing the demand directly for various domestic goods (with secondary repercussions), and indirectly (through loans and subsidies) for British exports and re-exports.
2. Similar government policy on the Continent (outside France), increasing the demand for British exports and re-exports.

The Monetary Mechanism

A money supply from the British banking system sufficiently elastic to finance increases in output and foreign trade at the higher cost-price levels.

The 'general factors' are, in the view taken here, in no way distinct from the 'demand factors'. They represent the general sources for the specific demand phenomena already listed. The double listing is meant, as it were, to equate the two types of vocabulary.

The decline in prices from 1815 to 1850 is by no means continuous or uniform. The import index shows a major decline from 1814 to 1826 (broken by a rise in 1825); it remains fairly steady from 1826 to about 1840; and then moves rapidly to a low point in 1848. In other prices as well there is a clearly marked tendency towards a rise, or a cessation in the fall, during the thirties; notably in cotton, coal, and iron.

The sharp fall in import prices immediately after 1814 may certainly be attributed to the removal of the obstructions to supply which characterized the war: insurance and freight rates fell, the pound appreciated on the foreign exchanges. Fears of shortage ended in the speculative markets. The continued declining tendency after 1821 (when immediate adjustment to peace-time conditions may be said to have been completed) is to be linked to the cheapening of transport costs, the further development of sources of supply, and the other long-run factors listed by Tooke and Schumpeter. The tariff reductions—of Huskisson and Peel—also contributed to this process. Britain's raw materials and imported foodstuffs could be expected, then, to fall in price, other things being equal.

Nor can it be easily denied that the normal consequences of the industrial revolution (or Kondratieff depression) would be in the direction of lowering costs.[1] The expansion and refinement of industrial plant, the extension of

[1] In reply to a protectionist-inflationist argument a writer in the *Edinburgh Review* (lv, July 1832, p. 425) properly asks: 'What but the facilitating of production, or, in other words, the reduction of price, is the object of inventions and discoveries in the arts?'

mines, and the lowering of internal transport costs followed directly upon the major booms of the twenties, thirties, and forties. Supply curves were shifting down and to the right, and this process was being reinforced by the fall in the prices of imported raw materials.

In partial equilibrium analysis the lowering of a cost curve yields (the demand curve remaining fixed) a simultaneous increase in output and a lower price. Tooke wrote in terms of increased output. When he uses lower costs to explain lower prices Tooke makes implicit assumptions as to the constancy or 'normality' of demand curves in different markets. He is saying, in effect, that the dynamic element in the secular price decline came from the supply side of individual markets; and that demand curves, in their cyclical and secular behaviour, did not contribute positively to the long-term price decline. This, too, is the burden of Schumpeter's argument, when he conceives of society enjoying the fruits of previous investment, although to the extent that he allows the existence of chronic depression he admits some secular influence from the side of demand.

The monetary view, made explicit, can be set up in either of two ways. It may mean, simply, that the banking system did not foster positively a sufficiently inflationary movement to maintain prices steady. Since the supply of labour was probably more inelastic than the supply of other factors it is probable that full employment (i.e. bottle-necks in the labour market) would have emerged before the corrective inflationary process could have been carried to a sufficient length, even assuming that some authority might have attempted to apply it. That was, in fact, what did occur in 1824–5, 1835–9, 1844–7. The rise in prices that took place at those periods was not sufficient to prevent, in net, a secular price decline. The booms ended before prices had risen to their previous peak level.[1] It should be emphasized that the monetary analysis, formulated in this way, does not imply that the behaviour of the banking system caused the price decline; but it does contain the judgement that the price level should remain steady, and that the banking system is the proper instrument to keep it so.

The second possible view of the monetary mechanism is that it not only did not operate to raise prices, but that it constituted a positively deflationary force, restricting cyclical expansions and prolonging contractions in an effort to preserve its limited bullion reserve. That hypothesis will be examined separately below; but the reader of the *History* will recall that it does not conform to the short-period events of these years. Booms were

[1] It is not implied, of course, that booms ended merely because costs rose. It will be recalled (pp. 553 ff.) that the nature of the boom, as envisaged here, would bring about automatically a revision of profit expectations in the main lines of new enterprise, aside from increases in cost. It is, however, clear that in a capitalistic society, where investment is undertaken by individuals and corporations, full employment has been, historically, an essentially unstable position. Leaving aside, for the moment, the precise mechanism of the upward turning-point, it is just to assume that abnormal intervention would have been required to maintain prices steady.

permitted to move to full employment by the banking system; full capacity in industry and full employment in labour markets were attained before the upper turning-point was reached on at least three occasions. And in those instances where expansions ended before full employment was reached an inelastic money supply was not primarily responsible.

Inflationist sentiment from 1815 to 1850 (like that of the last quarter of the nineteenth century) was really concerned with the desirability of a price rise and the means of attaining it: the first rather than the second of the two monetary views. The available means seemed to be monetary, and, in consequence, the appropriate explanation of the falling price tendency was 'the Cross of Gold'—the second view.[1] As Clapham points out,[2] the mechanism of the chronic deflation was never satisfactorily expounded; and, if our view is correct, it cannot be, for it did not take place. Expressed in quantity theory terms, such was the increase in T that extraordinary positive monetary stimulus would have been required to prevent a fall in prices; and such action was not only institutionally unfeasible, but probably technically impossible as well. The rise in wages (and possibly in other prices too) that would have resulted from the full employment situation created by inflationary action would probably have reversed the expansion before it had fully attained its purpose of maintaining a constant secular price level.

As for Schumpeter's hypothesis, it does seem to focus on the factors that made for the fall in manufactured domestic prices. It does not, however, give sufficient attention to the forces tending to lower import prices. If the term 'innovation' is sufficiently broadened, they too may, nevertheless, be brought within the compass of his generalization. So far as prices are concerned, and the forces affecting them, a part of the long-wave model appears to be applicable from 1814 to 1850.[3] But the fact that the price rise, from 1790 to 1814, cannot be related significantly to the Kondratieff prosperity process militates against using the concept of a single coherent wave in the interpretation of the period as a whole.

[1] See, for example, T. Doubleday, *A Financial History of England*, pp. 238-50, on the Currency Act of 1819 and its alleged consequences: 'Against a combination of usurers and theorists, one set all selfishness, the other all crotchets, there was no defence to be made. The country gentlemen, who were the dupes of the economists, were led to believe that cash payments were necessary for both the interest and security of themselves. Those who had the power were resolved; and nothing was left to the Bank but to narrow its issues, and look about for gold and silver wherewith to meet the storm' (p. 240).

[2] Op. cit. i. 507.

[3] It should be remembered, of course, that the continued secular price decline beyond 1830 (the Kondratieff trough) constitutes an embarrassment to the Schumpeter scheme. Prices should have been rising from 1830 to 1844 (Kondratieff recovery) and rising still more rapidly in the following fourteen years. The secular low point for prices (*circa* 1848) is thus seriously out of harmony with Schumpeter's version of the long wave.

Chapter V

SECULAR TRENDS (*continued*)

7. Production, Investment, and Foreign Trade. The period 1790–1815, in the behaviour of production as well as of prices, fails to conform to the pattern of the Kondratieff upward phase:[1]

In its 'pure' form, our model yields the expectation that in prosperities the output of producers' goods should at first increase at the expense of the output of consumers' goods. The latter should, even absolutely, decline, and if the innovations in question be of the type of railroad construction, no fully compensating increase of the former might show for years. In general, however, new products will be released as prosperity wears on, their impact being part of the mechanism that eventually turns prosperity into recession. Hence decrease could show only in a segment between recovery and the later stages of prosperity. But the avalanche of consumers' goods and their satellites should come in recession.

In fact producers' goods increased more rapidly than consumers' goods production in both periods, as estimated by Hoffmann; and the tendency is even more pronounced in the second than in the first period. Both coal and iron output estimates show, similarly, a much more rapid advance in the second than in the first period. Brick production, when the rate of growth is calculated from the average centring on 1793 to that centring on 1815, shows no net increase. That is due, in part, to the fact that the average centring on 1815 includes predominantly depressed years, so far as brick production is concerned. The peak in 1805 is higher than that in 1792; that in 1811 higher than 1805; but the secular increase, at best, is relatively slight in the first period.

It would appear that the major expansion of British industrial plant took place in the second and not in the first secular period: the economy was undergoing even more vigorous change then than during the war decades. Schumpeter draws a distinction between the action of the first innovators (who presumably operated in the latter decades of the eighteenth century) and those who followed in their wake, imitating, enlarging, and refining their germinal contributions.[2] That may be an accurate view of the typical history of a particular technical device; but it can hardly be expanded to explain the movement of the economy as a whole. If, in the upward phase of the Kondratieff, the new innovations were on so small a scale as not to attract any very large amounts of new investment, then it is unlikely that they could determine, in an important way, the trends of prices and production.[3]

[1] Schumpeter, ii. 502.

[2] Ibid. i. 278–9. Schumpeter associates the phase of imitation, enlargement, and refinement with the downward phase of the Kondratieff and adduces, as a typical symptom, the spread of joint-stock enterprise to industrial ventures.

[3] Schumpeter's view of such innovations as being the 'ignition' or 'starter', which, though themselves small, affect aggregate

There were, it is true, several intervals from 1790 to 1815 marked by considerable home investment. Canal construction played a large part in the boom immediately before the outbreak of war (1790–2); the rise in brick production from 1798 to 1804 indicates an impressive increase in construction, and, in the same interval, shipbuilding was extremely active; there was a minor joint-stock floatation boom in 1807–8; and the prosperity of 1809–10, although centred on the South American trade, saw a modest rise in brick production and also some dock and canal building. Furthermore, throughout these years one can trace a marked improvement in industrial methods and in the scale of manufacture. The cotton industry felt the first effects of the cheapened and enlarged supplies of raw material afforded by the cotton gin; while the iron industry, stimulated by wartime orders and cut off intermittently from foreign supplies of ore, was forced to expand in scale and to make itself independent of large-scale imports. But this type of investment activity was clearly more important after 1815 than before.

The controlling element in the growth and fluctuations of the British economy from 1790 to 1815 was its foreign trade. The volume of domestic goods' exports increased at the same rate in both periods; exports including re-exports increased more rapidly in the first than in the second period. Relative to the growth in total output (which was greater in the second period) foreign trade expanded more rapidly in the first than in the second period. An important reason for the expansion in exports was, of course, loans and subsidies granted to foreign powers by the government. The rise in the value of exports from 1797 to 1800–2 coincides with a rise in extraordinary remittances abroad; the relative stagnation until 1808 coincides with a low level of remittances; the rise from 1808 to 1815 (broken in 1811) is accompanied (to 1813) by a rising volume of such remittances. This factor, in conjunction with the inflation experienced on the Continent during this period, helps explain, in part at least, the expansion of exports. The United States, too, stimulated by the demands of Britain and the Continent, and enjoying a handsome profit in the carrying trade, appeared as a growing market for British goods. Despite the intermittent blockade, exports to the Continent were relatively more important during the Napoleonic Wars than in the decades that followed.

Investment in fixed capital at home—the controlling element in the Schumpeter conception of the long wave in this period—was almost certainly inhibited to some extent by the government's absorption of savings. This is not to deny, of course, that a great volume of domestic investment took place: in agricultural inclosures, in the construction of new industrial plant, in the extension of mines, in the construction of new houses for a

movements through some kind of multiplier, does not seem very convincing (i. 274–5). He attempts thus to relate movements of the principal variables for 1790 to 1820 to the Kondratieff process. He ignores, however, the role of government spending, capital exports, and foreign trade, as possible determinants of the trends.

relatively expanding urban population, in the building of ships and docks.[1] The profits made in agriculture, commerce, and industry certainly, in part, were turned towards the enlargement of Britain's fixed capital. It is probable, however, that the government's demands, through taxation and the sale of securities (with a consequent rise in the interest rate), served somewhat to limit domestic investment.[2] In any case the increase in Britain's capital stock was certainly more rapid after 1815 than before.

It is significant that, from 1790 to 1815, only two periods occurred when home enterprise dominated the attention of speculative investors. The first—the canal boom of the early 1790's—took place before the war began; the second occurred in 1807–8, when the continental markets were obstructed and the government's excess expenditure over revenue was relatively low.[3] Short- and medium-term investment in foreign exchange,[4] and long-term investment in government securities, were more typical of the war years. The government, of course, spent the taxes it collected and the funds it borrowed; and, as noted earlier, the iron, woollen, and shipbuilding industries, especially, felt directly the consequences of such expenditure; while the export industries (notably cotton) and the re-export traders experienced indirect stimulus from capital exports in the form of loans and subsidies.

It appears evident, however, that, on balance, the Napoleonic Wars turned investment away from the channels that would have been followed in a period of peace, and were, in fact, followed after 1815. In judging the effect of this process on the British economy one must weigh the stimulus of an inflationary fiscal policy against the retardation in types of home investment that might have been pursued if the government had not been the principal borrower. Any conclusions as to the probable course of economic events from 1793 to 1815 under imagined peace-time conditions must, of course, be purely hypothetical. It may, however, be tentatively inferred that technological advance would probably have been more rapid; that the increase in exports would have been less rapid; and that the increase in producers' goods production would have been greater, with the brick index rising more sharply and the increased production of iron turned more largely to machinery, bridges, and other domestic uses rather than to cannon and materials of warfare. In individual markets, demand curves might have shifted somewhat less to the right, but long-run cost curves

[1] If the growth in British exports is taken as the central feature of the period, the concentration of investment in shipbuilding and dock construction may be viewed as a corollary to that influence.

[2] A striking bit of evidence in this direction is the enormous leap in brick production from 1816 to 1825. The increase in building thus indicated would seem to point to previous inhibition, through high interest rates, and labour and raw-material costs.

[3] The annual average excess expenditure over revenue, from 1800 to 1819, was £17·7 million. In 1807 the figure was £8·0 million, in 1808, £10·0 million (Cannan, *The Paper Pound*, p. xlii).

[4] The financing of exports to South America, in 1808–10, and even the shipment of goods to the Continent (especially when the blockade forced the use of circuitous routes) involved the outlay of funds for fairly long periods of time.

would have shifted farther down and to the right. The increase in total output would have been differently distributed as among industries. And, above all, the tendency for prices to fall would have been more strongly and sooner felt.

The most striking feature of the industrial revolution process during the war years was the amazing growth of the cotton industry. There is little reason to believe that expansion in that area of the economy would have been less rapid at a time of peace. Export markets would have been more steadily available, and the supply of raw cotton would have been cheaper and more abundant. Further, to the extent that war-time conditions obstructed the flow of foreign wheat to Britain (helping to raise the cost of living, lowering real wages) the domestic demand for cotton goods was less than it would have been. Similarly, had there been no war it is doubtful whether investment in agriculture would have been as large as, in fact, it was. A greater quantity of resources might have been freed for industrial investment.

The conventional view of Britain during the Napoleonic Wars is that the stimulus of inflation induced an abnormally rapid rate of development, which was not sustained in the succeeding years. As we have seen, production rates of growth are, in all cases, more rapid in the second secular period. There is, however, another aspect of the conventional view for which there is greater justification: the unquestionably increased economic advantage of Britain over the Continent in 1815 as compared with 1793. Aside from political and military obstructions to economic progress, the Continent was seriously hampered in acquiring adequate supplies of cheapened American cotton and other necessary raw materials. Even under hypothetical peace-time conditions, though, it is possible that Britain would have advanced more rapidly than France and Germany from 1793 to 1815. The political, social, commercial, and technological bases for the cotton textile and iron revolutions were better laid in Britain in the decades before 1793. But under peace-time conditions it is probable that the lag of the Continent would have been less marked than it was.

The period from 1815 to 1850 was dominated, of course, by the continued growth of foreign markets and an enlarged volume of domestic investment. There were, as we have seen, three major booms, reaching peaks in 1825, 1836, and 1845. The nature of the predominant forms of new investment varied, but in each instance the construction of factories, the installation of new machinery, and the expansion of coal and iron mines occurred on a large scale. Although such developments were concentrated, for the most part, in the prosperity phase of each major upswing, technical advance continued even in such relatively quiescent periods as 1819–22, 1826–32, and 1839–42. The development of the Scottish iron industry, for example, after the discovery of the hot-blast (1828), was remarkably steady, through prosperity and depression. There seems to be little doubt that such technical progress and expansion was a principal feature of the years 1815–50,

whether it be regarded as an increase in T, a fall in real costs, or a relative increase in domestic investment.

There was, as well, a considerable but varying amount of capital exports: in the twenties, Latin American government bonds and mining shares; in the thirties, United States federal and state bonds; in the forties, the beginnings of railway financing abroad. It is difficult, indeed, to calculate the absolute volume of capital exports in each case and to weight their importance. There is, however, no doubt that the British gross barter terms of trade improved, on balance, in the decades after 1815, and showed a striking upward movement (i.e. a worsening) only with the appearance of large-scale capital exports in the 1850's. Broadly, one can observe a clearly marked worsening of the terms of trade, thus defined, from 1793 to 1815, a considerable net improvement from 1815 to 1847.[1] This phenomenon is typical of a decline in capital exports relative to the total volume of new investment.

Railway construction in Britain commanded increasing amounts of capital in each of the three major booms, playing a small part in the twenties, a major role in the thirties, and virtually dominating the forties. Total railway mileage completed was approximately as follows: 1821–30, 100; 1831–40, 1,400; 1841–50, 5,000.[2] It should be emphasized that the cost-reducing effects of the extension of the British railway system were evident in the fairly short run. The lines were laid to connect areas already highly industrialized, and prepared, almost immediately, to take full advantage of cheapened transport and communication facilities. In the United States, the extension of the railways, to the west at least, was part of a broad process of frontier development, the full results of which could not so quickly be felt in increasing available supplies and lowering costs.

The accelerated expansion of the coal and iron industries can, quite directly, be related to the growing requirements of railway construction. Other uses for iron were, of course, becoming more numerous; and, as well, the volume of iron exports was expanding—more rapidly even than manufactured cottons. But through the thirties and forties the stimulus derived from railway building was clearly the determining factor in the development of these two industries.

The preponderating position of railway building in the forties led Schumpeter to end the first long cycle in 1842, ignoring the later date (1848) indicated by price indexes. The second long cycle (1844–1900) is controlled primarily, according to Schumpeter, by the building of the railways; and it is thus logical for him to place the forties in the second wave. Prices, however, failed to rise from 1842 to 1848, despite the burst of railway building which defines the Kondratieff early prosperity phase. The

[1] The most significant break occurs in the thirties when capital exports to the United States were on a large scale (see below, pp. 798–9).

[2] H. G. Lewin, *Early British Railways*, p. 186, and E. Cleveland-Stevens, *English Railways*, pp. 24–5.

expansion of the English and Scottish iron industries was sufficient to yield an even lower price for pig-iron in 1848 than in 1842. Not until the fifties, when Britain was exporting capital on a grand scale, did the rising price tendency assert itself. The failure of prices to rise in the forties is a serious weakness in the Schumpeter hypothesis as applied to this period.

The argument presented here may be summarized as follows:

1790–1815. War-time expenditure (involving considerable capital exports) produced in Britain an 'abnormal' expansion in exports, a 'subnormal' volume of internal investment (exclusive of agriculture). Whether total output would have increased more or less rapidly under peace-time conditions is extremely difficult to say; but the direction of production was clearly affected by the direct and indirect consequences of the government's spending at home and abroad.

1815–50. Domestic investment, directed towards the expansion of plant and mineral resources, the improvement of machinery, and, later, the extension of railway transport, dominated the British economy in this period. There were several intervals when capital exports absorbed a considerable part of the investor's savings; but the gross barter terms of trade would seem to show the net improvement, in the second period, consequent upon a relative decrease in capital exports. This is not to deny the importance of Britain's export markets in the second period; but rather to emphasize the relatively greater importance of home investment.

This view conforms, broadly, to Tooke's; and does not essentially run counter to the monetary analysts' emphasis on the increase in T. It is, however, part of a broader theoretical framework than Tooke's, and a quite different framework from that of the monetary analyst. It traces, further, a pattern unlike Schumpeter's, especially from 1790 to 1815. For the period as a whole (even in the case of British railway construction) the view taken here does not recognize as a long-period phenomenon the distinction between the period of innovation and the period of elaboration. The sort of new construction and technological development being pursued had a relatively short period of gestation. No important element in the price rise in the first secular period can be connected with the Kondratieff prosperity process; nor do the relative rates of growth of consumers' goods and producers' goods output conform to the long-wave sequence: on the contrary. The central distinction between the two periods is held to be that, during the first, British investment took, to a considerable extent, the form of capital exports and non-productive military expenditure. In their secondary consequences, these types of expenditure provided for some improvement and extension of the community's capital stock. But the rate of growth was even more rapid in the second secular period, when, on balance, new investment was turned more largely inward, and into more productive channels.[1]

[1] The essence of this hypothesis involves a distinction between the short-run effects of new investment on income and employment and the long-run effects on

8. Interest Rates. The yield on Consols and the computed rate on exchequer bills are the only two continuous interest-rate series available. They show, as one would expect, broadly similar movements; a net rise in the first secular period, a net fall in the second. The peak figures, in both cases, come considerably before the end of the first period, for Consols, in 1798; for exchequer bills, which fluctuated less than Consols, the maximum figure (5·3 per cent.) prevailed through 1795–9 and 1802–6. After the end of the wars both rates fell rapidly. The minimum figure (in the whole period 1790–1850) for the rate on exchequer bills was reached in 1824, as well as a figure close to the minimum rate on Consols, which, in fact, came in 1845. Over the entire period 1790–1850 a net decline in the interest rate, thus measured, took place.

The market-rate of interest on first-class bills of exchange is available for the period 1824–50. It shows a low point in 1844 for the entire period covered; but a secular trend drawn from 1834 to 1839 would show a slight upward tendency. The peaks in 1837, 1839, and 1847 are successively higher, as are those for the Bank of England's discount rate.[1] Even though no commercial discount rate is available for the war years, it is highly probable that a net rise would be recorded between the average centring on 1793 and that centring on 1815, a net decline from 1815 to 1847. The yields on Consols and on exchequer bills conform sufficiently well to the commercial rates, in the period where both are available, to justify this hypothesis. And there is, as well, Tooke's testimony to a rise in interest rates during the early years.[2]

productivity (or the rate of increase of capital, somehow measured). Similar volumes of new investment for (say) war materials and cotton factories may, within a given period, have precisely the same income and employment multiplier effects; and they may yield precisely the same secondary increases in new investment. But in the first case society is left with a number of cannon, and in the second case with enlarged facilities for production (i.e. lower cost-curves). The conception of war inflation as a relative stimulus to productivity is based on the assumption that wastage is more than compensated for by continuous full employment; that the secondary investment consequent upon inflation more than outweighs the relative loss due to primary investment in non-productive war equipment. The judgement made here is that for Britain, during the Napoleonic Wars, this assumption is not valid. War inflation may have yielded slightly greater than 'normal' employment; but the rate of increase of productivity was, relatively, slowed down.

A similar distinction can be made between the consequences of domestic investment and capital exports. In the case of capital exports, however, long-run reductions in import prices and permanently enlarged export markets may result, as they did, for instance, in partial consequence of British financing of the transcontinental American railways. It is probable, however, that the long-run effects will be slower in emerging, especially if the capital exports are being used to develop a backward area. Capital exports during the Napoleonic Wars, however, were not, for the most part, used productively. Their purpose was to supply war materials and consumers' goods, not to open new sources of supply or to increase the productivity of Continental industry.

[1] The troughs, however, in 1828, 1830, 1833, and 1844 are successively lower for the market-rate of interest. As in the price indexes, it is probably just to view the rise in the thirties as an interruption in the downward secular trend. Statistically this series may be characterized as exhibiting an increased amplitude of movement about a virtually constant trend, from 1824 to 1850.

[2] See above, p. 630.

Interest rates would be expected to rise under the pressure of the government's war-time demands and to fall when those special demands had disappeared from the market. To some extent, too, the prevailing types of new investment (1815–50) might be expected to yield a secular decline in long-term interest rates. The progressive extension and refinement of industrial plant is calculated to produce a diminishing marginal return; and, in fact, the breaks in the downward secular trend can, in each instance, be associated with the temporary appearance of some new, high-yield, type of investment: in 1824–5 Latin American mining shares; in 1835–9, American bonds; in 1847, domestic railways.

The increasing profits to be earned on the British railways impart to the security indexes an upward trend which was not shared fully by other shares.[1] So small, moreover, is the area of the economy covered in the security indexes that no generalizations about industrial profit margins can be drawn from them. Baines and Porter present series purporting to exhibit a decline in the profit margin in important branches of the cotton trade, which, they both believed, represented a quite general industrial trend:[2]

	(*a*) *Difference between cost and selling price of calico (Baines)*		(*b*) *Difference between price of cotton and twist (Porter)*		(*c*) *Selling price of calico less prices paid for weaving and cottons (Porter)*	
Annual average	*Pence per piece*	*Index*	*Pence per lb.*	*Index*	*Pence*	*Index*
1802–5	..	..	20·20	149	..	..
1806–10	..	..	16·49	122	..	..
1811–13	..	..	11·86	87	..	..
1814–19	7·96	100	13·57	100	217·50	100
1820–5	3·75	47	10·01	74	149·54	69
1826–30	0·30	..	7·21	53	91·05	42
1831–3	1·33	17	5·72	42	77·33	36
1834–9	..	..	..	..	82·33	38
1840–4	..	..	..	..	58·65	27

N.B. These series refer patently to different margins. The absolute level of (*c*) is especially meaningless, since the price paid for weaving and cottons do not, apparently, represent the unit costs per piece of calico for which a price is given. For that reason the margins have been expressed as relatives of their level in the period 1814–19, when all three series are available. They do indicate that the price of manufactured goods fell more rapidly than the costs of raw cotton and labour, and that the profit per unit of output probably declined. In themselves, however, these series cannot prove that the profit percentage (on total capital invested) or that gross profits declined.

Baines concluded, using his table as partial evidence—

that the profits of the manufacturer have been small; and it is certain that in every branch of the trade the profits of the capitalist have been greatly reduced within the last twenty years. In this respect, however, the cotton trade only

[1] See Vol. I, Pt. II, pp. 380 f.

[2] Baines, pp. 356–7; Porter, pp. 185–7. For an account of declining profit margins in other branches of industry, see Vol. I, Pt. I, especially pp. 221 ff., 291 ff.

resembles almost every other branch of industry in the country: the interest of money and the profits of capital have fallen universally; but profits are still sufficient to allow of a great accumulation of capital in the manufacture, as is evident from the continual erection of new mills, and the remarkable extension and improvement of the towns where the business is carried on.

It is probable that the period 1834–9 saw some interruption in the decline, but that it was resumed in the cyclical depression running from 1839 to 1842, when in some areas excess capacity and rising unemployment, and generally falling prices again existed in the face of secular increases in output.[1] Whether average industrial profit margins were less in the early forties than in the early thirties it is impossible to establish; although Porter's figures would seem to indicate that they were. But if one assumes that the type of investment being pursued was essentially responsible for the secular decline in the price of manufactured goods and interest rates (which do show new low levels in the early forties); and if, as Baines's testimony would indicate, the same process explains both the decline in profit margins in the two decades preceding 1833 and the broad concordance over that period of prices, interest rates, and profit margins, then there is some evidence for viewing the reduction in profit margins as a progressive movement, which proceeded into the forties at least. On this view, not until the large-scale capital exports of the fifties did any factor appear capable of reversing this pattern of development.[2]

Schumpeter's conception of the Kondratieff recession and depression calls for a decline in interest rates and profit margins; and he finds in the years 1790–1850 that his expectations are, in general, justified.[3] He is forced, however, to deprecate the effects of war financing in raising the yield on Consols from 1793 to 1798, implying that the mechanics of the Kondratieff prosperity (presumably the construction of canals, turnpikes, cotton and iron factories, and land inclosure) were the decisive factor. The reader of the *History* will recall, however, that domestic investment was on a much reduced scale in the cycle from 1793 to 1797.[4] Only after the abandonment of the standard in 1797 did a boom occur which involved any considerable increase in capital construction.[5] Schumpeter's emphasis

[1] See Vol. I, Pt. I, pp. 291 ff.

[2] See especially, Jenks, *The Migration of British Capital to 1875*, chap. vi, 'Cosmopolitan Enterprise'.

[3] Op. cit. ii. 628 31.

[4] Vol. I, Pt. I, pp. 37 ff.

[5] To some extent it is probable that the abandonment of the bullion standard, freeing the Bank from pressures on its reserves and ending the widespread fears of credit restriction, aided in fostering the boom from 1798 to 1800–2. But it is to be noted, as well, that the timing of the peaks of the major cycles (defined as those where an increase in output is stimulated both by rising exports and an expanded volume of internal investment) conforms to the normal interval between major cycle peaks for this period (see above, Chap. I, p. 535): the peak in the canal boom came in 1792; the next such peak could be expected at about 1802. The revival in internal enterprise from 1798 to 1802, then, may have been less influenced by the abandonment of the standard than might have first appeared: a freeing of the money market was a necessary but not sufficient condition for that revival.

on the peak in the Consol rate in 1798 is, then, peculiarly misplaced; and it affords additional evidence for rejecting a predominating role for the Kondratieff prosperity process from 1790 to 1815.

The secular fall in the interest rate is something of an embarrassment to the monetary explanation of price movements; i.e. an abnormally high interest rate, necessitated by inadequate bullion reserves, is held to be the mechanism by which price deflation was imposed on the system. The fact of secular decline in the interest rate does not, however, eliminate the possibility of an 'abnormally' high interest rate. There might have been a lag in the money rate of interest behind a falling 'real' or 'natural' rate of interest: the rate might not have fallen, in some sense, low enough.

The only method for testing the validity of this hypothesis would be to establish, first, the existence of abnormally high unemployment from 1815 to 1850; second, to show that an artificially inelastic money supply was responsible for choking off prosperities, extending depressions, and thus producing the lower average. As noted earlier, the extent to which average unemployment was greater in the second than in the first secular period appears to be slight; and this difference is to be accounted for by the abnormality of the first period (i.e. war inflation) rather than by any factors peculiar to the second. This latter conclusion depends on the judgement that depressions were not 'abnormally' extended and prosperities shortened by the action of the banking system from 1815 to 1850.

Tooke's partial equilibrium analysis of individual markets could be related without violence to the fact of a secular fall in interest rates. The 'extension of mechanical processes' involved a type of new investment which was calculated to yield a diminishing marginal return.

9. 'The Quantity of Money.' Secular trend rates for the Bank's private discounts and note circulation show a rise in the first period, a lesser fall in the second, yielding a net expansion for the years 1793–1847. Bullion in the Bank rises little for the first period, but sharply over the second. These movements were not continuous. Private discounts reached a peak in 1811 and fell precipitously after the wars (interrupted by the crisis of 1825–6) to a secular low point in the interval 1828–33. From then to the end of the period a secular rise appears. Total deposits at the Bank show a secular rise from 1820 onwards. The note circulation declined only slightly after the wars and maintained a fairly steady secular level until the early forties, when the bullion reserve increased to new high points (1844, 1850) and (under the terms of the Act of 1844) the note issue as well.

The average rates of change are not very informative. They indicate that the Bank financed an increased money volume of transactions in the first period; a slightly diminished volume, in net, over the second period, although an increase is evident from the early thirties at least. The reserve proportion fell in the first period, and fluctuated about a much higher level in the second period, with a clearly marked rise in the forties in the average bullion reserve and the reserve proportion.

One cannot, however, generalize from the Bank's advances to the total effective volume of money. Aside from information as to cash transactions and the velocity of circulation, one would require figures for country bank and joint-stock bank circulation, inland bills of exchange, and various kinds of book credit among manufacturers and traders before achieving even a rough approximation, And further, since the fluctuations in the volume of money tended to be so much greater than in production or prices, the use of this type of secular trend measurement is peculiarly inadequate. The role of money in the economic system can be dealt with most satisfactorily in short period terms; and that was the aim of the *Finance* sections of the *History*.

From those historical accounts and the later statistical analyses several general characteristics emerged.[1] It appeared that the latter stages of all business cycles saw some tightening of the money market, and that the upper turning-points were accompanied (usually followed) by financial crises of greater or less severity. It was concluded, nevertheless, that the upper turning-points were not precipitated essentially by inelasticity in the supply of money. At a time of general confidence the elasticity of supply seemed to be considerable. Forces outside the monetary mechanism were judged to have precipitated the upper turning-point; but these forces were all reflected in the money market, and reactions there spread and accentuated a general downward tendency. If the Bank were responsible for precipitating the upper turning-points, through a rationing of discounts and a high Bank rate, in an effort to preserve its bullion reserve, one would expect the Bank to act positively in the latter stage of expansion. In fact the Bank rate consistently lagged behind the rise in the market-rate, and rose most sharply at times of panic, well after the upper turning-point. The broadly passive action of the Bank is not final evidence against a monetary theory of the upper turning-points; but it is persuasive when placed in the whole setting of the Bank directors' view of their function. A quarter of a century after the end of our period, and long after that, Walter Bagehot and others still complained of the Bank's unwillingness to act in protection of the reserve until crisis, precipitated elsewhere, forced action upon the directors.

The central fact about the banking system in the period 1815–50 is simply that it was capable of financing booms that reached full employment; and that the failure of protracted revivals to set in (after the peaks in 1825 and 1836–9) sooner than they did can be attributed in only small part to an inelastic money supply. The most positive role of the money supply in these two periods was in reflecting, through higher money rates, the pressures consequent upon abnormal wheat imports, and a variety of other forces specific to those two relatively stagnant periods.[2] But it is our contention that none of the significant secular characteristics of the years

[1] See below, pp. 880 ff.; also above, pp. 558–63.

[2] See Vol. I, Pt. I, pp. 236–8, 298–301.

1815–50 can be traced to the money supply; in both secular periods the banking system was sufficiently flexible to permit the expression of the more profound underlying forces. That view, it should be emphasized, cannot be derived or disproved simply from an examination of the secular movements in financial data, but depends intimately on the short-period analysis previously given.

10. Labour. Statistics on money wages and real wages are seriously inadequate. The rates of growth do, however, seem to show a net fall in real wages during the first period, a net rise during the second, and a relatively more rapid increase in the consumption of tea, wine, and tobacco in the second than in the first period. This has been, broadly, the conclusion of most historians of the period.[1] But the lack of satisfactory statistical data makes it especially necessary to emphasize the usual cautions in moving from a calculated figure for real wages to wide generalization about the level of welfare. We cannot here pretend to enter the essentially sociological controversy as to the effects of growing urbanization during the period 1790–1850. It bears obviously on any statement as to the consequences for the working classes of 'the industrial revolution'. At best, however, our statements must be confined to the limited body of statistical evidence available, and the qualitative material presented in the *Labour* sections of the *History*.

There is little doubt that the rise in prices during the war outweighed, for the working classes, the rise in money incomes. The creation and persistence of the Speenhamland system is a fair symptom of this tendency. The extent to which the wage subsidies counteracted the rise in living costs is impossible to estimate; but it is almost certain that they failed to prevent a net decline in real wages from 1793 to 1815. The rate of increase of tea and tobacco consumption is, further, less than the rate of growth of the population in those years. There were, of course, intervals of greater and less pressure from the side of retail prices on real wages; but, on the whole, the working classes were probably worse off at the end of the Napoleonic Wars than in the period immediately before 1793.

Schumpeter would link this phenomenon to the Kondratieff prosperity process.[2] It can more plausibly be connected with obstructions in the supply of imported commodities, bad harvests, and the direction of new investment, as determined by the government's war needs. The monetary view would tend to regard the fall in real wages as a frictional lag of money wages behind price movements. The sharp decline from 1798 to 1800 contains, perhaps, some element of institutional lag; but the prevailing lower level throughout the war years cannot satisfactorily be attributed to such a short-period mechanism.

The most striking single fact concerning labour in the second secular period is that money wages declined, in net, very slightly; less even than

[1] See, for example, Clapham, i. 561–2; G. D. H. Cole, pp. 177–88.

[2] Op. cit. ii. 565 and 576.

food prices and much less than other retail prices.[1] This is powerful evidence against a monetary interpretation of the secular price decline; for, if monetary deflation was primarily responsible for that decline, then the prices of all factors of production should have been affected roughly together.[2] The stickiness of money wages in these years, further, cannot be attributed to trade unions or other monopolistic frictions on the supply side of the labour market. Their total influence, except in a few areas, must have been very slight. The rising tendency in real wages is the expected result of the increased productivity of labour which, it is assumed, occurred during the second secular period. The population, it is true, was increasing; but it was increasing at a lesser rate than the 'quantity of capital', as measured, for instance, by the rate of growth of iron and coal production. Had the Corn Laws not maintained an artificially high level for bread prices, it is probable that the increase in real wages would have been even more marked than, in fact, it was.

This analysis accords essentially with Schumpeter's conception of the Kondratieff depression process, although it is part of no long-wave construction. The monetary analysis in the face of this evidence would involve once again the concept of a lag in money wages behind retail prices. Tooke could maintain simply that forces tending to lower the cost of production (i.e. to shift down the long-run supply curve) of labour were less strong than for other factors of production.

[1] The wages of hand-loom weavers are, of course, an exception to this statement.

[2] Presumably an equal percentage reduction in the monetary demand for all commodities is assumed, resulting in various net price declines, depending on the relative elasticity of supply in each market.

PART II

STATISTICAL MEASUREMENT AND ANALYSIS

Chapter VI

THE MEASURES OF CYCLICAL BEHAVIOUR

1. Introduction.[1] The method of measuring cyclical behaviour used in this study has been developed over a period of years by the National Bureau of Economic Research. The technique is designed to answer the simple question: How does a given economic magnitude (e.g. imports of raw cotton) behave over time?

We examine a series to mark off peaks and troughs of movements which are of longer duration than seasonal fluctuations but not as long as secular movements. Thus a set of cycles is obtained peculiar to a given series. The method then attempts to find numerical answers to such questions as the following: How long do the cycles in the series last on the average? Is the series fairly regular or rather variable in the duration of its cycles? How widely does it fluctuate? Does the series show any clear secular trend? What sort of patterns do the movements of the series produce on the average? Does it expand at a greater rate than it contracts? Does it taper off in the later stages of its expansion or does it reverse its movement sharply and abruptly?

All these questions relate to the behaviour of a single series. They are reducible to problems of measurement involving no more than simple arithmetical computations.

In addition to a set of measures relating to a given series in isolation, another set is computed describing the behaviour of the series with reference to business cycles as a whole. The basis for this second group of measures is a set of dates marking the turning-points in general business cycles. Here again simple calculations are made to answer questions such as the following: Do the turning-points in the series under consideration typically coincide with those of business cycles? If not, by how long a period of time do they lead or lag? During what stages of a business cycle does the series usually expand and how consistent is the relationship?

When a large number of time series are analysed in this way an array of measures is obtained providing information as to the comparative behaviour of different economic processes over time. They indicate which series show significant conformity to business cycles and what the character of their relationship to business cycles is. The technique is, therefore, a fruitful

[1] For those who do not intend to follow the statistical analyses of the subsequent chapters in any great detail, the brief statement of objectives contained in this Introduction may prove a sufficient preliminary to an understanding of the more general conclusions of the text.

way of accumulating a body of information to serve as the factual basis for analytical work of a theoretical nature.

It is designed primarily to describe the cyclical behaviour of individual *monthly* time series, but with certain modifications it can be applied to annual series as well. Since for the period prior to 1850 the number of monthly series available is relatively small (except for commodity and security prices), the major portion of our analysis is applied in annual form.[1] The following description will, therefore, be carried through for a sample annual series and the modifications required for monthly analysis will be introduced where necessary. The shortcomings and interpretative qualifications arising from the use of the cruder annual time unit will be pointed out.[2]

2. Reference Dates. To learn how different economic processes behave with reference to business cycles their movements must be observed during the revivals, expansions, recessions, and contractions respectively in general business activity. Before the observations can begin, these periods in time must be marked off. Hence we have made a table of 'reference dates' showing the years of the troughs and peaks[3] of successive business cycles in Great Britain between 1790 and 1850. This table was based on a close study of all the statistical series available for the period supplemented by an examination of relevant qualitative material, largely of a contemporary nature. Of course, changes in general business activity represent processes which do not occur in a single month, and any attempt to choose a given month as marking a revival or recession must, of necessity, be somewhat arbitrary. But these 'reference dates' serve as useful bench-marks in time to which may be referred the cyclical fluctuations of various economic series. As essential tools of analysis, therefore, their use is justified.

3. Reference Cycles and Specific Cycles. Each series is broken into segments marked off by our set of reference dates,[4] giving a group of refer-

[1] About 15 per cent. of the total number of series analysed were in monthly form.

[2] This description of method is an adaptation of *The National Bureau's Measures of Cyclical Behavior* by W. C. Mitchell and A. F. Burns, Bulletin 57, National Bureau of Economic Research, July 1935. Certain revisions in the method incorporated since publication of this bulletin have been drawn from Part I of the preliminary draft of *Methods of Measuring Cyclical Behavior*, Nov. 1939. Chap. XI, Pt. III, of the latter preliminary volume, entitled 'Effects of the Time Unit upon Cyclical Measures', includes a detailed evaluation of the comparative results obtained from annual analysis.

[3] The monthly turning-points in general business conditions need not fall in the same years which represent the annual turning-points. It can readily be seen, for example, that a monthly peak may come in Jan. of the year following its annual peak. Moreover, it is possible that over a given period of time the number of reference cycles marked off by monthly dates may exceed the number marked off by annual dates. Thus the last annual reference-cycle dates for our period are a trough in 1842, a peak in 1845, and a trough in 1848. However, a close scrutiny of monthly series shows a shortlived revival from Sept. 1846 to Apr. 1847. This interval was marked off as an expansion in the monthly dates. But since the year 1847, taken as a whole, was less prosperous than 1846, no additional cycle was inserted in the annual dates.

[4] In the case of monthly series a preliminary step is the elimination of seasonal variations. The raw series is first studied to find periods during which the seasonals are

ence cycles corresponding in their dating to the timing of general business fluctuations. Then the average of the values of the series during each reference cycle is computed and the data are converted into percentages of this base. These percentages are called 'reference-cycle relatives'. The application of a uniform set of dates to all series and the reduction of the original data expressed in diverse units to relatives of their average values during the periods thus marked off put all the materials into comparable form and permit a comparison of the behaviour of different processes during successive business cycles.

In addition to breaking up a series according to reference dates, each series is marked off according to its own peculiar movements, yielding a set of 'specific cycles'. The specific cycles of a series may have turning-dates which differ little from the reference dates, or that usually lead or lag behind the reference dates by a brief or by considerable intervals, or that have no regular relationships to the reference dates. To mark off specific cycles, each series is examined for wave-like movements, the durations of which are of the same order of magnitude as those of business cycles. Not every trough and peak is taken as a specific-cycle turning-point, but discretion is exercised in distinguishing cyclical from other types of movement.[1] In most series, however, the dates of the troughs and peaks of the specific cycles are clearly defined. After the specific troughs and peaks have been chosen, the averages serve as bases for a second set of relatives, except that the new set shows movements during specific cycles.

4. Measures of Timing and Duration. The tables of reference dates yield measures of the duration of business cycles and of their phases of expansion and contraction. The dates of the cyclical turning-points in a given series yield similar measures of the duration of its specific cycles. Table 78 [A1] shows the durations in months of the specific cycles and their

fairly uniform. Seasonal indexes are then computed for each homogeneous segment. The basic method used in ascertaining average seasonal variations involves the conversion of the monthly figures into relatives of their annual averages, the averaging of these relatives for successive Jans., Febs., and so on, and adjusting these monthly averages for secular trend. The chief departures from this method occur in the case of 'moving seasonals', where the pattern shifts from one year to the next in regular fashion, and in the case of changing amplitude, where the seasonal pattern remains constant but the amplitudes vary. For a description of the detailed procedure in these cases, see Part I of the National Bureau's preliminary draft of *Methods of Measuring Cyclical Behavior*, chap. iii, pp. 12 ff.

In order to convey a quick impression of the magnitude of a series' seasonal indexes, 'average seasonal amplitudes' are computed. They are obtained by subtracting the month-by-month indexes from 100, summing the differences without regard to signs, and dividing the aggregate by 12. When several seasonal indexes are used for a given series, the average seasonal amplitude is a weighted arithmetic mean of the average amplitudes of whatever seasonal indexes are used, the weights being proportional to the number of years to which each set of seasonal indexes is applied.

[1] In marking off monthly specific-cycle turning-points there is a set of working rules which aid in distinguishing the cyclical movements from random and residual seasonal movements. The basic criterion for these rules is the duration of the movement. See Part I of the N.B.E.R.'s *Methods of Measuring Cyclical Behavior*, chap. iv, pp. 13 ff.

phases (columns 4–6) as well as the lengths of the specific-cycle phases expressed as percentages of the durations of the full cycle (columns 7–8), for annual figures of real values of exports of the produce and manufactures of the United Kingdom from 1801 to 1850.

The annual time unit is too crude to permit a systematic comparison of the timing of series in annual form with that of business cycles. For monthly series, however, timing measures are computed. By comparing the turning-points of specific cycles with the reference dates, the degree of regularity with which the specific cycles of a given series correspond in time to business cycles is determined. When the correspondence is close, figures are entered in columns 2 and 3 of Table 78 [A 1] indicating the number of months by which the troughs and peaks in the series precede or follow the reference troughs and peaks.

5. Measures of Amplitude. The average value of the home-produced exports during the first specific cycle (1803 to 1807) was £38·3 million. With that figure as a base, the values for the years covered by this cycle are converted into specific-cycle relatives. The amplitudes of the cyclical swings are measured by finding the rise of the specific-cycle relatives from the initial trough of a cycle to the peak and the fall from the peak to the terminal trough.[1] The results, therefore, show rise and fall in percentages of the average value of the series during the specific cycle that is being measured.

These amplitude measures are given by Table 79 [A 2] in three forms. Columns 2–4 show the averages of the specific-cycle relatives centred at the initial trough, peak, and terminal trough. The second set of measures, given in columns 5–7, shows the rise from trough to peak, the fall from peak to trough, and the total rise and fall; these figures are obtained directly from the entries in columns 2–4. The third set of measures, given in columns 8–10, shows the amplitude per month; they are obtained by dividing the figures in columns 5–7 of Table 79 [A 2] by the corresponding duration figures in columns 4–6 of Table 78 [A 1].

6. Measures of Secular Movements. The 'intra-cycle' trend is that portion of the secular movement which falls within the period of a single cycle. The 'inter-cycle' trend is that portion of the secular movement which extends from cycle to cycle. The former is retained in the measures of cyclical behaviour, the latter is eliminated in computing specific-cycle and reference-cycle relatives.

Table 80 [A 3] sets forth the chief facts concerning the secular movements. Columns 2 and 3 show the average value of the data during the expansions and contractions of specific cycles. Column 4 shows the average value of the data during each complete specific cycle (these are the bases on which the specific-cycle relatives are computed).[2]

[1] In order to diminish the influence of random factors upon the amplitude of monthly series, three-month averages are used centring on the troughs and peaks.

[2] In computing these averages for monthly series, expansion is taken from the

TABLE 78. A 1. *Timing and Duration of Specific Cycles: Value of Domestic Exports, 1801–50*

Dates of specific cycles			*Lead (−) or lag (+)*[a]		*Specific cycles*			*Per cent. of duration of specific cycles*	
Trough	*Peak* (1)	*Trough*	*At reference peak* (2)	*At reference trough* (3)	*Expansion (months)* (4)	*Contraction (months)* (5)	*Full cycle (months)* (6)	*Expansion* (7)	*Contraction* (8)
1803	1806	1807	..	..	36	12	48	75	25
1807	1810	1811	..	..	36	12	48	75	25
1811	1815	1816	..	..	48	12	60	80	20
1816	1818	1819	..	..	24	12	36	67	33
1819	1822	1823	..	..	36	12	48	75	25
1823	1825	1826	..	..	24	12	36	67	33
1826	1827	1829	..	..	12	24	36	33	67
1829	1830	1832	..	..	12	24	36	33	67
1832	1836	1837	..	..	48	12	60	80	20
1837	1839	1842	..	..	24	36	60	40	60
1842	1845	1846	..	..	36	12	48	75	25
1846	1847	1848	..	..	12	12	24	50	50
AVERAGE . .			..	..	29 0	16 0	45 0	62 0	38 0
AVERAGE DEVIATION.			..	..	11·0	6 0	9 5	15 8	15 8

[a] Columns 2 and 3 are blank since, as stated above, timing measures are not computed for annual series.

TABLE 79. A 2. *Amplitude of Specific Cycles: Value of Domestic Exports, 1801–50*

Dates of specific cycles			*Standing*			*Total movement*			*Movement per month*		
Trough	*Peak* (1)	*Trough*	*At initial trough* (2)	*At peak* (3)	*At terminal trough* (4)	*Rise* (5)	*Fall* (6)	*Rise and fall* (7)	*Rise* (8)	*Fall* (9)	*Rise and fall* (10)
1803	1806	1807	97	107	97	+10	−10	20	+0 3	−0 8	0 4
1807	1810	1811	92	119	81	+27	−38	65	+0 8	−3 2	1 4
1811	1815	1816	77	120	97	+43	−23	66	+0 9	−1 9	1 1
1816	1818	1819	101	113	85	+12	−28	40	+0·5	−2 3	1 1
1819	1822	1823	97	102	98	+5	−4	9	+0·1	−0 3	0 2
1823	1825	1826	98	108	87	+10	−21	31	+0·4	−1·8	0 9
1826	1827	1829	89	105	101	+16	−4	20	+1 3	−0 2	0 6
1829	1830	1832	97	104	99	+7	−5	12	+0·6	−0 2	0 3
1832	1836	1837	84	123	97	+39	−26	65	+0 8	−2 2	1 1
1837	1839	1842	85	108	96	+23	−12	35	+1 0	−0 3	0 6
1842	1845	1846	86	109	105	+23	−4	27	+0 6	−0 3	0 6
1846	1847	1848	102	104	94	+2	−10	12	+0 2	−0 8	0 5
AVERAGE . .			92 1	110 2	94 8	+18 1	−15 4	33 5	+0 6	−1·2	0 7
AVERAGE DEVIATION			6 6	5·7	5·3	10 8	9·8	17·2	0·3	0 9	0 3

The entries in the other columns are derived from these figures. Detailed account is taken of the intra-cycle portion of the trends in columns 5–6. Column 5 states the percentage rise or fall from the average level during the contraction phase to the average level during the following expansion, and column 6 states the percentage rise or fall from the average level during an expansion to the average during the following contraction. Together these columns show the height of the steps from one phase of specific cycles to the next, the width of the steps being already entered, in columns 4 and 5 of Table 78 [A 1].

For most purposes the magnitude of the intra-cycle trend can be judged sufficiently well from the line of inter-cycle trend, that is, the step-line formed by the mean levels of successive specific cycles. The percentage change from the mean level of one specific cycle to the mean level of the next is presented in column 9. Columns 7 and 8 serve as checks on column 9 and provide additional detail. Column 7 shows the percentage change from one expansion to the next, and column 8 from one contraction to the next. Columns 10–12 reduce the inter-cycle trends shown in columns 7–9 to a per month basis, the divisors being successively the number of months from the midpoint of one expansion to the midpoint of the next expansion, the mid-point of one contraction to the next, and the midpoint of a full cycle to the next.

While the measures in columns 5–12 show in a simple manner the percentage changes between successive phases or cycles, we should get biased results if we averaged these measures over a number of cycles. Assume, for example, that the average annual values of successive cycles are 80, 40, 80, 40, 80. There is, obviously, no secular trend in this series. Yet the percentage changes between successive cycles are −50, +100, −50, +100; hence the average per cent. change from cycle to cycle is +25. The result exemplifies the familiar statement that percentage changes have an 'upward bias'. But the bias disappears if we modify the computation by using the average of the two values being compared as the base of the percentage instead of the first value. On this plan the bases are uniformly 60 in the above example; the percentage changes are alternately −67 and +67, and their average is 0. We enter in column 13 percentages computed in this manner; that is, instead of using the average standing in the preceding cycle as the base, as we do in column 9, we use a simple average of the average standings in the given and preceding cycles as the base. Column 14 differs from 12 in the same way that column 13 differs from column 9. We restrict averages in Table 80 [A 3] to columns 13 and 14, because only these columns are free of 'secular bias'. In column 14 we show both weighted and unweighted averages; the former weights the rates

revival month through the peak month. (The initial trough is included in the expansion of annual series only.) Similarly, contraction for monthly series is taken from the recession through the trough. (The peak is not included in the contraction of annual series.) The full cycle extends from the revival through the trough. (Again, the initial trough of an annual series is included in the full cycle.)

TABLE 80. A 3. *Measures of Secular Movements: Value of Domestic Exports, 1801–50*

Dates of specific cycles			*Average annual standing*			*Percentage change from average of preceding phase of specific cycle*		*Percentage change from average of same phase of preceding cycle*			*Percentage change per month from average of same phase of preceding cycle*			*Percentage change from average of preceding cycle using average of given and preceding cycle as base*	
Trough	*Peak* (*1*)	*Trough*	*Expansion* (*2*)	*Contraction* (*3*)	*Full cycle* (*4*)	*Expansion* (*5*)	*Contraction* (*6*)	*Expansion* (*7*)	*Contraction* (*8*)	*Full cycle* (*9*)	*Expansion* (*10*)	*Contraction* (*11*)	*Full cycle* (*12*)	*Total* (*13*)	*Per month* (*14*)
1803	1806	1807	386	372	383		− 4								
1807	1810	1811	426	329	406	+15	−23	+10	−12	+ 6	+0·21	−0·25	+0·12	+ 6	+0·12
1811	1815	1816	431	417	428	+31	− 3	+ 1	+27	+ 5	+0·02	+0·45	+0·09	+ 5	+0·09
1816	1818	1819	433	352	413	+ 4	−19	0	−16	− 4	0·00	−0·44	−0·08	− 4	−0·08
1819	1822	1823	363	354	361	+ 3	− 2	−16	+ 1	−13	−0·38	+0·02	−0·31	−14	−0·33
1823	1825	1826	376	315	360	+ 6	−16	+ 4	−11	0	+0·10	−0·31	0·00	0	0·00
1826	1827	1829	344	363	353	+ 9	+ 6	− 9	+15	− 2	−0·30	+0·50	−0·06	− 2	−0·06
1829	1830	1832	370	368	370	+ 2	− 1	+ 8	+ 1	+ 5	+0·22	+0·03	+0·14	+ 5	+0·14
1832	1836	1837	437	421	434	+19	− 4	+18	+14	+17	+0·33	+0·21	+0·35	+16	+0·33
1837	1839	1842	485	501	493	+15	+ 3	+11	+19	+14	+0·23	+0·40	+0 23	+13	+0·22
1842	1845	1846	546	578	552	+ 9	+ 6	+13	+15	+12	+0·20	+0·25	+0·22	+11	+0·20
1846	1847	1848	583	528	565	+ 1	− 9	+ 7	− 9	+ 2	+0·19	−0 38	+0·06	+ 2	+0·06
AVERAGE														+3 5	+0·06
AVERAGE DEVIATION														6·4	0 13
WEIGHTED AVERAGE														..	+0 08

of rise between successive cycles by the intervals between their midpoints.[1]

7. Cyclical Patterns. To show the behaviour of a series during the course of its specific cycles in greater detail than in Table 79 [A 2], each specific cycle is broken into five stages, designated respectively by the roman numerals, I, III, V, VII, and IX. Stage I refers to the year of the initial trough, stage V the year of the peak, and stage IX the year of the terminal trough. Stages III and VII refer respectively to the average standing in mid-expansion and in mid-contraction.[2] The 'specific-cycle patterns' are presented in the form of specific-cycle relatives.[3]

Reference-cycle patterns are made on a similar plan; but here the five stages are marked off by the cyclical turning-dates, together with the intervening periods of expansion and contraction, of general business. By breaking each reference cycle into five stages, measures of the behaviour of different economic processes from stage to stage of business cycles are obtained. When charted the reference-cycle pattern of a series gives a vivid picture of the behaviour of a series in the course of the general business cycle.

Table 81 [A 4] illustrates how the specific-cycle patterns are made and Table 82 [B 1] how the reference-cycle patterns are made. The captions of each table indicate the manner in which the cycles are divided into stages. Table 82 [B 1] is like Table 81 [A 4], except that the dates of troughs and

[1] It is readily obtained by dividing the sum of the entries in column 13 by the number of months from the midpoints of the first to the midpoint of the last cycle in the series. In line with National Bureau procedure, no average deviation is computed for the weighted figure.

[2] These standings are computed as follows:

Number of years from turn to turn counting both	*Weight of successive values in obtaining mid-phase standing*
2	1, 1
3	0, 1, 0
4	0, 1, 1, 0
5	0, 1, 2, 1, 0
6	0, 0, 1, 1, 0, 0
7	0, 0, 1, 2, 1, 0, 0
8	0, 0, 1, 2, 2, 1, 0, 0
9	0, 0, 1, 2, 2, 2, 1, 0, 0
10	0, 0, 1, 1, 2, 2, 1, 1, 0, 0

[3] The computation of cyclical patterns as above described represents a compromise attempt to adjust to annual data a method originally derived for a nine-stage monthly analysis. For a monthly series stage I covers the three months centred on the initial 'revival', which is the month following the initial trough of the specific cycle; stage V covers the three months centred on the 'recession', which is the month following the peak; stage IX covers the three months centred on the terminal 'revival'. Stages II to IV cover successive thirds of the phase of expansion, and stages VI to VIII cover successive thirds of the contraction phase. Monthly specific-cycle patterns are obtained by averaging the specific-cycle relatives for the months included in each of these stages.

TABLE 81. A 4. *Specific-cycle Patterns: Value of Domestic Exports, 1801–50*

Dates of specific cycles			*Averages of specific-cycle relatives at five stages of cycles*				
Trough	*Peak* (*1*)	*Trough*	*I Initial trough* (*2*)	*III Mid-expansion* (*3*)	*V Peak* (*4*)	*VII Mid-contraction* (*5*)	*IX Terminal trough* (*6*)
1803	1806	1807	97	100	107	102	97
1807	1810	1811	92	104	119	100	81
1811	1815	1816	77	102	120	109	97
1816	1818	1819	101	101	113	99	85
1819	1822	1823	97	101	102	100	98
1823	1825	1826	98	107	108	98	87
1826	1827	1829	89	97	105	104	101
1829	1830	1832	97	100	104	101	99
1832	1836	1837	84	98	123	110	97
1837	1839	1842	85	102	108	104	96
1842	1845	1846	86	100	109	107	105
1846	1847	1848	102	103	104	99	94
AVERAGE . . .			92·1	101·2	110·2	102 8	94·8
AVERAGE DEVIATION .			6·6	2 0	5·7	3·4	5·3

TABLE 82. B 1. *Reference-cycle Patterns: Value of Domestic Exports, 1801–50*

Dates of reference cycles			*Averages of reference-cycle relatives at five stages of cycles*				
Trough	*Peak* (*1*)	*Trough*	*I Initial trough* (*2*)	*III Mid-expansion* (*3*)	*V Peak* (*4*)	*VII Mid-contraction* (*5*)	*IX Terminal trough* (*6*)
1801	1802	1803	99	105	112	101	90
1803	1806	1808[a]	97	100	107	98	98
1808	1810	1811	90	114	117	98	79
1811	1815	1816	77	102	120	109	97
1816	1818	1819	101	101	113	99	85
1819	1825	1826	97	101	107	97	87
1826	1828	1829	89	105	104	103	101
1829	1831	1832	97	104	101	100	99
1832	1836	1837	84	98	123	110	97
1837	1839	1842	85	102	108	104	96
1842	1845	1848	86	100	108	105	95
AVERAGE . . .			91·1	102·9	110·9	102·2	93·1
AVERAGE DEVIATION .			6·5	3·0	5·5	3·7	5·7

[a] The second reference cycle in this series corresponds in its timing to the first specific cycle. Since figures on real values of home exports are not available for years prior to 1801, that year could not be taken with any assurance as the initial trough of a specific cycle. We also have a few cases of series with one or more reference cycles beyond the last specific cycle. For example, the last specific trough in the price of leather butts falls in 1838. The series runs until 1850, but from 1838 to 1841 it rises continuously and thereafter falls without a break. Without examining figures after 1850, there is no valid basis for taking 1850 as a trough. However, two reference cycles fall in the interval 1838–50 and these were included in the reference-cycle analysis. This procedure is consistent with our aim which is not so much to obtain an exact match between specific and reference-cycle periods as to compare specific and reference-cycle behaviour over the period 1790–1850.

peaks are taken from the standard list of reference dates instead of being taken from the turning-points of specific cycles, and that the entries are expressed in units of reference-cycle relatives instead of specific-cycle relatives.

Table 83 [A 5] and Table 84 [B 2] are closely related to Tables 81 [A 4] and 82 [B 1]. The entries in Table 83 [A 5] are obtained by dividing the difference between successive figures in Table 81 [A 4] by the number of months from the middle of one stage to the middle of the next stage. Table 84 [B 2] is made from Table 82 [B 1] just as Table 83 [A 5] is made from Table 81 [A 4]; that is, the differences between successive entries in Table 82 [B 1] are divided by the number of months between the middle of one stage and the middle of the next.

8. Rates of Change per Month. In making the cyclical patterns no heed is paid to differences in duration. A very brief business cycle like that from 1801 to 1803 is broken into five stages in the same fashion as is a long cycle like that which lasted from 1819 to 1826. Similarly differences in duration are disregarded in measuring amplitudes of cyclical rise and fall, and in measuring inter-cycle trend movements.

TABLE 83. A 5. *Average Rates of Change per Month from Stage to Stage of Specific Cycles: Value of Domestic Exports, 1801–50*

Dates of specific cycles			*Rate of change per month in specific-cycle relatives from stage to stage of cycles*			
Trough	*Peak* (*1*)	*Trough*	*I–III Initial trough to mid-expansion* (*2*)	*III–V Mid-expansion to peak* (*3*)	*V–VII Peak to mid-contraction* (*4*)	*VII–IX Mid-contraction to terminal trough* (*5*)
1803	1806	1807	+0·2	+0·4	−0·8	−0·8
1807	1810	1811	+0·7	+0·8	−3·2	−3·2
1811	1815	1816	+1·0	+0·8	−1·8	−2·0
1816	1818	1819	0·0	+1·0	−2·3	−2·3
1819	1822	1823	+0·2	+0·1	−0·3	−0·3
1823	1825	1826	+0·8	+0·1	−1·7	−1·8
1826	1827	1829	+1·3	+1·3	−0·1	−0·2
1829	1830	1832	+0·5	+0·7	−0·2	−0·2
1832	1836	1837	+0·6	+1·0	−2·2	−2·2
1837	1839	1842	+1·4	+0·5	−0·2	−0·4
1842	1845	1846	+0·8	+0·5	−0·3	−0·3
1846	1847	1848	+0·2	+0·2	−0·8	−0·8
AVERAGE . .			+0·6	+0·6	−1·2	−1·2
AVERAGE DEVIATION			0·4	0·3	0·9	0·9
AVERAGE INTERVAL IN MONTHS . .			14·5	14·5	8·0	8·0

This procedure is dictated by the basic assumption that a single business cycle may be taken as a unit in describing cyclical behaviour. However, in order to study the effects of variations in this unit on the other measures, we supplement the latter with figures on rates of change per month. Thus,

for example, Table 79 [A 2] (columns 8–9) shows the rates of change per month from the troughs of specific cycles to the peaks and from the peaks to the troughs; Table 80 [A 3] (column 14) shows the rates of change per month from the average value of a series in one specific cycle to the average value in the next; and Tables 83 [A 5] and 84 [B 2] show the rates of change from stage to stage in each specific and each reference cycle.

TABLE 84. B 2. *Average Rates of Change per Month from Stage to Stage of Reference Cycles: Value of Domestic Exports, 1801–50*

Dates of reference cycles			*Rate of change per month in reference-cycle relatives from stage to stage of cycles*			
Trough	*Peak* (1)	*Trough*	*I–III Initial trough to mid-expansion* (2)	*III–V Mid-expansion to peak* (3)	*V–VII Peak to mid-contraction* (4)	*VII–IX Mid-contraction to terminal trough* (5)
1801	1802	1803	+1·0	+1·2	−1·8	−1·8
1803	1806	1808	+0·2	+0·4	−0·8	0·0
1808	1810	1811	+2·0	+0·2	−3·2	−3·2
1811	1815	1816	+1·0	+0·8	−1·8	−2 0
1816	1818	1819	0·0	+1·0	−2·3	−2·3
1819	1825	1826	+0·1	+0·2	−1·7	−1·7
1826	1828	1829	+1·3	−0 1	−0·2	−0 3
1829	1831	1832	+0·6	−0·2	−0·2	−0·2
1832	1836	1837	+0·6	+1·0	−2·2	−2·2
1837	1839	1842	+1·4	+0·5	−0·2	−0·4
1842	1845	1848	+0·8	+0·4	−0·2	−0·6
AVERAGE . .			+0·8	+0·5	−1·3	−1·3
AVERAGE DEVIATION			0·5	0·4	0·9	0·9
AVERAGE INTERVAL IN MONTHS . .			16·9	16·9	8·7	8·7

9. Measures of Conformity to Business Cycles. Comparisons between the timing and duration of specific and reference cycles show roughly whether the wave-like movements in a given series do or do not conform regularly to the waves in general business activity. Further light is shed upon this problem by the similarity or the difference between the specific-cycle and reference-cycle patterns of a series. But it is desirable to measure explicitly the varying degrees of conformity.

For this purpose we study the movements of a series from stage to stage of successive reference cycles, endeavouring to find during what reference stages the series commonly expands and during what stages it commonly contracts. If the typical period of rise is I to V or III to VII or VII to III, we say that the stages during which the series typically rises are 'associated with reference expansion'.[1] Only a V to I expansion is regarded as 'associated with reference contractions'. Whatever division of the stages seems typical of the series is applied uniformly to all the reference cycles covered by it.

[1] A III to VII expansion is regarded as a lag behind reference expansion, a VII to III expansion as a lead.

We make two sets of measures of conformity. The first set shows the average rate of change per month during the reference-cycle stages associated with reference expansion, during those associated with reference contraction, and the difference between those two rates of change. This third result is needed because some series with rapidly rising trends at times continue to advance even during the stages associated with reference contraction, and we wish to show how much, if at all, the rate of rise is accelerated during expansions in general business and retarded during contractions.

While the average rates of rise or fall shown by the first set of conformity measures are useful, they do not indicate the *regularity* with which a series responds to the stimuli of general business expansion and contraction. To bring out this feature of cyclical behaviour as well as may be, we make 'indexes of conformity'. These show uniformity or lack of uniformity in the direction of movement, but take no account of magnitude of change. When a series rises during the stages associated with reference expansion in one cycle, we mark it +100; when the series remains unchanged, we mark it 0; when it falls, we mark it −100. We cast up the algebraic sum of these entries and divide by their number. The result varies between +100 (positive conformity in all the reference cycles covered) and −100 (inverse conformity in all the cycles). An equal number of positive and inverse movements produces an index of 0. An 'expansion index' of +50 means positive conformity in 3 and inverse conformity in 1 case out of 4; one of +33 means positive conformity in 2 and inverse conformity in 1 case out of 3. For conformity during the stages associated with reference contraction we make a 'contraction index' in a similar way, but now a decline is marked +100 and a rise −100; for a decline means positive conformity to reference contractions and a rise means inverse conformity. Finally, we make indexes of conformity to business cycles as wholes. In doing this we allow for the fact that some series rise or decline throughout business cycles, but at different rates during reference expansions and contractions. We attain a preliminary 'business-cycle index' by crediting each difference between the rate of change per month during the stages associated with reference expansion and contraction with +100 when the difference is minus, with −100 when it is plus. Since this index shows merely the conformity to business cycles considered as running from trough to trough, we supplement it by another index showing conformity to business cycles considered as running from peak to peak. A weighted average of the two preliminary indexes gives us the final 'business-cycle index'. An index of +100 means that the rate of change per month during the stages associated with reference contraction is without exception algebraically lower than that of the rate of change during the next preceding and following reference expansions.

Table 85 [B 3] presents these measures for real value of exports. We read in the captions that 'expansion covers stages I–V' and that 'expansions

are related to reference expansions'. This means that the typical period of expansion of export values is from stage I to stage V of the reference cycles, that the movements of the series during these reference stages are associated with reference expansion, and that the movements from stages V to IX are associated with reference contraction. Column 2 states for each reference cycle the interval from the middle of stage I to the middle of stage V, and column 4 states the interval from the middle of stage V to the middle of stage IX. Column 3 shows the average change per month from the middle of stage I to the middle of stage V, and column 5 shows the average change per month from the middle of stage V to the middle of stage IX; the first is obtained by dividing the entries of column 2 into the differences between the standings in stages I and V as shown in Table 82 [B 1], and the second is obtained by dividing the entries of column 4 into the differences between the standings in stages V and IX. Column 6 shows the excess of the entries in column 5 over those in column 3. The average rates of change per month, which constitute our first set of conformity measures, are recorded below the entries for individual cycles in columns 3, 5, and 6.

The conformity indexes shown at the bottom of Table 85 [B 3] constitute our second set of conformity measures. The expansion index is based on the signs of the entries in column 3, the contraction index is based on

TABLE 85. B 3. *Measures of Conformity to Business Cycles: Value of Domestic Exports, 1801–50*

Expansion covers stages I–V. Expansions are related to reference expansions

Dates of reference cycles			*Average change of reference-cycle relatives during stages associated with*				*Average change for reference expansion subtracted from average change for reference contraction*
			Reference expansion		*Reference contraction*		
Trough	*Peak* (1)	*Trough*	*Interval in months* (2)	*Average change per month* (3)	*Interval in months* (4)	*Average change per month* (5)	(6)
1801	1802	1803	12	+1·1	12	−1·8	−2 9
1803	1806	1808	36	+0·3	24	−0·4	−0·7
1808	1810	1811	24	+1·1	12	−3·2	−4 3
1811	1815	1816	48	+0·9	12	−1·9	−2 8
1816	1818	1819	24	+0·5	12	−2·3	−2·8
1819	1825	1826	72	+0·1	12	−1·7	- 1 8
1826	1828	1829	24	+0 6	12	−0·2	- 0·8
1829	1831	1832	24	+ 0·2	12	−0·2	0·4
1832	1836	1837	48	+0·8	12	−2·2	3 0
1837	1839	1842	24	+1·0	36	−0·3	−1·3
1842	1845	1848	36	+0·6	36	−0·4	- 1·0
AVERAGE . . .			..	+0·7	..	−1·3	−2 0
AVERAGE DEVIATION .			..	0·3	..	0·9	1·1
INDEX OF CONFORMITY TO							
Reference expansion .			..	+100	..	..	..
Reference contraction .			..	..	..	+100	..
Business cycles (L–L) .			..	..	..	..	+100
Business cycles (H–H).			..	..	..	..	+100
All business cycles . .			..	..	..	..	+100

the signs in column 5, and the index of conformity to business cycles considered as running from peak to peak requires in most series some special computations, but in our sample series it is obvious from the distribution of signs in columns 3 and 5 that this index is +100. The index of conformity to all business cycles, or the final business-cycle index, is a weighted average of the two preliminary indexes, the weights being proportionate to the number of cycles covered by each.

10. Averages and Average Deviations. All the measures described above are made for every reference and for every specific cycle covered by a series. These figures for individual cycles show net changes produced by the interaction of cyclical fluctuations, intra-cycle trends, and random perturbations.[1] So long as the cycles are considered one at a time, there is no way of telling what part of the net changes is due to each of these three components. But when averages are struck for all the cycles covered by a series, features peculiar to single cycles tend to fade away, while features common to all the cycles tend to stand out clearly.

Averaging of this sort is a preliminary device for dealing with the problem of segregating cyclical fluctuations from random perturbations. In general, the larger the number of cycles covered by an average, the more probable it is that the random perturbations of individual cycles will cancel one another. Hence more confidence is, of course, placed in our measures of cyclical behaviour made from long series than in those made from short ones.

As a rule no attempt is made to exclude from the average measures cycles which appear out of line with the usual behaviour of a series, even when some known special factors account for the peculiar movement. Thus, for example, the cycles falling in the Napoleonic War period are included in the overall average for the cotton consumption series, despite its much more marked fluctuations during the war than after the war. Similarly, in the few cases where a single random factor warped an individual cycle out of resemblance to the other cycles of its array, it is nevertheless retained in the average. An example of the latter circumstance is the unusual peak in tea consumption in 1836 following upon the breakdown of the East India monopoly.

The justification for the inclusion of all cycles in our average measures lies in the kind of use we make of those measures. The average pattern is not taken as representative of normal (in the sense of typical) behaviour except when there is a rather high degree of homogeneity in the components of the average. Wherever the variability of a series is large, our analytic discussion runs in terms of individual cycles rather than in terms of the

[1] A rough measure of random movements was calculated for monthly series. It is based on the consistency of positive movements from stage I to stage IV and negative movements from stage V to stage VIII in the nine-point monthly specific-cycle pattern (see similar, but less detailed figures based on the five-point annual pattern in Table 83 [A 5]). The random movements of a monthly series could then be designated as either 'mild', 'moderate', 'pronounced', or 'very pronounced'. For the detailed procedure, see Part I of *Methods of Measuring Cyclical Behavior*, chap. v, pp. 23-4.

non-representative average.[1] The impact on any series of such special factors as those mentioned above is pointed out wherever known.

The statistical measures of variability used are the average deviations from our averages. These deviations are simple measures of the degree in which the figures for individual cycles in a series are clustered about the arithmetic means. Random perturbations enter prominently into the average deviations; any changes that occur in the cyclical component proper or in intra-cycle trends do likewise.[2]

11. The Charts. A neat summary picture of the cyclical behaviour of a series is provided by the standard charts of cyclical patterns.

a. The Captions. We state on the charts the number of specific and reference cycles included in the cyclical patterns, the periods covered, and the conformity indexes. In the chart showing the cyclical patterns of real value of exports, for example, there appears the legend 'Conformity: +100, +100, +100'. The first figure is always the index of conformity to reference expansions; the second is the index of conformity to reference contractions; the third is the final index of conformity to whole business cycles.

b. The Time Scales. The average durations of the specific and reference cycles are represented by the long horizontal lines above and below the cyclical patterns. The horizontal bars placed in the captions alongside the number of specific and reference cycles serve as yardsticks which mark off one year on the duration scale.

The short horizontal lines above and below these time scales show the average deviations from the average durations.

The time scales showing the average duration of specific and reference cycles are broken by five[3] vertical lines dropped from or erected at the midpoints of the stages into which we divide both sets of cycles. The distances between the vertical lines correspond to the average time intervals between the midpoints of successive cycle-stages. The verticals at turning-points are extended through the time scales in order that the eye may quickly find this stage.

c. Cyclical Patterns and Amplitude Scales. The vertical scale at the left of the chart runs in units of cycle relatives; that is, percentages of the average value of the series during a specific or a reference cycle. With the aid of this scale, the amplitude of the cycles can be read.

The two curves show the specific-cycle and reference-cycle patterns derived by averaging the standings at the successive stages into which individual cycles are divided.

The lengths of the vertical lines show the average deviations of the individual cycles from their average standings at the stages plotted.

[1] In the course of the analytic discussion, however, when it was regarded as especially desirable to have an average measure exclusive of certain cycles with strong random elements, such an average was computed.

[2] In monthly series, whatever seasonal variations escape our efforts to eliminate them are included in the average deviations.

[3] There are, of course, nine such lines for a monthly series.

d. Leads and Lags. In the case of all annual series and those monthly series in which the specific and reference cycles do not correspond to one another no leads and lags are shown. The two time scales are arbitrarily placed so that the peak (or recession) of the specific-cycle pattern and that of the reference-cycle pattern fall on the same vertical line.

When, in monthly series, the specific and reference cycles correspond to one another, the two time scales are so placed with reference to one another that they show the average lead or lag of the turning-dates of specific cycles in relation to the turning dates of business cycles.[1]

e. Uniformity of Scales. In the charts strict uniformity is maintained in both the time and the amplitude scales. Hence the features of one chart can be compared directly with the similar features of any other chart.

However, in making comparisons, it must be remembered that charts drawn from annual data show coarser time scales and lower amplitudes than charts from monthly data.

f. A Few Aids in Reading the Charts. The following points should be borne in mind in reading the charts: (1) The representative value of the patterns is indicated by the vertical lines showing average deviations and by the captions stating the number of cycles covered. (2) Even when the number of cycles is large and the average deviations are small the full significance of the patterns cannot be known without close study of the quality of the original data, the arrays from which the patterns are made, and the many measures which are computed but are not recorded on the charts. (3) In the main the differences among the charts reflect typical differences in cyclical behaviour, but to some extent they are connected with the varying periods covered by the series. (4) As already stated, the time scales show average leads or lags at reference turns only for monthly series and only when there is a one-to-one correspondence of specific and reference cycles. Identity of number of cycles is a necessary but not a sufficient condition for correspondence; thus two short specific cycles may correspond to one reference cycle and one long specific cycle to two reference cycles, yielding, in sum, an equivalent number for each type of cycle. (5) Most important of all, the amplitude of the reference-cycle pattern relative to that of the specific-cycle pattern provides a quick clue to the relationship in time of a given series to business cycles. If the turning-dates of the specific cycles are virtually coincident with the reference dates, the two patterns will be nearly the same. If the turning-dates of the specific cycles differ from the reference dates by tolerably regular intervals, the two patterns will be much alike when allowance is made for the difference in timing. But if the timing of the specific cycles is relatively independent of business cycles, then what may have been a large amplitude in the specific-cycle pattern will be obscured or disappear entirely in the reference-cycle pattern.

[1] See, for example, the chart of the average pattern of the monthly series of the market-rate of interest (figure 8 of Fig. 145*b* on p. 926).

g. Four Illustrative Charts. The charts on this page (Fig. 131) show the cyclical patterns of four series: (1) value of domestic exports of the United Kingdom; (2) market-rate of interest; (3) bullion in the Bank of England; and (4) poor-relief expenditures in England and Wales.

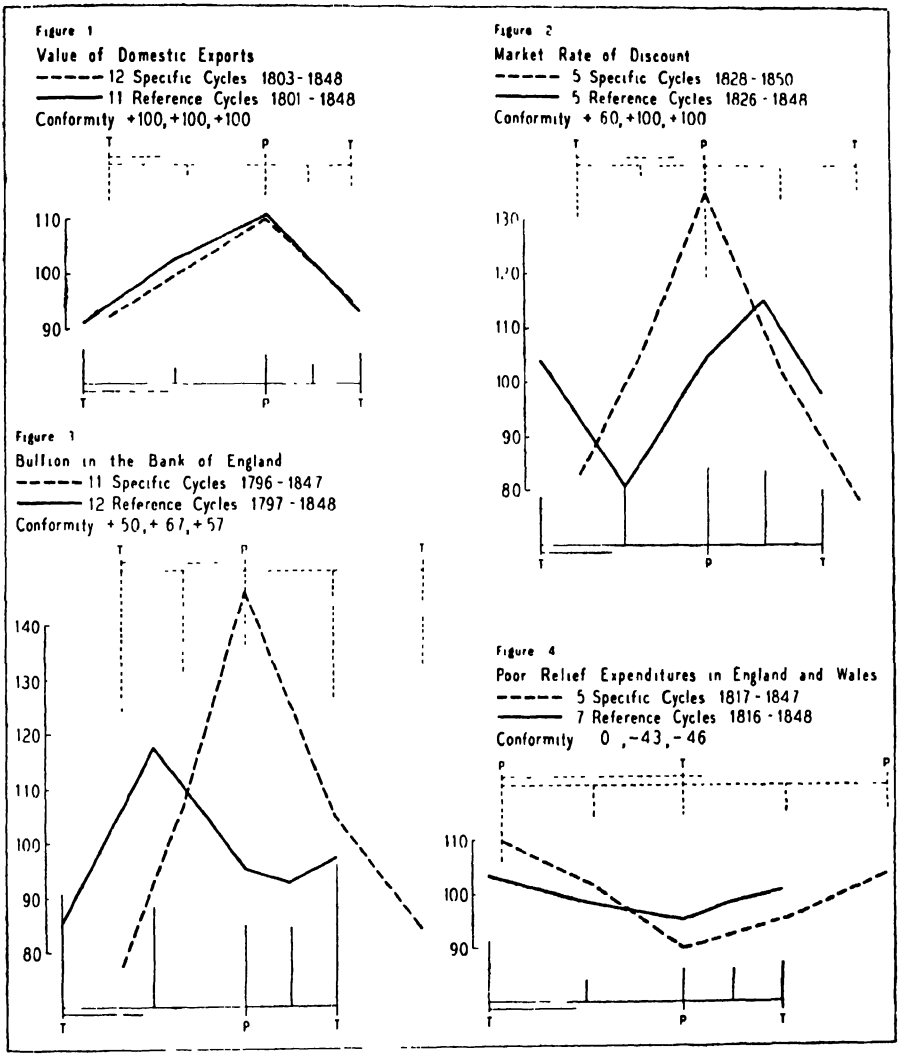


FIG. 131. Standard Charts of Cyclical Patterns

A glance at the chart of the export series reveals a close similarity in the specific- and reference-cycle patterns. This indicates a high degree of coincidence in timing between the turning-dates of this series and those of general business cycles. The intra-cycle trend factor stands out clearly in the upward tilt of the patterns. The contraction phase of the specific cycles

is briefer, but marked by a more rapid rate of movement, than the expansion phase. The average amplitude of the specific cycles is small in relation to the amplitudes of the financial series presented on the same page, and the average deviations are moderate. The average duration of the series is only slightly less than that of business cycles. Of course, the perfect I–V conformity of this series means that it is an exceptionally good indicator of general business cycles.

The interest rate series shows a very consistent conformity to business cycles, expanding fairly regularly during stages III–VII of reference cycles and uniformly recording a net fall during stages VII–III. (Note the +60 conformity to reference expansions and the +100 conformity to reference contractions.) The rate of rise in the interest rate during stage III–V is greater than the rate of rise in stage V–VII. The specific cycles show on the average rather large amplitude and somewhat longer contractions than expansions.

The bullion series has a cyclical pattern which declines through stages III–VII of business cycles. It thus shows a relationship to business cycles exactly opposite to that of the market-rate of interest which expands from stages III–VII. The drain on the Bank's bullion reserve is revealed as more rapid during the latter stages of general business expansion than in the early stages of contraction. The conformity to the general pattern is, however, only moderate. The specific-cycle pattern shows a rather wide average amplitude. Its slight upward tilt, indicative of a net increase in the bullion reserve for the period, stands out in contrast to the slight net downward trend in the interest rate series. In any such comparison, however, account must be taken of the different periods to which the respective patterns of the two series refer.

Cycles in poor-law expenditure are much longer on the average than business cycles and are rather mild in amplitude. The reference-cycle pattern reveals a rise through the contraction (stages V–IX) in general business and a fall through the expansion (stages I–V). Though this inverse pattern conforms to expectations, there is little consistency in the behaviour of this series during general business expansions and only mild conformity to its average reference-cycle pattern during business contractions. It is obvious that relief expenditures do not constitute a good indicator of general business fluctuations.

12. Summary Tables and Charts of Original Data. Each of the following five chapters is accompanied by three sections of charts and tables; summary tables of the cyclical behaviour of the individual series analysed precede each chapter; charts of original data and charts of their average patterns of cyclical behaviour are dispersed throughout the text. The charts of the average patterns have already been discussed; a few comments are now in order on the original data charts and the summary tables.

The charts of original data are plotted on a geometric scale. Specific-cycle

turning-points are indicated by crosses enclosed in circles, reference-cycle troughs by solid lines, and reference-cycle peaks by dotted lines.[1] None of the charts begins before 1790 nor ends later than 1850. For a number of series, however, the cyclical analysis is based on an initial turning-date which precedes 1790 by a year or two and/or a final turning-date which extends somewhat beyond 1850. The exact initial and terminal dates for these series are, of course, given in both the summary tables and in the specific-cycle dating in the captions of the average patterns.

The summary tables of cyclical behaviour have been compiled from more detailed tables such as are presented above for the illustrative series on the value of domestic exports. The illustrative tables give cycle-by-cycle measures as well as average measures, whereas the summary tables present only averages. When a series is analysed on an inverted basis, an 'i' is placed alongside its specific-cycle dates in the table. For inverted series 'expansion' on the specific-cycle tables refers, of course, to contraction, 'contraction' to expansion; similarly a rise refers to a fall, and a fall to a rise.

[1] In the case of the original data charts of quarterly series the reference date lines are placed in the exact month in which they fall, though in the cyclical analysis the reference turning-points were uniformly taken in the middle of the quarter.

TABLE 86*a*

Measures of Average Cyclical Behaviour: Production Series

Specific-cycle behaviour	(1) *Hoffmann's index of total production*	(2) *Hoffmann's index of consumers' goods production*	(3) *Hoffmann's index of producers' goods production*	(4) *Kondratieff's index of textile production*
PERIOD COVERED	1794–1847	1794–1847	1794–1849	1803–50
NUMBER OF CYCLES	12	12	12	13
AVERAGE DURATION (in months)				
Expansion	38·0 (15·0)	37·0 (13·5)	38·0 (16·3)	26·8 (15·4)
Contraction	15·0 (5·0)	16·0 (6·0)	17·0 (5·8)	16·6 (6·4)
Full cycle	53·0 (16·7)	53·0 (13·8)	55·0 (18·2)	43·4 (17·6)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	17·5 (6·6)	18·4 (5·3)	21·9 (7·4)	35·1 (13·8)
Fall	5·2 (2·0)	7·8 (3·9)	5·9 (3·6)	21·2 (11·5)
Rise and fall	22·8 (8·2)	26·2 (8·5)	27·8 (8·5)	56·3 (17·8)
Movement per month				
Rise	0·5 (0·1)	0·6 (0·2)	0·7 (0·3)	1·7 (0·7)
Fall	0·4 (0·2)	0·5 (0·3)	0·3 (0·2)	1·3 (0·6)
Rise and fall	0·4 (0·1)	0·5 (0·1)	0·6 (0·2)	1·5 (0·5)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	90·7 (3·4)	90·6 (2·6)	87·5 (4·4)	84·4 (8·5)
„ III	99·5 (1·9)	99·7 (1·7)	99·1 (2·9)	100·5 (5·0)
„ V	108·2 (3·7)	109·0 (3·0)	109·4 (3·4)	119·5 (6·0)
„ VII	105·2 (3·3)	105·2 (2·4)	106·0 (3·5)	106 0 (6·8)
„ IX	102·9 (2·8)	101·2 (2·8)	103·5 (4·8)	98·2 (8·5)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·5 (0·2)	+0·6 (0·3)	+0·8 (0·3)	+1·6 (0·8)
„ III to V	+0·4 (0·2)	+0·5 (0·2)	+0·7 (0·4)	+1·8 (0·7)
„ V to VII	−0·4 (0·2)	−0·5 (0·3)	−0·4 (0·3)	−1·5 (0·7)
„ VII to IX	−0·3 (0·2)	−0·5 (0·3)	−0·3 (0·2)	−1·1 (0·7)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+13·1 (5·0)	+12·3 (2·5)	+16·5 (8·8)	+16·4 (8·6)
Weighted average change per month from cycle to cycle	+0·24	+0·23	+0·29	+0·37

TABLE 86*a* (*cont.*)

Measures of Average Cyclical Behaviour: Production Series

(5)	(6)	(7)	(8)	(9)
Stocks of raw cotton	*Consumption of raw cotton*	*Woollen broad cloth milled in the West Riding*	*Woollen narrow cloth milled in the West Riding*	*Production of bricks*
1826–51	1791–1847	1793–1819	1794–1819	1798–1848
5	17	6	6	8
33·6 (21·1)	24·0 (11·3)	26·0 (6·7)	32·0 (12·0)	45·0 (12·0)
26·4 (8·6)	15·5 (5·8)	26·0 (3·3)	18·0 (6·0)	30·0 (12·0)
60·0 (14·4)	39·5 (13·9)	52·0 (8·0)	50·0 (11·3)	75·0 (18·8)
52·2 (35·0)	42·4 (19·8)	20·0 (8·0)	25·5 (7·5)	42·2 (22·0)
42·0 (23·6)	28·6 (16·7)	17·2 (6·8)	24·3 (11·8)	30·5 (14·8)
94·2 (54·2)	71·0 (28·7)	37·2 (9·3)	49·8 (14·8)	72·8 (27·6)
1·5 (0·8)	2·1 (1·1)	0·8 (0·3)	1·0 (0·5)	0·9 (0·4)
1·9 (1·2)	2·0 (1·1)	0·6 (0·2)	1·6 (1·1)	1·3 (0·8)
1·5 (0·7)	1·9 (0·8)	0·7 (0·1)	1·1 (0·5)	1·0 (0·4)
78·8 (15·8)	81·4 (11·4)	92·0 (5·3)	88·8 (4·9)	81·8 (13·2)
101·8 (4·6)	102·2 (6·2)	102·8 (1·8)	103·2 (3·5)	98·8 (7·0)
131·0 (19·2)	123·8 (10·0)	112·0 (3·7)	114·3 (4·3)	124·0 (9·5)
106·0 (8·8)	107·1 (6·9)	100·3 (2·9)	103·8 (3·9)	104·4 (7·9)
89·0 (13·6)	95·2 (11·0)	94·8 (5·2)	90·0 (9·0)	93·5 (10·6)
+1·5 (0·7)	+2·1 (1·1)	+0·8 (0·4)	+1·2 (0·7)	+0·7 (0·3)
+1·6 (0·9)	+2·2 (1·1)	+0·7 (0·2)	+0·8 (0·4)	+1·1 (0·7)
−2·2 (1·8)	−2·1 (1·1)	−0·9 (0·3)	−1·4 (1·1)	−1·5 (0·9)
−1·5 (0·8)	−1·8 (1·2)	−0·4 (0·4)	−1·7 (1·0)	−1·0 (0·7)
+11·2 (34·4)	+18·9 (12·8)	+3·4 (9·5)	−1·0 (5·2)	+11·7 (10·0)
+0·17	+0·47	+0·06	−0·02	+0·16

[*Continued*

TABLE 86*a* (*cont.*)

Measures of Average Cyclical Behaviour: Production Series

Specific-cycle behaviour	(10) *Production of tin*	(11) *Production of copper in Cornwall*	(12) *Production of copper in the United Kingdom*	(13) *Tonnage of ships built and registered in the United Kingdom*
PERIOD COVERED	1793–1836	1799–1850	1823–47	1817–49
NUMBER OF CYCLES	12	12	5	5
AVERAGE DURATION (in months)				
Expansion	20·0 (9·3)	32·0 (9·3)	31·2 (20·2)	43·2 (10·6)
Contraction	23·0 (12·8)	19·0 (7·0)	26·4 (8·6)	33·6 (12·5)
Full cycle	43·0 (18·5)	51·0 (10·0)	57·6 (7·7)	76·8 (10·6)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	19·6 (13·8)	17·2 (8·4)	15·6 (4·3)	55·8 (23·0)
Fall	17·8 (10·6)	10·2 (5·2)	9·0 (2·8)	50 8 (17·8)
Rise and fall	37·4 (20·2)	27·5 (9·2)	24·6 (2·1)	106·6 (39·9)
Movement per month				
Rise	1·0 (0·5)	0·5 (0·2)	0·5 (0·1)	1·3 (0 6)
Fall	0·8 (0·3)	0·6 (0·3)	0·4 (0·2)	1·7 (0 7)
Rise and fall	0·9 (0·3)	0·5 (0·2)	0·4 (0·1)	1·4 (0·3)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I.	92·6 (9·6)	92·2 (5·9)	92·6 (4 6)	77·4 (16·1)
,, III	101·7 (4·0)	99·1 (2·4)	100·4 (4·1)	103·4 (9·3)
,, V	112·2 (6·2)	109·5 (3·7)	108·2 (1·8)	133·2 (9·0)
,, VII	102·9 (5·1)	103·2 (3·6)	104·2 (4·2)	102·2 (6·2)
,, IX	94·3 (7·4)	99·2 (4·5)	99·2 (3·9)	82·4 (14·3)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·9 (0·5)	+0·4 (0·3)	+0·5 (0·2)	+1·2 (0 5)
,, III to V	+1·0 (0·7)	+0·6 (0·3)	+0·5 (0·2)	+1 4 (0·7)
,, V to VII	−0·9 (0·4)	−0·6 (0·3)	−0·3 (0·2)	−2·1 (0·5)
,, VII to IX	−0·8 (0·4)	−0·5 (0·3)	−0·5 (0·4)	−1·4 (1·0)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+1·2 (11·9)	+7·6 (7·3)	+6·5 (7 0)	+11·8 (18 8)
Weighted average change per month from cycle to cycle	+0·03	+0·15	+0·11	+0·15

TABLE 86*a* (*cont.*)

Measures of Average Cyclical Behaviour: Production Series

(14) *Beveridge's index of total industrial activity*	(15) *Beveridge's sub-index of textile activity*	(16) *Beveridge's sub-index of construction activity*	(17) *Beveridge's sub-index of other industrial activity*
1795–1849	1793–1851	1795–1849	1795–1849
14	16	12	16
24·0 (10·3)	22·5 (5·2)	29·0 (15·0)	19·5 (8·4)
22·3 (10·3)	21·0 (10·1)	25·0 (11·3)	21·0 (10·1)
46·3 (10·8)	43·5 (10·5)	54·0 (20·0)	40·5 (13·8)
13·7 (10·5)	19·8 (10·8)	28·2 (20·8)	7·4 (5·4)
14·0 (6·7)	19·5 (9·2)	29·5 (15·8)	7·5 (3·9)
27·7 (13·1)	39·2 (16·4)	57·8 (31·9)	14·9 (7·6)
0·5 (0·3)	0·9 (0·4)	0·8 (0·4)	0·4 (0·3)
0 7 (0·4)	1·2 (0·8)	1·3 (0·5)	0·4 (0·2)
0 6 (0·2)	1·0 (0·5)	1·0 (0·4)	0·4 (0·2)
95·7 (6·5)	91·8 (6·6)	91·2 (12·4)	97·7 (3·2)
101·7 (2·9)	103·3 (2·8)	103·5 (3·9)	100·6 (1·8)
109·4 (4·3)	111·6 (5·0)	119·5 (10·6)	105·1 (2·8)
102·1 (2·7)	102·2 (2·6)	101·0 (4·8)	101·1 (2·0)
95 4 (4·6)	92·1 (6·2)	90·0 (8·8)	97·6 (2·7)
+0·4 (0·2)	+1·0 (0·6)	+0·8 (0·4)	+0·3 (0·2)
+0·5 (0·4)	+0·8 (0·4)	+0·9 (0·4)	+0·5 (0·4)
−0 8 (0·5)	−1·2 (0·9)	−1·4 (0·6)	−0·4 (0·2)
−0·7 (0·5)	−1·2 (0·8)	−1·1 (0·6)	−0·4 (0·2)
+0·6 (4·9)	+0·1 (5·3)	+0·7 (10·6)	+0·6 (2·6)
+0·01	0·00	+0·01	+0·01

TABLE 86*b*

Measures of Average Cyclical Behaviour: Production Series

Reference-cycle behaviour	(1) *Hoffmann's index of total production*	(2) *Hoffmann's index of consumers' goods production*	(3) *Hoffmann's index of producers' goods production*	(4) *Kondratieff's index of textile production*
PERIOD COVERED	1793–1848	1793–1848	1793–1848	1801–48
NUMBER OF CYCLES	13	13	13	11
AVERAGE STANDINGS OF RELATIVES IN				
Stage I.	91·8 (4·0)	92·0 (3·7)	91·9 (6·4)	87·3 (9·2)
„ III	98·2 (2·0)	99·5 (2·0)	95·8 (2·6)	100·7 (5·6)
„ V	106·0 (3·4)	106·8 (3·8)	105·0 (4·5)	112·5 (12·3)
„ VII	105·3 (2·4)	104·5 (3·2)	106·5 (5·0)	108·8 (8·7)
„ IX	103·2 (2·4)	102·7 (2·8)	106·9 (7·0)	104·2 (6·7)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·4 (0·3)	+0·5 (0·3)	+0·3 (0·3)	+1·0 (0·9)
„ III to V	+0 4 (0·2)	+0·4 (0·2)	+0·5 (0·2)	+0 6 (0·9)
„ V to VII	−0·1 (0·3)	−0·3 (0·4)	+0·1 (0·4)	−0·6 (1·0)
„ VII to IX	−0·2 (0·3)	−0 3 (0·4)	0·0 (0·5)	−0·9 (1·1)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	I–V	I–V	I–V
Average change per month of relatives during stages matched with				
Reference expansion	+0·4 (0·2)	+0·5 (0·2)	+0·4 (0·2)	+0·8 (0·6)
Reference contraction	−0·2 (0·2)	−0·3 (0·3)	0·0 (0·4)	−0·7 (0·7)
Indexes of conformity to				
Reference expansion	+100	+100	+100	+82
Reference contraction	+ 54	+ 69	0	+82
Business cycles	+ 72	+ 84	+ 52	+90

TABLE 86*b* (*cont.*)

Measures of Average Cyclical Behaviour: Production Series

(5)	(6)	(7)	(8)	(9)
Stocks of raw cotton	*Consumption of raw cotton*	*Woollen broad cloth milled in the West Riding*	*Woollen narrow cloth milled in the West Riding*	*Production of bricks*
1826–48	1793–1848	1793–1819	1793–1819	1793–1848
5	13	7	7	13
87·0 (12·8)	81·3 (12·3)	94·7 (5·5)	92·9 (6·7)	97 5 (12·7)
105·4 (13·7)	99·8 (7·2)	104·6 (5·3)	102·0 (2·3)	93·3 (6·7)
110·0 (19·6)	116·4 (14·7)	102·4 (5·7)	110·1 (5·9)	109·1 (10·9)
100·2 (13·8)	113·5 (9·3)	98·3 (6·3)	102·0 (4·0)	108·0 (12·5)
100·8 (20·2)	104·5 (9·3)	97·4 (5·6)	95 1 (10·4)	101·3 (13·3)
+1·4 (1·4)	+1·4 (1·1)	+0·6 (0·2)	+0·7 (0 6)	−0·2 (0·6)
0·0 (1·2)	+0·9 (1·3)	−0·2 (0·6)	+0·5 (0·2)	+0·8 (0·6)
−0·9 (1·8)	−0·8 (1·4)	−0·6 (0·4)	−1·3 (1·1)	−0·3 (1·0)
−0 3 (0·8)	−1·2 (1·4)	−0·2 (0·5)	−1·1 (1 2)	−0·6 (1·1)
I–V	I–V	VII–III	I–V	I–V
+0·7 (0·7)	+1·2 (0·9)	+0·4 (0 3)	+0·6 (0·4)	+0·3 (0 6)
−0 6 (1·2)	−1·0 (1·1)	−0 3 (0 5)	−1·2 (1·2)	- 0 6 (0·9)
+80	+85	+71	+100	+54
+40	+54	+14	+ 57	+23
+78	+84	+38	+ 69	+ 28

[*Continued*

TABLE 86*b* (*cont.*)

Measures of Average Cyclical Behaviour: Production Series

Reference-cycle behaviour	(10) *Production of tin*	(11) *Production of copper in Cornwall*	(12) *Production of copper in the United Kingdom*	(13) *Tonnage of ships built and registered in the United Kingdom*
PERIOD COVERED	1793–1837	1797–1848	1826–48	1816–48
NUMBER OF CYCLES	11	12	5	7
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	98·1 (7·7)	95·0 (6·2)	96·8 (7·0)	100·9 (11·8)
„ III	101·1 (7·5)	100·7 (11·6)	99·0 (2·4)	89·6 (10·0)
„ V	100·6 (6·3)	102·6 (5·1)	105·6 (1·4)	106·9 (13·2)
„ VII	101·0 (8·0)	101·2 (3·1)	102·2 (3·4)	111·4 (11·9)
„ IX	102·3 (11·6)	102·2 (5·2)	102·0 (4·0)	107·4 (17·3)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·3 (0·6)	+0·3 (0·3)	+0 2 (0·5)	−0·5 (1·0)
„ III to V	−0·2 (0·7)	+0·1 (0·5)	+0·4 (0·2)	+0·8 (0·8)
„ V to VII	+0·2 (0·9)	0·0 (0·4)	−0·2 (0·2)	+0·6 (0·9)
„ VII to IX	+0·2 (0·8)	+0·1 (0·4)	−0·1 (0·1)	+0·1 (1·2)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	VII–III	VII–III	I–V	III–VII
Average change per month of relatives during stages matched with				
Reference expansion	+0·2 (0·4)	+0 2 (0·2)	+0·3 (0·3)	+0·6 (0·5)
Reference contraction	−0·1 (0·6)	0·0 (0·3)	−0·2 (0·1)	−0·3 (1·1)
Indexes of conformity to				
Reference expansion	+27	+58	+60	+71
Reference contraction	+27	0	+80	+43
Business cycles	+24	+26	+78	+38

TABLE 86*b* (*cont.*)

Measures of Average Cyclical Behaviour: Production Series

(14) *Beveridge's index of total industrial activity*	(15) *Beveridge's sub-index of textile activity*	(16) *Beveridge's sub-index of construction activity*	(17) *Beveridge's sub-index of other industrial activity*
1793–1848	1793–1848	1793–1848	1793–1848
13	13	13	13
96·3 (6·0)	91·7 (7·2)	99·8 (14·8)	97 9 (2 7)
99·7 (3·3)	105·5 (3·3)	94·6 (5 4)	99·3 (3·0)
108·2 (5·9)	109·5 (7·8)	109 5 (9·7)	104·4 (3·6)
103·2 (4·9)	101·5 (4·1)	106·6 (11·0)	101·8 (3·4)
95·6 (6·2)	92·2 (6 6)	97·4 (14·9)	98·1 (3·1)
+0·3 (0·4)	+0 9 (0·7)	−0·2 (0·7)	+0·1 (0·2)
+0·5 (0·5)	+0·2 (0·5)	+0·8 (0 7)	+0·3 (0·4)
−0·8 (0·6)	−1 2 (0·9)	−0 5 (0·9)	−0·4 (0·3)
−0·9 (0 4)	−1·3 (0 9)	−0·9 (1·1)	−0·5 (0·2)
I–V	I–V	I–V	I–V
+0 4 (0 3)	+0·6 (0·5)	+0·3 (0·7)	+0 2 (0 2)
−0·9 (0·5)	−1·3 (0·8)	−0·7 (0·8)	−0·4 (0 3)
+46	+62	+23	+54
+92	+85	+46	+85
+92	+84	+60	+92

Chapter VII

CYCLICAL PATTERNS RELATING TO PRODUCTION

Introduction. No statistics for Great Britain from 1790 to 1850 are less adequate than the data on production, with the exception of unemployment. This lack is accentuated by the institutional bias of most historians of specific industries in these years. Questions as to the nature of the markets in which products were sold and other matters relevant to an explanation of cyclical behaviour are left largely unanswered. The following analyses, therefore, are severely limited by a simple meagreness of information.

Broadly three types of cycles emerge in the thirteen series examined. The shortest of these averages about 40 months. In two cases (raw cotton consumption and the Kondratieff index) this stems directly from the average behaviour of raw cotton imports. The other cycle of this type (tin mined) is probably less significant, the average duration being compounded of a much less regular pattern than for the textile series. The Hoffmann indexes, as well as the West Riding wool-production series, exhibit an average duration of approximately 53–5 months, a figure which conforms to the average length of reference cycles. The brick-production series exhibits an extremely long average cycle of 75 months. There is no uniform relation between the average durations and average amplitudes of these three types. Exceedingly large amplitudes appear in the two extreme cases: the series dominated by cotton imports and shipping tonnage built.

All production series with the exception of narrow cloth milled contain a net upward secular trend for the period covered. With but two exceptions an upward secular trend emerges as a result of both shorter durations and lesser amplitudes in contraction than in expansion.[1] Cotton consumption shows the greatest upward trend, although the Hoffmann index of producers' goods has a greater upward trend than the index of consumers' goods (which contains cotton consumption). The phenomenal growth of iron and, to a lesser extent, coal production in the latter decades of the period accounts largely for this divergence in the rate of trend movement. Despite their growing relative importance, producers' goods receive in the Hoffmann index of total production a lesser weight than consumers' goods. That index, then, more closely resembles his estimates for consumers' than for producers' goods output.

With but three exceptions all production series in net expand in stages I–V and contract in stages V–IX, that is, they conform roughly to general

[1] These exceptions are the greater amplitudes of fall in yards of narrow cloth milled, and the greater duration of fall for tin mined.

cyclical movements. Conformity is somewhat better for the expansion than for the contraction stages, as would be expected under conditions of rising secular trend. The exceptions are broad cloth milled (VII–III), tin and copper mined in Cornwall (VII–III). The case for matching stages VII–III, however, with reference expansions is only very slightly better than for I–V in these cases. And, so far as can be discovered, these VII–III patterns do not have any general analytic significance.

Perhaps the most significant distinction to be drawn from the cyclical analysis of these series is the tendency for the producers' goods index and brick production to show a much more marked expansion in stage III–V than in stage I–III. The consumers' goods index, as well as both wool series and cotton consumption, exhibit greater increases in stage I–III than in stage III–V. This divergent behaviour when supplemented with evidence on the volume of exports (which, like consumers' goods, shows a greater I–III than III–V expansion) indicates important relationships for which a general theory of business cycles in this period must attempt to account.

The behaviour of the brick-production series, further, when combined with other information on domestic investment, led to our distinction between cycles characterized by large increases in new construction and those characterized by slight increases or actual declines in new construction. The reference cycles, on that basis, can be divided as follows into 'major' and 'minor' cycles:

Reference Cycles

'Major'	*'Minor'*
1797–1801	1793–7
1801–3	1803–8
1808–11	1811–16
1816–19	1826–9
1819–26	1829–32
1832–7	1837–42
1842–8	

If full data were available defining its initial trough, a reference cycle with a peak in 1792 would, probably, be designated as a major cycle. Its latter stages (like cycles with peaks in 1825, 1836, and 1845) were marked by large-scale new investment at home, which took, in the early 1790's, the form of a canal building boom.[1] The dating of the next major cycle is more properly 1797–1803 than 1797–1801. The downward movement in 1800–1 produced relatively slight declines in the series which reflect the decline at all, while several important series (e.g. bricks and the volume of total exports) show a continuous upward movement through that short reference cycle. Not until 1802 is it probable that the recovery forces which began to operate in 1798 had worked themselves out. The cycle 1797–1801

[1] See Vol. I, Pt. I, pp. 13 ff. 1788 can best be regarded, on the evidence available, as the trough in the cycle the peak of which came in 1792.

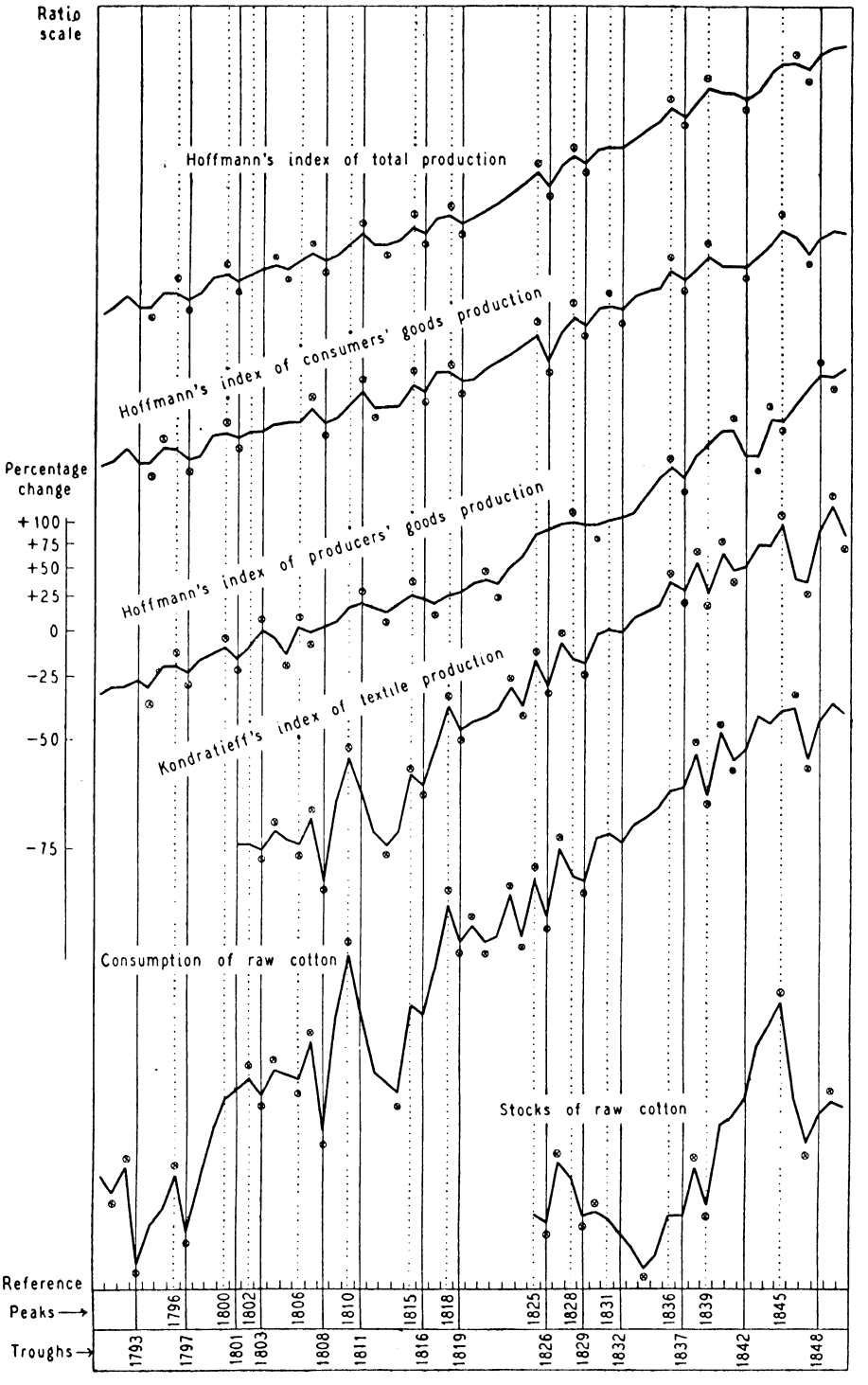


FIG. 132*a*. Production Series

might be viewed as the early stages of a major cycle, parallel, for example, to the period 1819–23. The analytic hypothesis which underlies this grouping of business cycles, and the full evidence for it, is presented in the first three chapters of the first part of this volume. It is suggested that, throughout the statistical analyses which follow, the reader bear in mind this distinction as among the cycles.

1. Hoffmann's Index of Total Production

Hoffmann's index of total output is derived from two sub-indexes: production of producers' goods and production of consumers' goods. Producers' goods production has a weight of approximately 40 per cent. in the total index. The movements of the total, therefore, are more nearly like consumers' goods production, as are all of its cyclical characteristics. The cyclical pattern is regularly one of expansion during stages I–V, and, with but two exceptions out of thirteen (1802–3, 1810–11), absolute contraction during stages V–IX. A more detailed analysis of the behaviour of Hoffmann's production index can best be carried on in terms of its two components which are discussed below.

2. Hoffmann's Index of Consumers' Goods Production

Specific-cycle Behaviour. The average duration of expansion is more than twice as long as that of contraction, and the average amplitudes of the two phases show a similar relationship. This indicates that the average per-month movement in the two phases is roughly similar, and that there is a strong upward secular trend.

Reference-cycle Behaviour. The duration of the specific-cycle expansion is somewhat greater than the reference-cycle expansion. This is due simply to the fact that the series does not exhibit a cyclical peak corresponding to the reference peak in 1802, but moves upward, at irregular rates, from a trough in 1801 to a peak in 1807. The rate of rise during reference expansions slightly exceeds the rate of decline during reference contractions. The average rate of rise in the first stage of expansion (I–III) is slightly greater than in the second stage (III–V).

The average reference-cycle pattern shows clearly I–V stages of expansion. The average change-per-month figures indicate, further, that this index of consumers' goods production conforms positively to cyclical expansions, contractions, and full cycles. The expansion index shows invariable positive conformity; the contraction index shows positive conformity in ten cycles out of thirteen; the total business-cycle index fails to show perfect conformity, because, in the cycle 1808–11, there is an increase from 1810 to 1811 (a reference contraction), which produces a counter-cyclical change. The average per-month rise in this cyclical contraction is, in fact, greater than the average per-month rise in either the

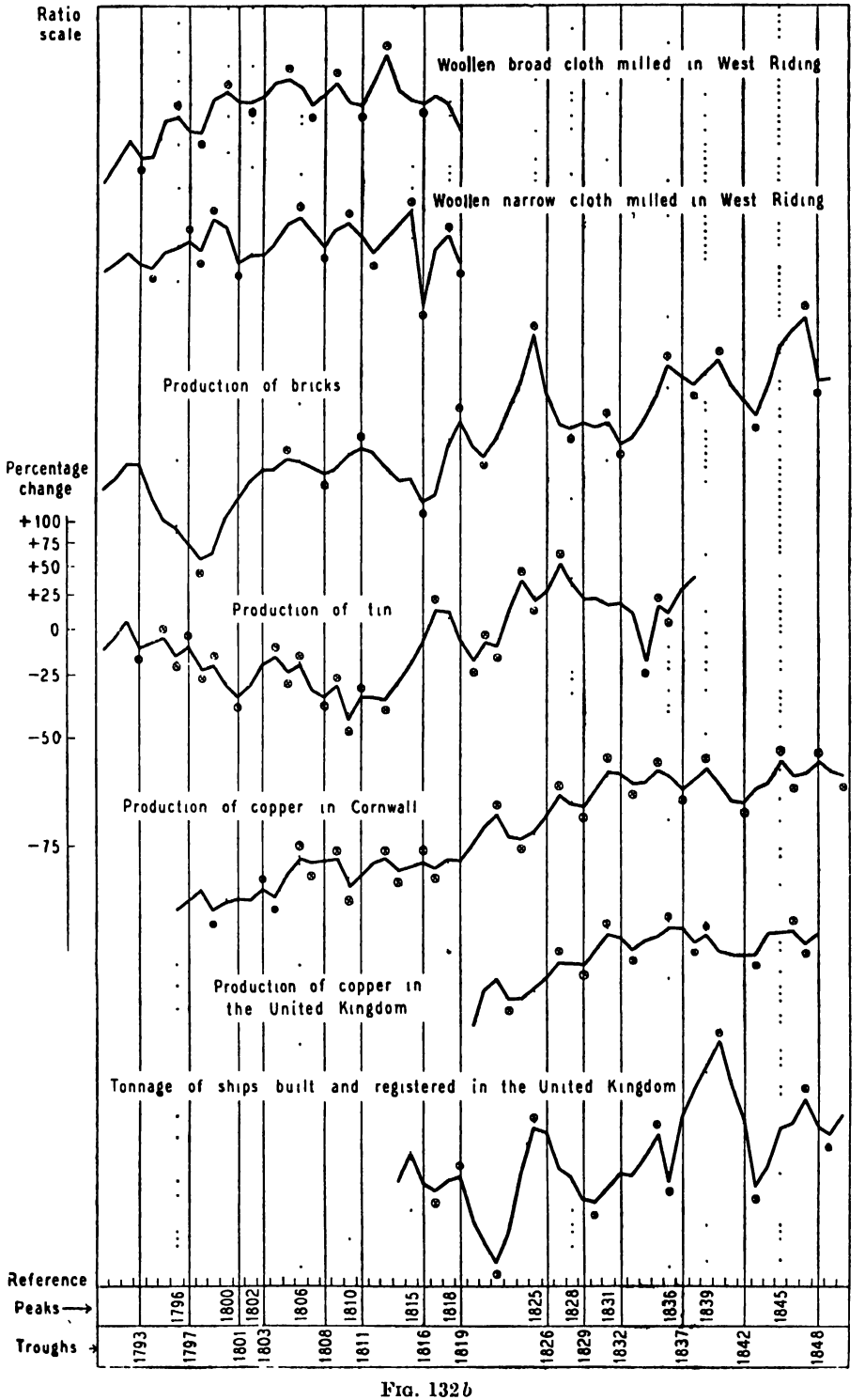

Ratio scale
Woollen broad cloth milled in West Riding
Woollen narrow cloth milled in West Riding
Production of bricks
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Production of tin
Production of copper in Cornwall
Production of copper in the United Kingdom
Tonnage of ships built and registered in the United Kingdom
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

Fig. 132*b*

preceding (1808–10) or the following (1811–15) expansion. This rise is almost certainly a flaw in the Hoffmann index.[1]

Ten specific-cycle troughs coincide with reference-cycle troughs, and three differ; nine specific-cycle peaks coincide, and three differ.[2] A reference trough has been established for the year 1793. The consumers' goods index exhibits no movement between 1793 and 1794, and, following the practice of the National Bureau of Economic Research, the later date has been taken as the specific-cycle trough. The constant figure for those two years in the Hoffmann index represents an average of diverse movements among the component series. The absence of a trough in 1811 has already been remarked. The final lack of coincidence among the troughs occurs in 1848. The consumers' goods index, like raw-cotton consumption (which probably controls it at this point), reaches a low point in 1847. In setting reference dates it was, however, judged that the rise, from 1847 to 1848, in cotton consumption did not represent a sufficiently significant increase in cotton goods output and employment to justify setting the reference trough in 1847.

The index reaches a peak in 1795, declines slightly to 1796, and sharply to 1797. The reference contraction, however, runs only from 1796 to 1797. Cotton consumption and export series show a clearly marked peak in 1796, and the reference date at that point depends, in some measure, on those data. Both woollen broad and narrow cloth milled in the West Riding (components of the Hoffmann index), however, decline from 1795 to 1796; and their fall probably explains the slight net fall in the index. The failure of a peak to appear in 1802 has already been noted. The index rises, with reference expansion, from 1801 to 1802; but the inverse movement of cotton consumption and narrow cloth milled in the West Riding from 1802 to 1803 might possibly have yielded Hoffmann a constant figure for those two years. In 1807 the index shows a peak, whereas the relevant reference peak has been marked off in 1806. A sharp rise in cotton consumption in 1807 almost certainly explains this lack of conformity. The bulk of the evidence on output in the textile industries (including cotton and wool exports, and the West Riding series) seemed to indicate a contraction from 1806 to 1807. The increase in imports was probably a speculative phenomenon called forth by the fears of raw-material shortage inspired by the Napoleonic decrees at the end of 1806 and the growing difficulties with the United States.[3] The failure of the index to conform to the reference timing in its movement from 1810 to 1811 has already been noted.

In this analysis we have regarded the Hoffmann consumers' goods index as virtually a textile production index. That view is justified by the

[1] See Vol. I, Pt. I, pp. 97 ff. For this period the textile industries constituted the most important area of consumers' goods output. As the history of those years indicates, there is ample evidence of a powerful cyclical contraction in textile output from early in 1810 to the latter months of 1811.

[2] The fact that there is one more trough than peak stems merely from the fact that cycles are measured from trough to trough.

[3] See Tooke, I. 273–6, and Vol. I, Pt. I, pp. 97 ff.

weights he assigns, especially in the early years. In general, that index conforms well to the reference dates, which were set largely on other evidence.

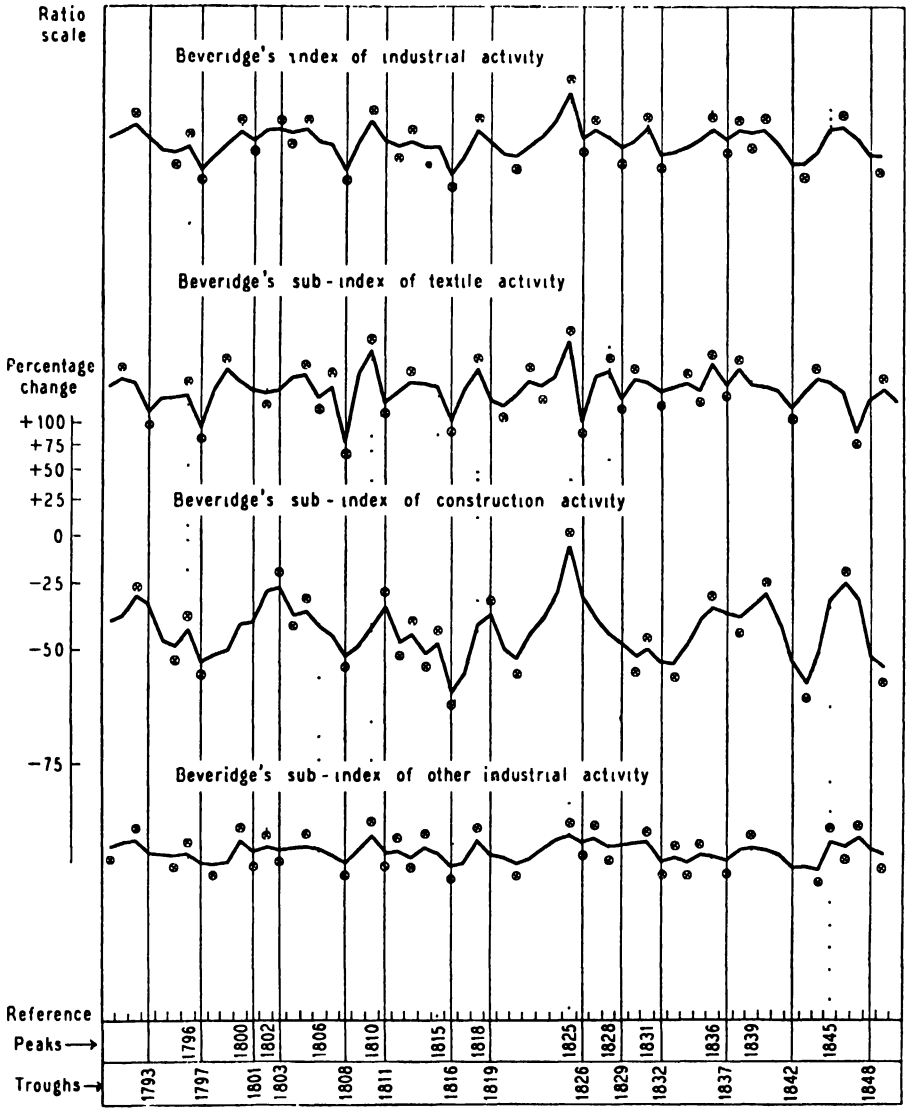


FIG. 132*c*

3. Hoffmann's Index of Producers' Goods Production

Specific-cycle Behaviour. As in the case of the consumers' goods index, the average duration of expansion is more than twice as long as that of contraction. The amplitude of rise is greater than for the consumers' goods index, the average amplitude of the fall is less. This indicates a steeper

upward secular trend for producers' goods. Again unlike the consumers' goods, this index shows an average per-month rise slightly more than twice the average per-month fall. The rates were almost equal for consumers' goods. The total amplitude is slightly greater than for consumers' goods production.

Reference-cycle Behaviour. The average reference-cycle expansion is somewhat shorter in duration than the specific-cycle expansion. This is due to the fact that the index shows no decline from 1825 to 1826, a clearly marked reference contraction.[1] A notable feature of this series is the uninterrupted increase in the average of the average standings for both expansion and contraction phases. The reference contractions emerge, on the average, as declines in the rate of increase. This does not mean, of course, that there were no absolute declines in the reference contraction phases of any cycle. It indicates, however, that the rises during those phases were sufficient, on the whole, to outweigh the declines. The average reference pattern reveals a much more pronounced average rate of expansion in stage III–V than it does in stage I–III. It will be recalled that the average reference pattern for consumers' goods production showed a slight contrary relative movement in the two expansion phases. The implications of this relationship are explored in the chapters on 'Business Cycles' in Part I of this volume.

The average reference pattern clearly conveys the consequence of the powerful secular trend on the cyclical behaviour of this series. Stages V-IX show a net average rise: that rise is, however, less than for stage I–III, and, of course, much less than for stage III–V, where the greater part of expansion is concentrated. This pattern, despite its asymmetry, represents clearly a I–V expansion for producers' goods output. The index of conformity to reference expansion shows that the series rose, in every case, during reference expansion: but the index of conformity to reference contractions shows no such invariant relation. Finally, the index of conformity to business cycles as a whole shows that the rate of rise in stages matched with reference contractions was greater, in six cases, than during the preceding or following reference expansions.

The Hoffmann index of producers' goods output is overwhelmingly weighted with coal and iron, and to a lesser extent with shipbuilding. For iron production estimates are scattered and Hoffmann's interpolation [based on an assumed proportional movement between output and (to 1800) iron imports and (after 1800) shipments of iron on the Monmouthshire Canal] are open to the most serious question. The coal shipments he uses, although fairly continuous and reliable series, do not reflect total coal production. The dependence of the index on these two makeshift series necessitates great caution in drawing general conclusions about the cyclical behaviour of producers' goods production from its movements.

[1] There is, however, a sharp decline, from 1825 to 1826, in the rate of increase of the producers' goods index.

Figure 1

Hoffmann's Index of Total Production

12 Specific Cycles 1794-1847

13 Reference Cycles 1793-1848

Conformity +100, +54, +72

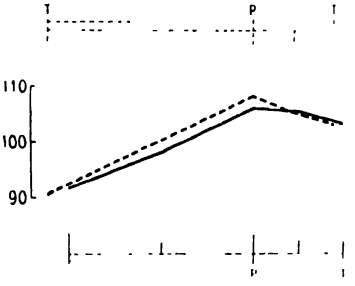


Figure 2

Hoffmann's Index of Consumers' Goods Production

12 Specific Cycles 1794-1847

13 Reference Cycles 1793-1848

Conformity +100, +69, +84

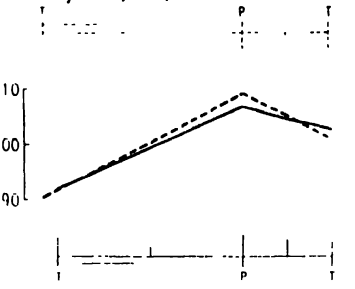


Figure 3

Hoffmann's Index of Producers' Goods Production

12 Specific Cycles 1794-1849

13 Reference Cycles 1793-1848

Conformity +100, 0, +52

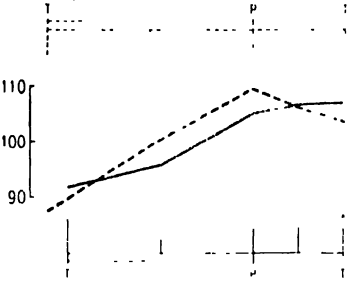


Figure 4

Kondratieff's Index of Textile Production

13 Specific Cycles 1803-1850

11 Reference Cycles 1801-1818

Conformity +82, +82, +90

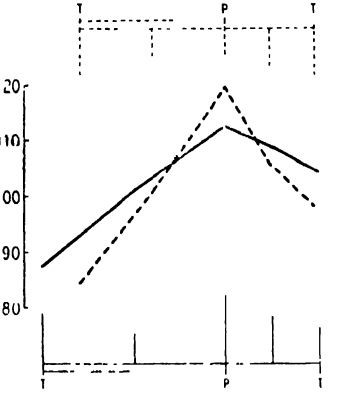


Figure 5

Stocks of Raw Cotton

5 Specific Cycles 1826-1851

5 Reference Cycles 1826-1848

Conformity +80, +40, +78

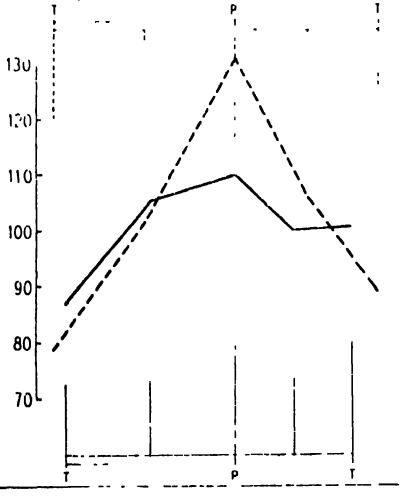


Figure 6

Consumption of Raw Cotton

17 Specific Cycles 1791-1847

13 Reference Cycles 1793-1848

Conformity +85, +54, +84

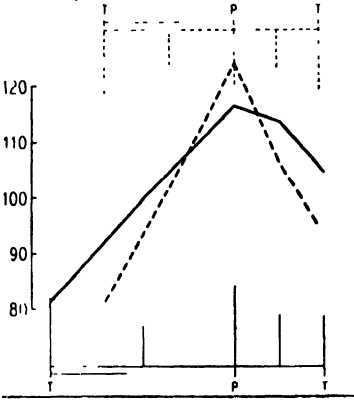


FIG. 133*a*. Cyclical Patterns of Production Series

The table on p. 697 attempts to indicate the specific series responsible for the movement of the Hoffmann index in those cases where it fails to conform to the reference dates.

The most reliable of the component series is that for new ship tonnage built and registered. This shows consistently belated peaks and troughs and imparts at several crucial points its character to the index as a whole. This lag is, almost certainly, a consequence of the length of time necessary to construct new ships. An export boom (such as 1809–10) might not produce an increase in shipbuilding until its latter stages; and the ships themselves might be built and registered only after the boom which inspired their construction had ended (as in 1811). It will be noted later that a similar tendency pervades the series representing brick production.

Leaving aside coal shipments—which represent, for the most part, sales of coal as a consumers' good—one can, especially in the period after 1815, establish a somewhat similar cyclical relationship for iron production. The floatation of new railway projects was usually a product of the latter stages of cyclical expansion. The completion of the lines, however, tended to maintain production in the iron industry for some time after the upper cyclical turning-point. The rate of increase of iron production declined in such periods; but, despite the excellent inverse conformity to a V–I pattern of iron-founders' unemployment,[1] it is probable that total iron production tended to increase for some time after 1825, 1836, and 1845.[2]

To the extent that the Hoffmann index reflects (for shipbuilding, iron production, and its other components) this lagging character, it is a true measure of the behaviour of producers' goods output. In a few cases, however, the failure to conform is probably the result of inadequate data or spurious calculation.

4. Kondratieff's Index of Textile Production

In general the series is so thoroughly dominated by raw-cotton imports, which it contains, that a separate detailed analysis is not justified. It includes also wool, flax, and hemp and jute imports;[3] and the diverse movements of these explain the occasional differences between the index and cotton imports:

	Cotton imports	*Kondratieff's index*	*Wool imports*	*Flax imports*	*Hemp and jute imports*
1801–2 . .	rise	steady	rise	rise	fall
1820–1 . .	fall	rises	rise	rise	fall
1836–7 . .	steady	falls	fall	fall	rise
1846–7 . .	rise	falls	fall	fall	fall

[1] See below, p. 947.

[2] See Vol. I, Pt. I, pp. 229–32, 291–3, 323–5.

[3] The weights given by Kondratieff to these three series are not indicated; but the virtual identity of his index with cotton imports would seem to indicate that they are relatively small.

Figure 7
Woollen Broad Cloth Milled in West Riding
------ 6 Specific Cycles 1793-1819
——— 7 Reference Cycles 1793-1819
Conformity +71, +14, +38

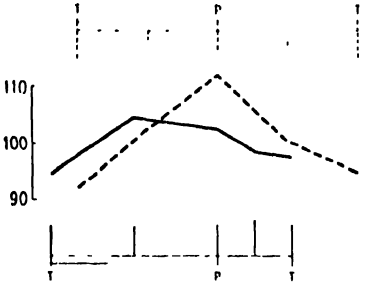


Figure 8
Woollen Narrow Cloth Milled in West Riding
------ 6 Specific Cycles 1794-1819
——— 7 Reference Cycles 1793-1819
Conformity +100, +57, +69

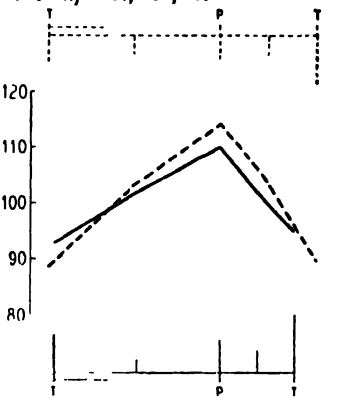


Figure 9
Production of Bricks
------ 8 Specific Cycles 1798-1848
——— 13 Reference Cycles 1793-1846
Conformity +54, +23, +28

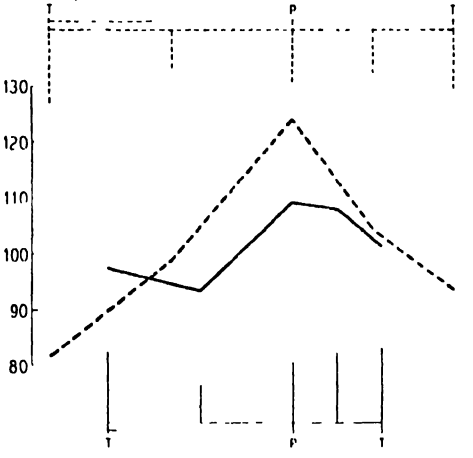


Figure 10
Production of Tin
------ 12 Specific Cycles 1793-1836
——— 11 Reference Cycles 1793-1837
Conformity +27, +27, +24

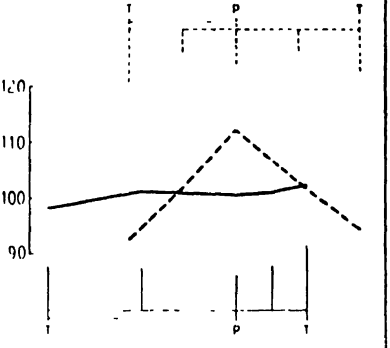


Figure 11
Production of Copper in Cornwall
------ 14 Specific Cycles 1799-1850
——— 12 Reference Cycles 1797-1848
Conformity +58, 0, +26

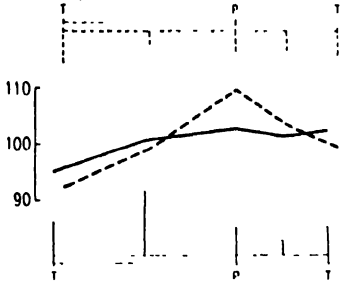


Figure 12
Production of Copper in the United Kingdom
------ 5 Specific Cycles 1823-1847
——— 5 Reference Cycles 1826-1848
Conformity +60, +80, +78

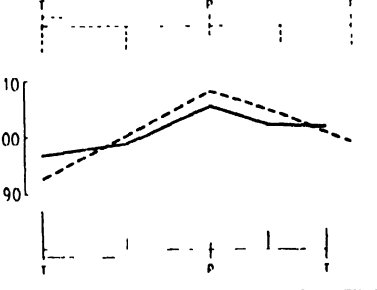


FIG. 133*b*

Reference dates		Hoffmann's Index	Components of Hoffmann's index[a]		
Peak	Trough		Iron	Coal	Shipping
	1793		✓	✓	✓
1796		conforms			
	1797	conforms			
1800		conforms			
	1801	conforms			
1802				✓	
	1803		✓	✓	
1806		conforms			
	1808		✓	✓	
1810				✓	
	1811			✓	✓
1815		conforms			
	1816			✓	✓
1818			✓	✓	✓
	1819			✓	✓
1825				✓	✓
	1826			✓	✓
1828		conforms			
	1829		✓		✓
1831			✓		✓
	1832		✓		✓
1836		conforms			
	1837	conforms			
1839			✓	✓	✓
	1842			✓	✓
1845					✓
	1848		✓	✓	

[a] The specific series comprising the Hoffmann index for the period under consideration are the following:

Iron

1790–1801 Iron imports.
1802–40 Iron shipments on the Monmouthshire Canal.
1840–50 Iron production.

Coal

1790–1800 Coal imports into London.
1801–19 Coal shipments from the ports of Newcastle and Sunderland.
1820–50 Coal shipments from all ports.

Shipping

1790–1800, 1810–12, 1814–50 } Tonnage of vessels built and registered in the British Empire.

It might be pointed out that a check of Hoffmann's references reveals, in the case of ship tonnage, a discrepancy between the actual series used and his description of them. Hoffmann states that his shipping series includes all ships built (presumably in Great Britain or the United Kingdom), including those for foreign account. In point of fact, his references in Eden, Colquhoun, and Marshall show that his series refer to tonnage of vessels built and registered in the British Empire. Thus, despite the fact that a series is available in Porter for the United Kingdom, Hoffmann includes the colonial possessions. Moreover, all series referred to are for ships built and *registered* in British territory, so that Hoffmann's claim to the inclusion of vessels for foreign account is not borne out in fact.

Figure 13

Tonnage of Ships Built and Registered in the United Kingdom

------ 5 Specific Cycles 1817 - 1849

——— 7 Reference Cycles 1816 - 1848

Conformity + 71, + 43, + 38

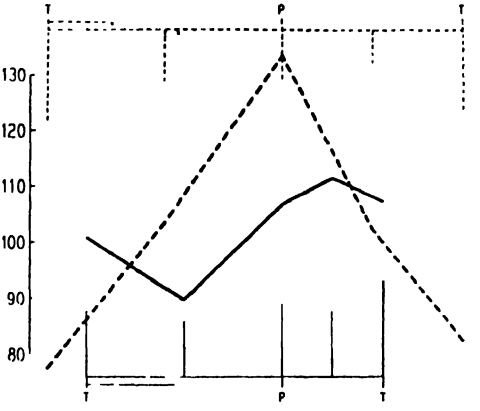


Figure 14

Beveridge's Index of Industrial Activity

------ 14 Specific Cycles 1795 - 1849

——— 13 Reference Cycles 1793 - 1848

Conformity + 46, + 92, + 92

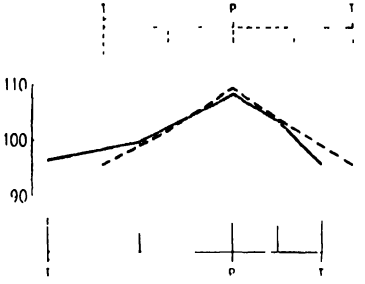


Figure 15

Beveridge's Sub - Index of Textile Activity

------ 16 Specific Cycles 1793 - 1851

——— 13 Reference Cycles 1793 - 1848

Conformity + 62, + 85, + 84

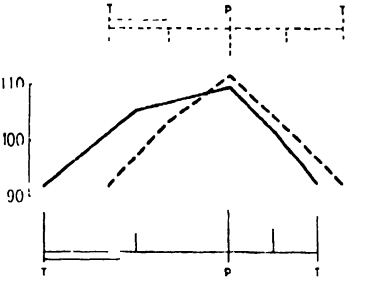


Figure 16

Beveridge's Sub - Index of Construction Activity

------ 12 Specific Cycles 1795 - 1849

——— 13 Reference Cycles 1793 - 1848

Conformity + 23, + 46, + 60

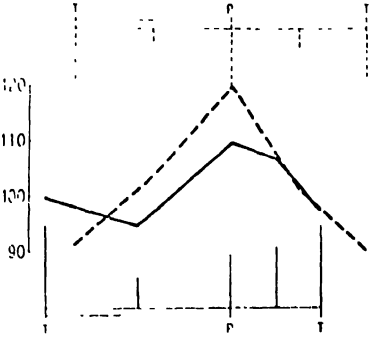


Figure 17

Beveridge's Sub Index of Other Industrial Activity

------ 16 Specific Cycles 1795 - 1849

——— 13 Reference Cycles 1793 - 1848

Conformity + 54, + 85, + 92

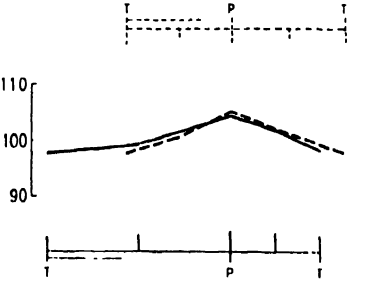


FIG. 133c

It is not implied, of course, that in all other cases the four component series moved together. Their divergences occasionally change the rate of movement of the index as compared to cotton imports. But on the whole those changes are unimportant. The Kondratieff index is a slightly distorted version of the cotton import series, and clearly does not fulfil the claim of its title, so far as cyclical analysis is concerned. The main consequence of introducing wool, flax, and hemp and jute imports is to moderate the upward secular trend, rather than seriously to alter year-to-year movements.

5. Stocks of Raw Cotton

Specific-cycle Behaviour. The average duration of cycles in raw-cotton stocks is larger than that of most production series. The series shows a larger average total amplitude than any production series except shipping tonnage and an expansion rate somewhat smaller than its rate of contraction. In net, there is, of course, a marked positive secular trend.

Reference-cycle Behaviour. For the period 1826–48 there are five reference cycles as compared with but four specific cycles. Only two troughs, 1826 and 1829, and one peak, 1845, coincide with reference dates. At three points reference peaks are anticipated by one year—1827, 1830, 1838. Despite the lengthy specific-cycle durations of cotton stocks, the series has a rather high positive conformity to business cycles. It expands in net during four reference expansions and remains unchanged during one. In only one reference contraction (1839–42) is a net increase recorded. That increase, especially in 1839–40, was the immediate reaction to the virtual cessation of cotton imports in 1839. The average pattern is best taken as I–V.

6. Consumption of Raw Cotton

Specific-cycle Behaviour. The average duration of cotton consumption cycles is 39·5 months - a duration notably shorter than in the production series. This results wholly from a shorter average expansion phase: the contractions are not sensibly shorter than for production.[1] Despite its upward secular trend, the average per-month rise is hardly greater than the average per-month fall, so that the greater total amplitude of average expansion is a consequence only of the greater duration of the rise.

There are three cases where the full cycle for this series is very much longer than the average: 1797–1803 (72 months), 1808–14 (72 months), 1832–9 (84 months). The first and third cases represent instances where cotton exports were increasing at an extraordinary rate, and the more normal short rhythm of the cotton consumption cycle can be discerned

[1] The average duration of contraction would be somewhat shorter, however, but for the abnormal net contraction from 1810 to 1814, due to the blocking off of American raw-cotton exports during the War of 1812.

only in fluctuations in the rate of rise during the abnormally long expansion phases (1797–1802, 1832–8). The second case results from the abnormally long contraction (1810–14) during the War of 1812 when supplies of raw cotton were seriously limited.

Next to brick production, this series has the largest total amplitude of any production series; while its per-month movement is greater than for any other production series. It has, as well, the greatest upward secular trend, properly reflecting the tremendous growth of the cotton industry in the period 1790–1850.

Reference-cycle Behaviour. There are seventeen specific cycles for cotton consumption as against thirteen reference cycles. In several cases, then, a reference cycle contains more than one specific cycle: in 1803–8 there are two specific cycles; in 1819–26 there are three specific cycles; in 1842–8 there are two specific cycles. As in the case of the Hoffmann consumers' goods production index, there is a slightly greater rate of rise in stage I–III than in stage III–V.

In all cases but one an increase in cotton consumption occurs during reference expansions; in all cases but one it decreases during reference contractions or increases at a lesser rate than during the previous reference expansion. It exhibits, in general, fairly good I-V conformity. A major exception occurs in 1839 (a reference peak) when the collapse of the Anglo-American financial structure, based, in its latter stages, on cotton speculation, led to a sharp decline in British cotton imports in the course of that year.[1] The abnormal fall in 1839 distorts the cyclical pattern in such a way as to make for a net fall during the reference expansion (1837–9), a net rise during the reference contraction (1839–42). There are other instances where movements contrary to the business-cycle pattern occur within stages of expansion and contraction; but in all such cases the net movement for reference expansion and contraction as a whole is in conformity.[2]

This series is not to be interpreted as a true series for raw cotton consumption or as an index of cotton goods manufactured. It is claimed that the series was derived by correcting net cotton imports for changes in stocks; but the series seems to partake of the nature of inventory rather than production fluctuations. This is probably due either to the inadequacy of the information about stocks held by dealers or to the holding of stocks by manufacturers. It is virtually identical, in its short-period movements, with total cotton imports. It is clear from the history of the period that, for example, cotton production did not fluctuate from 1819 to 1826 in the

[1] See Vol. I, Pt. I, pp. 278–81, 287–9.

[2] The following are the irregular cases:

Declines during reference expansion: 1805–6, 1811–14, 1827–8, 1838–9.

Rises during reference contraction: 1800–1, 1806–7, 1836–7, 1839–40, 1847–8.

These movements might, to some extent, be attributable merely to the secular rise in the series. In all cases, in fact, except the rise from 1839 to 1840, the increase during reference contraction is at a markedly lesser rate than during the previous and following expansion phases. The extraordinary increase in 1840 can be considered a result of the abnormal conditions existing in the previous year.

highly irregular manner that the cotton consumption series would indicate.[1]

7. Woollen Broad Cloth milled in the West Riding

Specific-cycle Behaviour. The average durations of expansion and contraction are equal, unlike other production series. The average amplitude and per-month movement of the contractions, however, are less than for the expansions, yielding an upward secular trend.

Reference-cycle Behaviour. The duration of reference cycles is appreciably shorter than for specific cycles, especially in the contraction phase. In the period covered by this series there are seven reference cycles, but only six specific cycles. The series fails to show the reference-cycle expansion from 1801 to 1802, but the net decline is slight, and the rate of decline very much less than from 1800 to 1801. Although there is, on the average, a net rise from cycle to cycle, the only stage that shows average expansion is I–III. The series declines through the other three stages, with the greatest average decline in stage V–VII. The patterns of the individual cycles, however, are highly irregular. Two cycles exhibit a I–V expansion; one shows V–I; one shows VII–III; and the three remaining cycles show a rise only in stages I–III. Since a greater net average rise appears in stages VII–III than in stages I–V, the series has been designated as of VII-III average expansion.

A production series of this type would, normally, be expected to exhibit a I–V conformity; and, in fact, the major cyclical movements are clearly reflected. Generalization about characteristic behaviour is, moreover, seriously limited by the short period for which the series is available. One characteristic, however, seems fairly consistent, namely, the tendency to lead at the reference peaks and troughs:

Cases of Lead

Broad cloth milled		*Reference cycle*	
Peak	*Trough*	*Peak*	*Trough*
	1802		1803
1805		1806	
	1807		1808
1809		1810	
1813		1815	

An attempt was made to discover any peculiarities in the market for broad cloths that might explain this phenomenon, but it met with no success.[2]

[1] See Vol. I, Pt. I, pp. 153–4.

[2] Professor Herbert Heaton, who has studied the development of the British woollen and worsted industry during the eighteenth century, has sent us, in a private communication, the following statement about the production of broad and narrow cloths.

'The long run explanation of the increase in broad cloth production is probably the coming of the flying shuttle, which made it possible to weave the broad with only one

In only one case out of seven the series does not rise in stages matched with reference expansions. This occurred during the short reference cycle from 1801 to 1803, as noted earlier. In three cases out of seven the series failed to show a decline during stages matched with reference contractions: 1796–7, 1800–1, 1802–3. The former two cases result from the fact that the series shows a I–V pattern in those instances, reaching peaks in 1796 and 1800. A possible explanation for the third case is a revival in government orders for uniforms and other woollen materials, upon the resumption of hostilities, at the close of 1802. The outbreak of war, largely by depressing the export markets, produced a clearly marked general relapse in 1803; but it is known that the woollen industry was one area of the economy directly affected by government war-orders. And this fact may explain the contrary movement from 1802 to 1803. The continued increase from 1803 to 1805 can be considered a result of the general revival in domestic and export markets, as well as of continued war orders.

The index of conformity to all business cycles, as a result of these divergences shows that (measured from trough to trough) the average rate of rise of two contraction phases was greater than in the preceding expansion phases; and that (measured from peak to peak) the average rate of rise in two expansion phases was less than in three preceding contraction phases.

8. Woollen Narrow Cloth milled in the West Riding

Specific-cycle Behaviour. The average duration of specific cycles is slightly less than for broad cloth; but the duration of expansions is greater, and of contractions less than in the other case. This occurs despite the fact that broad cloth exhibits an appreciable upward trend as compared with the negligible trend for narrow cloth. Technical developments in the period, simplifying the manufacture of broad cloths, and new export demands probably explain their greater upward trend. The average amplitude of cycles as a whole is greater, principally owing to the greater amplitude of

person at the loom. Obviously, from the figures, the wide piece triumphed over the narrow, once it could be made as easily in terms of labor cost and equipment. Tailors could cut clothes more economically out of a broad cloth than out of a narrow. Whether the broad cloth was of superior quality to the kersey and other narrows I don't quite know, but there is plenty of evidence that after 1790 at any rate Yorkshiremen were out to capture the high grade broadcloth trade from the West of England, and were buying Spanish wool, improving their processes, etc. Hence the steeply mounting curve of broads is partly due to the shuttle and partly to cutting into the West of England market.

'At the same time the narrow cloth did not disappear, since many kinds of cloth were best made in that width, and many new patterns were most serviceable in that form. Some "fancy" pieces, light fabrics for women's wear, for linings, for American Indians, or for slaves' pants, were narrows.

'Faced with this complicated situation, it would require a minute knowledge of markets to answer your question, and I have no such knowledge. The cheap narrows went to Germany, and the Baltic, and the market would be affected by Napoleon's antics. But they also went to the West Indies and came here. On the other hand I get the impression that South America took chiefly high grade broads, since the slaves wore cottons.'

contraction. The average rate of fall is considerably greater than the rate of rise; but this discrepancy in rates is due largely to an extraordinary decline from 1815 to 1816. The rise, from 1812 to 1815, was based, in the textile industries, very largely on export orders expected to appear upon the conclusion of peace. It is probable that a considerable part of the increased manufacture was for stock. In 1816 both American and continental markets collapsed, bringing about a severe general depression, probably leaving abnormal stocks on hand.

Reference-cycle Behaviour. With but two exceptions every cycle exhibits a I–V expansion. These exceptions are due to a rise from 1796 to 1797 and a fall from 1811 to 1812, counter in each case to the reference-cycle movement. There are no very satisfactory *ad hoc* explanations of these divergences, although the latter is almost certainly connected with the persistence of depression in some branches of the woollen industry through a part, at least, of 1812.[1]

The average pattern, however, is very clearly I–V. There is a slight slackening in the rate of rise in stage III–V, a slight slackening in the rate of fall in stage VII–IX. In all cases there is a net rise during reference expansion; but in two cases a net decline fails to appear in the course of reference contractions (as noted above, 1796–7, 1802–3). The rate of rise in only one contraction, however, is greater than in the preceding expansion (1793–7); and only one expansion has a lesser rate of rise than the preceding contraction (1796–1800).

A comparison of the woollen cloth series reveals two salient facts: the superior reference-cycle conformity of the narrow-cloth series, and the obscure pattern of broad cloth. Since broad cloth constituted much the larger portion of output and, as well, showed the more rapid increase in this period, its failure to conform is the more troubling. A lack of essential historical information about the nature of the respective markets in which the two types of cloth were sold precludes any very satisfactory explanation of typical behaviour.

9. Production of Bricks

Specific-cycle Behaviour. Cycles in brick production are among the longest of any series relating to production [75·0 (18·8)]. Average expansions are the longest in duration and contractions are exceeded in length only by shipping tonnage built and raw cotton stocks.[2] Except for the latter two series the average amplitude of movement, as well, is greatest. The average duration of rise is greater than the average duration of fall. The relative average amplitudes of the two phases stand in a similar relationship. The

[1] See 'Diary of Joseph Rogerson', *The Leeds Woollen Industry, 1780–1820*, edited by W. B. Crump, pp. 133–47. This diary of a woollen manufacturer indicates clearly the financial difficulties and lack of full employment in the Leeds branch of the woollen trade, especially in the early months of 1812.

[2] Cotton stocks, of course, are not meant to be considered a production series in the same sense as brick production.

average per-month rate of fall, however, is slightly greater than the rate of rise. These average specific-cycle movements yield an upward secular trend. The specific-cycle stage III–V increases more rapidly than I–III; stage VII–IX decreases less rapidly than V–VII.

Reference-cycle Behaviour. Reference cycles are only two-thirds the length of specific cycles. This is, of course, a reflection of the lesser number of specific than reference cycles:

1. The cycle from 1793 to 1797 does not appear, except as a slackening in the rate of fall during 1795 and 1796, an increase in the rate of fall in the following two years.
2. The brick-production series shows but one cycle from 1798 to 1808, whereas there are three reference cycles.
3. From 1808 to 1816 there is one specific cycle, but two reference cycles.
4. From 1816 to 1829 there are three reference cycles: from 1816 to 1828 there are two specific cycles.

Only the reference-cycle stage III–V exhibits average net expansion. All other stages are declining, the rate being smallest in stage I–III (although only slightly greater in V–VII). The average of average changes per month during reference expansions is positive; the average of average changes per month during reference contractions is negative—these indicating broad positive cyclical conformity. But the indexes of conformity show that three expansion phases move contrary to business expansions, while five contraction phases move contrary to business contractions. As a result, in its conformity to all business cycles the index is rather low.

The reference patterns for individual cycles are, then, extremely diverse. This can be attributed largely to two facts. The cycles as marked off by reference dates represent different types of business cycles. Brick production tended to increase strongly only in cycles during which a large amount of new construction was undertaken. These can be denoted by their reference peaks as follows: 1792, 1802, 1810, 1818, 1825, 1836, 1845. In every instance but that represented by the peak in 1818[1] one can establish clearly a sharp increase in internal capital investment, aside from the construction of residential buildings; and, conversely, from data other than the brick-production series one can establish relative stagnation in such investment during the intervening periods.

The other fact explaining the diverse patterns of individual cycles is the occasional tendency for brick production to lag behind reference turning-points. The following cases of lag may be noted:

[1] The sharp increase in brick production to 1818 was not accompanied by very substantial increases in other types of internal investment that can be traced statistically. It is probable that the brick increase resulted from a post-war housing boom. It will be noted that the rise, after a set-back in 1820–1, continues to a new secular level, which persists, irregularly through the next three decades, with only a slight upward bias. The rise from 1816 to 1825 was, in large part, a housing boom (see Shannon, 'Bricks—A Trade Index', *Economica*, n.s., I, 1934, pp. 301–3).

Brick production		*Reference cycle*	
Trough	*Peak*	*Trough*	*Peak*
1798		1797	
	1811		1810
	1819		1818
1821		1819	
1828		1826	
1838		1837	
	1840		1839
1843		1842	
	1847		1845

Although a I–V expansion emerges as, on the whole, the best general pattern for this series, the tendency (which appears in six cases) for a continued increase through a part or all of stages V–IX weakens that pattern.[1] In all cases where a lag at the peak occurs there is a slackening in the rate of increase after the upper reference turning-point. This phenomenon is probably to be connected with the same forces which produce the lagging tendency in the Hoffmann index of producers' goods production.[2]

The average reference pattern (also like producers' goods production) shows expansion concentrated in stage III–V. This conforms to other statistical and qualitative evidence, which indicates that domestic capital investment tended, on the whole, to occur mainly in the latter stages of expansion, after a period of increasing activity based largely on increases in exports.

As noted earlier, the behaviour of the brick-production series and other data on internal investment would seem to permit a distinction between cycles characterized by large increases in new construction and those in which construction played a relatively minor role. Where cycles were accompanied by large increases in new domestic investment, the latter stage of expansion (III–V) saw the greatest increase in brick production. On evidence other than the brick-production series we have further concluded that in such cycles the greatest volume of investment was undertaken and initiated in the latter stages of general business expansion. Where the investment thus initiated (most clearly in the case of railways) had a fairly long period of gestation, the brick-production series seems to reflect that fact in an increase in stage V–VII. The converse of this hypothesis also seems to hold; that is, the brick-production series appears more sensitive to reference contractions in those cases where the reference expansions were not accompanied by major increases in new construction, or (as probably in the reference expansion from 1819 to 1825, which appears to have been largely a residential housing boom) where the period of gestation of new construction was relatively short.

[1] As noted earlier there is a slight average net contraction in stage V–VII. This represents, then, an average of cases of V–VII contraction and cases of V–VII expansion. These diverse types of behaviour in the contraction phase of reference cycles explain the large average deviation for stages V–IX.

[2] See above, pp. 692–7.

In the following cases the V–VII reference stage saw a net decline in brick production: 1796–7, 1806–7, 1815–16, 1825–6, 1831–2, 1836–7, 1839–41.[1] Two of these contractions (1825–6, 1836–7) followed major expansions in brick production and home investment generally; but the 1836–8 contraction was followed (1838–40) by a further considerable expansion, closely connected with the new railway investment inaugurated in the previous boom (1832–6).[2] The other cases of V–VII contraction followed upon either slight increases in stages I–V (as in 1830–1) or a net decline during those stages (as in 1793–6). In general, cycles exhibiting this pattern were minor cycles, in the sense that they saw no large-scale revival in home investment (this established independently of the brick-production series). The following cases of expansion during stage V–VII followed considerable increases in brick production: 1810–11, 1818–19, 1839–40, 1845–7. There is, further, only a very slight decline from 1792 to 1793, whereas most other indexes of activity show a sharp fall in the latter year; and, since the boom with a reference peak in 1792 was a major boom (in the sense used here), the slight decline in 1793 may be taken as additional evidence for this hypothesis.[3]

10. Production of Tin

Specific-cycle Behaviour. The average duration of specific cycles is somewhat shorter than for the Hoffmann production series, although longer than for cotton consumption.[4] The deviation from that average, however, is large, owing to two extremely long specific cycles (1813–20, 1825–34).[5] The average amplitude, again, is not a representative average, cycles after 1813 (with the exception of 1820–2) having much larger amplitudes than those before. The average amplitude and per-month movement are greater for expansion than for contraction. In net, then, there is an upward secular trend; but this is compounded of a declining trend until 1810, a rising trend thereafter. These two trends parallel those which appear in the tin export series, and year-to-year movements between exports and production also conform fairly well. The sharp decline in tin production from 1827 to 1834 may, for example, be connected with a loss of export markets, due to increasing and cheaper supplies of Dutch colonial tin.[6] Previous to 1814 Britain had, in some measure, a world monopoly; but the restrictions on

[1] In some of these cases a single year constitutes the whole contraction phase, i.e. stages V–VII and VII–IX.

[2] See Vol. I, Pt. I, pp. 284 ff.; also Shannon, pp. 304–7.

[3] Shannon does not treat the behaviour of brick production in the minor cycles; but he clearly relates the large increases with other forms of domestic investment activity. His dating of such booms coincides with that given here.

[4] This can, possibly, be connected with the 'unprofitable character of the tin mines' (Joseph Carne, 'Statistics of the Tin Mines in Cornwall', *Journal of the Statistical Society*, 1839, p. 265).

[5] In the long decline from 1827 to 1834 there are very slight increases from 1829 to 1830 and from 1831 to 1832. These are, however, so small that the marking off of specific cycles is not justified.

[6] J. R. McCulloch, *Dictionary of Commerce*, ii. 644–5.

trade during the Napoleonic Wars produced a decline in exports until the break up of the Continental System (1811–12) and a return to peace (1815).

The irregular fluctuations in this series are partly a result of special relations between the tin-mine owners and the East India Company. Annual contracts were made at prices lower than the going market rate. But the amount taken fluctuated inversely with the commercial demand, i.e. the owners would sell less at the special low rate if other markets seemed promising. The decline, for instance, in 1810 is directly connected with the termination of a contract with the East India Company, on the grounds that the difference between the previous contract price and the market price (at a time of general prosperity and rising prices) was so great as to make the contract unprofitable for the mine-owners.

The tin price trends move inversely with the production secular trends: rising to 1814, falling to 1830, rising at the time of general collapse in export markets (1830–4).[1] Until 1814 the monopoly enjoyed by the British producers probably explains the inverse movement; after that date, falling costs and increased competition can be held accountable.[2]

Reference-cycle Behaviour. This series shows an average net decline only in stage III–V, although the rate of rise in stages V–IX is somewhat less than in I–III. The resulting VII–III expansion pattern is not very satisfactory. The most consistent characteristic of the series is the tendency to anticipate, by one year, the reference-cycle peak. In 1809–10 this is known to have resulted from the cancellation of the East India Company contract; and in the four cases between 1790 and 1816 this relation between the two markets in which the mine-owners sold may explain the general leading character of the series at cyclical peaks.

The reference pattern shows almost no cyclical conformity, although average rises in stages VII–IX and I–III have led to the designation of a VII–III expansion. The most clear-cut movement is the I–III expansion. In general, tin production, because of its relatively minor role in the economy and the peculiarities of the tin markets during these years, is not a good cyclical indicator.

11. Production of Copper in Cornwall

Specific-cycle Behaviour. The average duration of specific cycles is roughly similar to that for the Hoffmann production indexes. The average duration of expansions is about a third longer than for contractions, a lesser margin than in the production indexes. Among production series it has a relatively small amplitude of movement, and the average per month rate of rise is only slightly less than the rate of fall. The fairly strong net upward secular movement occurs, almost entirely, before 1832.

[1] At the close of the period covered by the series the relative portion of output consumed at home had, largely, increased. The rise in prices from 1832 to 1836 is probably a product of general prosperity in the domestic markets at that time rather than of the monopoly factor.

[2] McCulloch, ii. 644–5.

A considerable expansion was stimulated by the requirements for the sheathing of ships, during the war years, when shipbuilding was abnormally active.[1] The government's demands for coinage purposes added to the shipbuilding demand in the decade after 1796.[2] The continued rise through the twenties may be a consequence of the opening of some Cornish mines in the course of the mining floatation of 1824–5.[3] The stagnation from about 1831 is probably to be connected with an increased volume of copper imports rather than a failure of the home consumption to increase. In general, however, very little is known of the history of this industry that is relevant to its cyclical and secular behaviour.[4]

Reference-cycle Behaviour. By what appears to be sheer coincidence the average duration of reference cycles is identical with that of specific cycles. The average duration of reference expansions, however, is two months longer than for specific-cycle expansions. Only stage V–VII shows an average net decline. The largest expansion, as in the case of tin production, comes in stage I–III.

The series has been designated VII–III expansion. It shows, on the average, positive conformity in expansions, zero conformity in contractions, and rather low positive conformity for all cycles. At best, then, it reflects but crudely and irregularly the reference-cycle pattern.

12. Production of Copper in the United Kingdom

From 1820 to 1848 a series is available for total copper raised. Cornwall was the largest producing county with (in 1860) 96 of 170 mines in the United Kingdom. The relative numbers varied, and, more important, the total output per mine was not uniform. In fact, Cornwall produced, on the average, from three-quarters to four-fifths of the total copper raised in the United Kingdom in the period 1820–48.

The specific-cycle turning-points of the two series differ somewhat, with copper raised in Cornwall leading the total series in five cases, lagging in

[1] McCulloch, i. 479 ff.

[2] Tooke, *High and Low Prices*, Part IV, p. 24.

[3] See Vol. I, Pt. I, pp. 185 ff.

[4] Tooke's brief comments on the movements of the copper price (pp. 24–6) are the most incisive analysis available of short-period movements (1790–1823). The best general study of the industry is H. Hamilton's *The English Brass and Copper Industries to 1800* (1926). It focuses, of course, on the mercantilist period. His discussion of the last decade of the eighteenth century is, however, extremely illuminating (pp. 204–13). The picture which emerges for that period is one of prosperity and increased prices for mine-owners, despite rising labour costs. Brass and copper manufacturers suffered, however, from a loss of export markets and from relatively greater rises in the price of unwrought copper than in their manufactured products. In general there was a diversion, in the use of copper, from brass manufactures to ships' sheathing. Cyclically the depression of 1793 emerges clearly from this account. Sir Charles Lemon's article ('Statistics of the Copper Mines of Cornwall', *Journal of the Statistical Society*, 1838, pp. 69 ff.) is not very helpful, being merely an institutional account of the organization and price-setting mechanism for the industry. McCulloch (i. 479 ff.) states that copper was used extensively in shipbuilding, the laying of gas-pipes, in a variety of household manufactures, and, in addition, for various Indian religious ceremonies.

one. The average specific-cycle behaviour for the two series (over the period 1820–48) is, however, much the same, with a slightly larger amplitude of movement, and a slightly greater upward trend for the Cornwall than the total series.

The total series has been assigned a I–V reference-cycle pattern. It has one contrary movement in expansion (1837–9) and it fails to decline during one contraction (1836–7). In general, conformity does not result from exact coincidence of dating but from a broad net positive conformity to reference expansions and contractions.

13. Tonnage of Ships built and registered in the United Kingdom

Specific-cycle Behaviour. Over the period for which this series is available there are only five specific cycles (to seven reference cycles). Their average length [76·8 (10·6)] is even greater than for brick production. The average amplitude, also like that for brick production, is very large. Unlike the import series, which also have large average amplitudes, shipbuilding cycles move fairly smoothly—a fact which emerges in the long average length of specific cycles. This regularity also yields a relatively low average rate of movement.

Despite the rapid increases after 1815, in total foreign trade, and the modest secular rise in new tonnage, British shipowners and builders regarded their industry as a distressed area. This can be attributed in a large measure to over-construction during the Napoleonic Wars, when Britain not only required, for military purposes, an increased tonnage, but when, as well, she enjoyed (with the United States) virtual monopoly of the world's carrying trade.

Reference-cycle Behaviour. The reference pattern for shipbuilding exhibits, in its average III–VII expansion, the principal characteristics associated with other capital goods' production series: expansion is concentrated in stage III–V, and there is a clearly marked tendency for continued increase (at a lesser rate) beyond the upper turning-point.[1] The averages, however, represent divergent behaviour in different cycles.

Two reference cycles (1816–19 and 1842–8) are typical, in that they follow a course much like the average pattern. The one-year reference decline (1819), of course, makes any distinction between stages V–VII and VII–IX meaningless. In the cycle from 1819 to 1826 shipbuilding, like brick production, does not lag at the peak. Its decline, however, in 1826, is slight, as compared, for example, with the decline in the volume of exports. In the minor cycle from 1826 to 1829, conformity to the average pattern appears only as a lesser rate of decline in stage III–V than in any other stage; in that from 1829 to 1832 the pattern again emerges, with absolute contraction in I–III and a larger III–V rate of increase than during the

[1] In some of the capital goods' series this characteristic emerges as a lesser average V–VII than VII–IX contraction: e.g. brick production.

contraction stages. The most serious exceptions occur in the decade 1832–42. Shipbuilding fell off in the peak year, 1836, but then continued to increase until 1841. The cycle 1837–42 differs from the pattern in its greater I–III than III–V increase, but conforms well in its contraction stages. This is especially worth noting because it constitutes one of the two reference contractions which contain more than one year. The cycle from 1832 to 1837, however, differs sharply from the average pattern. The final cycle of the period (1845–8) conforms to the average pattern in its lesser V–VII than III–V increase, and its absolute contraction in stage VII–IX.

14, 15, 16, 17. Beveridge's Index of Industrial Activity and Sub-indexes of Activity in Textiles, Construction, and 'Other Industries'

Specific-cycle Behaviour. Beveridge's indexes differ from all others that we have examined in that they are composed of series from which trend has been eliminated. This process makes virtually impossible a comparison of them with the Hoffmann and Kondratieff production indexes with respect to amplitude and trend. The elimination of trend appears as the lack of any decisive tilt in the average patterns (specific and reference cycle) of these four series.

The sub-indexes vary significantly in the average duration of their specific cycles. The textile series exhibits short cycles, dominated by the typically inventory character of cotton, wool, and other raw-material imports that it contains. The irregular fluctuation of coal shipments, similarly, imparts to the 'other industries' sub-index specific cycles only slightly smaller in average duration than those of the textile series. The construction sub-index, however, unlike the other two components of the total, contains fewer specific than reference cycles over the period covered. The movement of the construction series reflects properly the longer rhythm of production of that type. It is doubtful, however, if the import series and coal shipments are indicative of pronouncedly shorter specific than reference cycles in output and employment in the industries they purport to represent.

Similar, but lesser, reservations are to be made with respect to the relative average amplitudes of these series. The construction sub-index exhibits by far the greatest amplitude, followed by the textile and 'other industries' series, in that order. If the sub-index representing 'other industries' is regarded as representing the manufacture of consumers' articles for domestic consumption (e.g. leather, coal, salt, glass), this array may be regarded as roughly accurate. But 'other industries' also contains, as a heavily weighted component, shipping cleared, as an overall measure of output in the export industries. Shipping cleared, when trend is eliminated, contains a relatively small average amplitude of movement, in no wise reflecting the type of fluctuation to which the principal export industries were subject. That this low amplitude conforms broadly to that of the other

components of its sub-index is, then, purely a matter of arbitrary designation: the 'other industries' series is not, analytically, homogeneous in the same sense as the others.

It is our view that the textile import series misrepresent not only the timing and average duration of cycles of production in the cotton and woollen industries, but also, probably, their amplitude. We would regard exports as a better measure, although subject also to the stricture that, since stocks could be held and permitted to fluctuate, the volume of exports too overstates the actual amplitude of movements in production, although probably to a lesser extent than do imports. The average amplitude of raw cotton and wool imports is appreciably greater than for the volume of cotton and woollen manufactured exports, and, we hold, than for textile production and employment. The Beveridge textile index, then, over-estimates to some extent the average amplitude of textile production movements; although we would agree that it was, on the average, less than for the amplitude of output in the construction industries.

In the total index of industrial activity given by Beveridge the three sub-indexes receive approximately equal weights. The turning-points are thus controlled by the sub-indexes in rough proportion to their relative amplitudes. This imparts to it an implicit weight in favour of the construction industries almost certainly unjustified by the distribution of the working population. In duration, the total index falls between the textile and construction sub-indexes, exhibiting but one more specific than reference cycle. The rise of the textile sub-index in 1827 (aided by a lesser rise in 'other industries') and its fall in 1839 are sufficient to outweigh, in those instances, the movement of the construction series. There are several differences between the turning-points of the total index and our reference dates, but the 'extra' specific cycle occurs between 1837 and 1842, where two specific cycles to one reference cycle are to be found. In amplitude, the total index of production is greater than for 'other industries', but less than for textiles and, of course, construction.

Reference-cycle Behaviour. Although the three sub-indexes differ in the degree and type of their consilience with our reference dates, they all exhibit moderately high, and in some instances very high, indexes of conformity to a I–V expansion pattern. The construction index exhibits the least conformity. Like brick production, which is a heavily weighted component, this series rises, on the average, only in the III–V stage of expansion, and exhibits a continued increase in the stage following the peak in four major cycles: 1803, 1811, 1819, 1846. There is, also, an increase in 1840, following upon the peak year (1839) of the preceding, especially powerful, minor cycle expansion. The sharp decline in 1841, however, prevents the appearance of net V–VII expansion in this instance. This tendency to lag at both peaks and troughs has already been remarked in the individual construction series, and explained in terms of the general factors affecting investment.

This index adds further support to the analytic distinction between major and minor cycles: there is net contraction in the course of every minor cycle expansion except that from 1837 to 1839, and the rate of increase, in that exception, is very much less than in any of the major cycle expansions. The index of conformity to reference expansions is thus low (+23) and represents diverse, if consistent, behaviour with respect to the two types of business cycles that have been differentiated. The increases after the major cycle peaks in 1803, 1811, and 1819, and the lack of net decline in 1801 explain the failure of the contraction index to be perfect. The index of conformity to all business cycles is higher than that for either expansion or for contraction, indicating that the relative rates of movement conformed to reference cycles in some instances where the absolute directions did not. But for the greater rate of increase in 1811 than in 1808–10 and 1811–15 the conformity index for all business cycles would be perfect.

The textile sub-index exhibits higher positive conformity to our reference dates than the construction series. But for its increase in 1803, and its net decline from 1806 to 1808, the contraction index and the index for all business cycles would be perfect. But for the decline in 1802, the sharp drop in 1806 (outweighing the increases in 1804–5), and the fall in 1839 (exactly counter-balancing the rise in 1838), the expansion index would be perfect.

The high conformity of this series results rather from net increases in the course of reference expansion and net declines during reference contraction than from the exact coincidence of specific and reference cycle dates. Like its component import series, the textile index exhibits markedly greater average I–III than III–V expansion. It will be recalled that the average pattern for construction exhibited net contraction in stage I–III, very rapid advance in III–V. This divergence, a central feature of British business cycles in this period, stems from the fact that textile fluctuations were dependent on export demands while the volume of construction was determined by the host of factors producing fluctuations in domestic investment.[1] It is significant of this relationship that no clear distinction can be drawn between the average rate of increase of the textile index in major and minor cycle expansions. It is, finally, to be noted that Beveridge's textile index tends to correct somewhat the bias, with respect to our reference dates, that the construction series imparts to the total index. The construction series lags fairly consistently at cyclical troughs, whereas in every case but one (1802) the textile index exhibits increase in the year following a reference trough.

The mild and irregular specific-cycle movements of the 'other industries' index yield high positive conformity to a I–V average pattern. But for the rise in 1829 the contraction index and the index for all business cycles would be perfect. The expansion index would be perfect but for the net decline in 1826–8 and the lack of net movement during the following refer-

[1] For a full discussion of this point see above, pp. 531–76.

ence expansions: 1793–6, 1803–6, 1811–15, 1832–6. As in the case of the textile index the specific-cycle turning-points of this series diverge in many years from the references dates, and high conformity emerges as the result of net movement in the appropriate direction.

The average pattern for the 'other industries' index exhibits somewhat more rapid increase in the III–V than in the I–III stage of business cycles. Eight of fourteen reference cycles (including 1788–93) show more rapid increase or a lesser rate of decline in stage III–V than I–III. And in all but one case (1832–6) the exceptions occur during minor cycle expansions. This fact, and the character of the average pattern, would seem to indicate that some at least of the components of this sub-index were subject to the same forces which determined the flow of investment. On the whole major cycle expansions do exhibit markedly greater rates of increase than minor cycles, and, with the exception of 1832–7,[1] they can be roughly discerned by inspection from the chart of the series. The precise analytic significance of this characteristic is obscure since, as noted above, the components of the sub-index represent different types of markets.

The Beveridge total index of industrial activity exhibits very high positive conformity to reference contractions and to all business cycles, and moderate conformity to reference expansions. But for the lack of net movement in 1803, followed by net decline in the reference expansion 1803–6, the indexes for contraction and for all business cycles would be perfect. There are slight net declines in the course of the following minor cycle expansions: 1793–6, 1803–6, 1811–15; and there is no net movement during the minor cycle expansion, 1826–8.

Both the construction and 'other industries' sub-indexes, it will be recalled, reflected but indifferently the minor cycle expansions. And the former component, especially, imparts its character to the total index owing to its very large typical amplitude of movement. Minor cycle expansions, it was found, were dependent primarily on substantial increases in the volume of exports. That variable is represented among Beveridge's data by the shipping cleared series (included in the 'other industries' sub-index) which we regard as a poor reflector of the volume of exports. Our central criticism of these series is that Beveridge has failed, statistically and in his general analysis, to take adequately into account the role of British export markets in the business cycles of this period. It may be added that the existence of the minor cycles, which a superficial glance at the Beveridge total series might lead one to question, is, in a sense, confirmed by the almost perfect conformity of this index to all business cycles. This probably means that total production, as measured by Beveridge, was increasing at less than the trend rate during minor cycle expansions, and falling absolutely only during the contraction phases of minor cycles.

[1] In the expansion 1832–6 neither the coal nor the shipping series of the 'other industries' sub-index responds very strongly to general prosperity; and those two components carry 27 of the 35 weights in the sub-index at that period.

It may be of some interest to compare the behaviour of Beveridge's production series with those of Hoffmann. The latter constructed but two sub-indexes, one representing consumers' goods output, the other producers' goods. Like Beveridge's textile sub-index the consumers' goods series, heavily weighted with textile data, exhibits greater average I–III than III–V expansion rates. The producers' goods series, like Beveridge's construction sub-index, shows a markedly greater III–V than I–III expansion rate, with a number of cases of lag beyond the cyclical peak. Beveridge's construction series was strongly influenced by Shannon's brick-production series, which was not available to Hoffmann. The similarity of the reference-cycle behaviour of the two indexes thus tends to confirm the generality of our view of the timing relationship of investment to business cycles in this period.

Since Hoffmann has not eliminated trend from his indexes, they exhibit absolute rise in instances where the Beveridge series decline (because the rate of increase is less than the trend rate). Hoffmann's series thus emerge with perfect conformity to reference expansions, but lesser conformity than Beveridge's to reference contractions. The index of conformity to all business cycles is somewhat higher in the Beveridge than in the Hoffmann total index, but this stems from only one more instance of failure of the latter to conform: a rise in 1811 at a greater rate than in 1811–15. In sum, both indexes reflect fairly well the business cycles that we have delineated from 1790 to 1850, if not by their absolute direction of movement, at least in their relative rates of movement.

The average pattern of the Hoffmann series, however, differs in one important respect from that of Beveridge's. The latter's total index exhibits a greater III–V than I–III rate of expansion, reflecting the influence of the construction, and, to some extent, the 'other industries' sub-indexes. Hoffmann, however, has given his consumers' goods sub-index a greater weight than the producers' goods series (60 to 40). The average pattern for his total thus emerges with equal rates of increase in the two expansion stages. So ambiguous is the concept of total production, so inadequate the data in this period, that we hesitate to pass judgement on this point.

Finally a comparison can be made between the Beveridge and Kondratieff textile indexes with respect to their reference-cycle behaviour. Both exhibit lesser III–V than I–III average rate of increase, although the distinction is much sharper in the Beveridge series. Over the period for which they are both available (1801–48), there are but seven differences in the absolute direction of movement in reference-cycle stages:

Cycle	*Stage*	*Beveridge*	*Kondratieff*
1801-3 . .	I–V, V–IX	down, up	no movement, down
1811–16 . .	I–III, III–V	up, down	down, up
1826-9 . .	III–V	up	down
1829-32 . .	III–V	down	up
1839-42 . .	V–VII	down	up

In all these instances the overwhelming dependence of the Kondratieff series on cotton imports determines its divergence from the better balanced textile index of Beveridge. The conformity indexes of the two series are roughly similar for contraction and for all business cycles; but the counter-cyclical movement of Beveridge's series in the period 1801–6 produces a somewhat lower expansion index than in the case of Kondratieff's figures: the difference is, however, not such as to be considered significant of divergences in the method or the data employed by the two statisticians. The principal consequence of the use of trend-eliminated series by Beveridge is to lower the average amplitude of expansion and to increase the amplitude of contraction, relative to movements which appear in the Kondratieff textile index: an obvious result, when the trends in the raw data are universally upward.

Appendix

PRODUCTION SERIES OF COMMODITIES TAXED WITH EXCISE

These output series run from 1790 to 1825. They include candles, writing- and brown paper, hides, glass, strong beer, hard soap, soft soap, tiles, printed goods, goatskins.

Years are measured from 5 July and, for that reason, they have not been formally examined for their relation to reference cycles. Their utility is further limited because the early free-trade victories deny them to the economic historian beyond 1825.

The following table indicates the descending order of magnitude of the average duration and average amplitude of specific cycles, as well as upward secular trend of the series:

Average duration	*Average amplitude*	*Secular trend*
Tiles	Tiles	Printed goods
Hides	Printed goods	Hard soap
Beer	Goatskins, &c.	Soft soap
Goatskins, &c.	Soft soap	Paper
Printed goods	Glass	Goatskins, &c.
Hard soap	Hard soap	Candles
Glass	Beer	Tiles
Candles	Candles	Glass
Soft soap	Paper	Hides
Paper	Hides	Beer

The average of the average durations of these series (about fifty months) conforms broadly to that for the Hoffmann total production series over the same period (about forty-five months).

TABLE 87

Measures of Average Cyclical Behaviour: Production Series of Commodities taxed with Excise

Specific-cycle behaviour	(1) *Tiles*	(2) *Printed goods*	(3) *Goat-skins, &c.*	(4) *Soft soap*
PERIOD COVERED	1795–1822	1790–1822	1799–1820	1794–1817
NUMBER OF CYCLES	5	8	5	7
AVERAGE DURATION (in months)				
Expansion	33·6 (16·3)	31·5 (20·2)	28·8 (8·6)	24 0 (10·3)
Contraction	31·2 (10·6)	16 5 (5 6)	21·6 (3·8)	15 4 (4·9)
Full cycle	64·8 (22·1)	48·0 (21·0)	50·4 (7·7)	39·4 (10·8)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	25·4 (7·9)	33·6 (8·7)	26·6 (7·1)	20·9 (9·6)
Fall	25·2 (4·6)	14·2 (6·4)	18·8 (6 2)	15·3 (8·3)
Rise and fall	50·6 (4 9)	47·9 (13 9)	45 4 (9·5)	36·1 (9·9)
Movement per month				
Rise	1 0 (0 3)	1 5 (0·5)	1 0 (0·2)	1 0 (0 6)
Fall	1·0 (0·5)	1 0 (0·6)	1 1 (0 6)	1·1 (0·6)
Rise and fall	0·9 (0 3)	1·2 (0 4)	0 9 (0 2)	1·1 (0·4)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	89·2 (7·0)	82·1 (4·6)	87 0 (5·2)	91·4 (7·5)
„ III	104·0 (2·4)	98·9 (2·4)	101·0 (2·0)	101·4 (3·8)
„ V	114·6 (2·5)	115·8 (5·4)	113·6 (4·1)	112·3 (4 0)
„ VII	101·8 (3·8)	109·2 (4·8)	104·8 (3·8)	105·1 (4·7)
„ IX	89·4 (4·5)	101 5 (6 0)	94·8 (3·8)	97 0 (8·6)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+1·1 (0·5)	+1·5 (0·6)	+1 0 (0 2)	+1 0 (0·6)
„ III to V	+0 9 (0·6)	+1·5 (0·6)	+1·0 (0·3)	+1·0 (0·7)
„ V to VII	−0·9 (0·5)	−1·0 (0·7)	−1·0 (0·9)	−1·0 (0·6)
„ VII to IX	−1·0 (0·5)	−1·0 (0·6)	−1·1 (0·6)	−1·1 (0·6)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+3·8 (9·2)	+20·4 (7·2)	+6·2 (8 2)	+7·3 (9·3)
Weighted average change per month from cycle to cycle	+0·06	+0·41	+0 12	+0 19

TABLE 87 (*cont.*)

Measures of Average Cyclical Behaviour: Production Series of Commodities taxed with Excise

(5)	(6)	(7)	(8)	(9)	(10)
Hard soap	*Paper*	*Candles*	*Strong beer*	*Glass*	*Hides*
1796–1824	1795–1820	1796–1818	1794–1820	1795–1821	1792–1822
7	8	6	6	7	6
34·3 (15·6)	19·5 (7·5)	28·0 (10·7)	28·0 (5·3)	29·1 (10·8)	34·0 (20·7)
13·7 (2·9)	18·0 (7·5)	16 0 (5·3)	24 0 (8 0)	15 4 (4·9)	26 0 (10·0)
48·0 (17·1)	37·5 (7·9)	44 0 (9·3)	52·0 (13·3)	44·6 (10·8)	60 0 (16 0)
16 3 (6·3)	13·2 (4·0)	12·8 (4·2)	11·2 (4 2)	17·9 (11·8)	9·7 (6 1)
6·7 (4·2)	7·0 (4·5)	7·7 (5 6)	10·0 (5·7)	17·4 (11·9)	7·8 (3 9)
23·0 (9·1)	20·2 (7·6)	20 5 (6 3)	21·2 (8·5)	35·3 (14·2)	17·5 (7·0)
0·5 (0·2)	0·8 (0·4)	0 5 (0·1)	0·4 (0·1)	0·6 (0·2)	0·3 (0 1)
0·5 (0·4)	0·5 (0·4)	0 5 (0·3)	0·4 (0·2)	1·0 (0·5)	0·4 (0·2)
0 5 (0·2)	0 6 (0·3)	0 5 (0·2)	0 4 (0·1)	0·7 (0·2)	0·3 (0·0)
92·0 (3·4)	93·6 (2·4)	93·7 (3 7)	94·8 (1 9)	93·0 (8·0)	96 3 (4·2)
99·0 (1·7)	99·2 (0 8)	100·8 (2·4)	100·0 (1·0)	104·0 (3·7)	101·3 (1·7)
108·3 (3·3)	106·9 (2·6)	106·5 (1·2)	106 0 (2·3)	110·9 (4 7)	106 0 (2·7)
104 7 (3·4)	102·5 (1·8)	103·7 (1 1)	103·3 (1·0)	101·9 (5 3)	100 8 (3 2)
101 6 (4·4)	99·9 (2 4)	98 8 (4·6)	96·0 (4·0)	93·4 (10 7)	98·2 (3 5)
+0·5 (0·3)	+0 8 (0·5)	+0·5 (0·2)	+0·4 (0 2)	+0·7 (0 3)	+0·3 (0·1)
+0·6 (0·3)	+0·9 (0·4)	+0·4 (0·1)	+0·4 (0·2)	+0·5 (0·2)	+0·3 (0·1)
−0·5 (0·3)	−0·5 (0·4)	−0·4 (0·2)	−0·2 (0·2)	−1·0 (0·6)	−0·4 (0·2)
−0·5 (0·4)	−0·4 (0·4)	−0·5 (0·5)	−0·6 (0·2)	−0·1 (0·7)	−0 3 (0·2)
+8·8 (5·1)	+6 1 (2 4)	+4·6 (4·5)	+0·2 (3·0)	+2·7 (9·1)	+3·0 (4·4)
+0·20	+0·17	+0 11	0 00	+0·06	+0 05

1. Tiles. In its large average amplitude and duration this series resembles the index of brick production. The large upward movements (1790–4, 1799–1805, 1817–19) are shared by the brick index, as are the trend decline from 1794 to 1799, the moderate rise from 1807 to 1810, and the rapid rise from 1822 to 1825. The production of tiles would appear, clearly, to have been affected by the same forces that affected brick production.

2. Printed Goods. The broad behaviour of printed goods' production justifies its association with cotton exports. It exhibits a similar rapid rate of rise in the decade after 1794, a tapering off to about 1808, a sharp peak and decline in the cycle from 1808 to 1811, a peak in 1815 only slightly above that in 1810, and a resumption of a rapid rate of increase thereafter. The increase in printed goods from 1817 to 1825 is, in fact, slightly greater than in the total volume of cotton goods' exports from 1816 to 1824 (an equivalent interval). It will be noted that the peak in 1818 is relatively higher (with respect to that in 1815) in the case of printed goods than in total cotton exports, indicating, probably, a growth in their relative importance in the industry.

3. Goatskins, &c. This series includes horse and cow hides, vellum and parchment, as well as goatskins. If the dating of the series is set back by one year, the following specific-cycle turning-points would coincide with reference dates:

Peaks	*Troughs*
	1804
1807	
	1809
	1817
	1820

The following specific-cycle peaks coincide with reference peaks: 1796, 1802, 1815, 1818. The series also appears sensitive to general business-cycle movements in its slackened rate of increase in 1793–4, and in its failure to increase from 1802 to 1803. The specific-cycle 1809–13, as well, resembles that in other series from 1808 to 1811. Broadly, then, the series exhibits high conformity to the reference pattern. The secular trend is strongly upward, at a decelerating rate, from 1790 to 1812.

4–5. Soap. There were two types of soap differentiated in the tax returns on which the production figures are based: soft soap, which was used principally in connexion with textile manufacturing, and hard soap, which was largely a consumption good. The oppressiveness of the soap duty probably led to considerable evasion,[1] and it is also possible, though no estimates are available, that some soap was home-produced.

The relatively short cycles in soft soap production are probably connected with the wide use of this item in cotton textile production, which series also shows cycles of similarly short duration. The trend decline from 1790 to 1801 and the more or less continuous rise thereafter are the outstanding broader movements of the curve. The sharp increase in cotton textile production during the cycle 1797–1801 is not at all reflected in the soft soap series. The latter increases most rapidly in the next two years (1802–3). The very pronounced peak in 1810, however, appears in both series. After 1817 the production of soft

[1] McCulloch, ii. 535.

specific cycles. Noteworthy also is the long cycle from 1798 (1799 in the case of crown glass) to 1813 upon which several shorter cyclical movements are superimposed. No substantial net cyclical change appears in either series; the average change from cycle to cycle in the case of total glass production is positive but small; in the case of crown-glass production it is actually slightly negative.

The glass-production series correspond well in their broad movements to the curve of brick production. All three curves reach a low point in 1798–9. The peak in crown glass in 1805 is clearly reflected in the brick-production curve, as is the peak in total glass output in 1811. The sharp upswing after 1820–1 in the three curves is indicative of the heavy new construction which characterized that period.

10. Hides. The reason for including this series, distinct from that for goatskins, horse and cow hides, &c., is that the latter is based on an excise which was levied per dozen skins, whereas this series is based on a tax which was levied per lb. The two could not be combined without additional data. Though there is close correspondence between the two series with reference to their specific-cycle timing, there are two notable differences in their behaviour. The average amplitude of the hide series is the smallest of all the Fine production series analysed, whereas goatskins, &c., exhibit very marked fluctuations. Moreover, the marked upward trend in the latter series until 1812 is but a gentle incline in the hide figures. The conformity of hide production to general business cycles is very low, but increases if account is taken of its tendency to lag by two years.

Chapter VIII

CYCLICAL PATTERNS OF FOREIGN TRADE AND SHIPPING

PART I. EXPORTS

Introduction

It is unnecessary to emphasize the significance of export markets to the British economy in this period. The overwhelming dependence of the cotton industry, for example, on sales abroad dominates fluctuations as a whole. It is a truism that Britain's rise to economic dominance in the first three-quarters of the nineteenth century stemmed largely from her success in foreign markets. The role of exports in business cycles is examined in detail elsewhere, but it may be stated as a first approximation that increases in the volume of exports were a necessary, but not always sufficient, condition for general recovery.

Export statistics are more complete that any other group of data for this period. It is possible to obtain series showing not only the volume of various kinds of exports, i.e. official values, weighted according to the prices current in 1696, but, after 1814, value series as well. As a result one can isolate the influence of price movements on foreign trade values.

The volume of total exports exhibits specific cycles of greater average duration than reference cycles. This is due principally to the steady increase from 1826 to 1845 broken significantly, for example, in the case of the volume of domestic goods exports, only in 1837. Not all export series, of course, fail to reflect the minor intermediate reference cycles (peaks in 1828, 1831, and 1839). But the total effect of the strong secular increase of iron, cotton, and linen exports in the latter three decades of the period is to eliminate any considerable reflection of those cycles. On the whole, in those cases where reference contractions are not reflected in absolute declines in the volume of exports, they do appear as a slackening in the rate of increase. And this fact, coupled with the tendency for export prices to fall more rapidly during reference contractions than expansions, yields consistently better cyclical conformity for the value than for the volume series.

Re-exports conform well to reference-cycle movements during the war years, when the continental markets played a major role in British business fluctuations. After 1814, however, they decline sharply. The figure for 1814 is not surpassed until 1849. The lesser importance of the re-export trade in the years after 1814 is accompanied by a falling off in its conformity to reference-cycle movements.[1] It exhibits, for that period, an

[1] The decline after 1814 as well as the lesser conformity is also clearly evident in domestic exports to Europe.

TABLE 88*a*

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Specific-cycle behaviour	(1) *Volume of total exports*	(2) *Value of total exports*	(3) *Volume of re-exports*	(4) *Value of re-exports*
PERIOD COVERED	1793–1846	1803–48	1793–1848	1803–50
NUMBER OF CYCLES	12	11	15	10
AVERAGE DURATION (in months)				
Expansion	37·0 (21·3)	24·0 (10·9)	24·8 (10·7)	24 0 (9·6)
Contraction	16·0 (5·3)	25·1 (10·3)	19 2 (8·6)	32·4 (18·0)
Full cycle	53 0 (20 7)	49·1 (14·3)	44·0 (13·3)	56·4 (20 4)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	26·9 (15·4)	20·5 (12·0)	29·1 (22·4)	38·4 (25·8)
Fall	13·0 (10·7)	18·0 (11·1)	21·7 (20·6)	36·6 (27·0)
Rise and fall	39·9 (24·0)	38 5 (21·9)	50·8 (38·5)	75·0 (50·2)
Movement per month				
Rise	0·9 (0 5)	1 0 (0·6)	1 4 (1 0)	2 0 (1·6)
Fall	0·8 (0·6)	0·8 (0·5)	1·0 (0·8)	1 3 (0·9)
Rise and fall	0·8 (0·4)	0·8 (0·4)	1·1 (0 8)	1·5 (1·1)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	85·1 (9·6)	91·5 (8·0)	86·5 (11 8)	85·4 (12·1)
„ III	101·9 (1·9)	102·2 (3·3)	102·1 (4 3)	104·1 (4·3)
„ V	112·0 (7·2)	112·0 (7·3)	115·6 (11·5)	123·8 (16·5)
„ VII	106·4 (4·6)	103 8 (4·9)	104·9 (4·5)	104·9 (3·9)
„ IX	99 0 (7·5)	94·0 (5·6)	93·9 (9·6)	87·2 (11·4)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+1·1 (0·5)	+1·0 (0 6)	+1·4 (1 1)	+2·0 (1 5)
„ III to V	+0·8 (0·5)	+0·9 (0 6)	+1·3 (1 1)	+2·0 (1·6)
„ V to VII	−0·7 (0·5)	−0·7 (0·3)	−1·0 (0 9)	−1·3 (0·9)
„ VII to IX	−0·9 (0 8)	−0·9 (0·7)	−1 0 (0·8)	−1·2 (0·8)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+13 4 (11·6)	+3·7 (8·4)	+7·1 (12·1)	+3·8 (19 0)
Weighted average change per month from cycle to cycle	+0·27	+0·07	+0·16	+0·07

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(5) *Volume of domestic exports*	(6) *Value of domestic exports*	(7) *Volume of exports of domestic manufactures*	(8) *Value of exports of domestic manufactures*	(9) *Volume of exports of domestic raw materials*
1793–1847	1803–48	1816–47	1817–48	1816–50 (1)
10	12	5	8	9
50·4 (25 0)	29·0 (11 0)	55·2 (27 8)	25·5 (10·9)	20·0 (8·9)
14·4 (3·8)	16·0 (6·0)	19·2 (8·6)	21·0 (9·0)	25·3 (12·4)
64 8 (28·3)	45 0 (9·5)	74·4 (26·9)	46·5 (13 5)	45·3 (13·6)
34 1 (14·1)	18·1 (10 8)	35·2 (14·2)	18·8 (8·4)	11·7 (8 0)
15·8 (6·9)	15·4 (9·8)	13·2 (7·8)	14·6 (7·9)	33 0 (21 1)
49 9 (15·5)	33·5 (17 2)	48·4 (17 3)	33·4 (13·6)	44·7 (15 1)
0 8 (0·3)	0 6 (0·3)	0 7 (0 1)	0·8 (0·3)	0 6 (0 4)
1 2 (0·6)	1·2 (0 9)	0 9 (0·7)	1·0 (0 8)	1·2 (0·4)
0·9 (0·3)	0·7 (0·3)	0·7 (0·2)	0 8 (0·4)	1 0 (0·2)
82 5 (8 7)	92·1 (6·6)	80·2 (7·4)	91·1 (5·6)	96 6 (12·0)
100·0 (4·0)	101·2 (2 0)	99·8 (2·2)	101·5 (2 9)	90·6 (9 1)
116·6 (6·0)	110·2 (5·7)	115·4 (7·3)	109·9 (4·6)	84·9 (5·2)
108 9 (7·1)	102·8 (3·4)	109 6 (6·3)	103·0 (2·8)	100·9 (5·5)
100 8 (9 8)	94·8 (5·3)	102·2 (5·8)	95 2 (4·2)	117·9 (16·6)
+0·8 (0·3)	+0·6 (0·4)	+0·8 (0 3)	+0·9 (0·3)	−0 7 (0 3)
+0·7 (0·5)	+0 6 (0·3)	+0·6 (0·2)	+0·7 (0·4)	−0 6 (0·5)
−1·2 (0·6)	−1·2 (0 9)	−0·9 (0·8)	−1·0 (0·9)	+1·2 (0·5)
−1·2 (0·6)	−1·2 (0 9)	−1·0 (0 6)	−1·0 (0·8)	+1·2 (0·4)
+19 0 (11 8)	+3·5 (6·4)	+29 0 (11 0)	+5·1 (7·0)	+20·0 (20 2)
+0·30	+0 08	+0·36	+0·11	+0·45

[*Continued*

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Specific-cycle behaviour	(10) *Value of exports of domestic raw materials*	(11) *Volume of exports of domestic foodstuffs*	(12) *Value of exports of domestic foodstuffs*	(13) *Volume of exports of cotton manufactures*
PERIOD COVERED	1816–50 (i)	1816–48	1816–48	1793–1847
NUMBER OF CYCLES	7	9	12	10
AVERAGE DURATION (in months)				
Expansion	24·0 (13·7)	20·0 (12·4)	13·0 (1·8)	48·0 (12·0)
Contraction	34·3 (12·2)	22·7 (9·5)	19·0 (8·2)	16·8 (5 8)
Full cycle	58·3 (12·2)	42·7 (19 6)	32 0 (8·0)	64·8 (13 0)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	15·7 (8·8)	16·8 (7 1)	13 7 (6 3)	52·9 (19·7)
Fall	36·4 (16 9)	17·8 (8·6)	20 3 (12·7)	20·3 (10·4)
Rise and fall	52·1 (9·3)	34·6 (12·9)	34·0 (16·8)	73·2 (27·6)
Movement per month				
Rise	0·7 (0·3)	1·1 (0·5)	1 1 (0 6)	1·1 (0·3)
Fall	1·1 (0·4)	0·8 (0·3)	1·0 (0·5)	1·3 (0·7)
Rise and fall	0 9 (0·2)	0 9 (0·3)	1·1 (0 4)	1·1 (0·4)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	99·0 (12·0)	94·2 (3·8)	97·2 (5·0)	71·5 (8·6)
,, III	91·9 (8·4)	102·3 (1·5)	104·3 (3·8)	99·1 (3·5)
,, V	83·3 (4·3)	111·0 (4·2)	110·9 (5·4)	124·4 (11·1)
,, VII	99 6 (5·2)	101·8 (2·0)	102 3 (2·6)	118·2 (9 9)
,, IX	119·7 (12·6)	93·2 (5·9)	90 6 (8·4)	104·1 (6·3)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−0·6 (0 3)	+1·0 (0 5)	+1·1 (0 6)	+1·2 (0·3)
,, III to V	−0·7 (0·3)	+1·1 (0·5)	+1·0 (0·5)	+1·0 (0·5)
,, V to VII	+1·0 (0·6)	−0 8 (0·3)	−0 9 (0·4)	−0·9 (0·7)
,, VII to IX	+1·2 (0·2)	−0·8 (0·4)	− 1·2 (0 6)	−1·6 (0·9)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+20·5 (20·7)	−2·2 (7·3)	−7·8 (12·1)	+38·1 (16·6)
Weighted average change per month from cycle to cycle	+0·35	−0·05	−0 24	+0 58

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(14) *Value of exports of cotton manufactures*	(15) *Volume of exports of woollen manufactures*	(16) *Value of exports of woollen manufactures*	(17) *Quantity of exports of woollen piece goods*	(18) *Quantity of exports of woollen yarn goods*
1816–48	1793–1848	1817–48	1816–48	1817–48
8	14	10	8	8
30·0 (15·0)	30·0 (13·7)	21·6 (7·7)	25 5 (11·2)	31 5 (20 2)
18·0 (7·5)	17·1 (5·9)	15 6 (5 0)	22·5 (10·5)	15·0 (4·5)
48 0 (18·0)	47 1 (12 9)	37·2 (6·7)	48 0 (15 0)	46·5 (19 1)
18 1 (6 9)	30·7 (14·8)	20·1 (11 7)	25·6 (7 1)	49·8 (28 2)
15 0 (6 5)	23 4 (7·6)	21·1 (9 3)	21 9 (13 6)	31 0 (15 0)
34·1 (11·6)	54·1 (16·6)	41 2 (16·4)	47 5 (16 6)	80 8 (31·2)
0·7 (0·2)	1·1 (0·4)	0 9 (0 3)	1·2 (0·3)	1·8 (0·8)
1·0 (0 6)	1·5 (0·7)	1·4 (0·6)	1 1 (0·7)	2 2 (0 9)
0 7 (0 2)	1 2 (0·2)	1 1 (0 4)	1 1 (0 3)	1 9 (0 5)
91 2 (4 5)	87·2 (9·4)	93·1 (7·5)	88·6 (6·2)	82·1 (14·1)
100 8 (2 0)	101·0 (5·3)	104·4 (3·9)	104·9 (4·4)	100 0 (12·0)
110·4 (4 7)	117·9 (7·2)	113 2 (6·0)	114·2 (5 2)	131·9 (18 3)
104·8 (3·4)	106·4 (7·9)	102·6 (5 4)	104·4 (3·7)	115 6 (18 7)
95·4 (5 1)	94·5 (9·5)	92 1 (6·5)	92·4 (9·1)	100 9 (23·1)
+0 7 (0·2)	+1·1 (0 5)	+1 0 (0·4)	+1 4 (0·5)	+1·7 (1 0)
+0·7 (0 4)	+1 2 (0·5)	+0·8 (0 4)	+0·9 (0 5)	+1·9 (1·0)
−0·8 (0·6)	−1 5 (0·8)	−1 4 (0 8)	−1·0 (0 6)	−2 2 (1·0)
−1·1 (0·7)	−1·6 (0·7)	−1·4 (0·7)	−1·2 (0·8)	−2·1 (0·8)
+5 6 (5·4)	+7 2 (12·0)	+1·0 (11·1)	+7·3 (6·2)	+21 4 (28 3)
+0·12	+0 15	+0·03	+0·15	+0·44

[*Continued*

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Specific-cycle behaviour	(19) *Quantity of exports of woollen hosiery, &c.*	(20) *Volume of exports of linen manufactures*	(21) *Value of exports of linen manufactures*	(22) *Quantity of exports of iron, hardware, and cutlery*
PERIOD COVERED	1817–50	1793–1848	1816–48	1797–1845
NUMBER OF CYCLES	10	15	9	10
AVERAGE DURATION (in months)				
Expansion	22·8 (10·8)	27·2 (12·7)	26·7 (8 9)	40·8 (29·8)
Contraction	16·8 (5·8)	16·8 (7·0)	16·0 (6·2)	16·8 (5·8)
Full cycle	39·6 (10·6)	44·0 (16 0)	42 7 (11·6)	57·6 (28·3)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	60·2 (29·2)	38·2 (13·3)	29·9 (14·1)	46·1 (28·5)
Fall	59·0 (18·0)	29·9 (17·3)	23·7 (11·5)	21·6 (13·3)
Rise and fall	119·2 (33·6)	68·1 (24·3)	53 6 (18·6)	67·7 (33·4)
Movement per month				
Rise	2 7 (1·2)	1·6 (0·6)	1·1 (0·3)	1·3 (0·3)
Fall	3·7 (1 0)	2·0 (1·1)	1·6 (0·9)	1·5 (1·1)
Rise and fall	3 1 (0·8)	1·7 (0·6)	1 3 (0 3)	1 2 (0·4)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	80 5 (21·4)	82 5 (10·6)	86 7 (9 9)	77·9 (14·7)
„ III	108·2 (12 2)	105·0 (4·5)	104·1 (3·9)	99·3 (5·2)
„ V	140·7 (14·4)	120·7 (6·6)	116·6 (6·0)	124·0 (13·8)
„ VII	110·2 (9·4)	107·3 (4·8)	105·6 (4·8)	111·2 (13·0)
„ IX	81 7 (18·1)	90 9 (11·6)	92 9 (8 8)	102·4 (9·5)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+2·7 (1·6)	+1·8 (0·7)	+1 3 (0·5)	+1·2 (0·4)
„ III to V	+2 7 (1·5)	+1 4 (0·7)	+0·9 (0 5)	+1·4 (0·4)
„ V to VII	−3·8 (1·5)	−1·8 (1·1)	−1·6 (1·0)	−1·7 (1·2)
„ VII to IX	−3·6 (1 2)	−2 1 (1·3)	−1·7 (1·0)	−1·3 (1·2)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+1·8 (16·0)	+9·9 (11·9)	+6·8 (11·4)	+28·7 (24·1)
Weighted average change per month from cycle to cycle	+0·04	+0·23	+0·17	+0·51

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(23) *Volume of exports of iron, hardware, and cutlery*	(24) *Value of exports of iron, hardware, and cutlery*	(25) *Volume of exports of brass and copper manufactures*	(26) *Value of exports of brass and copper manufactures*	(27) *Value of domestic exports to Asia*
1795–1848	1797–1803; 1817–48	1819–54	1816–51	1809–48
15	11	8	9	8
25·6 (15·4)	26·2 (11·9)	27·0 (11·2)	25·3 (10·3)	31·5 (13·5)
16·8 (5·8)	14·2 (3·6)	25·5 (16·9)	21·3 (14·5)	27·0 (15·8)
42·4 (14·2)	40·4 (12·1)	52·5 (19·5)	46·7 (16·9)	58·5 (11·2)
30·4 (12·4)	29·6 (15·5)	35·4 (16·9)	26·1 (14·4)	34·0 (16·0)
16·7 (8·6)	19·0 (11·6)	23·0 (13·8)	16·7 (9·3)	22·4 (6·5)
47·1 (13·2)	48·6 (25·2)	58·4 (21·1)	42·8 (15·8)	56·4 (21·3)
1·4 (0·4)	1·2 (0·4)	1·4 (0·5)	1·1 (0·4)	1·0 (0·4)
1·1 (0·6)	1·4 (0·8)	0·9 (0·3)	0·9 (0·5)	1·2 (0·7)
1·2 (0·3)	1·2 (0·5)	1·2 (0·3)	1·0 (0·4)	0·9 (0·3)
86·3 (7·7)	88·0 (7·5)	84·5 (11·2)	89·0 (9·3)	83·5 (9·2)
99·5 (4·2)	101·0 (4·5)	102·9 (9·1)	102·6 (6·7)	100·9 (3·4)
116·7 (5·8)	117·6 (10·1)	119·9 (7·1)	115·1 (7·0)	117·5 (7·5)
108·5 (6·8)	107·3 (7·1)	108·4 (9·0)	106·9 (6·1)	106·5 (4·5)
99·9 (8·3)	98·6 (7·4)	96·9 (13·9)	98·4 (10·0)	95·1 (5·8)
+1·3 (0·5)	+1·2 (0·4)	+1·5 (0·7)	+1·1 (0·5)	+1·1 (0·6)
+1·6 (0·5)	+1·3 (0·6)	+1·3 (0·6)	+1·0 (0·5)	+0·9 (0·4)
1·0 (0·7)	1·5 (0·8)	−0·9 (0·3)	−0·9 (0·5)	−1·2 (0·7)
1·1 (0·6)	1·3 (0·7)	−1·0 (0·3)	−0·9 (0·4)	−1·2 (0·7)
+14·4 (13·6)	+11·2 (10·2)	+17·1 (10·8)	+10·6 (9·9)	+18·1 (7·9)
+0·33	+0·26	+0·34	+0·22	+0·32

[*Continued*

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Specific-cycle behaviour	(28) *Value of domestic exports to Europe*	(29) *Value of domestic exports to British N. America and the W. Indies*	(30) *Value of domestic exports to Central and S. America*	(31) *Value of domestic exports to the United States*
PERIOD COVERED	1807–48	1816–48	1816–50	1817–48
NUMBER OF CYCLES	10	7	9	11
AVERAGE DURATION (in months)				
Expansion	31·2 (19·7)	24 0 (6·9)	30·7 (12·7)	18·5 (6·0)
Contraction	18·0 (7·2)	30·9 (12·7)	14·7 (4·2)	15·3 (4·8)
Full cycle	49·2 (23·3)	54·9 (12·7)	45·3 (15·7)	33·8 (5·4)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	23·7 (20·8)	21·4 (10·8)	41·7 (21·8)	49·0 (13·5)
Fall	16 2 (6·7)	30·0 (15·1)	30 8 (19·1)	45·8 (22 9)
Rise and fall	39·9 (25·9)	51·4 (20 7)	71·3 (37·8)	94·8 (27·1)
Movement per month				
Rise	0·8 (0·6)	1·0 (0·7)	1·4 (0·6)	2·8 (0·5)
Fall	0 9 (0·4)	1·1 (0·4)	2·4 (1·8)	3·3 (1 8)
Rise and fall	0·8 (0·4)	0·9 (0 3)	1·7 (0·7)	2·8 (0·8)
AVERAGE STANDING OF RELATIVES IN				
Stage I	89·7 (11 8)	94·3 (6 5)	83·4 (10·4)	81·6 (11·2)
„ III	98·1 (5·6)	105·7 (4·0)	98·7 (6·1)	107·2 (10 7)
„ V	113·4 (9·6)	115·7 (6·9)	125·1 (13·3)	130·6 (9·2)
„ VII	105·7 (6·8)	99·9 (3·3)	108·8 (8·0)	104·7 (7·6)
„ IX	97·2 (4·9)	85·7 (9·5)	94·3 (10·1)	84·8 (14·7)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·5 (0·3)	+1 1 (0·6)	+1 1 (0 4)	+2 9 (0·8)
„ III to V	+1·1 (1·0)	+1·0 (0·7)	+1·7 (0·9)	+2 7 (0·9)
„ V to VII	−0·9 (0·5)	−1·1 (0·4)	− 2 5 (1 7)	-·3·5 (2·0)
„ VII to IX	−1·0 (0·3)	−1·0 (0·6)	-·2·3 (1·8)	−3·0 (1·9)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+7·3 (16·2)	−3 3 (9 6)	+10·0 (7·2)	+3·6 (15·9)
Weighted average change per month from cycle to cycle	+0·16	−0·06	+0·22	+0·11

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(32)	(33)	(34)	(35)	(36)
Volume of total imports	*Value of total imports*	*Quantity of raw cotton imports*	*Quantity of raw wool imports*	*Quantity of flax imports*
1793–1850	1804–50	1791–1846	1791–1847	1806–51
16	13	15	17	13
26·2 (8·8)	21·2 (8·5)	27·2 (16·3)	23·3 (8·0)	24·0 (9·2)
16·5 (6·2)	21·2 (8·5)	16·8 (7·0)	16 2 (6·0)	17·5 (6·8)
42·8 (10·4)	42·5 (13·3)	44·0 (18·7)	39·5 (12·0)	41·5 (14·2)
25·1 (11·1)	30·8 (17·8)	48·5 (21·8)	68·8 (35·3)	47·6 (19·2)
14·2 (9·6)	25·5 (19 4)	32·7 (17·9)	55 7 (35·7)	40 1 (19 3)
39·3 (19·2)	56·3 (37·2)	81·1 (27·8)	124·5 (66·5)	87 7 (32 9)
1·6 (1·3)	1·4 (0·5)	2 2 (1 0)	3 1 (1·3)	2·6 (1·5)
1 0 (0 7)	1·2 (0·8)	2·1 (1·2)	3·9 (2 7)	2 5 (1·4)
0 9 (0 4)	1·2 (0·5)	2·1 (0·8)	3 3 (1·6)	2·4 (1·2)
88 1 (4·8)	88·5 (5·7)	79 5 (12 6)	71 2 (18·0)	78 7 (12 2)
99·4 (2·9)	99·5 (3 0)	101 0 (8·1)	104·4 (11·2)	105 2 (6·1)
113·2 (6·9)	119·3 (13·2)	127·9 (9·2)	140·0 (22·8)	126·3 (9·6)
104·9 (4 8)	103·2 (6 2)	109·7 (7 8)	113 2 (9 9)	107 2 (9 6)
98·9 (5 0)	93·8 (7·6)	95·3 (13·2)	84 3 (14·1)	86·2 (13 0)
+1·0 (0·4)	+1·1 (0 4)	+2·0 (1·1)	+3·2 (1 4)	+2 8 (1·6)
+1·2 (0 7)	+1·7 (0·8)	+2·5 (1·1)	+3·1 (1 7)	+2·4 (1·7)
−1·1 (0 8)	−1·4 (1·1)	−2·2 (1 2)	−3 9 (2·8)	−2·4 (1 5)
−0·9 (0·6)	−1·0 (0·8)	−2·0 (1 3)	−4·0 (2·7)	−2·6 (1·6)
+11 3 (6 4)	+5·9 (8 1)	+21·6 (16·5)	+18 4 (15·6)	+12 2 (9 4)
+0·27	+0·14	+0·47	+0 47	+0·29

[*Continued*

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Specific-cycle behaviour	(37) *Quantity of hemp and jute imports*	(38) *Quantity of fir timber imports*	(39) *Quantity of wheat imports*	(40) *Quantity of raw sugar imports*
PERIOD COVERED	1802–52	1789–1839	1795–1848	1795–1850
NUMBER OF CYCLES	15	14	14	18
AVERAGE DURATION (in months)				
Expansion	21·6 (9·0)	23·1 (11·1)	26 6 (10 2)	18 7 (8·9)
Contraction	18 4 (7·7)	19·7 (8·8)	18 9 (8 8)	18·0 (8·7)
Full cycle	40 0 (10·1)	42·9 (15·4)	45·4 (12·9)	36·7 (13 1)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	43·9 (19 4)	43 5 (22 2)	143 7 (67·1)	16 6 (9·1)
Fall	39 7 (25·1)	36 2 (25 4)	138·0 (62 9)	11 2 (8·1)
Rise and fall	83·6 (36·1)	79·7 (42 5)	281·7 (95·9)	27·8 (14 7)
Movement per month				
Rise	2·3 (1·2)	2 1 (1 1)	5·6 (2·0)	1 0 (0·6)
Fall	2 4 (1·6)	2·1 (1 4)	7·8 (3·5)	0·6 (0·4)
Rise and fall	2·2 (1·0)	2·0 (1·2)	6·3 (2·1)	0·8 (0·3)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	81·5 (14·4)	82·5 (13·4)	59·5 (36·6)	92·5 (5·4)
„ III	109·2 (8·6)	103·4 (8·0)	112·4 (29·1)	100·5 (2·1)
„ V	125·5 (11·1)	126·0 (13 6)	203·2 (39 7)	109·1 (5 0)
„ VII	105 2 (6·9)	107·1 (6·2)	105·1 (39·1)	102·7 (2·7)
„ IX	85·8 (15·6)	89·8 (13·8)	65·2 (38·4)	97·9 (4·6)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+2·8 (1·5)	+2·1 (1·4)	+4·2 (1·7)	+1·0 (0·6)
„ III to V	+1·8 (1·2)	+2·2 (1·0)	+6·9 (3·0)	+1·0 (0·6)
„ V to VII	−2 4 (1·6)	−2·1 (1·6)	−9·8 (3 9)	−0·7 (0·4)
„ VII to IX	−2·4 (1·6)	−2·0 (1·5)	−5·8 (4·4)	−0·6 (0 4)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+3 4 (10·1)	+8·2 (18·0)	+11·8 (58 0)	+6·4 (8·4)
Weighted average change per month from cycle to cycle	+0·09	+0·18	+0·26	+0·17

TABLE 88*a* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(41) *Balance of trade*	(42) *Gross barter terms of trade*	(43) *Net barter terms of trade*	(44) *Shipping tonnage in foreign trade, entered and cleared*	(45) *Shipping tonnage in coasting trade, entered and cleared*	(46) *Shipping tonnage belonging to the United Kingdom*
1802–50 (i)	1789–1850 (i)	1802–47	1816–48	1827–49	1796–1843
13	18	8	6	3	6
19·4 (9·1)	18·7 (5·9)	36·0 (18·0)	46·0 (22·0)	76 0 (45 3)	72 0 (63·3)
24·9 (14·2)	22·0 (11·1)	31·5 (18·4)	18·0 (8·0)	12 0 (0 0)	22·0 (13·3)
44·3 (19·5)	40·7 (11·6)	67·5 (29·2)	64 0 (21·3)	88 0 (45·3)	94 0 (61 3)
18·2 (9·4)	15·6 (9·2)	20·4 (9·0)	33·2 (13·1)	16·0 (8·7)	16·2 (16·6)
15·8 (10 7)	17·6 (7·6)	11 8 (5·8)	12·3 (7·0)	4 0 (1 3)	4·3 (3·1)
33·9 (19 7)	33·1 (13·8)	32·1 (11·4)	45·5 (16 0)	20 0 (9·3)	20 5 (15 7)
1·1 (0·6)	0·9 (0·6)	0 6 (0·3)	0·8 (0·3)	0 2 (0 0)	0 2 (0·1)
0·6 (0 3)	0·9 (0·4)	0 5 (0·3)	0 7 (0·4)	0 3 (0 1)	0 3 (0 2)
0 8 (0 3)	0 8 (0 3)	0·5 (0 2)	0·7 (0·2)	0 2 (0 0)	0·2 (0 2)
107·2 (5·4)	105·2 (6·6)	89·5 (5·6)	84·7 (6·2)	92 3 (3 8)	91·8 (10·2)
98 6 (3 0)	96·8 (4·2)	99 9 (1 7)	96 5 (2·2)	99·7 (0·4)	100·8 (1·8)
89·0 (5 8)	89·7 (4·0)	109·9 (3·4)	117 8 (6 9)	108 3 (5 8)	108 0 (6 3)
98·0 (2·9)	98·6 (3·7)	104·9 (4·1)	111·2 (8 2)	106·3 (5·1)	106·0 (6·7)
104·8 (5 3)	107·2 (6·0)	98·1 (5·1)	105 5 (8·5)	104·3 (5·1)	103 7 (7·2)
−1·0 (0 6)	- 0·9 (0·7)	+ 0 7 (0 3)	+0 6 (0 2)	+ 0·2 (0 0)	+ 0 2 (0·1)
--1·2 (0·6)	- 0·8 (0·6)	+0·6 (0·3)	+ 1·0 (0·4)	+0 2 (0·0)	+ 0·2 (0 1)
+ 0·7 (0·3)	+ 0·9 (0·5)	− 0·4 (0·2)	−0·7 (0·4)	−0·3 (0·1)	−0 3 (0 2)
+ 0 6 (0·3)	+0 9 (0 4)	- 0·6 (0 4)	−0 7 (0·4)	- 0·3 (0·1)	0 3 (0·2)
−3·0 (5·3)	+0·8 (6·4)	+9·0 (6·0)	+20·2 (11·4)	+ 14 5 (1·5)	+ 5·8 (9 4)
−0 07	+0·02	+ 0·14	+ 0·32	+0·14	+ 0·07

TABLE 88*b*

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Reference-cycle behaviour	(1) *Volume of total exports*	(2) *Value of total exports*	(3) *Volume of re-exports*	(4) *Value of re-exports*
PERIOD COVERED	1793–1848	1801–48	1793–1848	1801–48
NUMBER OF CYCLES	13	11	13	11
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	87·1 (8·4)	91·6 (8·4)	90·5 (15 0)	96·1 (15·9)
„ III	102 4 (4·6)	103·5 (5·1)	102·7 (11·0)	104·1 (13·4)
„ V	108·8 (4·8)	109·5 (5·0)	104 6 (8·0)	104 0 (6·0)
„ VII	104·2 (4·4)	101·6 (3·7)	103·6 (6·4)	100·2 (5·5)
„ IX	100·5 (8·5)	92·6 (5·9)	99·5 (12·3)	91·5 (10·0)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·9 (0·7)	+ 0·8 (0 7)	+0 8 (1·6)	+0 6 (1·7)
„ III to V	+0·4 (0 3)	+ 0·4 (0 4)	+ 0 2 (0·8)	−0 1 (0·9)
„ V to VII	−0·7 (0·8)	−1·2 (0·9)	−0·3 (1·1)	−0·7 (1 3)
„ VII to IX	−0·6 (0·9)	−1·3 (0 9)	−0·5 (1·2)	−0·9 (1·0)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	I–V	I–V	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	+0·7 (0 4)	+0·6 (0·3)	+0·5 (0·7)	+0·2 (0·6)
Reference contraction	−0 7 (0 8)	−1 2 (0 9)	−0·4 (1·1)	−0 9 (1·2)
Indexes of conformity to				
Reference expansion	+ 92	+91	+38	0
Reference contraction	+31	+ 91	−15	+27
Business cycles	+80	+ 100	+ 24	+29

TABLE 88*b* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(5) *Volume of domestic exports*	(6) *Value of domestic exports*	(7) *Volume of exports of domestic manufactures*	(8) *Value of exports of domestic manufactures*	(9) *Volume of exports of domestic raw materials*
1793–1848	1801–48	1816–48	1816–48	1816–48
13	11	7	7	7
86·2 (6·6)	91·1 (6·5)	85 7 (6 2)	90·6 (5 8)	92 1 (12·2)
102·1 (3·5)	102·9 (3·0)	100·3 (2 0)	101 3 (2 0)	97·9 (6 4)
109·9 (4·5)	110·9 (5·5)	108·1 (4·2)	110 3 (5·0)	97·0 (8 3)
104·5 (4·3)	102·2 (3·7)	105·0 (2 0)	103·0 (2 9)	103 9 (8 2)
101·1 (8·4)	93·1 (5 7)	102 6 (5 6)	94 6 (4 2)	111 3 (15 2)
+ 1·0 (0 5)	+ 0 8 (0·5)	+0 9 (0·5)	+ 0 7 (0 5)	+ 0 5 (0 8)
+ 0·4 (0·2)	+0·5 (0·4)	+0·5 (0·2)	+0·5 (0·5)	− 0·1 (0·5)
−0 8 (0·8)	−1 3 (0·9)	−0 5 (0·8)	−1 0 (0 9)	+ 0 8 (1·0)
−0·6 (0 9)	−1·3 (0 9)	−0·4 (0·8)	−1 1 (0 8)	+ 0 8 (1·1)
I–V	I–V	I–V	I–V	V–I (1)
+0 7 (0·3)	+ 0 7 (0·3)	+ 0 7 (0 2)	+ 0·6 (0 2)	+0 2 (0 5)
−0 7 (0 8)	−1 3 (0·9)	−0·5 (0 8)	−1 1 (0 9)	+ 0·8 (1 0)
+ 92	+ 100	+ 100	+ 100	+ 14
+38	+ 100	+ 14	+ 100	−43
+76	+100	+ 69	+100	−8

[*Continued*

TABLE 88*b* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Reference-cycle behaviour	(10) *Value of exports of domestic raw materials*	(11) *Volume of exports of domestic foodstuffs*	(12) *Value of exports of domestic foodstuffs*	(13) *Volume of exports of cotton manufactures*
PERIOD COVERED	1816 48	1816-48	1816–48	1793–1848
NUMBER OF CYCLES	7	7	7	13
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	93·4 (13·2)	96·1 (6 1)	101·7 (11·3)	78·3 (8 8)
„ III	97·1 (5·0)	105 3 (4·8)	104 0 (7·4)	101·5 (4·7)
„ V	99·0 (8·6)	99·1 (3·9)	99·0 (4·9)	113·0 (8·0)
„ VII	104·1 (8 2)	98·3 (7·2)	97·1 (8·7)	108·5 (6·2)
„ IX	107·0 (16·3)	93·7 (8·2)	89·1 (9 8)	106·5 (11·2)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+ 0 3 (0·8)	+0·7 (0 4)	+0 5 (0·8)	+ 1·5 (0·6)
„ III to V	+ 0 1 (0·6)	−0 4 (0·4)	- 0·4 (0·5)	+ 0 6 (0 4)
„ V to VII	+0·5 (0·8)	−0·4 (0·7)	−0·6 (0·9)	−0·7 (1·2)
„ VII to IX	+0·3 (0·9)	−0·6 (0·5)	−1·0 (0·6)	−0 5 (1·4)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	V- 1 (i)	I–V	I–V	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	+ 0·2 (0·5)	+ 0·1 (0·2)	+ 0·1 (0·3)	+ 1 0 (0 4)
Reference contraction	+0·4 (0·8)	−0·5 (0·6)	- 0·8 (0·7)	−0 6 (1 3)
Indexes of conformity to				
Reference expansion	- 14	+29	+29	+100
Reference contraction	−43	+29	+71	+23
Business cycles	−8	+85	+100	+56

TABLE 88*b* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(14) *Value of exports of cotton manufactures*	(15) *Volume of exports of woollen manufactures*	(16) *Value of exports of woollen manufactures*	(17) *Quantity of exports of woollen piece goods*	(18) *Quantity of exports of woollen yarn goods*
1816–48	1793–1848	1816–48	1816–48	1816–48
7	13	7	7	7
90·1 (3 9)	87·8 (10 6)	92·4 (9 1)	90 1 (8·1)	80·9 (14·2)
102·9 (3 0)	102·2 (4 5)	102 7 (4 3)	103 3 (6 0)	97 0 (10 3)
108·4 (5·6)	112·8 (6·4)	111·4 (5·8)	107 6 (4 4)	114 3 (7 9)
102·7 (3 2)	103·8 (7·6)	99·9 (3·3)	100 3 (7·3)	107 1 (6 5)
94·9 (5·0)	95·8 (11 0)	90·0 (8·3)	95 0 (13 7)	99·0 (18·0)
+0 8 (3·4)	+0·8 (0 6)	+0·6 (0·7)	+0 8 (0 6)	+0 9 (0 8)
+0·2 (0·5)	+0·5 (0 6)	+0·6 (0·5)	+0 3 (0·5)	+1·1 (0·8)
- 0·8 (0·9)	- 1·3 (1·0)	− 1·5 (1·1)	0·8 (1·1)	- 1 6 (1·8)
-1·0 (0·9)	- 1·2 (1·1)	− 1 4 (1·1)	−0·7 (1·0)	1·6 (1·8)
I–V	I V	I–V	I–V	I–V
+0 5 (0 3)	+0 7 (0·5)	+0·6 (0·4)	+0·6 (0·3)	+1 0 (0 5)
−0 9 (0 9)	−1·3 (1·0)	−1·4 (1·1)	− 0·8 (1·1)	- 1·6 (1·8)
+71	+ 85	+100	+71	+100
+43	+62	+71	+43	+14
+69	+76	+100	+69	+92

[*Continued*

TABLE 88*b* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Reference-cycle behaviour	(19) *Quantity of exports of woollen hosiery, &c.*	(20) *Volume of exports of linen manufactures*	(21) *Value of exports of linen manufactures*	(22) *Quantity of exports of iron, hardware, and cutlery*
PERIOD COVERED	1816–48	1793–1848	1816–48	1797–1848
NUMBER OF CYCLES	7	13	7	12
AVERAGE STANDINGS OF RELATIVES IN				
Stage I.	81·3 (13·7)	83·2 (13·7)	85·1 (12 2)	82·0 (8·3)
„ III	108·1 (17·8)	106·9 (6 2)	101 4 (3·6)	98·0 (5·2)
„ V	119·3 (15·8)	111·6 (9·1)	115·0 (7·4)	108·1 (12 1)
„ VII	98·6 (11·6)	101·5 (7·2)	105·6 (7 8)	111 4 (8·4)
„ IX	81·0 (22·0)	92·8 (14·4)	92·9 (8 7)	110 2 (15·6)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+ 1·7 (1·5)	+1·3 (0·7)	+1 2 (0·7)	+ 1 0 (0 4)
„ III to V	+ 1·3 (2·0)	+0 2 (0 9)	+0·9 (0 6)	+0·7 (0 7)
„ V to VII	−2 6 (1·6)	−1·7 (1·6)	-1 4 (1·2)	0 0 (1·4)
„ VII to IX	−2·4 (1·9)	−1·5 (1·8)	-1·6 (1·0)	−0·4 (1·6)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	I–V	I–V	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	+1·5 (1·1)	+0·8 (0·6)	+1·0 (0·5)	+0·9 (0·4)
Reference contraction	−2·5 (1·7)	−1·6 (1·7)	1·5 (1·1)	−0 2 (1·3)
Indexes of conformity to				
Reference expansion	+ 100	+ 85	+ 71	+83
Reference contraction	+71	+54	+71	0
Business cycles	+85	+ 72	+ 85	+39

TABLE 88*b* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(23) *Volume of exports of iron, hardware, and cutlery*	(24) *Value of exports of iron, hardware, and cutlery*	(25) *Volume of exports of brass and copper manufactures*	(26) *Value of exports of brass and copper manufactures*	(27) *Value of domestic exports to Asia*
1793–1848	1797–1803 1816–48	1816–48	1816-48	1808–48
13	9	7	7	9
87·1 (7·0)	90·3 (11·4)	91·4 (8·9)	94 7 (10 0)	90 3 (12 5)
97·4 (4 9)	96·0 (5·8)	104·0 (7·7)	101·4 (5·8)	100·8 (7 4)
113·0 (8·3)	115·2 (8·7)	94·6 (7·9)	97·6 (8·1)	107·1 (8·6)
108·9 (5·6)	109·1 (8·1)	99·1 (7·6)	101 0 (5 1)	104·6 (6·6)
102·8 (11·2)	100·0 (8·4)	105·6 (16·5)	104·4 (13·8)	98·8 (8·0)
+0·7 (0·6)	+ 0·4 (0·9)	+1·0 (1·0)	+ 0 6 (0·8)	+0·6 (0·8)
+0·9 (0·4)	+ 1·2 (0·6)	−0·5 (0·5)	0·2 (0·5)	+0·3 (0·4)
−0 9 (1·1)	−1·2 (1·2)	+0·8 (1·2)	+ 0·5 (0 8)	−0·4 (1·1)
−1·0 (1 0)	−1·3 (1·0)	+0 8 (1·2)	+0 5 (1·0)	−0 6 (1·0)
I–V	I–V	VII–III	VII–III	I–V
+0·8 (0·3)	+0·8 (0·5)	+1·0 (0·8)	+0·7 (0·6)	+0·5 (0·5)
−0·9 (1·0)	−1·3 (1·1)	−0·2 (0·5)	0 0 (0·3)	−0·5 (1·0)
+ 100	+89	+ 100	+71	+44
+38	+78	+14	+43	+ 33
+76	+100	+ 69	+31	+41

[*Continued*

TABLE 88*b* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Reference-cycle behaviour	(28) *Value of domestic exports to Europe*	(29) *Value of domestic exports to British N. America and the W. Indies*	(30) *Value of domestic exports to Central and S. America*	(31) *Value of domestic exports to the United States*
PERIOD COVERED	1808–48	1816–48	1816–48	1816–48
NUMBER OF CYCLES	9	7	7	7
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	90 0 (10·9)	100 1 (9·3)	83·1 (11 0)	80·6 (15 2)
„ III	104·8 (4·4)	96·4 (3·8)	97·1 (7·0)	105 3 (13·3)
„ V	102·0 (7·3)	111·4 (9·9)	122 9 (19·0)	127·1 (17·3)
„ VII	100·8 (3·8)	103 1 (5·6)	107·9 (9 6)	105·1 (8 2)
„ IX	98·8 (7·3)	91·1 (10·7)	95·0 (8 3)	80 9 (17·9)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+ 1·0 (0·9)	−0·1 (0·5)	+ 0·8 (0 4)	+ 1·5 (1 5)
„ III to V	− 0·2 (0·3)	+ 0·8 (0·7)	+1·4 (1·6)	+ 1·4 (1·5)
„ V to VII	−0 2 (0·7)	−0·9 (0·5)	− 2·2 (2·2)	3 4 (2·2)
„ VII to IX	− 0·3 (0·8)	−1·1 (0·7)	−2·1 (2 4)	− 3 5 (2 0)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	VII–III	I–V	I–V	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	+0 8 (0·8)	+0·4 (0·4)	+ 1·1 (1·0)	+ 1·4 (0·9)
Reference contraction	− 0·2 (0·2)	−1·0 (0·6)	− 2·2 (2·3)	3·4 (2 1)
Indexes of conformity to				
Reference expansion	+56	+43	+71	+71
Reference contraction	+ 56	+ 71	+71	+71
Business cycles	+88	+62	+54	+ 100

TABLE 88*b* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(32)	(33)	(34)	(35)	(36)
Volume of total imports	*Value of total imports*	*Quantity of raw cotton imports*	*Quantity of raw wool imports*	*Quantity of flax imports*
1793–1848	1801–48	1793–1848	1793–1848	1801–48
13	11	13	13	11
87 8 (6·6)	91·5 (9 2)	82 2 (12 7)	69 8 (16·2)	79·0 (12 0)
99·1 (4 4)	98 7 (7 6)	98 8 (8·2)	102·5 (11·3)	111·0 (13 3)
112·7 (9·3)	115·7 (14 4)	118 2 (15·0)	134·8 (27 7)	116·1 (19·9)
106·8 (6·1)	105·5 (9 4)	113·8 (11·1)	120·1 (17·2)	106·5 (13·1)
101·2 (8·7)	94 9 (10 5)	106·9 (10·9)	92 4 (18·1)	93·1 (17·3)
+ 0·7 (0·5)	+0 5 (0 8)	+1 3 (1·1)	+2·2 (1·6)	+2 2 (1·7)
+ 0 7 (0·6)	+ 0·8 (1·3)	+ 1 0 (1 3)	+ 1 8 (1 9)	0 0 (1·0)
−1 0 (1 0)	−1 7 (1 6)	0·8 (1·3)	- 2·6 (3·0)	- 1 6 (2 2)
−1·1 (1·0)	−1·7 (1·6)	- 1·1 (1 5)	- - 3·8 (3·4)	− 1·9 (2·4)
I V	I–V	I-V	I-V	I V
+ 0·7 (0·4)	+0 6 (0·8)	+ 1 2 (0 9)	+ 2 0 (1·1)	+1 1 (0·7)
−1·0 (1·1)	−1 7 (1·6)	1·0 (1 1)	−3·2 (2·6)	−1 8 (2·0)
+77	+82	+ 85	+ 100	+100
+54	+ 64	+69	+85	+ 27
+80	+ 81	+84	+84	+ 76

[*Continued*

TABLE 88*b* (*cont.*)

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

Reference-cycle behaviour	(37) *Quantity of hemp and jute imports*	(38) *Quantity of fir timber imports*	(39) *Quantity of wheat imports*	(40) *Quantity of raw sugar imports*
PERIOD COVERED	1801–48	1793–1837	1793–1848	1793–1848
NUMBER OF CYCLES	11	11	13	13
AVERAGE STANDINGS OF RELATIVES IN				
Stage I.	87·3 (18·1)	93·5 (22·7)	90·8 (46·5)	94·5 (6·7)
„ III	105·9 (9·0)	91·5 (8·1)	84·4 (38·8)	97·9 (4·7)
„ V	114·9 (15·2)	114·7 (14·3)	126·4 (53·6)	104·0 (4·9)
„ VII	103·7 (8·9)	114·6 (10·4)	123·4 (29·4)	103·6 (5·2)
„ IX	89·1 (20·8)	103·3 (20·6)	106·2 (62·0)	103·1 (8·5)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+1·1 (1·7)	+0·2 (1·2)	−0·2 (3·9)	+0·3 (0·4)
„ III to V	+0·5 (1·2)	+1·6 (1·4)	+2·6 (4·9)	+0·5 (0·5)
„ V to VII	−1·4 (2·4)	−0·3 (1·8)	−1·4 (6·9)	−0·2 (0·8)
„ VII to IX	−1·7 (2·7)	−1·3 (2·0)	−2·5 (6·7)	−0·2 (0·8)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	I–V	III–VII	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	+0·8 (1·2)	+0·9 (1·3)	+1·3 (2·9)	+0·4 (0·3)
Reference contraction	−1·5 (2·3)	−0·8 (1·5)	+1·4 (5·0)	−0·2 (0·8)
Indexes of conformity to				
Reference expansion	+64	+45	+23	+54
Reference contraction	+45	+27	+23	+23
Business cycles	+52	+52	+28	+48

TABLE 88*b*

Measures of Average Cyclical Behaviour: Foreign Trade and Shipping Series

(41)	(42)	(43)	(44)	(45)	(46)
Balance of trade	*Gross barter terms of trade*	*Net barter terms of trade*	*Shipping tonnage in foreign trade entered and cleared*	*Shipping tonnage in coasting trade entered and cleared*	*Shipping tonnage belonging to the United Kingdom*
1801–48	1793–1848	1801–48	1816–48	1826–48	1793–1848
11	13	11	7	5	13
102·1 (6·1)	98·9 (8·8)	95·4 (6·7)	88·4 (6·2)	96·2 (1·8)	97·6 (4·2)
103 3 (4·5)	103·1 (5·0)	101 5 (3 3)	94·6 (3·9)	97 0 (2 0)	97·8 (2·0)
93·9 (8·7)	96·6 (7·6)	101·3 (3·8)	109·9 (7·2)	102·8 (2·2)	99·9 (2·1)
96·5 (6 3)	97·9 (6·7)	100·2 (3·4)	109 6 (4 5)	103·2 (1·0)	102·1 (2·4)
98·8 (7 7)	99·4 (9·8)	100 2 (6·1)	106 6 (4·4)	103·8 (1·4)	104·2 (3 4)
+0 1 (0 6)	+0·3 (0·7)	+0 3 (0 6)	+0·5 (0·3)	0·0 (0·1)	0 0 (0 2)
0·5 (0 9)	−0·3 (0·7)	−0·1 (0·4)	+0 8 (0·4)	+0·4 (0·3)	+0 2 (0·2)
+0·5 (0·8)	+0·3 (0 8)	0·2 (0 6)	−0·3 (0·8)	+0 1 (0 1)	+0 2 (0 2)
+0 4 (0 8)	+0 3 (0 8)	0·1 (0·7)	−0·4 (0 6)	+0 1 (0 1)	+0·2 (0·2)
V–I (1)	V–I (1)	I–V	I–V	I–V	III–VII
−0 2 (0·6)	−0·1 (0·5)	+0·1 (0·4)	+0·6 (0·3)	+0·2 (0 1)	+0·2 (0 2)
+0 4 (0 8)	+0 3 (0·8)	−0 1 (0·6)	−0·3 (0·7)	+0·1 (0·1)	+0·1 (0 2)
·55	−15	+55	+100	+100	+62
−27	−8	+9	−14	−40	−46
−43	−16	+5	+77	+33	+24

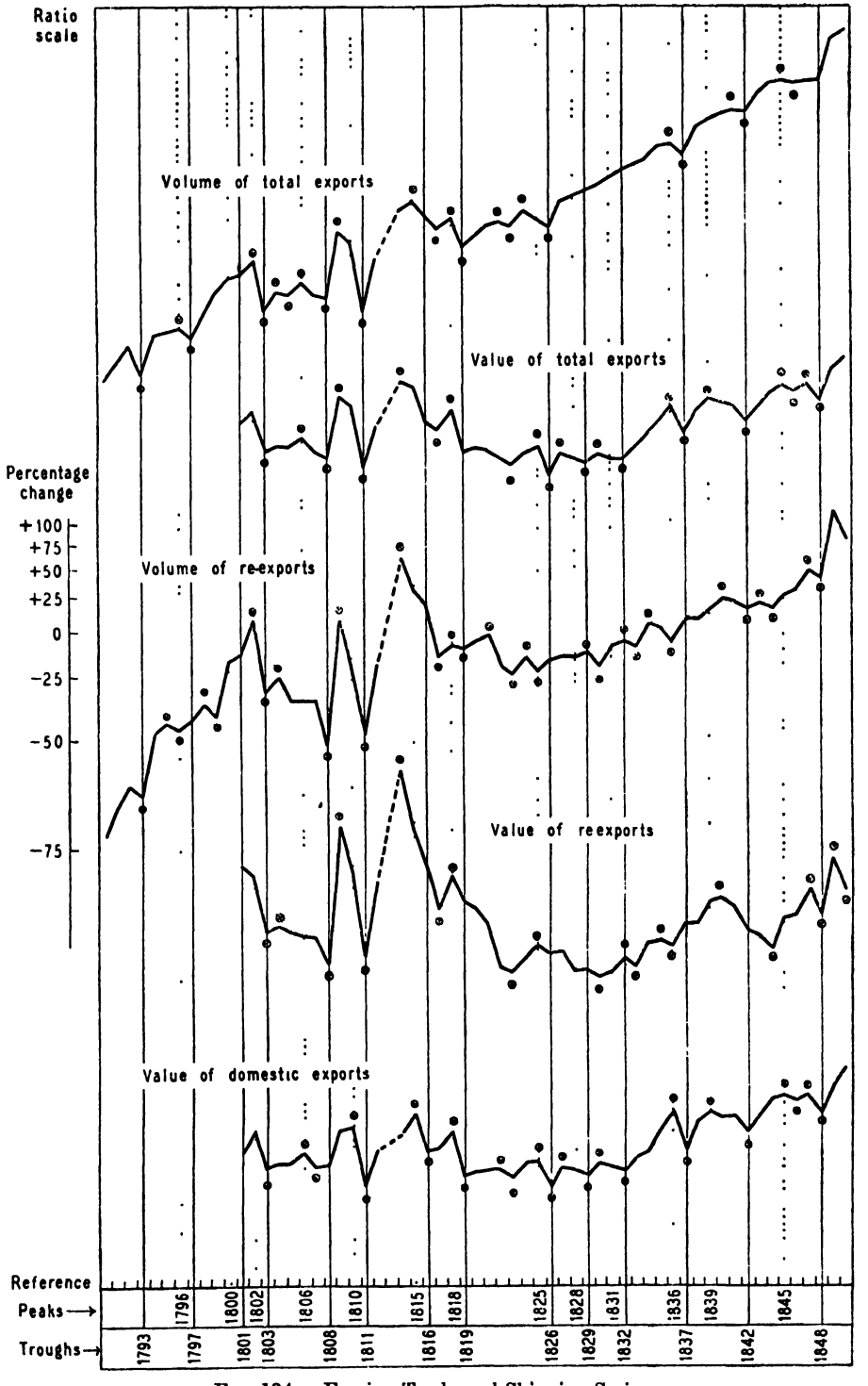


FIG. 134*a*. Foreign Trade and Shipping Series

average cycle of short duration which seems, broadly, 'inventory' in character.

The average amplitudes of the volume of export series are, for the most part, substantially greater than in the production series.[1] The smallest amplitude is that for the volume of foodstuff exports, the largest for cotton exports. In most cases the average amplitude of the values is less than for the volumes, notably so in the case of cotton exports. This is due to lesser average rises; the amplitudes of fall in the value series, because of the prevailing downward price trend, tend to be greater than for the volume series.

The upward secular trend in the total volume of exports (measured by average per month change from cycle to cycle) is slightly greater than in the Hoffmann index of consumers' goods production and total production, but approximately the same as in producers' goods output. Although this trend is fairly uniform for the total volume series its components show divergent trend movements. In general, it may be said that steeply rising trends in the export of iron, linen, and raw materials (largely minerals) compensated, in the later decades, for a slackening rate of increase in cotton exports, which dominate the secular movements of the total series prior to that date.

As might be expected, these series show I–V expansion, the only exceptions being for copper, total raw material exports, and domestic exports to Europe. There is a clearly marked tendency for a concentration of increase during reference stage I–III. In almost all cases there is a slackening in the average rate of increase during stage III–V. An exception to this pattern is, significantly, iron exports, which, like brick production and the Hoffmann index of producers' goods output, shows greater III–V than I–III expansion.

The value series exhibit, in general, better conformity to reference contractions and to all business cycles than do volumes. The value of domestic manufactures' exports and total domestic exports, in fact, show perfect conformity to reference expansions, contractions, and business cycles as a whole.[2] In this they are unique among the series analysed. The fact that prices tended to rise (or to fall less) in the latter stages of general business expansion lessens the divergence between the average rates of increase in stages I–III and III–V; i.e. values show greater relative increases in III–V than do volumes. But this compensating tendency in price movements is not sufficient to reverse the general character of the average patterns for those two stages; i.e. the greater rate of increase remains in I–III.

The analysis of the average behaviour of these series supports the

[1] The average amplitudes of cotton consumption and the Kondratieff textile production index are greater than for the other production series. But their dependence on cotton imports makes them poor indicators of typical cyclical behaviour for production, with respect to both amplitude and duration.

[2] It might be noted that, because of their heavy price bias, the series for the real value of exports were not given serious attention in the setting of reference dates. Their conformity, then, is not a matter of definition.

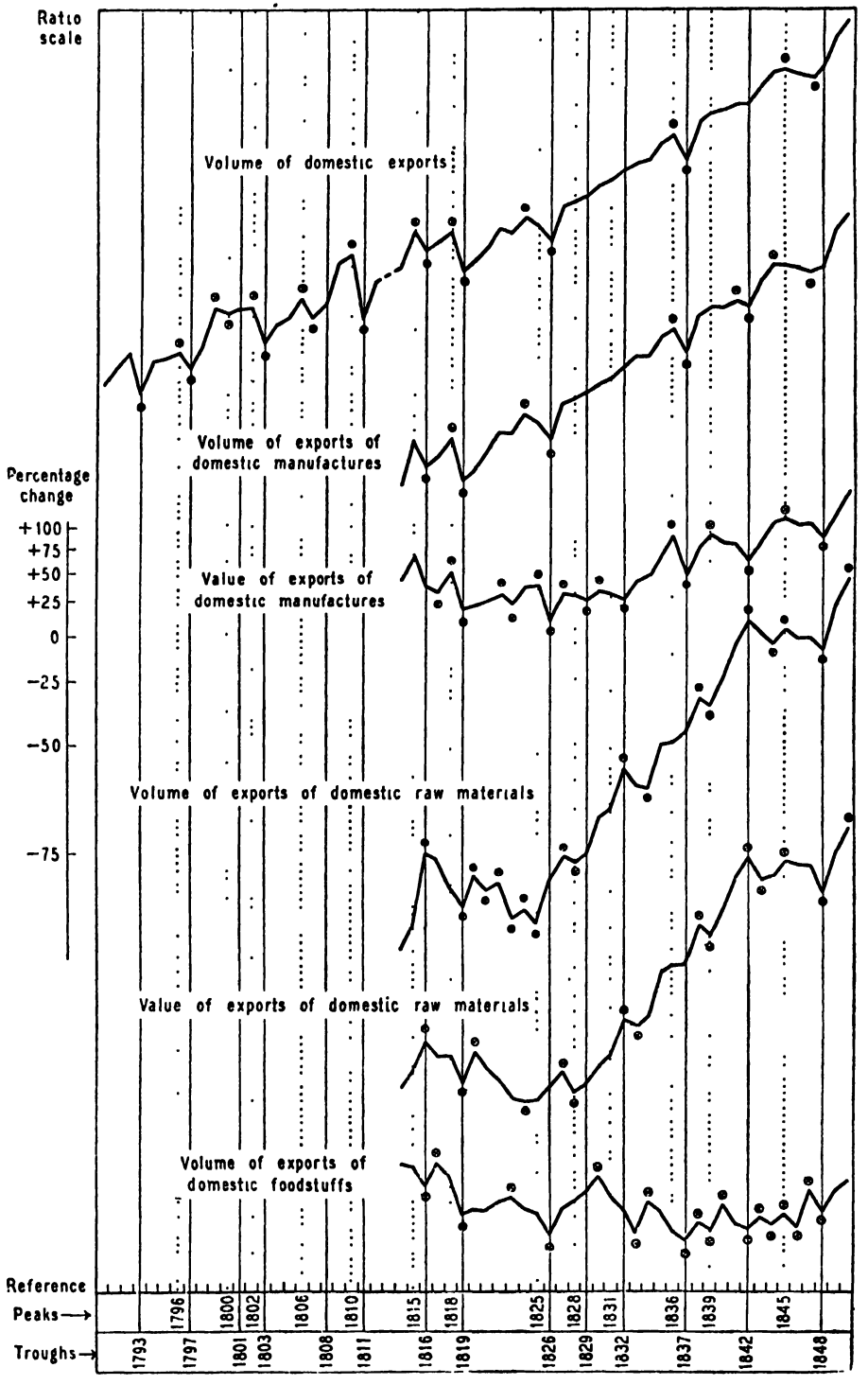

Ratio scale
Volume of domestic exports
Volume of exports of domestic manufactures
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Value of exports of domestic manufactures
Volume of exports of domestic raw materials
Value of exports of domestic raw materials
Volume of exports of domestic foodstuffs
Reference
Peaks→
Troughs→
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

Fig. 134*b*

contention of the *History* and Part I of this volume, that increases in exports were a necessary agent in moving the British economy from depression to recovery. There is no case of a decline in the total volume of domestic exports in what has been designated (by reference dates) as the first year of recovery. This evidence alone, of course, would not be sufficient to assign any causal role to exports in general business cycles. The conception of export increases as an initiating factor depends on the behaviour of other series and on a wide variety of non-statistical data.

The so-called minor cycles, it was earlier contended, depended overwhelmingly on the impulse towards expansion given by increasing exports. This thesis, too, cannot be established in terms of export statistics alone; but it should be noted that the average rate of increase in the volume of total exports is no less during minor than during major cycles.

In only two years of increasing general prosperity (i.e. years falling between reference troughs and peaks) does the total volume of domestic exports decline—1823 and 1825. Eight reference peaks and nine reference troughs coincide with turning-points in this series. In its broadest sense this coincidence of movement emphasizes the dependence of fluctuations in Britain on fluctuations in other areas. The willingness and ability of foreign markets to absorb British goods were not, of course, unconnected with conditions in Britain. The direction of foreign lending from London often determined the amount and direction of exports; a tight money market in London could impede the financing, and decrease the flow of goods abroad; the pressures of increasing domestic demands could raise the prices of export goods sufficiently to reduce the amounts taken in foreign markets. Nevertheless, despite these links with the domestic situation, the close connexion between exports and cyclical fluctuations in Britain emphasizes the need for examining the movements in other economies; and it indicates the limitations of the analysis of strictly British business fluctuations, as opposed to world movements, even in these years.

The following tables show the changing constitution and distribution of the total value of British exports:

Constitution of Domestic Exports as Percentage of Real Value

Eleven-year averages centred on	*Cotton goods*	*Woollen goods*	*Iron*	*Brass and copper*	*Linen goods*	*Total covered*
1815[a] . .	49	22	6	1·4	4·9	83·3
1825 . .	47	15	6	1·8	5·9	75·7
1835 . .	48	14	8	2·4	6·6	79·0
1845 . .	43	13	10	2·9	6·9	75·8

[a] Since the real values are available, for the most part, only from 1814, the percentages for '1815' are based on averages of 1814–16 for iron, brass, and copper, and linen, and on the figure for 1815, alone, in the case of cotton and wool.

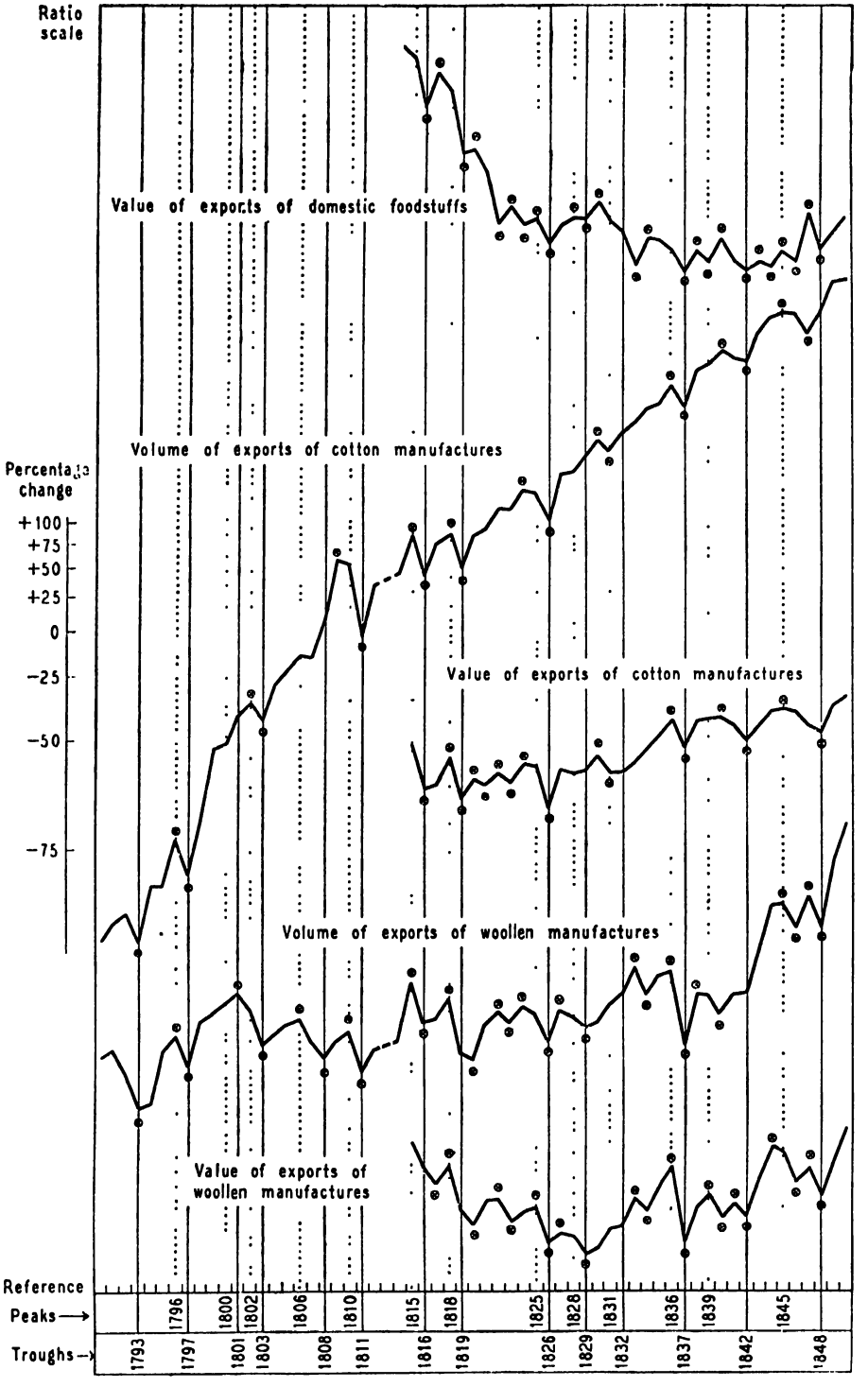

Ratio scale
Value of exports of domestic foodstuffs
Volume of exports of cotton manufactures
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Value of exports of cotton manufactures
Volume of exports of woollen manufactures
Value of exports of woollen manufactures
Reference
Peaks →
Troughs →
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 134c

Destination of Domestic Exports as Percentage of Real Value

Eleven-year averages centred on	*Asia*	*Europe*	*British N. America and the W. Indies*	*Central and S. America*	*United States*
1810[a] . .	7	35	—	—	19
1815[a] . .	8	45	21[b]	5[b]	16
1825 . .	12	42	14	12	16
1835 . .	13	41	12	11	17
1845 . .	17	44	9	10	14

[a] Nine-year averages: 1811–12 figures not available.
[b] Three-year average (1814-16), centred on 1815.

1. Volume of Total Exports

Specific-cycle Behaviour. The average length of the specific cycles for total exports is less than for domestic exports but greater than for re-exports. Because domestic goods constitute so much the larger portion of total exports, the series bears a closer resemblance to it than to re-exports. The total export series, of course, exhibits a lesser average amplitude than either of its components. The average rate of rise is slightly greater than the rate of fall, a characteristic more like the re-export than the domestic goods series; but, as in both component cases, the rate of rise in specific-cycle stage I–III is greater than III–V. The net effect of re-exports (as compared to domestic goods) on the trend of the total is to raise the trend relatively until 1815, and to lower it thereafter, but to a lesser extent in the thirties and forties than in the twenties.

Reference-cycle Behaviour. The average patterns of specific and reference cycles are very similar, with the powerful I–III expansion emerging clearly in both. With but one exception each contraction shows an absolute decline or a rise at a lesser rate than during the preceding expansion. Conformity to reference expansion is perfect except for one instance of no change; during reference contraction four contrary movements take place in addition to one instance of no change. The index of conformity to all business cycles is perfect until 1829; but thereafter one contraction (1828–9) has a rate of rise equal to that of the following reference expansion, and another contraction (1831–2) has a greater rate of rise than either the preceding or following reference expansion.

Re-exports varied, of course, in their relation to the total figure.[1] In 1801 they constituted slightly less than one-third of the total (30 per cent.), at their peak in 1814 (when the continental but not the American markets were open) they were slightly more than one-third (36 per cent.); at their low point in the post-war decline they were only 12 per cent.; and in 1850, although they had risen considerably, they were but 14 per cent. These

[1] Re-exports had one important effect on the reference-cycle conformity of total exports. Their decline in 1810 (representing a blocking off of continental markets) is sufficient to produce a net fall in the total figure from 1809 to 1810, although the volume of domestic goods' exports increased in that year.

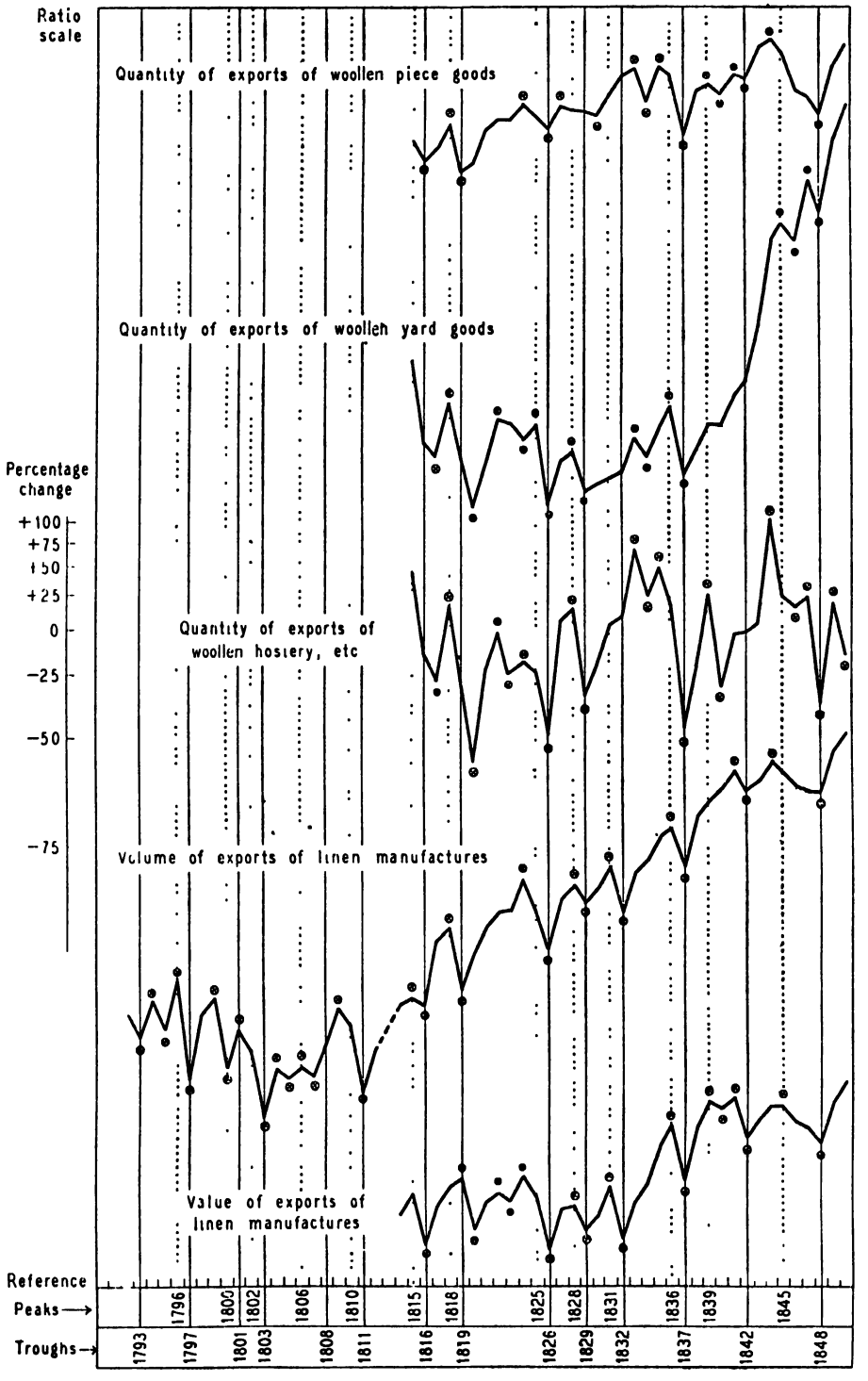

Ratio scale
Quantity of exports of woollen piece goods
Quantity of exports of woollen yard goods
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Quantity of exports of woollen hosiery, etc
Volume of exports of linen manufactures
Value of exports of linen manufactures
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

Fig. 134*d*

figures again emphasize the great importance of the Continent during the war years, and its lesser relative importance thereafter, although, of course, re-exports were by no means the only goods sold by Britain there.

The most striking single feature of this significant series is the unbroken rise, and almost constant rate of rise from 1827 to 1836. More broadly, the steady increase from 1819 to 1850 stands out, with relatively lesser interruptions than during the war years. That secular increase, in its steadiness, appears to ignore the distinction we have made between major and minor business cycles. The sharpest breaks, in fact (1819, 1825–6, 1837, 1846–7) are associated with the financial panics which accompanied the end of the major cycles rather than with the stagnation or only mild recovery of such periods as 1819–22, 1826–32, 1837–42.

2. Value of Total Exports

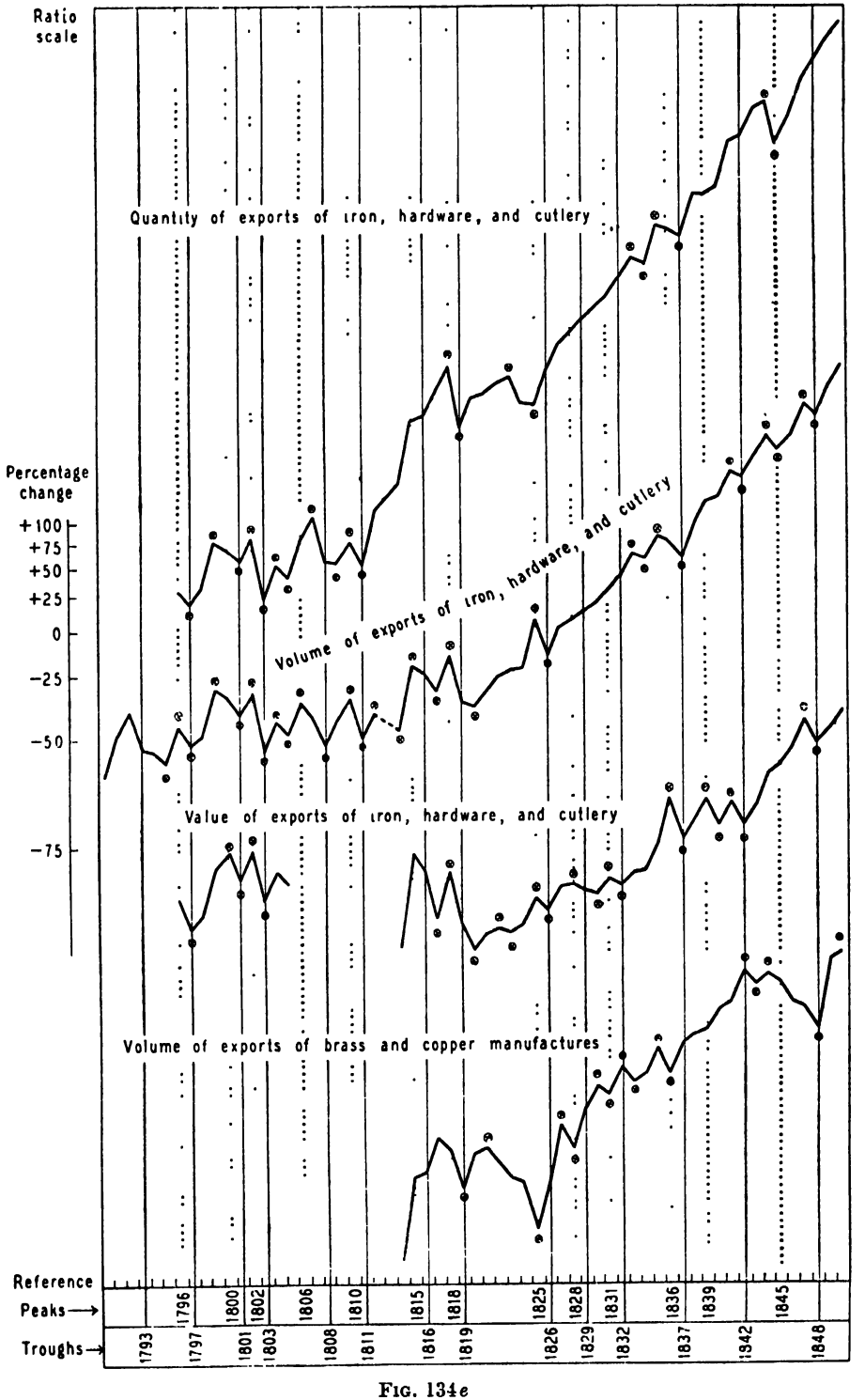
Specific-cycle Behaviour. The duration of cycles in the value series for total exports is somewhat less than for the volume series. It shows declines from 1827 to 1829 and from 1830 to 1832, whereas volumes rise uninterruptedly; it rises from 1846 to 1847, although volumes decline slightly but steadily from 1845 to 1847. The value series, however, fails to exhibit two specific cycles, which appear in volumes, during the earlier years. The decline in values from 1804 to 1805 is too small to justify a specific cycle; and the post-war price decline eliminates the rise in volumes from 1819 to 1822.

As one might expect from the persistence of the secular price decline, the average amplitude of rise is less than for volumes, the average amplitude of decline is greater. A persistent upward secular trend is not apparent until after 1826, the fall in average export prices more than out-weighing, on the whole, the secular increase in volumes up to that time.

Reference-cycle Behaviour. Like the volume series, the value of exports shows a fairly consistent pattern of expansion during stages I–V. Like other value series under declining price trend conditions, it has better conformity than the volume series to reference contractions and better conformity to all business cycles. The concentration of expansion in reference stage I–III emerges in the value, as in the volume series, but somewhat less strongly, indicating, of course, a tendency for export prices to rise in the latter stage of expansion.

3. Volume of Re-exports

Specific-cycle Behaviour. This series, in the short average duration of its specific cycles, behaves most like the cotton consumption series, of those thus far analysed. It bears, it will be later seen, a close resemblance in this respect, to most import series. Since re-exports were made up largely of sugar, tea, coffee, cotton, and other consumption goods and raw materials, the broadly 'inventory' character of the cycle duration is not surprising.


Ratio scale
Quantity of exports of iron, hardware, and cutlery
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Volume of exports of iron, hardware, and cutlery
Value of exports of iron, hardware, and cutlery
Volume of exports of brass and copper manufactures
Reference
Peaks →
Troughs →
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
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1831
1832
1836
1837
1839
1842
1845
1848

FIG. 134*e*

The series exhibits a considerable average amplitude of fluctuation, but its average deviation is also very large. The large amplitude results from the unstable nature of the series during the war years, when re-exports played a relatively more important role in British foreign trade than in the later years; but when, as well, the continental markets were subject to sudden obstruction. The large declines, for example, from 1802 to 1803, 1804 to 1808, 1809 to 1811 are connected respectively with the resumption of war after the short Peace of Amiens, the first impact of the Continental System, and Napoleon's sudden tightening of the blockade from about the summer of 1809.[1]

The net secular upward movement in this period was a result, on the one hand, of the continental need to import through Great Britain, and, on the other, of the considerable loans, subsidies, and short-term commercial credits, extended, especially to the German States, by the British. Napoleon's control of the Continent gave Britain, by default, a virtual monopoly of the carrying trade (aside from the United States). Whenever the north German ports were open (especially Hamburg) the demand, and the funds necessary to finance it, were available to create a considerable speculative re-export boom: as from 1793 to 1802, 1808 to 1809, 1811 to 1814. The latter boom (which pushed the re-export figure to a point not surpassed until 1849) was, of course, based on the assumption that the expected peace on the Continent would find the markets there prepared to absorb enormous quantities of the major re-exports.[2] The great decline from 1814 to 1817 indicates the extent to which these expectations were disappointed.

From a low point in 1823 a fairly steady upward secular trend is again evident. That trend, as well as the average amplitude of the series, is much less than during the war years. The length of the specific cycles is somewhat shorter and more regular. In general, exports to the Continent, as well as re-exports, showed less violent fluctuations than exports to the United States or to South America. Britain's capital exports were not directed to the Continent on any considerable scale until the fifties, although the beginning of that process can be observed in the small-scale railway building on the Continent by the British during the forties.[3]

There are, then, two clearly defined periods observable in the volume of re-exports. The first, marked by a strong upward secular trend to 1814, ends with the post-war liquidation in 1823: the second runs a fairly smooth upward course, at a lesser rate, to the end of the period, with definite indications, in the latter years (1844–50), of the much more important role the Continent was to play in the following two decades. The behaviour of this series, it is worth pointing out, dramatizes the great importance of the Continent to the British economy during the war years—a relation which the fact of warfare has often tended to obscure.

Reference-cycle Behaviour. The average reference-cycle pattern is clearly

[1] See Vol. I, Pt. I, pp. 87–93.
[2] Ibid., pp. 118–20.
[3] Ibid., pp. 315–18.

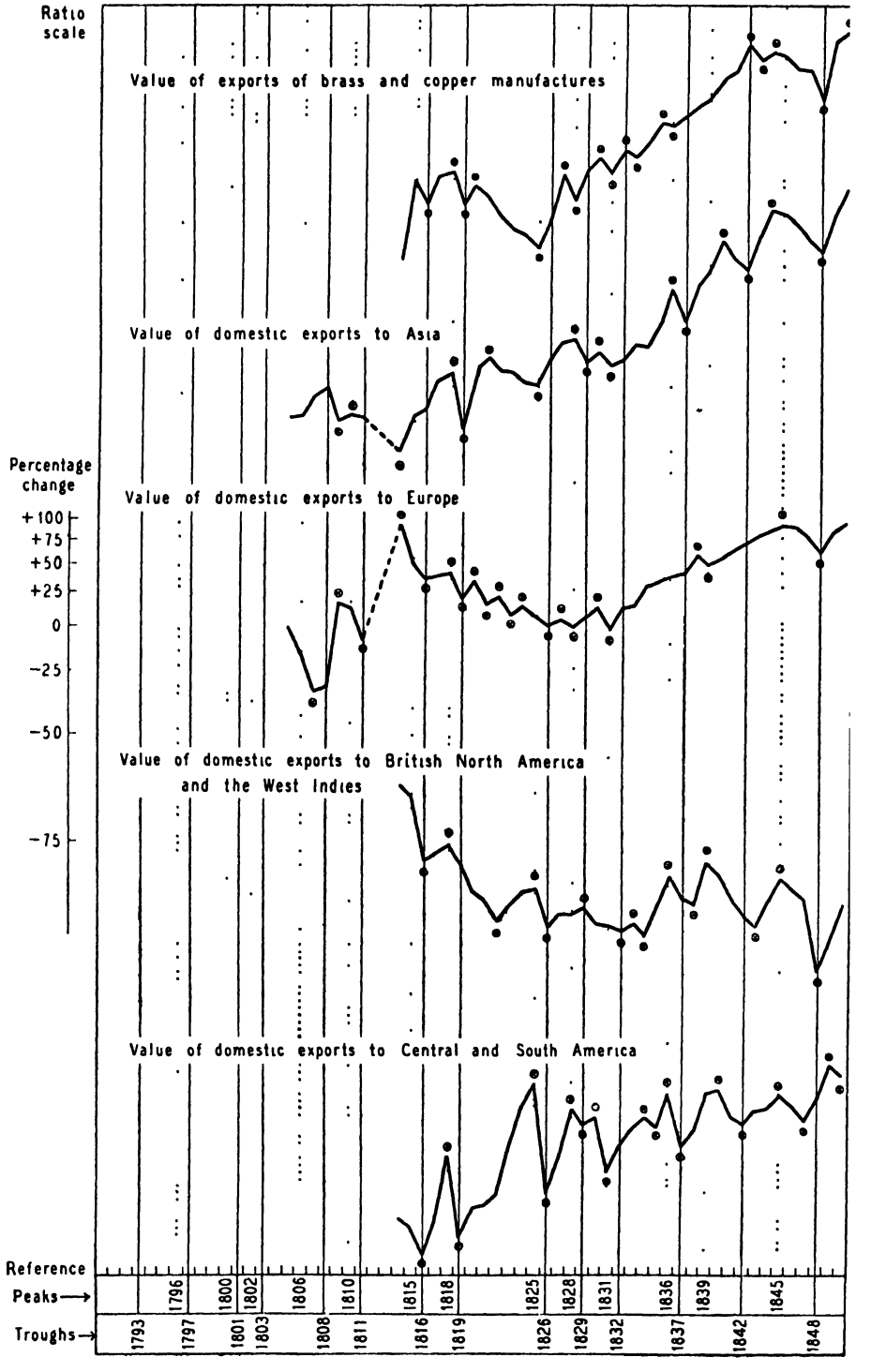

Ratio scale
Value of exports of brass and copper manufactures
Value of domestic exports to Asia
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Value of domestic exports to Europe
Value of domestic exports to British North America and the West Indies
Value of domestic exports to Central and South America
Reference
Peaks→
Troughs→
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

Fig. 134 *f*

I–V, but the individual cycles show wide deviations from that norm. In three reference contractions the series shows an absolute rise, but at a lesser rate than in stages I–V (1793–7, 1797–1801, 1829–32). In four cases the rate of rise during reference contraction is greater than during reference expansion (1819–26, 1826–9, 1832–7, 1842–8). In only four cases is there a genuine I V expansion and V–IX contraction (1801–3, 1808–11, 1811–16, 1837–42).[1] There are, in the remaining two cycles (1803–8, 1816–19), declines during stages I–V, the former being less than the V–IX decline and the latter greater. The lack of coincidence between specific and reference cycle dates which this situation reflects was much more pronounced in the period after the Napoleonic Wars than during those years. With one exception (1803–8) all the war-time cycles show either regular I-V conformity or a lesser rise in stages V–IX than in stages I–V; and that case can be clearly connected with the operation of the continental blockade.[2] From 1793 to 1816 the series shows 100 per cent. conformity to business cycles as a whole. As noted earlier, fluctuations in the continental markets (which this series largely reflects) were more important from 1790 to 1815 than from 1815 to 1850. It is not surprising, then, that the specific-cycle dating does not conform to that for reference cycles in the latter period.

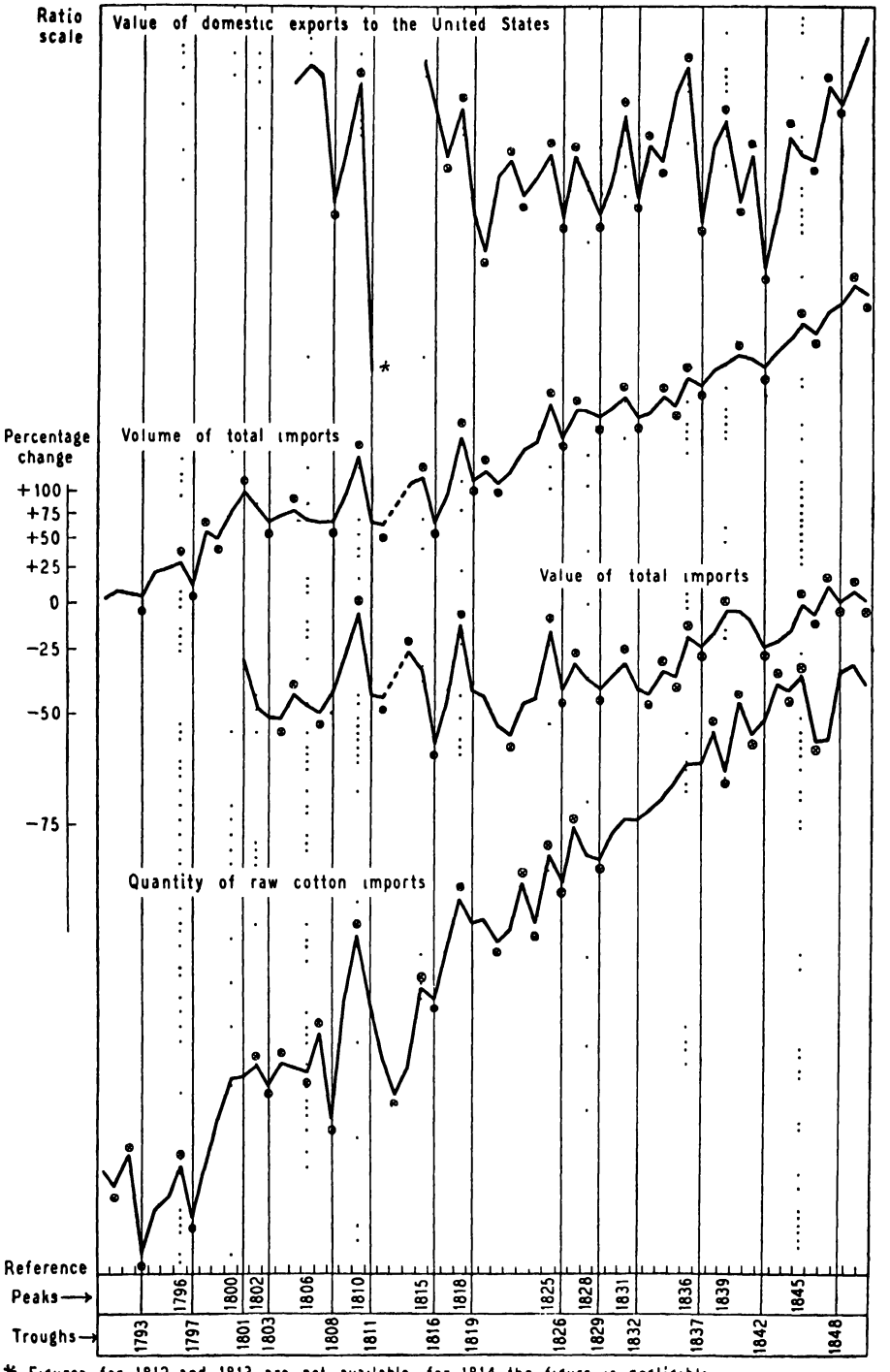
4. Value of Re-exports

Specific-cycle Behaviour. The fall in re-export prices after the Napoleonic Wars results in the elimination of the specific cycle present in the volume figures from 1819 to 1823. Similarly, falling prices so reduce the rise in re-export values in 1829 that no specific cycle may be marked off. Again, in 1843, so great was the decline in average re-export prices that an increase in volume yielded an absolute decline in value. In net, then, for the period 1803–48, there are three less specific cycles in the value series, which, of course, is reflected in its longer average duration. Price movements, in accentuating rises and falls of volume in the periods roughly from 1808 to 1817 and from 1836 to 1850, yield a greater average amplitude of movement for the value than the volume series. There are, as in the case of volumes, large deviations with respect to average amplitude. From 1803 to 1823 price movements accentuate the upward (to 1814) and downward (to 1823) trends in volumes. Over the rest of the period their secular influence is in the direction of damping the upward trend.

Reference-cycle Behaviour. The value of re-exports shows net average decline in all stages but I–III. The price decline which runs through the greater part of the period turns the slight average upward movement in volumes during stage III–V into net average decline, and increases markedly the average decline in stages V–VII and VII–IX.

[1] In the latter cycle the V–IX contraction is, in fact, negligibly small.

[2] In point of fact, the decline in I–V stages of the 1803–8 cycle was less than the decline in the preceding or following V–IX phase.



* Figures for 1812 and 1813 are not available, for 1814 the figure is negligible, due to the War of 1812

FIG. 134*g*

5. Volume of Domestic Exports

Specific-cycle Behaviour. The average duration of specific cycles is abnormally long [64·8 (28·3)]—only slightly shorter than that for brick production. This is due largely to the existence of two cycles of truly extraordinary length (1826–37, 1837–47). The average duration of expansions is 3·5 times that of contractions, by far the highest proportion for any major series. Only two contractions are more than one year in length (1824–6, 1845–7). The relative amplitudes of the two phases stand in a lesser proportion, due to a number of very sharp one-year declines, associated in all cases with financial crises (1793, 1803, 1811, 1816, 1819, 1825–6, 1837). The average rate of decline thus emerges half again as steep as the average rate of rise.

The secular trend (measured by average change per month from cycle to cycle) is slightly greater than for the Hoffmann consumers' goods production index and the total index, but equal to the producers' goods index. It is less, however, than for either cotton consumption or the volume of cotton goods' exports.

Reference-cycle Behaviour. Four reference cycles (1801–3, 1829–32, 1832–7, 1842–8) are not reflected in this series. The average reference-cycle pattern shows, clearly, expansion during stages I–V, and average absolute contraction in stages V–IX. As in the consumers' goods output index and wool production series, stage I–III shows the greatest average rate of rise. The greatest decline comes in stage V–VII, but this has no analytic significance.[1] The upward trend is clearly discernible in the tilt of the average patterns.

Of the four reference cycles which are not reflected by absolute declines in the contraction stages, three show relative slackening in the rate of increase during such stages (1800–1, 1828–9, 1839–42). The rise from 1831 to 1832 (during reference contraction), however, is substantially greater than that during the preceding or following expansion.

6. Value of Domestic Exports

Specific-cycle Behaviour. This series has shorter cycles than the volume of exports. The expansions are about 50 per cent. shorter in both duration and amplitude than for the volume series. The total decline is only slightly smaller than the total rise, whereas a very large discrepancy in the average movements of the two phases existed in the volume series. There are three trend periods in this series. A rise culminates in 1815; a trend decline ends in 1826; a rising trend characterizes the period thereafter. For the whole period there is an upward secular trend, very much less, of course, than for the volume of domestic exports, owing to the secular price decline.

[1] This stems simply from the rule of procedure that the change in stage V–VII (when the reference decline consists of but one year, as it does in all but one case for this series) be obtained by averaging the values for peak and trough, and expressing the average as a percentage of the average standing for the full cycle. The standing for stage V–VII would ordinarily fall midway between peak and trough, but rounding the figure yields an arbitrary and very slightly unequal distribution of the change.

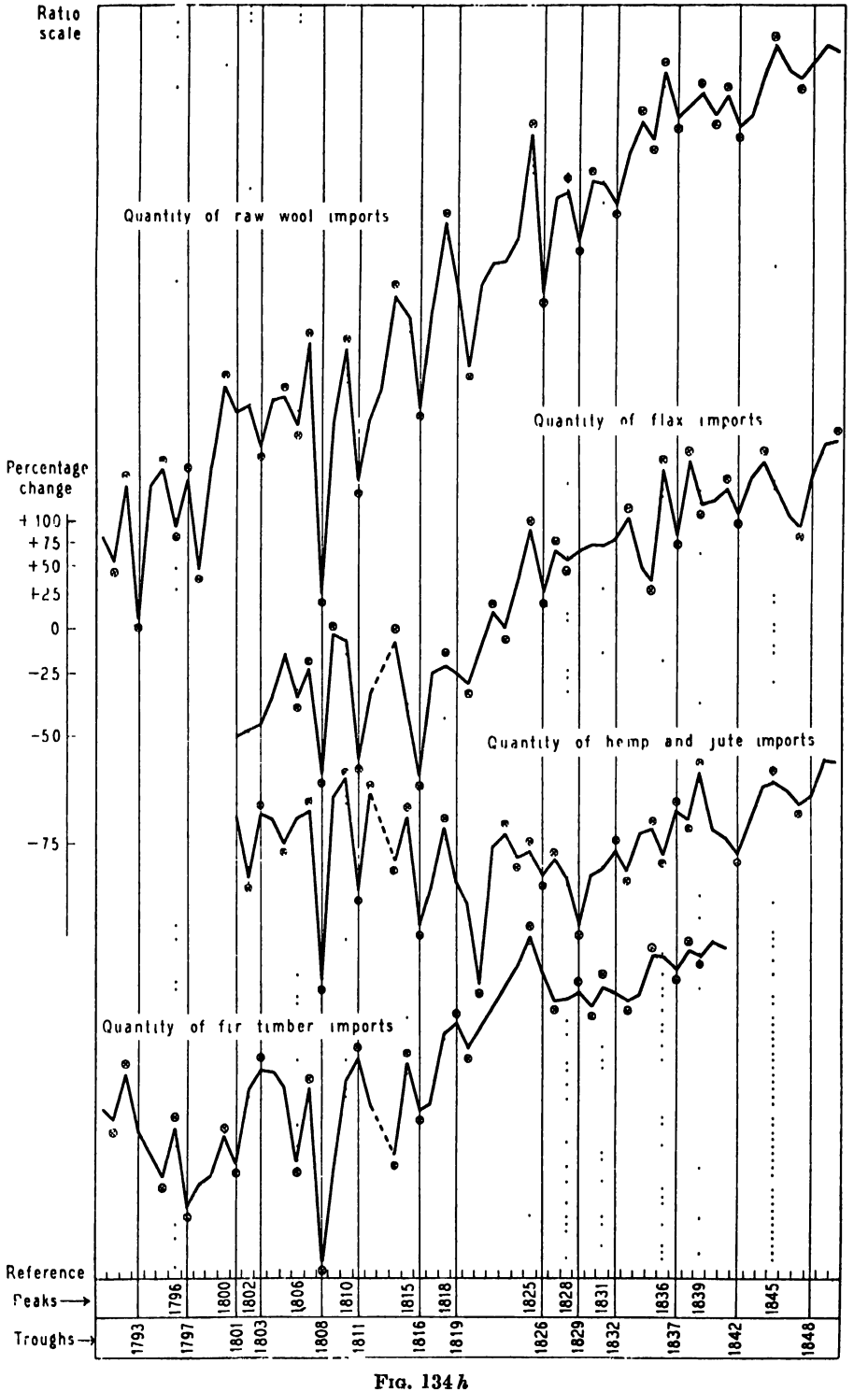

Ratio scale
Quantity of raw wool imports
Quantity of flax imports
Quantity of hemp and jute imports
Quantity of fir timber imports
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 134*h*

Reference-cycle Behaviour. The average specific-cycle expansion is shorter than the reference-cycle expansion, because the reference cycle from 1819 to 1826 is interrupted by an absolute decline in the real value of exports in 1823.[1] This decline appears also in the quantity series, but is so slight there that it does not justify the marking off of a specific cycle. Similarly, the reference contraction from 1845 to 1848 is broken by an increase from 1846 to 1847.[2] In general, then, whereas the volume of domestic goods' exports contained fewer specific than reference cycles, the real value series contains two more specific than reference cycles for the period 1803–48.

The amplitude of the average reference decline is greater than in the volume series, as is the rate of decline. The amplitude of the average expansion is less than in the volume series, but the difference is smaller than in the case of the relative declines. This results in rates of rise almost equal for the value and volume series.

These relations all stem from the fact of the secular decline in export prices over the whole period for which the real value series is available. It is probable that the decline in cotton prices (from a secular peak in 1799) controls the movement of export prices as a whole. Their movement over the whole period closely follows that for raw and export[3] cotton prices. Export prices tended to rise somewhat during the expansion phase of a few of the reference cycles, and this tempers the divergence of the two series during those phases. The decline in export prices, further, was relatively slight from 1803 to 1814, rapid from 1814 to about 1826, and considerably less rapid from 1826 to 1850. Accordingly, the divergence of secular trends in values and volumes is less marked in the first nine and the latter twenty-five years of the period. If data on real values were available for the period 1790–1804 the upward secular trend for real values from 1790 to 1814 would, of course, be greater than from 1805 to 1814; for all prices exhibit a powerful net upward trend in the period 1790–1805. It is impossible to establish whether the net result of the divergent export price trend (on either side of, say, 1799) would yield a greater or lesser upward trend than that for the volume of exports.

The better conformity to reference-cycle movements of the value than the volume series again simply reflects the influence of export prices which, because of their falling trend, produce cyclical contractions in the value series that do not appear in the volume series. The nature of economic development at this time (especially in the rapidly expanding export industries, notably cotton and iron manufactures) was such as to yield normally a falling price level, through the lower real costs which, in a sense, define the technical developments which lie at the heart of 'the industrial

[1] See Vol. I, Pt. 1, pp. 181–4, 213–14 for an account of the factors making for the slight decline in the quantity of exports from 1822 to 1823.

[2] See ibid., pp. 314–15 for this irregular movement, dependent on an increased volume of exports to the United States, and a rise in the prices of some commodities.

[3] See below, pp. 837-41, for the analysis of cotton price movements.

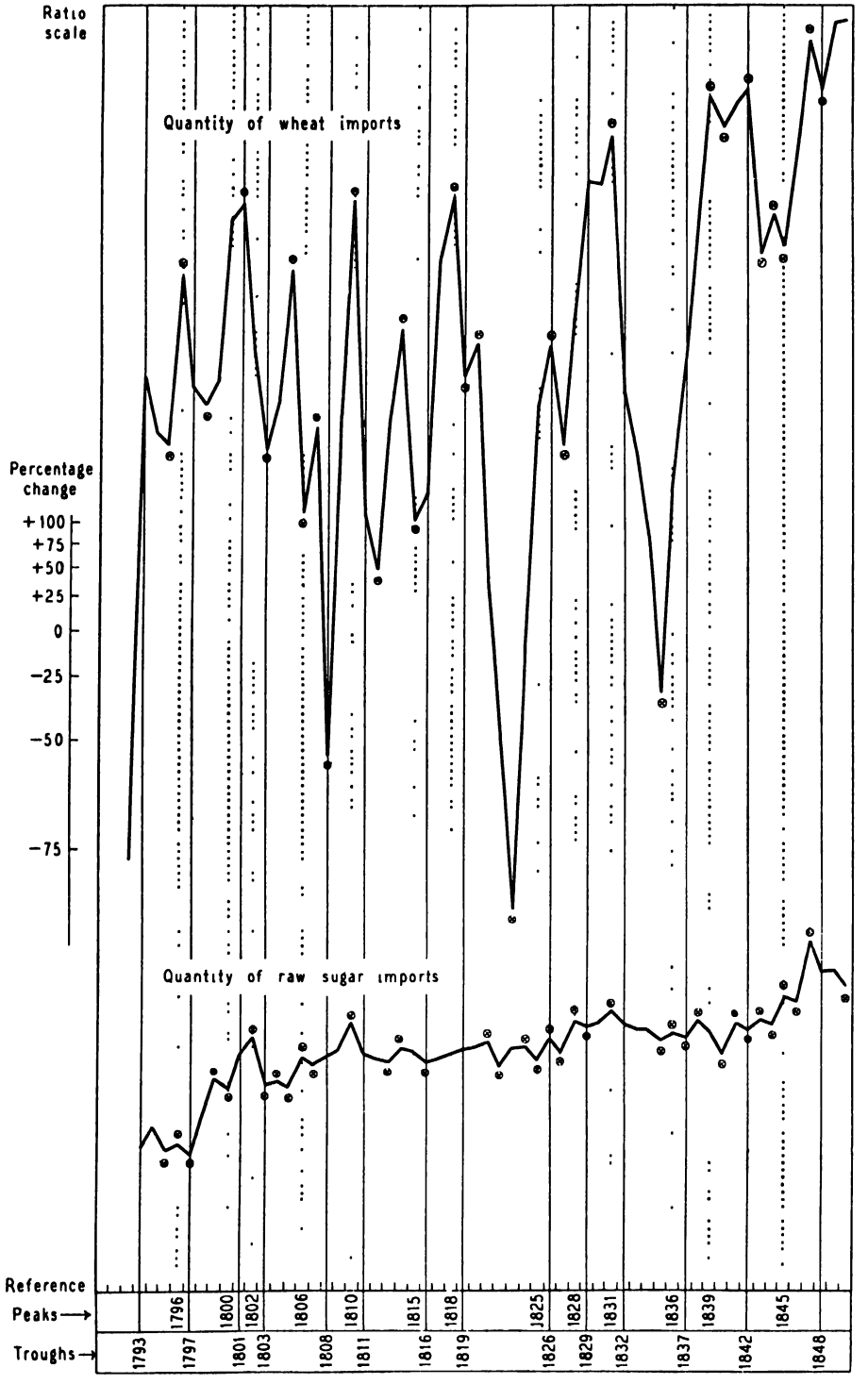

Ratio scale
Quantity of wheat imports
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Quantity of raw sugar imports
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 134.

revolution'. This secular trend, after the war years, was only interrupted significantly during major cycle expansions, and then usually only in their latter stages. The minor booms yielded, at best, slight export price increases or absolute declines. Thus we find, after the war years, a net export price decline in all reference contractions; and this characteristic of export prices yielded an absolute decline for the real value of exports in all reference-cycle contractions, including, of course, the three cases where the volume series showed net expansion.

This series shows a perfect I–V conformity; that is, a net increase occurs during all reference expansions, a net decline during all reference contractions. Not only did the series show net conformity for expansion and contraction phases, but, as well, all but two individual reference-cycle stages conform. These exceptions result from the decline in real values from 1827 to 1828, and from 1830 to 1831, when the falling price trend overpowers the upward trend in the volume of exports. It will be noted that both of the reference cycles where this occurred were what have been designated as minor cycles (1826–9, 1829–32).

The series has, of course, perfect conformity to all business cycles. In such a case the specific and reference-cycle patterns tend to coincide. The most important divergence of the two patterns is the greater rate of increase in the reference pattern in stage I–III than in stage III–V. The specific-cycle pattern shows equal rates of increase in the two expansion stages. The divergence is accounted for by the lack of coincidence between specific and reference-cycle dates in the following three cases:[1]

Value of domestic exports		*Reference cycle*	
Peak	*Trough*	*Peak*	*Trough*
	1807		1808
1827		1828	
1830		1831	

7-8. Volume and Value of Exports of Domestic Manufactures

The volume series accords almost perfectly with that for the total volume of domestic exports, since finished goods constituted an overwhelming proportion of both the volume and value of such exports:

Finished Goods as Proportion of Total Domestic Exports

(Per cent.)

	Volume	*Value*
1814 . .	75	81
1825 . .	85	92
1840 . .	86	91
1850 . .	88	90

[1] The other two divergences of the specific from the reference dates (caused by the real value decline in 1823 and increase in 1847) do not help to produce the irregular average rate of increase in the reference-cycle expansion stages.

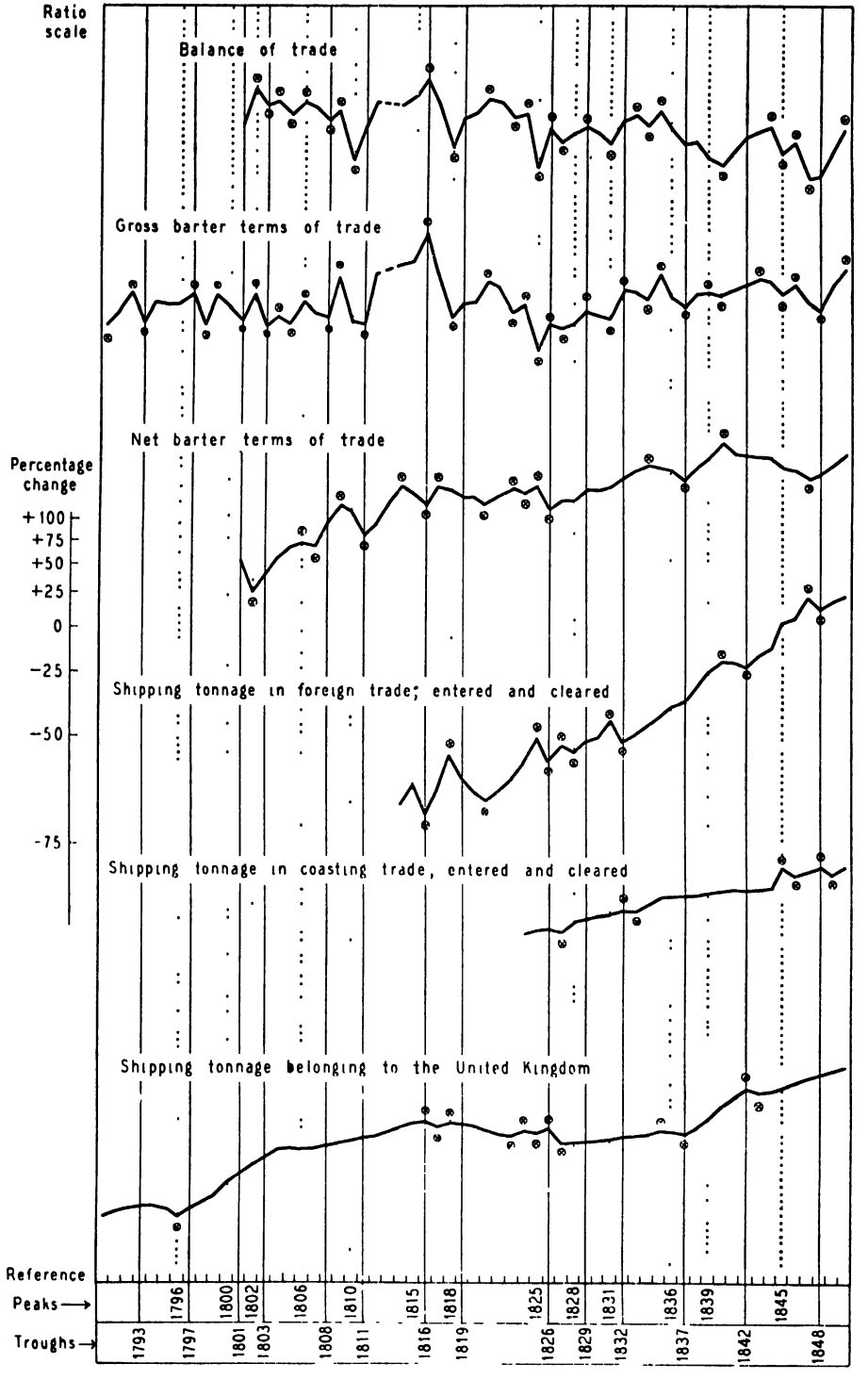

Ratio scale
Balance of trade
Gross barter terms of trade
Net barter terms of trade
Percentage change
+100
+75
+50
+25
0
-25
-50
-75
Shipping tonnage in foreign trade; entered and cleared
Shipping tonnage in coasting trade, entered and cleared
Shipping tonnage belonging to the United Kingdom
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

Fig. 134*j*

Over the whole period, and more particularly after 1825, there is a clearly marked tendency for the average export price of finished goods to fall more sharply than other kinds of domestic export prices.[1] From 1814 to 1825 they fell somewhat less than the average price of all exports. There is, as well, a greater upward secular trend (1814–50) for finished goods than for all domestic exports, in both volumes and values. Since finished goods' prices fell more than average domestic export prices, the difference is less for values than for volumes.

All turning-points accord with figures for the volume of domestic goods' exports, with the exception of the peak in 1844, which leads the peak in the total domestic series by one year. The volume of finished goods' exports declines slightly in 1845, whereas other categories of domestic exports rise slightly.

The average amplitude for specific cycles is less than for the total volume of domestic exports, since the series is not available from 1790 to 1814, when the war-time conditions under which foreign trade was conducted were such as to make for abnormally sharp fluctuations. The conformity of both series to business cycles as a whole is close, this following, of course, from the virtual identity of turning-points. The real value of finished goods' exports shows perfect business-cycle conformity (as does the total real value of domestic goods' exports), with net absolute decline in all reference-contraction phases.

9-10. Volume and Value of Exports of Domestic Raw Materials

Specific-cycle Behaviour. Both of these series were analysed on an inverted base. There are nine specific cycles in the volume series, and but seven in the value series. In 1822 and 1824 the volumes show rises sufficient to justify marking off specific cycles, whereas falling prices yield (from 1820) an unbroken net decline in values. The other principal consequence of the falling price tendency is the lesser secular increase in values than in quantities as measured from 1825.

The average duration of specific cycles in the volume series is 45·3 (13·6) months, placing it roughly, like raw cotton imports, in the class of 'inventory' cycles. The value series, since it contains two less specific cycles, has a longer average duration [58·3 (12·2)]. The average amplitude of movement is greater than for finished goods in the value, but not in the volume series. The upward secular trend in the value series is steeper than for finished goods' or total domestic exports, but the relatively small part raw materials play in the total should be kept in mind (see tabulation on p.763).[2] The major products included in this raw material series are coal, tin, copper, salt, wool, alum.

[1] This fact was ascertained by comparing relative trends in real value of total domestic goods' exports and real value of domestic finished goods' exports with the respective volume series.

[2] These proportions indicate that the secular fall in raw material prices was less than for export prices as a whole.

Figure 1
Volume of Total Exports
------ 12 Specific Cycles 1793-1846
——— 13 Reference Cycles 1793-1848
Conformity. +92, +31, +80

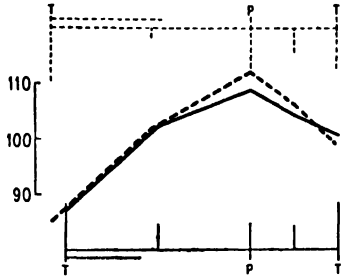


Figure 2
Value of Total Exports
------ 11 Specific Cycles 1803-1848
——— 11 Reference Cycles 1801-1848
Conformity +91, +91, +100

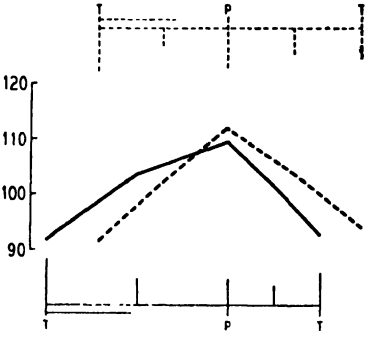


Figure 3
Volume of Re-exports
------ 15 Specific Cycles 1793-1848
——— 13 Reference Cycles 1793-1848
Conformity + 38, −15, +24

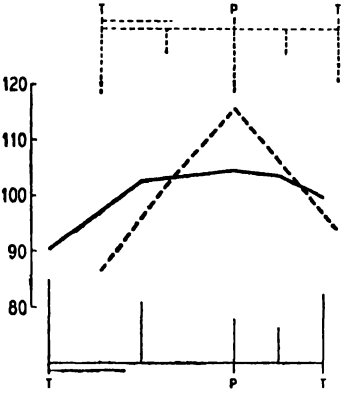


Figure 4
Value of Re-exports
------ 10 Specific Cycles 1803-1850
——— 11 Reference Cycles 1801-1848
Conformity 0, +27, +29

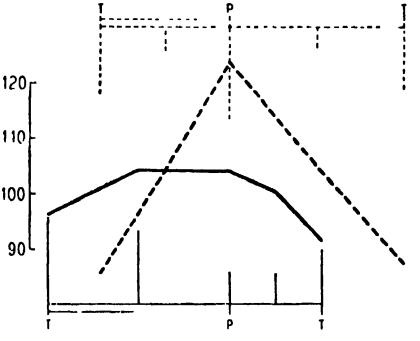


Figure 5
Volume of Domestic Exports
------ 10 Specific Cycles 1793-1847
——— 13 Reference Cycles 1793-1848
Conformity + 92, + 38, + 76

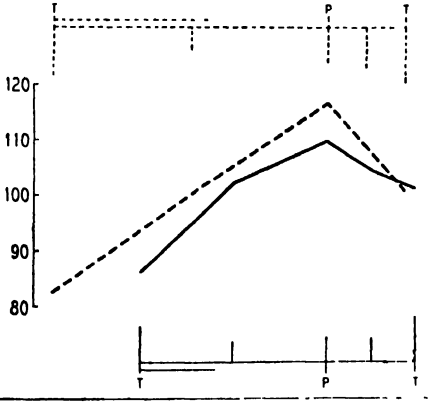


Figure 6
Value of Domestic Exports
------ 12 Specific Cycles 1803-1848
——— 11 Reference Cycles 1801-1848
Conformity +100, +100, +100

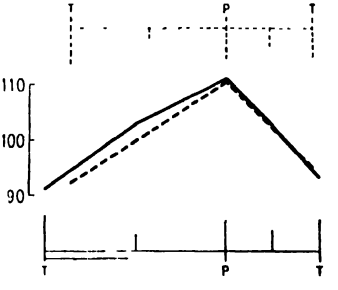


FIG. 135*a*. Cyclical Patterns of Foreign Trade and Shipping Series

Raw Material Exports as Proportion of Total Domestic Exports

(Per cent.)

	Volume	*Value*
1814 . .	3·7	1·7
1825 . .	3·3	1·9
1840 . .	7·7	4·9
1850 . .	8·1	5·8

Reference-cycle Behaviour. These series exhibit low average cyclical conformity. In the case of volumes, except for a slight average decline in stage III–V, the averages of the average standings increase progressively; i.e. the greatest average increase takes place in stage VII–IX;[1] in the value series all stages show net average increase. Among individual cycles, however, absolute declines occur, but with no consistency with respect to reference dates. In only two cases is there the V–I contraction that distinguishes total exports (1818–19, 1845–8).

Stages V–I, therefore, have been matched with reference expansions, indicating the broadly inverse movement of the series. This is merely the least unsatisfactory of the possible patterns. Raw materials exports simply do not behave with any great regularity. The most consistent cyclical tendency is indicated by the fact that the series, in net, declines in the course of all but one major cycle expansion: in 1816–18, 1819–25, 1842–5. It declines, as well in 1827–8, 1832–4, 1838–9, all periods of general domestic recovery.

A possible explanation for this phenomenon is that the mine-owners (for raw materials were constituted overwhelmingly of minerals) did not attempt to sell abroad when the home market was active, or that the rise in prices caused by domestic prosperity was sufficient to make foreign purchasers turn elsewhere for their mineral supplies.

The value series has also been assigned a V–I pattern, and exhibits the same numerical indexes of conformity, with one difference in sign. Individual cycle patterns, however, are dissimilar.

11-12. Volume and Value of Exports of Domestic Foodstuffs

Specific-cycle Behaviour. There are nine specific cycles in the volume, and twelve in the value series. The cycles 1819–22, 1822–4, and 1826–9 do not appear in the volume series. From 1830 the two series coincide with respect to specific-cycle peaks and troughs. The most striking divergence in the two series occurs from 1814 to 1822. The sharp drop in foodstuff prices imparts a decline to the value series which is hardly shared by volumes. Although the secular price fall continued throughout the period,

[1] The increase in stage V–VII is only slightly less than in VII–IX. In most cases (5 of 7) reference contractions run for but one year, and the rate of movement in the two contraction stages is identical, unless rounding the figures for average change yields a difference.

Figure 7

Volume of Exports of Domestic Manufactures

----- 5 Specific Cycles 1816 - 1847

——— 7 Reference Cycles. 1816 - 1848

Conformity +100, + 14, + 69

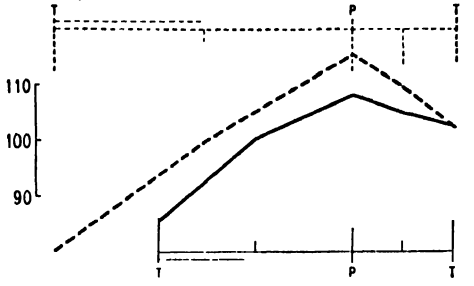


Figure 8

Value of Exports of Domestic Manufactures

----- 8 Specific Cycles 1817 - 1848

——— 7 Reference Cycles 1816 - 1848

Conformity +100, +100, +100

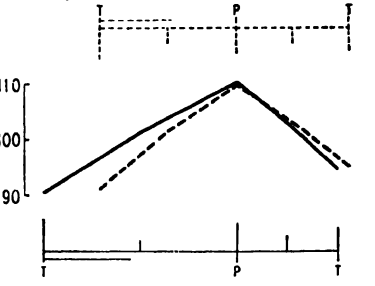


Figure 9

Volume of Exports of Domestic Raw Materials

----- 9 Specific Cycles 1816 - 1850

——— 7 Reference Cycles 1816 - 1848

Conformity + 14, - 43, - 8

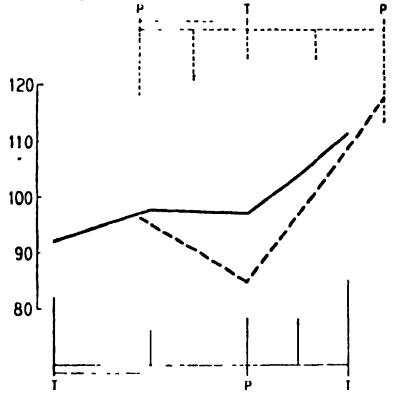


Figure 10

Value of Exports of Domestic Raw Materials

----- 7 Specific Cycles 1816 - 1850

——— 7 Reference Cycles 1816 - 1848

Conformity - 14, - 43, - 8

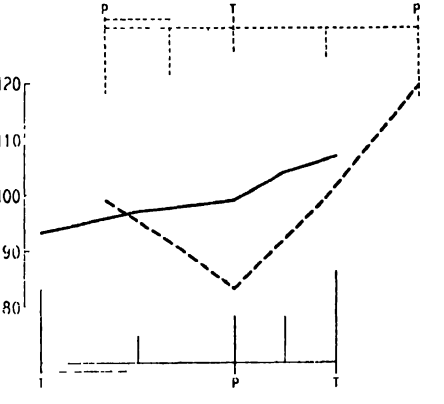


Figure 11

Volume of Exports of Domestic Foodstuffs

----- 9 Specific Cycles 1816 - 1818

——— 7 Reference Cycles 1816 - 1848

Conformity + 29, + 29, + 85

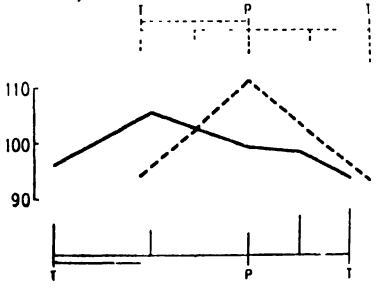


Figure 12

Value of Exports of Domestic Foodstuffs

----- 12 Specific Cycles 1816 - 1848

——— 7 Reference Cycles 1816 - 1848

Conformity + 29, + 71, + 100

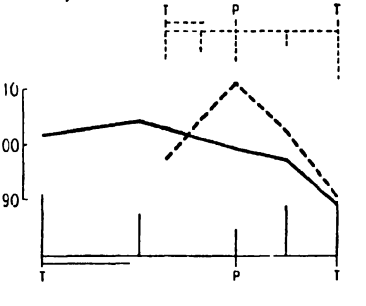


FIG. 135 *b*

it proceeded at a much lesser rate, from the early twenties onward, than during the decade after 1844.

Foodstuffs constituted the following proportion of total domestic exports:

Foodstuffs as Proportion of Domestic Exports

(Per cent.)

	Volume	*Value*
1814 . .	20·5	17·0
1825 . .	10·9	6·5
1840 . .	5·8	4·4
1850 . .	3 8	3·6

Unlike other types of exports the secular trend, for both volumes and values, over the whole period, is downward, although a slight rise appears from 1837 to 1850, more pronounced, of course, in volumes than in values because of the continued, if slight, downward movement of average foodstuff prices. The principal commodities included under domestic foodstuff exports are bacon and ham, beer and ale, beef and pork, butter and cheese, and fish (herrings).

Reference-cycle Behaviour. Both volume and value figures show an average rise in stage I–III; other stages decline. The smallest average rate of decline comes in stages III–VII, which leads to the rather unsatisfactory designation of the series, as of I–V expansion. There are no individual cases, however, of I–V expansion, V–IX contraction; although several, in their net movement for expansion and contraction phases, approximate this pattern. Despite the fact that the series do not show perfect conformity to the separate phases of reference cycles, they exhibit, nevertheless, fairly regular positive conformity to business cycles as a whole; i.e. the rate of rise in contraction during each of the cycles where contrary movement occurs is less than the rate of rise during reference expansion. The real values, in fact, show perfect conformity to all business cycles.

The most striking general feature of the series is their downward secular trend. On the whole Britain in these years was becoming more dependent on foreign food supplies and a lesser exporter. The essentially industrial character of economic progress appears strikingly in the relation between foodstuff and total domestic exports.

For the cyclical behaviour of this series there is no such easy explanation. The following hypothesis might tentatively be advanced, although the data for its confirmation or rejection are not available. It will be noted that, from 1814 on, the wheat price, in all but two reference cycles, shows a I–III contraction, indicating, in all instances, relatively abundant harvests at that point.[1] The export of foodstuffs exhibits a clearly marked average increase in stage I–III. Although by no

[1] See below, p. 854, for an analysis of the wheat price.

Figure 13

Volume of Exports of Cotton Manufactures

10 Specific Cycles 1793 - 1847

13 Reference Cycles 1793 - 1848

Conformity +100, + 23, + 56

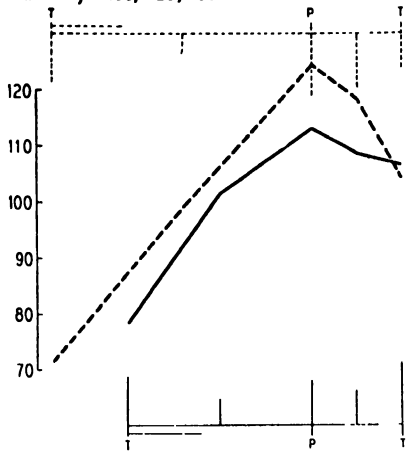


Figure 14

Value of Exports of Cotton Manufactures

8 Specific Cycles 1816 - 1848

7 Reference Cycles 1816 - 1848

Conformity + 71, + 43, + 69

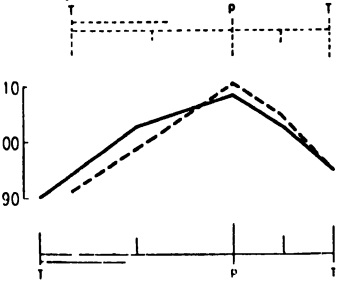


Figure 15

Volume of Exports of Woollen Manufactures

14 Specific Cycles 1793 - 1848

13 Reference Cycles 1793 - 1848

Conformity + 85, + 62, + 76

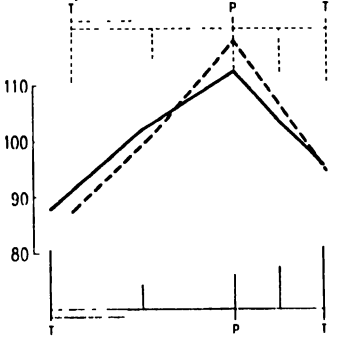


Figure 16

Value of Exports of Woollen Manufactures

10 Specific Cycles 1817 - 1848

7 Reference Cycles 1816 - 1848

Conformity +100, + 71, + 100

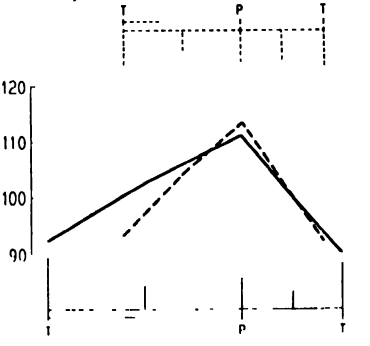


Figure 17

Quantity of Exports of Woollen Piece Goods

8 Specific Cycles 1816 - 1848

7 Reference Cycles 1816 - 1848

Conformity + 71, + 43, + 69

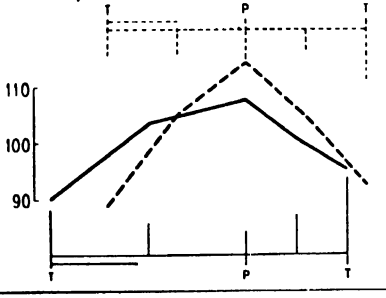


Figure 18

Quantity of Exports of Woollen Yard Goods

8 Specific Cycles 1817 - 1848

7 Reference Cycles 1816 - 1848

Conformity +100, + 14, + 92

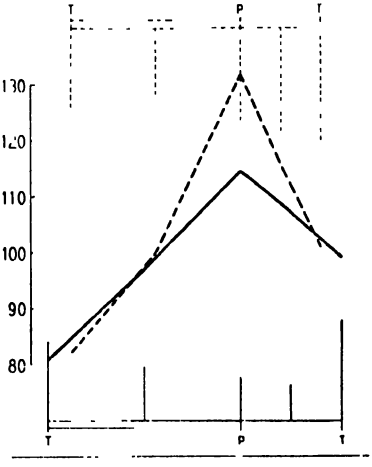


FIG. 135 *c*

means all foodstuffs were affected directly by the wheat harvest, or even affected favourably by the sort of weather that produced an abundant wheat harvest, it is, nevertheless, likely that to some extent the same conditions that yielded abundant wheat supplies produced exportable food surpluses.

13-14. Volume and Value of Exports of Cotton Manufactures

Specific-cycle Behaviour. Manufactured cotton exports have rather long average specific cycles [64·8 (13·0)], with large amplitudes. The amplitude and duration of rise are, on the average, more than twice that of fall. There is some tendency in its specific-cycle behaviour to exhibit a greater I–III than III–V expansion. The secular trend—strongly upward, of course, throughout—may be broken at 1811. The rate of rise thereafter is markedly less than before.

The secular trend from 1793 to 1811 is perhaps the most remarkable of the movements among our series. From 1793 to 1803 the average per-month rate of rise is 2·13; from 1803 to 1811, 1·36. From that point on the average is steadily about 0·50. There can be no doubt that the rise of the cotton industry—largely dependent on this export increase—was the most important industrial feature of the first two decades of the period; and the rate of rise in the volume of exports is, perhaps, as well, the most important evidence for the existence of 'an industrial revolution' at that time.

Reference-cycle Behaviour. There are three more reference than specific cycles. Cotton exports failed to decline from 1800 to 1801, 1806 to 1808, and from 1828 to 1829. From 1806 to 1807 there is an absolute decline in the series, but insufficient to justify a specific cycle. In six of thirteen cases there is perfect I–V conformity; in three cases there is a lesser rate of expansion in stages V–IX than in I–V (1803–8, 1837–42, 1842–8); in the reference cycle 1829–32 the rate of rise during contraction exceeds that during expansion; the other irregularity is relatively slight, being the minor decline from 1809 to 1810, anticipating the reference peak.

The rate of rise in stage I–III is clearly greater than in III–V. This fact fits well the conception of general business revival depending on export increases, supplemented, and to some extent supplanted, in the latter stages of prosperity by new investment at home.

The series shows perfect conformity to reference expansions, but has four inverse movements in reference contraction, and two cases of no net movement during reference contraction. There are, further, two cases where increase during reference contraction is greater than during the preceding reference expansion (1800–1, 1831–2); and three cases where such increase is greater than during the following reference expansion (1800–1, 1828–9, 1831–2).

From 1815 the value of cotton exports is available. There are two more specific cycles for values than for volumes. In 1821 and 1823 values declined sufficiently to justify specific cycles. These movements appear in

Figure 19

Quantity of Exports of Woollen Hosiery, etc

------ 10 Specific Cycles 1817 - 1850

——— 7 Reference Cycles 1816 - 1848

Conformity +100, + 71, + 85

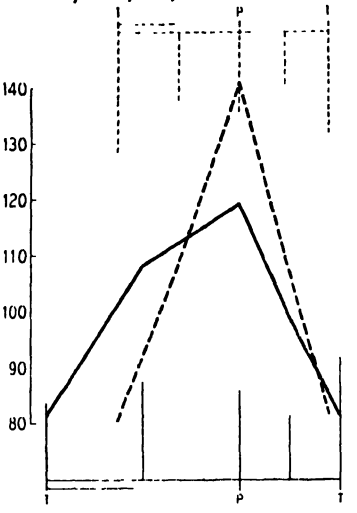


Figure 20

Volume of Exports of Linen Manufactures

------ 15 Specific Cycles 1793 - 1848

——— 13 Reference Cycles 1793 - 1848

Conformity + 85, + 54, + 72

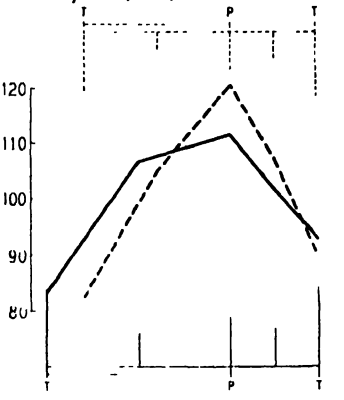


Figure 21

Value of Exports of Linen Manufactures

------ 9 Specific Cycles 1816 - 1848

——— 7 Reference Cycles 1816 - 1848

Conformity + 71, + 71, + 85

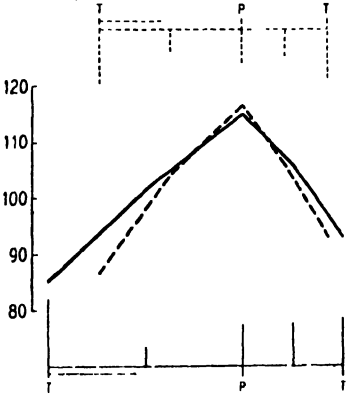


Figure 22

Quantities of Exports of Iron, Hardware, and Cutlery

------ 10 Specific Cycles 1797 - 1845

——— 12 Reference Cycles 1797 - 1848

Conformity + 83, 0, + 39

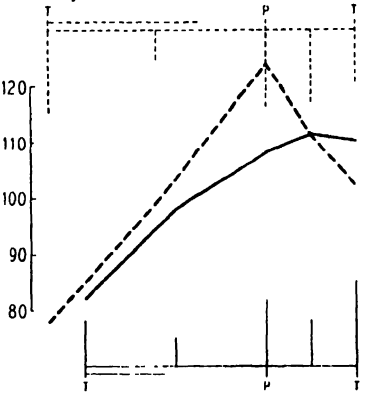


FIG. 135 *d*

the volume series in the former case as a mere slackening in the rate of rise; in the latter as a very slight absolute decrease. The total amplitude is about half that for volumes for the same period. The lesser amplitude derives from the markedly less average amplitude of rise. There is a very slight upward secular trend until 1826, a somewhat greater upward trend thereafter, but one in no way comparable to that in volumes. This derives, of course, from the sharply falling trend in cotton goods and yarn prices. The average pattern, like that of the volume series, is I–V, with a more marked I–III than III–V increase.

15-16. Volume and Value of Exports of Woollen Manufactures

Specific-cycle Behaviour. The average duration of specific cycles is less for the volume of woollen than for cotton exports. The amplitude of movement is about a third less, owing to smaller average movement in the expansion phase. The average amplitude of contraction is, in fact, slightly greater for the volume of woollen than for cotton exports. The average amplitude of expansion is about 25 per cent. greater than for contraction; but the average duration of expansion is fully 70 per cent. greater than for contraction. There is only a slight upward trend, at best, until about 1840. The last decade of the period saw a pronounced rise, at an even greater rate than cotton exports at that time, and close to the enormous rate of increase in cotton exports from 1793 to 1803.[1] Before 1840, trend movements are irregular, with a rise from 1790 to 1801, a fall from 1801 to 1811, and a fairly steady secular level (about the same as that in 1800) from 1815 to 1840.

Reference-cycle Behaviour. In net there is but one more specific than reference cycle; but there is more than one divergence. The series shows no rise from 1801 to 1802; it contains a decline in 1823, for which there is no reference contraction; it does not decline from 1831 to 1832, but does from 1833 to 1834. In addition it exhibits an increase in 1847 which can be matched with no reference expansion (annually).

The average pattern, however, is, on the whole, clearly I–V expansion. Like most other export series the average rate of rise in stage I–III is greater than in stage III–V. The exceptions to this average behaviour occur, in three of the four cases, in so-called minor cycles (1793–7, 1811–16, 1829–32). The other such instance is that of the cycle 1816–19. In the reference expansion 1832–6, further, the rate of increase in stage I–III is equal to that for stage III–V. But for the cases mentioned above, which result in changes contrary to reference expansions and contractions, the indexes of conformity would be perfect.

The United States constituted by far the most important market for

[1] For an explanation of the increase in woollen exports (largely connected with the growth of the 'shoddy' trade, i.e. mixed cottons and woollens, and the great increase in the raw material supply from Australia in the forties), see Vol. I, pp. 326–7.

Figure 23

Volume of Exports of Iron, Hardware, and Cutlery

------ 15 Specific Cycles 1795 - 1848

——— 13 Reference Cycles 1793 - 1848

Conformity. +100, + 38, + 76

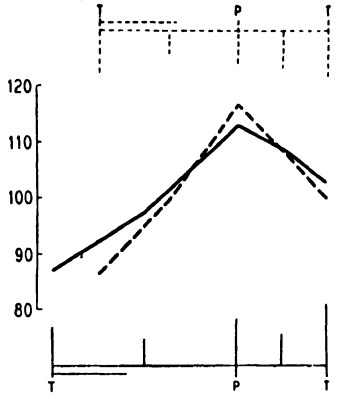


Figure 24

Value of Exports of Iron, Hardware, and Cutlery

------ 11 Specific Cycles 1797 - 1803, 1817 - 1848

——— 9 Reference Cycles 1797 - 1803, 1816 - 1848

Conformity +89, + 78, +100

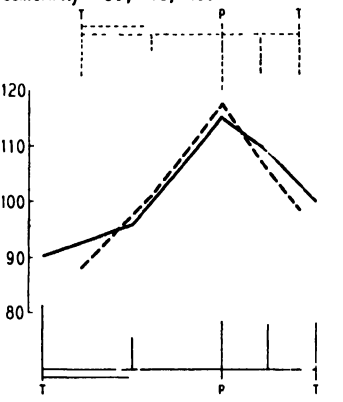


Figure 25

Volume of Exports of Brass and Copper Manufactures

------ 8 Specific Cycles 1819 - 1854

——— 7 Reference Cycles 1816 - 1848

Conformity +100, + 14, + 69

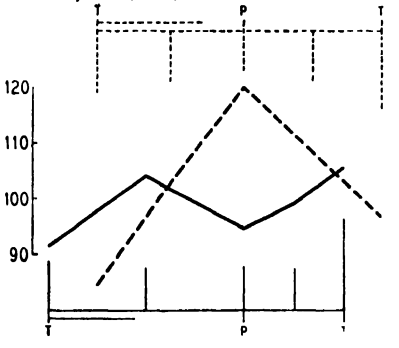


Figure 26

Value of Exports of Brass and Copper Manufactures

------ 9 Specific Cycles 1816 - 1851

——— 7 Reference Cycles 1816 - 1848

Conformity + 71, + 43, + 31

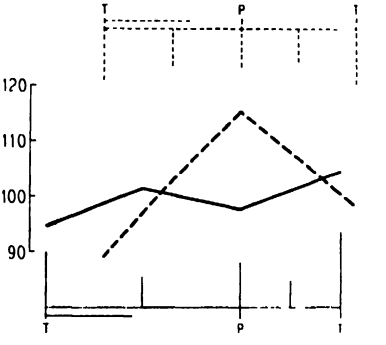


Figure 27

Value of Exports to Asia

------ 8 Specific Cycles 1809 - 1848

——— 9 Reference Cycles 1808 - 1848

Conformity +44, + 33, + 41

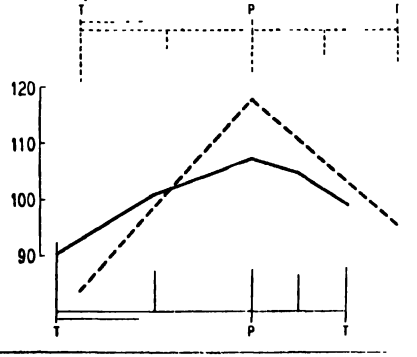


Figure 28

Value of Domestic Exports to Europe

------ 10 Specific Cycles 1807 - 1848

——— 9 Reference Cycles 1808 - 1848

Conformity + 56, + 56, + 88

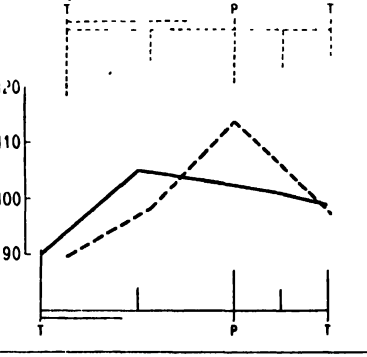


FIG. 135 e

British woollens. The close connexion between the economies of the two countries in these years explains largely the conformity of this series to reference dates. It is significant of this relation that, in the thirties, when Britain was exporting capital on a large scale to the United States, wool exports rise above the general secular trend from 1815 to 1840. The peak in 1847 is also a consequence of the American prosperity of that time.[1]

The value of woollen exports differs from the volume series in the period when both are available, in that it exhibits a decline from 1841 to 1842, whereas the volume of exports rises slightly. This gives the value series one more specific cycle. As in the case of the relation of the cotton value and volume series, the average amplitude of the value movements is smaller, although the divergence is less than for the two cotton export series.

The value series has a clearly marked downward trend from 1815 to 1829, a slight upward trend thereafter. The movement of wool export prices accentuates the fall to 1829 and the rise from 1829 to 1836, as compared to volumes; and the price fall thereafter damps the large secular increase in volumes during the forties. The secular decline in wool export prices, interrupted significantly only in the expansion from 1832 to 1836, is less severe than for cotton goods: mechanization proceeded more slowly, and on a less grand scale, than in the cotton industry.

The value series shows I–V business-cycle conformity; and, in all cases, there is a net increase in reference expansion stages, and net absolute decline in all reference contractions, except that from 1831 to 1832; but even there the rate of increase is less than during the previous reference expansion (1829–31). But for this exception the series would show perfect conformity to business cycles as measured by all the various indexes.

17-19. Quantities of Exports of Woollen Piece Goods, Woollen Yard Goods, and Woollen Hosiery

Specific-cycle Behaviour. These three quantity series represent the principal components of the volume of exports of woollen manufactures, analysed above. They first become available in 1815. Over the period covered hosiery exports exhibit the greatest number of specific cycles and thus the shortest average duration. Both piece goods and yard goods contain one more specific than reference cycle, yielding an average duration only slightly shorter than for reference cycles. Their amplitudes differ even more widely, the erratic movements of hosiery exports exhibiting by far the greatest amplitude, the largest, in fact, among all the export series available—119·2 (33·6). Due to the extraordinary trend rise after 1837, the yard goods series has a much greater average amplitude than piece goods. Measured from 1817 to 1837 the amplitudes of the two series show a much lesser difference. As noted earlier, in the analysis of the total volume of woollen exports, the principal trend movement is the rise which

[1] See Vol. I, pp. 314–15.

Figure 29

Value of Exports to British North America and West Indies

------ 7 Specific Cycles 1816 - 1848

——— 7 Reference Cycles 1816 - 1848

Conformity: +43, + 71, +62

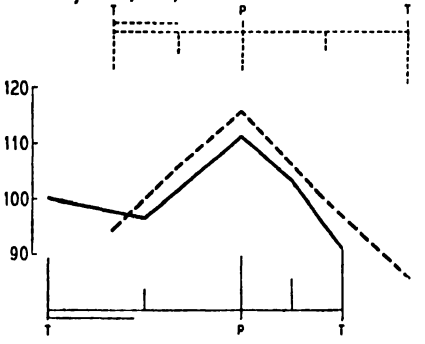


Figure 30

Value of Exports to Central and South America

------ 9 Specific Cycles. 1816 - 1850

——— 7 Reference Cycles: 1816 - 1848

Conformity + 71, + 71, + 54

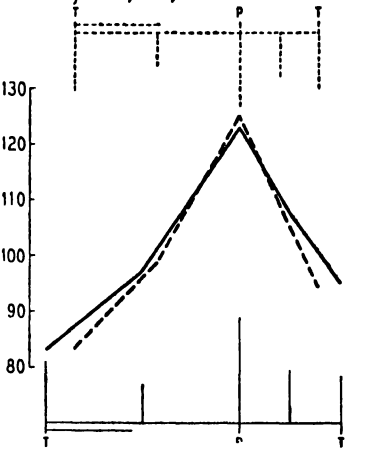


Figure 31

Value of Domestic Exports to the United States

------ 11 Specific Cycles 1817 - 1848

——— 7 Reference Cycles 1816 - 1848

Conformity + 71, + 71, + 100

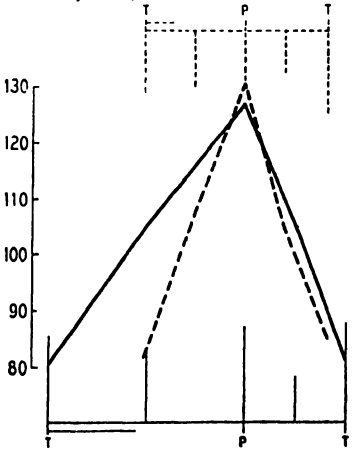


Figure 32

Volume of Total Imports

------ 16 Specific Cycles 1793 - 1850

——— 13 Reference Cycles 1793 - 1848

Conformity + 77, + 54, + 80

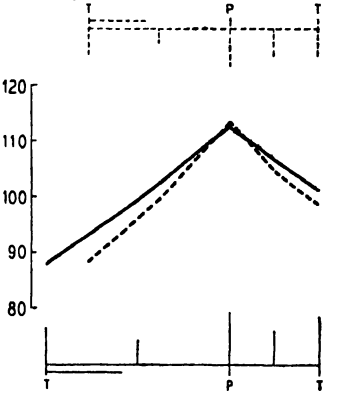


FIG. 135*f*

developed in the latter thirties and forties due to the introduction of Australian raw wool on the one hand, and the growing market for mixed cottons and woollens on the other. This extraordinary increase appears clearly in the yard goods series which includes the mixed cloth. Piece goods exports contain a modest, but fairly steady upward trend, while the net upward movement of hosiery exports is slight. The peaks in hosiery exports, nevertheless, in 1822, 1828, 1833, and 1844 are successively higher.

Reference-cycle Behaviour. All three component series exhibit relatively high conformity to a I–V expansion pattern. Both hosiery and yard goods exports have perfect expansion indexes. In neither case, however, does this result from exact coincidence of specific and reference-cycle expansion periods. The expansion index for piece goods would also be perfect but for the slight net decline from 1832 to 1836. In every case the contraction index is lower than that for expansion. The hosiery series, however, would exhibit perfect conformity to contraction but for the increase in 1832. Piece goods exports would also have a perfect contraction index, but for an increase in that year and a net rise in 1839–42. The rise in 1832 and net increases in 1839–42 and 1845–8 account for the low level of the contraction index for yard goods. In general, then, these series emerge as good, but broad, indicators of British cyclical fluctuations. Their conformity to business activity is higher than a superficial glance at their specific-cycle turning-points would indicate.

20-1. Volume and Value of Exports of Linen Manufactures

Note. The volume series (official value) was computed for two periods: the first running from 1792 to 1825, the second from 1814 to 1850. The former covers the volume of exports from Great Britain, the latter also includes exports from Ireland (the United Kingdom). Averages of the measures for the whole period were then obtained using the data for the United Kingdom from 1816 on. The difference between total exports of linen from Great Britain and from the United Kingdom during the period when the two series overlap was never greater than £360 thousand (14 per cent.). The movements of the two series are practically identical, justifying the use of averages obtained by linking the two sub-periods.

Specific-cycle Behaviour. The volume of linen exports has a cycle of fairly short average duration, although from 1808 on the series contains the same number of specific as reference cycles. In each of the intervals from 1793 to 1797 and from 1803 to 1808, however, it contains two specific cycles to one reference cycle. The average amplitude is very large, comparable to that for cotton exports. Cotton, however, had much greater average amplitude of rise than fall. In the case of linen exports the difference is not so impressive; and the net upward secular trend is, of course, less than for cotton exports. In fact, during the decade after 1793 (when cotton exports were rising at their most rapid rate) linen exports showed a trend decline. Not until after the destruction of the Continental System did linen exports show a very pronounced rise. The fact that Russia and

Figure 33

Value of Total Imports

13 Specific Cycles: 1804-1850

11 Reference Cycles: 1801-1848

Conformity: +82, +64, +81

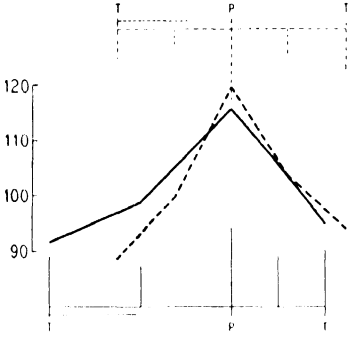


Figure 34

Quantity of Raw Cotton Imports

15 Specific Cycles: 1791-1846

13 Reference Cycles: 1793-1848

Conformity: +85, +69, +84

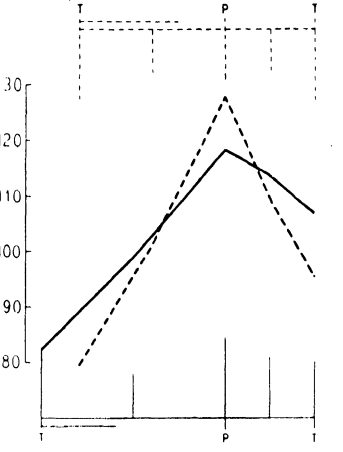


Figure 35

Quantity of Raw Wool Imports

17 Specific Cycles: 1791-1847

13 Reference Cycles: 1793-1848

Conformity +100, +85, +84

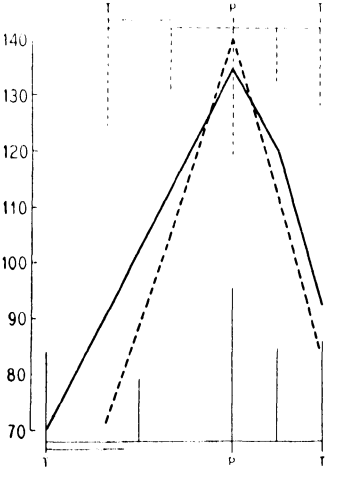


Figure 36

Quantity of Flax Imports

13 Specific Cycles: 1806-1851

11 Reference Cycles: 1801-1848

Conformity: +100, +27, +76

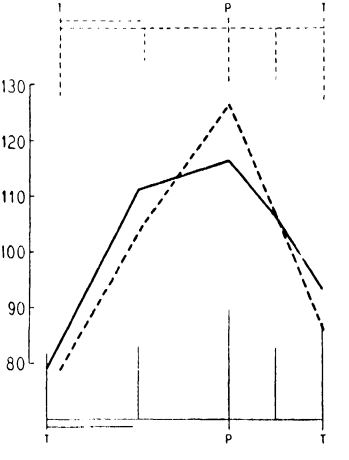


FIG. 135*g*

the Baltic States were the main sources of raw material supply for the British linen manufactures, explains the relative stagnation during the war years.[1] In the post-war years, when the industry was experiencing rapid mechanization, France was by far the principal importer of British linen goods and yarn, especially the latter.

Reference-cycle Behaviour. Linen exports exhibit an excellent I–V reference pattern, with a considerably greater average I–III than III–V rate of increase. The principal deviation from the reference pattern occurs in 1800–3, when the linen series rises during reference contraction (1800–1) and falls during reference expansion (1801–2). Moreover, in net, the series shows an increase during the reference contractions from 1806 to 1808, and from 1839 to 1842.

The value series for linen exports contains two more specific cycles than does that for volumes. Falling prices yield a decline from 1822 to 1823 and from 1839 to 1841. In two cases price movements make for more exact conformity to reference dates: specific-cycle peaks in the value series come in 1839 and 1845, whereas volumes show no decline from 1839 to 1840 and do decline from 1844 to 1845. Both average amplitude and duration of specific cycles are smaller (over the period 1814–50) than for volumes. A secular price decline induces a lesser net upward secular trend for the whole period. Not until after 1832, in fact, is there any secular upward movement. The movement from 1832 to 1836, however, as in several other value series, is more pronounced than for volumes, which indicates, of course, a cyclical price increase.

The disparity in rates of increase in stages I–III and III–V is considerably less pronounced in values than in volumes, although it is present. This measures, in a sense, the compensating role of rising prices in the latter stages of prosperity.

All measures of cyclical conformity would be perfect but for two irregularities. From 1818 to 1819 the series rises; and from 1819 to 1825 it manifests an irregular net decline. Both of these movements are, of course, counter to the reference pattern over those years.

22. Quantity of Exports of Iron, Hardware, and Cutlery

Specific-cycle Behaviour. There is available from 1796 a series which measures, in tons, the quantity of iron exports. The volume, i.e. official value, series for the same articles is arbitrarily based on prices in 1696. This series, in units of tons, differs in many of its year-to-year movements. It contains many fewer specific cycles and its average duration is thus longer. Its average amplitude of movement, however, is considerably greater as is its upward secular trend, which, as in the case of volumes, is concentrated in the period after 1815.

Reference-cycle Behaviour. Like the volume of iron exports, the quantity series exhibits a I–V expansion pattern. Its indexes of conformity, however,

[1] McCulloch, ii. 149.

Figure 37

Quantity of Hemp and Jute Imports

----- 15 Specific Cycles: 1802 - 1852

——— 11 Reference Cycles: 1801 - 1848

Conformity: + 64, + 45, +52

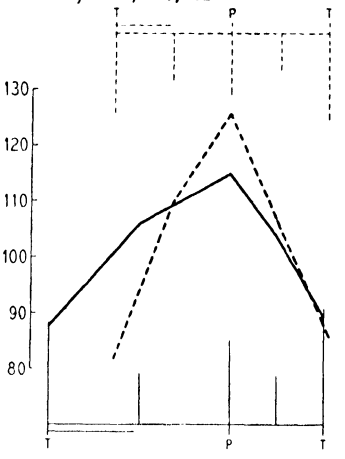


Figure 38

Quantity of Fir Timber Imports

----- 14 Specific Cycles: 1789 - 1839

——— 11 Reference Cycles: 1793 - 1837

Conformity: + 45, + 27, +52

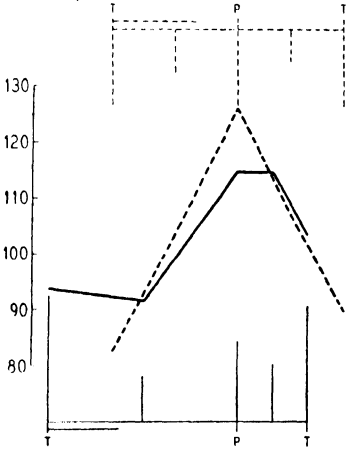


Figure 39

Quantity of Wheat Imports

----- 14 Specific Cycles: 1795 - 1848

——— 13 Reference Cycles: 1793 - 1848

Conformity: + 23, + 23, +28

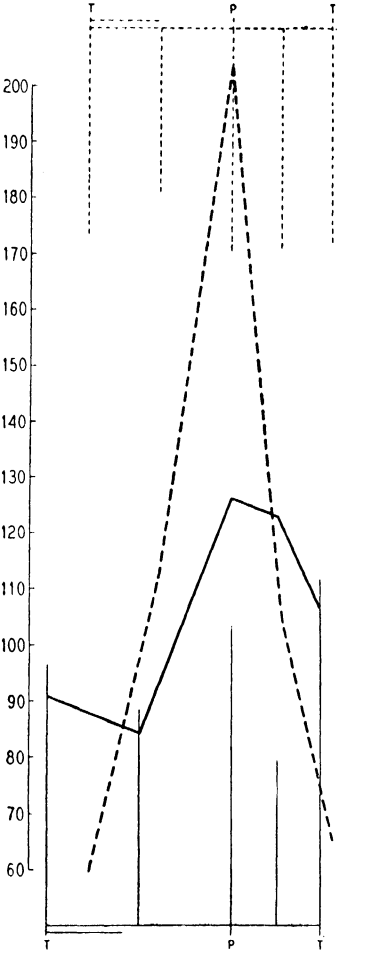


FIG. 135 *h*

are, in all cases, less than for the volume series. But for the net contraction in the course of the reference expansion 1842–5 the expansion index would be perfect. There are, however, net increases during six of the twelve reference cycles covered by this series, yielding a zero conformity index for reference contraction.

23-4. Volume and Value of Exports of Iron, Hardware, and Cutlery

Specific-cycle Behaviour. Iron exports exhibit, on the average, relatively short specific cycles, of about forty months. The average amplitude of the series is smaller than for any of the textile export series examined. The average amplitude of rise is almost twice that of fall. Until 1814 there is only a slight secular increase in the volume series; but after that date, and more especially after 1826, there is a very sharp upward trend. After about 1826 that trend is, in fact, more rapid than for cotton exports. The shape of a trend line for the whole period, in iron exports, is much similar to one drawn passing through points representing estimates of total iron output. Unlike textile export specific-cycle patterns, iron shows a greater III–V than I–III rate of expansion.

Reference-cycle Behaviour. In net there are two more specific than reference cycles: there are no reference counterparts for the specific cycles from 1803 to 1805 and from 1811 to 1814. In addition, like cotton exports, iron fails to show reference declines in 1829 and 1832. These are compensated, however, by specific cycles with peaks in 1833 and 1847.[1] Despite these rather numerous exceptions, the series can be properly designated as I–V expansion.

It exhibits, like the specific-cycle pattern, a greater average III–V than I–III expansion. This characteristic, it will be recalled, distinguished brick production as well as the Hoffmann index of producers' goods output. It would appear to indicate that the sequence which, it has been suggested, explains the movement of producers' goods in relation to business cycles in Britain, holds, as well, for the importers of British iron. This highly tentative hypothesis depends, of course, on the coincidence of reference dates abroad (especially in the United States) with the British reference dates.

The iron export series (volumes) shows perfect conformity to reference expansions. In the period of strong upward secular trend, however, conformity to reference contractions is, on the whole, inverse; but in only two of five cases after 1826 is the rate of rise during reference contractions greater than during the preceding (and in one case, the following) reference expansions. Both exceptions occur in cycles similarly irregular in the textile export series: 1831–2, 1845–8.

[1] Both of these specific cycles in iron exports were connected with exports to the United States. The decline in 1834 followed upon differences between the President and the Second U.S. Bank (*Encyclopaedia Britannica*, 7th ed., p. 432, David Laing, 'Iron-making'); the rise in 1847, like that in woollen goods exports, accompanied the peak in American business conditions in that year.

Figure 40

Quantity of Raw Sugar Imports

------ 18 Specific Cycles 1795 - 1850

——— 13 Reference Cycles 1793 - 1848

Conformity +54, +23, +48

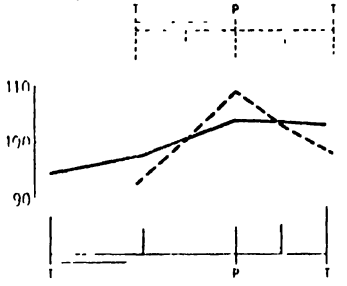


Figure 41

Balance of Trade

------ 13 Specific Cycles 1802 - 1850

——— 11 Reference Cycles 1801 - 1848

Conformity - 55, - 27, -43

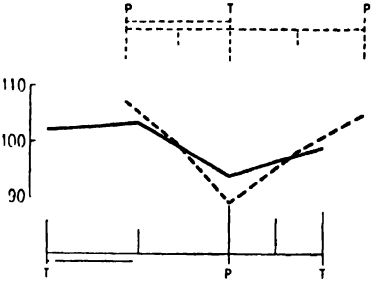


Figure 42

Gross Barter Terms of Trade

------ 18 Specific Cycles 1789 - 1850

——— 13 Reference Cycles 1793 - 1848

Conformity - 15, - 8, - 16

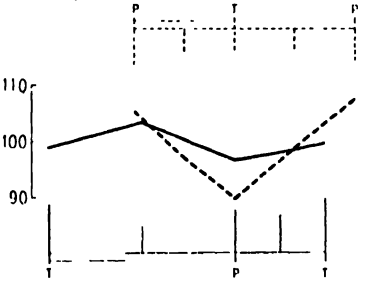


Figure 43

Net Barter Terms of Trade

------ 8 Specific Cycles 1802 - 1847

——— 11 Reference Cycles 1801 - 1848

Conformity +55, +9, +5

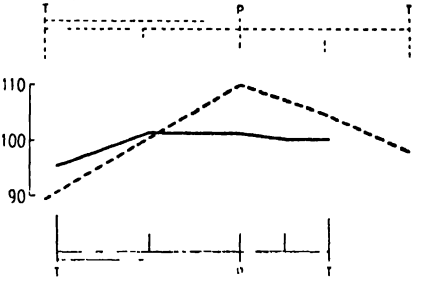


Figure 44

Shipping Tonnage in Foreign Trade, Entered and Cleared

------ 6 Specific Cycles. 1816 - 1848

——— 7 Reference Cycles 1816 - 1848

Conformity +100, - 14, +77

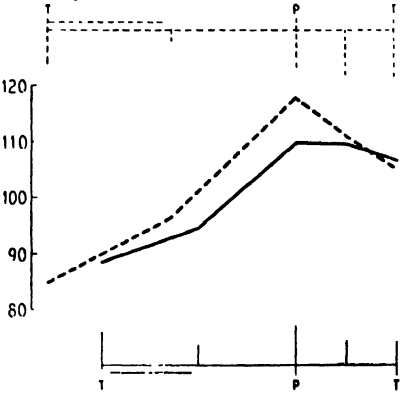


Fig. 135i.

The value series (1816–50) exhibits, as in other instances, better average cyclical conformity than volumes. It has, nevertheless, two more specific cycles than reference cycles: it falls from 1822 to 1823 and, like volumes, rises from 1846 to 1847. Its principal difference from the volume series is that it exhibits specific-cycle peaks in 1828 and 1831, coinciding with reference peaks. Superior cyclical conformity results from absolute decline in three reference contractions during which volumes increased (1828–9, 1831–2, 1839–42). The measures (except for secular trend) are, otherwise, very similar for the two series.

The secular decline in iron prices throughout the period covered by the value series damps, of course, the upward secular trend and produces a net downward movement in values (contrary to volumes) from 1814 to 1820. In the case of two reference cycles, however, the rise in iron prices yields markedly greater increases in values than in volumes: 1832–7 and 1842–8. In both cycles the expansion phase was marked by large-scale railway building within Britain, which was, quite directly, responsible for the counter-trend rise in iron prices.

25-6. Volume and Value of Exports of Brass and Copper Manufactures

Specific-cycle Behaviour. The average duration of specific cycles is about the same for the volume of brass and copper exports as for the production of unwrought copper, although there is little coincidence between the turning-points in the two series. This duration is similar to that for the volume of raw-material exports. The average amplitude is, however, about twice as great for exports as for copper production. Brass and copper exports, moreover, exhibit a sharp secular increase after 1825, while in that period the upward trend in production is negligible. This lack of conformity stems from the relatively slight dependence of the industry, especially after 1830, on the domestic copper supply.

Reference-cycle Behaviour. On the average volumes rise during all reference-cycle stages except III–V. The most pronounced rise occurs in stage I–III, and the series has been designated as of VII–III expansion. In the VII–III stages of each reference cycle the series shows net expansion, yielding perfect conformity to reference expansions. But there are three cases of upward movement during reference contractions: 1831–2, 1836–7, and 1845–8.

In all but one case (1839) the series falls during reference stage III–V, which is, of course, the period of greatest general prosperity. It rises, moreover, quite consistently, during reference contractions (except 1818–19 and 1845–8). For these puzzling characteristics there is no easy explanation available.

The value of brass and copper exports has one more specific cycle than the volume series due to the existence of a trough in 1816. Its turning-points, otherwise, coincide except for a peak in 1820, which anticipates the

peak in volumes by one year. The average amplitude of movement is smaller than for volumes, as is the average duration. The trend is damped somewhat by the secular fall in the average price of brass and copper exports.

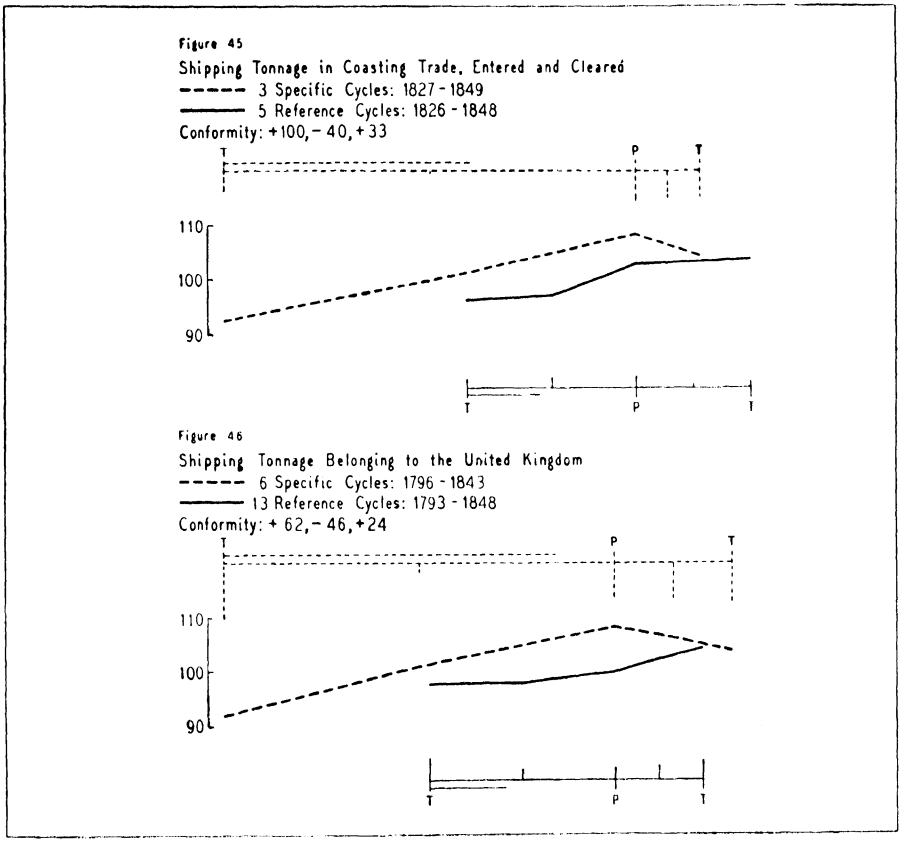


FIG. 135*j*

The average patterns are essentially similar to those for volumes, although the average rate of change from I–III is lower, owing to price declines in that stage. The decline in stage III–V is also less, indicating, on the average, a rise in copper export prices during the latter stages of general prosperity. An average price fall is indicated in stages V–IX.

27. Value of Domestic Exports to Asia

Specific-cycle Behaviour. Over the period covered there is one less specific than reference cycle, yielding the longest average duration for any series of this type. The distinction, however, is not to be regarded as significant.

The average amplitude of movement is moderate, resembling most closely that for the value of exports to British North America and the West Indies. The upward trend is considerably stronger than for any other series of this type, owing to the relative unimportance of Asiatic markets in the early years of the period. The major part of the trend rise is concentrated in the interval from 1831 to 1844, when China, especially, was being rapidly opened as a British market.

Reference-cycle Behaviour. Conformity to a I–V expansion pattern is positive and moderately high. But for the declines in 1809 and 1831, and the failure of any net upward movement to emerge in 1811–15, the expansion index would be perfect. But for the increases in 1816, 1826, and 1832 the contraction index would be perfect. In addition a number of specific-cycle turning-points fail to conform to reference dates: 1814, 1821, 1825, 1840, 1844. In general, then, the value of exports to Asia exhibits but crude conformity to the British business cycle sequence.

28. Value of Domestic Exports to Europe

Specific-cycle Behaviour. Of series representing the value of exports by areas, exports to Europe exhibit specific cycles of the smallest average amplitude and most irregular duration. From 1807 to 1832 there are eight specific cycles to only six reference cycles. In the remaining years there are but two specific cycles to three reference cycles. In net the average duration is slightly less than for reference cycles in the period covered, although uniform behaviour is not represented by that average. If the average amplitude of movement were to be measured from 1816 it would be markedly less than for the entire period. During the latter war years exports to the Continent were subject to special influences: the temporary loosening of the blockade explains the extraordinarily sharp rise in 1809; a tremendous speculation in exports, based on expectations of rich and peaceful markets—that of 1814. From 1816 cyclical movements are small in amplitude, exhibiting what appears to be an inventory character. The trend movement can be divided clearly into three segments: a rise from 1807 to 1814, a decline to 1831, and a steady rise to 1845. The net movement, of course, is upward, although at a lesser rate than to any other area, excepting British Colonial America and the United States.

Reference-cycle Behaviour. The value of exports to Europe exhibits fairly high positive conformity to a VII–III expansion pattern. No great analytic significance, however, is to be attached to this fact. The tendency to decline in stage III–V, for example, results from no uniform relationship to British business cycles: in 1810 it resulted from a tightened blockade; in 1815 from the collapse of a British speculation; in the cycle 1819–26 all stages exhibit contraction, due to the powerful downward trend in export prices. There is some possibility, however, that the declines in 1825, 1831, and 1839 reflect some sort of special sensitivity of continental exports to monetary stringency in Great Britain. This might be the case if the fluctuations

were purely a matter of inventory adjustment; but their behaviour is not sufficiently consistent to justify generalization of this kind. The series fails, for instance, to decline in 1836–7, when monetary stringency in London was extremely severe. Perhaps the principal significance of this series is to emphasize the very limited role that the Continent played after 1816 in British business fluctuations.

29. Value of Domestic Exports to British North America and the West Indies

Specific-cycle Behaviour. Cycles in the value of exports to British colonies in North America are of about the same duration as reference cycles over the period covered; but this does not result from identical specific and reference-cycle turning-points.

There is no specific cycle paralleling the reference cycle of 1829–32. The slight decline, however, in 1834 introduces a specific cycle which equates, for the whole period, the number of specific and reference cycles. In amplitude this series is moderate, being less than that for exports to the United States or to Latin America. Its trend, alone, among exports by areas, is downward. Since the downward trend is less than that for export prices, the volume of exports to this area increased over the period covered. These figures, nevertheless, indicate the relatively less progressive nature of the economies represented. It is significant that the most important break in the downward trend occurs in the thirties, when exports to the United States were also booming abnormally. The large increase in the value of exports to these colonial areas probably represents the backwash of that expansion period.

Reference-cycle Behaviour. The indexes of conformity to a I–V expansion pattern are positive and fairly high. The rise from 1822 to 1825 is not sufficient to compensate for the decline from 1819 to 1822, yielding a case of net contraction during reference expansion. The other exceptions are the rise in 1828–9 and the decline in 1829–31. But for these instances all indexes of conformity would be perfect.

The rather primitive economies included in this series would lead one to expect that the cycles in exports from Britain to them would represent movements inaugurated outside their borders. This hypothesis as to the derived nature of expansion in the colonial areas is partially supported by the fact that at four of the eight reference-cycle troughs this series lags: 1822, 1834, 1838, 1843.

30. Value of Domestic Exports to Central and South America

Specific-cycle Behaviour. There are but two more specific than reference cycles in this series over the period covered. These are caused by the relatively slight declines in 1835 and 1850. The average amplitude of this series is large, being second only to that for the United States. To this characteristic the tremendous cycle from 1819 to 1826 (when capital

exports to Latin America were on a very large scale) heavily contributes. The upward trend is fairly steady, except for the abnormal peak in 1825.

Reference-cycle Behaviour. All indexes of conformity to a I–V expansion pattern would be perfect but for the sharp fall in 1831 and the rise in 1832. These irregularities do not alter seriously the high correlation between British business fluctuations and exports to Latin America. Aside from these instances, and the declines in 1835 and 1850 noted earlier, only two specific-cycle turning-points fail to conform to reference dates: there are increases in 1840 and 1848 during periods which have been marked off as general contraction in Great Britain.

31. Value of Domestic Exports to the United States

Specific-cycle Behaviour. Over the period covered, the value of exports to the United States exhibits four more specific than reference cycles. In the course of the reference expansions 1819–25 and 1832–6 there are one-year declines (1820, 1823, 1834); in the course of the reference contraction 1839–42 there is a one-year rise (1841); and in the cycle 1842–8 there are two specific cycles, 1842–6, 1846–8. The average amplitude of movement is very great, owing in part to the fact that exports to the United States were blocked off almost completely during the War of 1812 (1812–14). But even when the average amplitude is measured from 1817 (excluding the war years), it exceeds considerably that for the value of exports to other areas.[1]

The over-all trend is upward, although there is no very continuous long-term movement. Owing principally to the rapid decline of prices, the series falls sharply from 1815 to 1820. There was some recovery in the twenties, although the value of exports to the United States remained far below the peak level of 1815. In the thirties, when Britain was exporting capital on a large scale to the United States, the value of exports rose, almost reaching, in 1836, the figure for 1815. Because of the secular decline in export prices between those dates, however, the lesser figure for the value of exports in 1836 represents a considerably greater volume of goods.

From 1836 to 1842 there is a second trend decline (interrupted 1838–9) paralleling a period of serious depression in the United States and Great Britain, and accentuated, in this series, by a severe price deflation. The subsequent trend rise brings the figure for the volume of exports to the United States to a new high level in 1850, the first year in which the total for 1815 is exceeded.

Reference-cycle Behaviour. The value of exports to the United States exhibits high positive conformity to a I–V expansion pattern for both expansion and contraction, and it has a perfect conformity index to all business cycles. But for the decline in 1817 (slightly greater than the rise in 1818) and the sharp rise in 1847, all indexes would be perfect.

The former instance (1817) represents the latter part of the period when the United States was recovering from the tremendous over-stocking of

[1] The average amplitude measured from 1817 to 1848 is 94·8 (27·1).

1815. When peace had been established, at the close of 1814, British merchants poured great supplies of goods into the American markets which had been blocked off in the preceding three years. The level of exports of 1815 could not be maintained and in 1816–17 the value of exports to the United States declined. The second instance (1847) represents the operation of an autonomous American business cycle. A major peak was reached in Britain in 1845; in the United States, however, the principal peak of the forties came in 1847. The large British exports there in that year contributed, however, to some general expansion at home; and the rise constitutes some evidence for marking off, in the monthly dates, a reference cycle with a peak early in 1847.

Since exports from Britain to the United States closely follow American business cycles, the high conformity of this series to British reference dates is significant of the close relationship between the two economies.

PART II. IMPORTS

Introduction

Of the individual import series analysed here four represent textile raw-material imports. The other three are imports of fir timber, wheat and wheat flour, and raw sugar. The following table shows the percentages of the total volume of imports represented by various component commodities:

Composition of Imports as Percentage of Total Volume

	1814	*1815*	*1820*	*1825*	*1830*	*1835*	*1840*	*1845*	*1850*
Group A									
Coffee	19·0	16·1	9·2	7·4	5·5	3·6	6·4	3·7	3·2
Sugar	17·4	17·4	18·0	12·4	14·8	12·7	8·5	10·3	9·8
Tea	7·7	7·8	9·3	6·6	6·9	9·1	4·2	6·0	5·0
Tobacco	0·2	1·5	1·1	0·9	0·7	0·5	0·5	0·4	0·4
Total A	44·3	42·8	37·6	27·3	27·9	25·9	19·6	20·4	18·4
Group B									
Wheat	3·6	1·2	4·3	2·6	7·1	0·7	7·6	3·3	12·2
Cotton	6·0	10·2	15·5	16·9	19·0	24·7	28·9	28·1	21·4
Flax (raw)	2·8	1·9	2·3	4·7	4·1	3·1	3·9	3·5	3·8
Hemp	1·4	1·9	1·1	1·1	0·9	1·2	0·8	0·9	1·0
Timber[a]	0·5	0·9	1·0	1·6	1·0	1·2	1·4	1·5	1·0
Wool	2·2	2·0	1·2	3·3	1·9	2·3	2·0	2·4	1·9
Total B	16·5	18·1	25·4	30·2	34·0	33·2	44·6	39·7	41·3
Per cent. A+B are of total	60·8	60·9	63·0	57·5	61·9	59·1	64·2	60·0	59·7

[a] Fir timber only, until 1840.

Imports of foodstuffs other than wheat and sugar (or closely allied consumption series), which constitute the bulk of imports not analysed here, will be examined along with real wage estimates, in the section devoted to

data on labour. Industrial raw materials and grain imports fluctuated more violently than did foodstuffs; and, as a result, the average amplitudes of movement for the series analysed here (with the exception of sugar) are greater, in all cases, than for the total volume of imports.

The amplitudes of movement are, further, considerably greater than for export and production series, while the average duration of specific cycles, among the import series, is, on the whole, somewhat less. These two tendencies summarize the statistical evidence for what has been called the 'inventory' character of the industrial raw-material import series. The tendency for the volume of such imports to fluctuate, as it were, above and below a more smooth production curve is to be explained by the high degree of organization in the markets for cotton, wool, timber, &c., as well as by the nature of the industrial demand for raw materials.[1] The secular trend for the total volume of imports over the whole period 1790–1850 is approximately the same as for the volume of exports. But from year to year they did not move together.[2]

All series exhibit I–V reference patterns with the exception of wheat imports, which were taken as III–VII but which, in fact, might equally have been taken as I–V. Total import volumes exhibit the same III–V and I–III expansion rates, whereas exports slacken, in the average rate of increase, in stage III–V. This broad characteristic is compounded of markedly greater average III–V increases in the major cycles, and a somewhat greater average I–III advance during minor cycles. Wheat imports, especially, exhibit the characteristic concentration of expansion in stage III–V. Quantities of timber and raw sugar imports share this characteristic, but the series of raw textile imports all show greater average I–III increases.

The constitution of total imports, expressed as percentages of volumes, changed as follows from 1814 to 1850:[3]

(In per cent.)

	Foodstuffs	*Raw materials*	*Finished goods*
1814 . .	40·6	48·1	11·3
1825 . .	24·8	66·9	8·3
1840 . .	27·5	66·9	5·6
1850 . .	33·7	59·2	7·1

[1] Although the markets for tea, sugar, coffee, &c., were equally well organized, the average amplitude of movement for imports of these commodities was considerably less than for industrial raw materials. This divergence is probably to be explained by reference to the more rapidly changing demand for wool, cotton, and other manufactures. In response to cyclical fluctuations wool and cotton output fluctuated more violently than did consumption of tea, &c. Greater fluctuations in stocks (and thus imports) could be expected in the former case.

[2] See below, 'The Gross Barter Terms of Trade', No. 42. The average per-month movement from cycle to cycle is slightly greater for the volume of exports than for the volume of imports.

[3] There are no value figures for categories of imports. Schlote's volume series seemed the best alternative although, if price movements were taken into account, it is possible that the proportions would be materially altered.

The fall in foodstuffs in the decade after 1814 represents, largely, the decline in the import of colonial goods for re-exports to the Continent. The rising tendency thereafter, especially in the last decade, is to be accounted for by the increasing relative volume of grain imports. Raw materials show the secular relative increase, and finished goods the relative decline, to be expected in view of the predominating industrial character of Britain's development from 1814 to 1850.

32-3. Volume and Value of Total Imports

Specific-cycle Behaviour. The volume of British imports shows a consistent cycle about forty months in length [42·8 (10·4)]. The average amplitude is smaller than for either domestic goods' exports or total exports. Amplitudes, however, vary widely and seem to reflect the so-called major and minor cycles. The largest rises come in 1809–10, 1817–18, 1821–5; the largest declines come in 1810–12, 1815–16, 1818–19, 1825–6. There is a tendency for a lesser amplitude in both rises and falls in the latter two decades of the period. The secular trend is, of course, strongly upward. It is interrupted, however, by a relatively stagnant trend period from, roughly, 1799 to 1806, a period of severe war-time restrictions to British imports.

Reference-cycle Behaviour. The average pattern for the volume of imports is clearly I–V. The major exception is caused by a counter cyclical rise in 1801 and a counter cyclical fall in 1802.[1] Although there are several further year-to-year deviations, all other reference expansions show a net rise, all contractions a net fall or a lesser rise than during the previous and following expansions. In the full cycle from 1803 to 1808 there is, however, no substantial change between the average standing at the initial reference trough (1803), the reference peak (1806), and the terminal trough (1808). This is due to the fact that the rise in 1803–5 is outweighed almost exactly by the fall in 1806, and to the lack of any movement from 1806 to 1808.[2] The rises from 1839 to 1840 and from 1846 to 1848 make the behaviour of this series irregular during the reference contractions 1839–42 and 1845–8. The very slight declines from 1798 to 1799 and from 1827 to 1828 also result in deviations from typical behaviour.

Unlike the export series, but like brick production and the Hoffmann index of producers' goods output, imports show a greater average increase in stage III–V than in I–III. However, the difference in the *rate* of increase between the two stages, as measured by change per month, disappears when averaged for all reference cycles. In the case of the major cycles, however, the tendency for a greater advance in stage III–V is much more

[1] Enormous grain imports in 1801 and a sharp fall in 1802 largely account for the movements of the total volume in these two years.

[2] It will be recalled that from the latter months of 1806 the continental blockade was operative, a circumstance which discouraged the import of colonial products for re-export.

pronounced than for the average; and on the average, there is a lesser increase in stage III–V than in I III, for the minor cycles.

With the exception of the cases mentioned above, this series shows excellent conformity to reference cycles. Conformity to reference expansions is, on the average, somewhat lower than for the volume of exports; conformity to contractions is, however, somewhat greater. So far as the average measures are concerned the behaviour of the series in 1800–2 and 1805–8 is solely responsible for its failure to show perfect conformity. Both irregularities occurred during the war period; and deviations in two instances of this kind would not justify any generalization about the relative conformity of imports and exports. The most important distinctions between the two series are not to be drawn from a comparison of their numerical measures of conformity, but rather from an examination of their relative rates of movement during the various reference-cycle stages.[1]

Over the period covered (1801–50) there are the same number of cycles for the real value of imports as for their volume. The volume series does not exhibit a cycle from 1846 to 1848, while the value series omits a cycle from 1819 to 1821. The average amplitude of the value of imports is greater than for volumes: the difference being more pronounced for the average amplitudes of fall than for rise. This follows, of course, from the fact of secularly falling import prices after 1814. That fall is sufficient to prevent the appearance of any protracted upward trend in the value of imports until the thirties. The rise thereafter is fairly steady, at a lesser rate than in volumes.

The effects of price movements on the average reference pattern for values, as compared with that for volumes, are the following: the increased rate of average decline in stages V-IX is sufficient to lessen substantially the upward tilt (roughly, the secular trend); the rise in stage III–V is accentuated. These changes indicate that in all stages, on the average, except III–V, import prices tended to fall.

The index of conformity for reference expansions would be perfect but for the fall in 1802. That fall in value is explained largely by the sudden fall in prices during the brief Peace of Amiens.[2] There are two counter-cyclical movements during reference contraction: the net rises in 1806–8 and 1845–8. The former case (1808) results from a rise in import prices due to fears of shortage; the latter (1847), from a slight rise in prices and an enormous increase in grain imports.[3] The net increase from 1806 to 1808 is greater than during the previous expansion (1803-6); but that from 1845 to 1848 is at a lesser rate than from 1842 to 1845. Thus only the former of these (as well as the fall from 1801 to 1802 which is greater than the fall in the following contraction, 1802–3) reduces the conformity indexes of business cycles as a whole.

[1] See below, No. 42, for an analysis of the cyclical behaviour of the gross barter terms of trade, i.e. the volume of exports divided by the volume of imports.

[2] The fall in the volume of imports was relatively slight, and can be accounted for largely by a sharp diminution in wheat imports.

[3] See Vol. I, pp. 314–15.

For the purposes of business-cycle analysis perhaps the most significant behaviour of the value of imports is the more pronounced III–V than I–III rate of rise. It will be recalled that the value of exports showed greater average increase in stage I–III. This would indicate, on the average, a tendency for Britain's adverse trade balance to increase in the latter stages of expansion, setting the framework, in part, for an external bullion drain and monetary crisis.

34. Quantity of Raw Cotton Imports

Specific-cycle Behaviour. Cotton imports resemble almost to the point of identity the cotton consumption series and the Kondratieff index of textile production, previously examined. Its average specific cycle, somewhat longer than for wool imports, is forty-four months; its average amplitude of movement is considerably less than for wool, somewhat less than for flax and hemp, but greater than for most production and export series. The average deviation of its amplitude is smaller than for the other textile import series and for fir timber imports. The major deviation from average behaviour, with respect to amplitude, occurred during the American Embargo and the War of 1812 (roughly 1808–13). In general, of course, the Napoleonic Wars interfered less with American cotton imports than with continental wool, flax, timber, &c. The secular trend over the whole period 1790–1850 is the largest for any of the individual import series examined, although only negligibly greater than for wool. It should be remembered, however, that wool imports did not represent the total raw-material supply, and that the domestic output (and total wool manufacture) increased less than raw wool imports, and considerably less than cotton manufacture.

Reference-cycle Behaviour. Cotton imports exhibit excellent I–V conformity. The major cases of irregularity result from the failure of the series to decline in 1801 and in 1837; from the decline in 1839; and from the rises in 1840 and 1842.[1] The other year-to-year deviations from the reference pattern do not affect significantly the averages; e.g. the decline from 1827 to 1828, during reference expansion, is more than outweighed by the rise from 1826 to 1827.

The average rates of increase in stages I–III and III–V do not differ significantly. But the similar averages represent quite diverse behaviour in different cycles with respect to relative rates of increase. The following table distinguishes, for each reference expansion, the stage with the greater rate of increase (see page 789).

The formalized stages of expansion, in two cases at least, conceal an important characteristic of this and other import series, namely, their tendency to fluctuate during reference expansion. From 1819 to 1825 and

[1] For the peculiar state of the cotton market in the years 1839–42, affected by the American cotton speculation and its aftermath, see Vol. I, pp. 279–89.

Reference cycle	*I–III*	*III–V*
1793–7		✓
1797–1801		✓
1801–3		✓
1803–8	✓	
1808–11	✓	
1811–16		✓
1816–19		✓
1819–26		✓
1826–9	✓	
1829–32	✓	
1832–7		✓
1837–42	✓	
1842–8	✓	

from 1842 to 1845 there are, for example, much more violent changes in the rate and direction of movement in cotton imports than in cotton exports, and, probably, than in cotton manufacture. Similar divergence can be noted between the behaviour of production and imports by comparing brick production and timber imports, and wool production and raw wool imports. These divergences virtually define what we have called the 'inventory' character of the import series.

35. Quantity of Raw Wool Imports

Specific-cycle Behaviour. Wool imports exhibit an average specific-cycle of typical length for series of this kind [39·5 (12·0)]. Its average amplitude is greater than for any of the series thus far examined, as is its average rate of change. There is, however, a pronounced lessening in the average amplitude of movement after 1826. The highly erratic fluctuations of the war years were due to obstructions in the Spanish wool supply. Germany was the principal source of raw wool from 1830 to about 1845. At that point Australia quite suddenly superseded Germany.[1]

Imports of raw wool increased relatively more rapidly than the total supply. In 1800 imports constituted about 5 per cent. of the total, in 1850 about 30 per cent. The upward secular trend over the whole period is exceeded only by cotton, among the import series; and even cotton imports increase at an only negligibly greater rate. One can trace, as in several other series, the following trend pattern (all dates approximate): stagnation from 1790 to 1798; a sharp rise to a new secular level from 1798 to 1802; a relative stagnation in the following decade; a fairly consistent upward trend after the end of the wars. The secular increase in wool imports is, of course, much greater than in the quantity of manufactured wool exports. The British woollen industry was increasingly dependent on the foreign supply, and, further, exports constituted a lesser proportion of the total market than in the case of cotton manufactures. Both factors

[1] Clapham, i. 243–4 and 477–8.

make for a divergence in trend. The duration of export volume cycles is only slightly greater than for imports, the average amplitude considerably less. There is a closer correspondence in the direction of the movements of the two series in the years after 1808 than before. The irregularity of the Spanish wool supply in the period 1793–1808 probably accounts for this phenomenon.

Reference-cycle Behaviour. This series shows an excellent I–V pattern. The net movement in all reference expansions is positive, and in all but one contraction it is negative (1796–7). But for the rise in wool imports in 1797 all the indexes of conformity would be perfect. There are, of course, a number of instances where reference and specific turning-points do not coincide. After the war years, however, there are only two such discrepancies. Wool imports decline in 1831, and reach a specific-cycle trough in 1847 instead of 1848, the reference trough. Like other textile series it shows a considerably greater average I–III and III–V expansion.

36. Quantity of Flax Imports

Specific-cycle Behaviour. Flax imports exhibit cycles of a typical import length [41·5 (14·2)]. The series contains two less specific cycles than hemp and jute imports, lacking those (specific to hemp and jute) from 1802 to 1805, and 1811 to 1814. Although other specific-cycle turning-points do not coincide in the series, there are many similarities. The average amplitude of movement is slightly greater for flax imports, especially in expansion phases, and the net upward secular trend is much more pronounced. Before 1816 there are irregular movements about a stationary secular trend, to be explained once again by war-time import obstructions. From 1816 to 1838 the upward trend is strong, the series tapering sharply in its rise to 1850. The average per month rate of rise, in fact, from 1816 to 1825 equals the extraordinary rate of increase in cotton imports in the decade after 1793. Although the peaks in 1836 and 1838 are substantially above that in 1825, a slackening in the rate of increase can be dated from the latter year.[1]

Reference-cycle Behaviour. Flax imports show a much more pronounced average I–III than III–V rate of increase.[2] Its I–V average expansion pattern, although consistent when measured broadly by net movements in reference expansion and contraction stages, does not hold for many individual reference cycles. The index of conformity for expansion, however, is perfect; and, although there are four cases of net increase during contraction stages, in only one case was the net increase during expansion

[1] For the factors affecting the secular movement of this series see above, 'Volume and Value of Exports of Linen Manufactures', Nos. 20–21.

[2] The average per-month rate of increase in stage III–V is, in fact, 0. In seven of eleven reference cycles there is net contraction in stage III–V. The slight average rise, in stage III–V shown in Fig. 135*g* of the average reference pattern, occurs because of the pronounced increase in standings at this stage of the remaining four reference cycles.

(1829–31) less than the average rate of increase in the preceding (1828–9) and following (1831–2) reference contractions.

37. Quantity of Hemp and Jute Imports

Specific-cycle Behaviour. Like other import series this exhibits roughly a forty-month cycle [40·0 (10·1)]. Similarly, it has an extremely large average amplitude of movement. The average amplitude of fall approximately equals the average amplitude of rise, the latter being slightly greater; and, since the average durations of the two phases stand in a like relation to one another, the series yields over its whole course only a slight upward secular trend.

In fact, there are two periods of divergent secular movement in hemp and jute imports. A highly irregular secular decline occurs from 1801 to 1829, a more regular secular advance follows to the end of the period. The Continental System impeded the supply of hemp from Russia; the War of 1812 the supply from the United States. The general uncertainty and high prices of the war years led to the supplanting of hemp rope by iron cables on a considerable scale.[1] This substitution accounts, in part, for the secular decline to 1829. The rise from that point can be associated with an increased use of jute for bagging raw cotton. Before then flax, tow, and codilla were used.[2]

Reference-cycle Behaviour. Like cotton imports, this series shows greater I–III than III–V expansion. Its I–V conformity is least consistent in the period from 1829 to 1839, when, probably, the rapid introduction of jute bags created an abnormal situation. The declines in that decade (1833, 1836, 1838) are all relatively slight and come in years of reference expansion. From 1801 to 1808, when the Baltic supply of hemp was subject to sudden interruption, the series also fails to reflect reference movements consistently.

38. Quantity of Fir Timber Imports

Specific-cycle Behaviour. Fir timber constituted the most important category of wood imported into the United Kingdom. The series ends in 1841 owing to the reclassification of wood imports at that time. This series represents a very high proportion of total timber imports—in 1831, more than five-sixths.[3]

The average duration of fir-timber import cycles is, like other import series, about forty months [42·9 (15·4)]. It shares the generally large amplitude of individual import (as compared with export and production) series, although among import series its average movement is less great than for the textile raw materials. Like total imports the amplitudes tend to lessen in the period after 1827. The net upward trend is slight, although there is a sharp rise, from 1814 to 1825, to a new secular level sustained in

[1] Tooke, *High and Low Prices*, Pt. IV, p. 32.

[2] McCulloch, i. 757.

[3] See Clapham, i. 238.

the following fifteen years. Although timber imports move much more erratically than brick production, the broad movements of the two series are strikingly similar. The irregular access to the Baltic timber supplies during the war years explains the highly erratic behaviour of the series at that time.[1] The rising trend of the later years is partially explained by the new and cheap supplies from the United States and Canada, which tended to supplant the older timber sources.[2]

Reference-cycle Behaviour. With a number of exceptions this series shows I–V business-cycle conformity. Only in the troubled period from 1803 to 1808 do timber imports move inversely with the reference dates. In all other cases it shows absolute contraction during contraction stages, or lesser rates of increase than during the previous expansion (1802–3, 1810–11, 1818–19). The increase, further, from 1814 to 1815 is not sufficient to outweigh the decline from 1811 to 1814 so that the series shows slight average contraction during reference-expansion stage I–III.

The average reference pattern exhibits graphically two characteristics which have been associated consistently with capital goods series: a greater III–V than I–III expansion, and a tendency to lag at the upper reference turning-point.[3] In the following cases such a lag is evident: 1802–3, 1806–7, 1810–11, 1818–19, 1828–9, 1839–40. On the average, however, the series shows net contraction in stages V–IX.

39. Quantity of Wheat Imports

Specific-cycle Behaviour. The average duration of specific cycles is typical for import series [45·4 (12·9)]. The average amplitude of movement is more than twice as large as the largest for any production, price, or foreign trade series analysed.[4] The average deviation is considerable, principally because of the extreme movements from 1808 to 1812 (total amplitude of cycle 624) and from 1843 to 1845 (total amplitude 45); but the modal amplitude is well above 200. The secular movement, in net, is strongly upward. From 1798 to 1815, however, a downward trend occurred, although the highly erratic movements of the series tend somewhat to obscure it. The failure of wheat imports to rise secularly from 1798 to 1815 may be attributed largely to war conditions. Continental supplies were only irregularly avail-

[1] See Clapham, i. 237–9.

[2] Shannon (p. 314) notes that the decline in 1808 was partially a result of the American embargo, which was not counteracted fully by shipments via Canada.

[3] It might appear, superficially, that the lesser V–VII than VII–IX average rate of contraction illustrates this characteristic. Unfortunately, the fact that, from 1790 to 1850, ten of thirteen reference cycles have but one-year contractions, makes any distinction between the two contraction stages relatively meaningless in the analysis of annual series. In the case of timber imports (which are available only from 1790 to 1841) there is but one reference contraction containing more than one year (1806–8). That shows, in fact, a substantial expansion in stage V–VII (1807), a large contraction in VII–IX (1808). This behaviour is, however, rather to be connected with the Continental System than with a typical lag at reference peaks.

[4] If wheat imports were to be expressed in terms of value the amplitude of movement would be even greater, since large imports tended to occur when prices were high.

able because of Napoleonic policy. In addition, inadequate continental harvests left, at times, abnormally low surpluses available for export to Britain.

Reference-cycle Behaviour. The average pattern is characterized by a striking rise in stage III–V, a feature, as well, of the wheat price. The wheat price rose very slightly in stage I–III, whereas imports show average decline. In only four of thirteen reference cycles is there net contraction in stage III–V:[1] 1801–3,[2] 1803–8, 1811–16, 1842–8. It is interesting that the first stage of no major cycle (except the brief cycle from 1816 to 1819) was marked by large increases in wheat imports; and, further, that the following periods of monetary crisis saw large increases in wheat imports: 1793, 1810, 1818, 1825, 1829, 1831, 1837–8, 1846–7.

It does not follow from this empirical evidence that business-cycle movements were 'caused' by changes in the harvest yield and consequent shifts in the pressure on the money market through wheat imports. But it should be realized that the actual sums spent on foreign wheat were of considerable magnitude relative to the total value of foreign trade. For example, £0·06 million were spent on foreign wheat in 1823; £7·62 million in 1831, £0·18 million in 1835. The difference between a peak and a trough year in wheat imports, then, might be fully £7 million. The importance of such a drain is evident when compared to the increase in the real value of total domestic exports in a major boom. From 1832 to 1836 they increased, for example, by only £17 million. Unfortunately there are no real value figures for imports; but this comparison should indicate that alterations in the value of foreign wheat purchased might have a sizeable impact on the British balance of payments in these years.

The series has low positive conformity to either a I–V or III–VII average pattern. In this it resembles the wheat price, which was finally designated as III–VII. Because of the average I–III contraction in wheat imports, the justification for a III–VII pattern is, perhaps, even stronger. The pattern, too, dramatizes the manner in which good harvests and low wheat imports helped permit, in many important cases, the maintenance of easy money conditions through the first stage of general business recovery.

Wheat imports occurred, of course, when the domestic price rose sufficiently to make such import profitable under the existing scale of duties. Their broad effect was, simply, to augment the total grain supply and to reduce or to lessen the rise in the wheat price. One would expect, then, a fairly close correlation in the direction of the movement of the two series. In fact, six peaks and six troughs coincide. The following are the exceptions:

[1] In the reference cycle 1816–19 there is greater rise in stage I–III than III–V; in 1842–8 both expansion stages fall, the decline being greater in I–III than III–V. The latter case, then, conforms better to the average reference pattern than the former.

[2] A distinction between stages I–III and III–V in the case of a one-year reference expansion (1801–2) is not analytically useful. All that may be said in this case is that an abundant harvest in 1801–2 yielded a sharp decline in the domestic wheat price and in wheat imports.

Wheat Price and Net Wheat Imports

Peak		*Trough*	
Price	*Imports*	*Price*	*Imports*
		1807	1806
1812	1814	1811	1812
1817	1818		
1825	1826	1822	1823

In addition, the wheat price fails to show specific cycles parallel to the following cycles in the import series: 1792–5, 1806–8, 1819–23, 1835–40, 1843–5; on the other hand, the specific cycle in the wheat price from 1830 to 1835 does not appear in imports. It is evident that wheat imports exhibit much shorter average cycles than the wheat price; but the major movements in the price are reflected clearly in imports. Several of the cycles in imports appear to be merely interruptions in a longer movement; e.g. the rises in 1807 and 1820.

In general there is good statistical evidence for the familiar assumption that movements in the wheat price and wheat imports stemmed from the same source. Imports, however, fluctuated more frequently and more violently. This is not surprising in that we are, in effect, examining the marginal area of the British wheat supply. Fluctuations in imports would be very much less if they were expressed in relation to the total wheat supply, which was the most important short period determinant of the wheat price.

40. Quantity of Raw Sugar Imports

Specific-cycle Behaviour. Sugar imports exhibit typically short specific cycles. Only two expansions (1807–10, 1816–21) and one contraction (1810–13) persist for more than two years.[1] The average amplitude of movement is relatively slight, being considerably less than for such industrial raw material imports as wool, timber, flax, &c. Both the average duration and the average amplitude of expansion are greater than for contraction, yielding a moderate upward trend.

A considerable part of the trend rise is concentrated in the period 1797–1802, when total sugar imports into Britain were swollen by abnormally large quantities designed for re-export to continental markets, principally Hamburg. A second sharp rise occurs from 1840 to 1847, reflecting, in part, the settlement of difficulties in the West Indies, which followed upon the freeing of slave labour there in the previous decade.

Reference-cycle Behaviour. Despite its patent lack of coincidence with reference-cycle turning-points, this series exhibits fair conformity to a

[1] The downward movements from 1831 to 1835 and from 1847 to 1850 which constitute specific-cycle contractions are interrupted in 1834 and 1849, respectively, by slight increases. Those increases, however, are too small to justify the marking off of specific cycles.

I–V expansion pattern. Net downward movement in the course of reference expansion occurs in only two cases: 1819–25, 1832–6. In addition, however, there is no net movement from 1793 to 1796, and from 1811 to 1815. These instances, of course, also serve to lower the conformity of the expansion index. The contraction index is considerably lower than that for expansion, there being four cases of net increase during reference contraction, and two instances of no net movement. In general, then, business fluctuations left but a broad and irregular imprint on this series.

PART III. MISCELLANEOUS SERIES RELATING TO FOREIGN TRADE

Introduction

These three series (the balance of trade, the gross barter terms of trade, and the net barter terms of trade) indicate the changing relations between import and export values, volumes, and prices. The least reliable elements in the data are the price indexes. These have been compiled by Schlote from Jevons's data. They affect the trade balance and net barter terms of trade, both of which contain an element of price adjustment. These calculated indexes, nevertheless, are probably sufficiently accurate to justify broad analytic generalization.

The trade balance (value of exports minus value of imports) and gross barter terms of trade (volume of exports divided by volume of imports) move much alike in the short period, exhibiting similar short average duration and mild amplitude for specific cycles, and a similar average reference pattern. Both rise in all stages except III–V, indicating that both the volume and value of imports tended to increase more rapidly than exports in the latter stages of general prosperity. To some extent this can be traced to the behaviour of wheat imports, which is one of the few individual import series that shows a markedly greater average III–V than I–III rate of expansion.[1] The net barter terms of trade series (import divided by export prices) shows a rising trend sufficient to convert the slight net upward movement in the gross barter terms of trade into a trend decline in the trade balance. In view of the essentially cost-reducing nature of the industrial revolution process it is not surprising that British export prices (largely manufactures) should have fallen more than import prices (largely foodstuffs and raw materials); and this tendency was accentuated by the extraordinary fall in the price of raw cotton which, on balance, probably had greater impact on the average price of exports than imports, due to the extremely large proportion of exports containing cotton as a raw material.

In general one might expect a trend rise in the volume of exports

[1] See above, No. 39.

relative to imports during periods when capital was being exported on an increasing scale. The rises from 1812 to 1816 and from 1831 to 1835 are probably of that character, related, respectively, to war expenditure on the Continent (and to the short-term financing of speculative exports) and large-scale lending to the United States, whose increased imports of British goods are a central feature of the reference cycle 1832–7. The relatively slight rise in the terms of trade and the trade balance during the expansion 1842–5 probably stems, as well, from the fact that it was essentially a domestic railway boom, marked by no very substantial increases in capital exports. Similarly, the decline from 1816 to 1825 is closely related to the post-war change in the trade and credit relations between Britain and the Continent, which involved a sharp reduction in exports there. Assuming that the demand for imports in Britain did not decrease to an equivalent extent, this process might be expected to produce a decline in the gross barter terms of trade.

The most puzzling feature of these two series is the lack of any decisive trend movement in the gross barter terms of trade from 1790 to about 1811.[1] The sudden increases in loans, subsidies, and war expenditure abroad after 1793 might have been expected to cause a more rapid increase in the volume of exports than imports. It is possible that war-time capital exports yielded a lesser demand for British goods than would have similar loans at a time of peace. But what seems more likely is that an abnormal increase in imports (relative to a peace-time adjustment) was financed from increased invisibles (e.g., shipping) and by a willingness to part with bullion, after Britain's currency was made inconvertible. A sharp decline in the bullion reserve (1799–1803) roughly paralleled a period of heavy expenditure abroad; and throughout the war years the relation between such expenditure and pressure on bullion holdings seems fairly well established. In the early years of the war (1793–7) the transfer problem was to some extent eased by the advent of flight capital from Europe, although a considerable internal credit restriction was required to maintain the exchanges under the bullion standard.

These speculations about the balance of payments are necessarily crude. Judgements on the amount of capital exports can be based only in part on quantitative evidence; there are virtually no data on income from previous investment, shipping, banking, insurance, profits, and even on international bullion movements. The behaviour of the gross barter terms of trade, in their rise during the latter stages of the war and in the thirties, and their fall during the post-war decade and in the forties, does conform, however, to other information on the direction of movement of capital exports. This trend pattern may be seen even more clearly if the gross barter terms of trade are expressed as relatives of overlapping eleven-year periods with 1791–5 taken as base:

[1] There is, perhaps, a case for marking an upward trend as early as 1803. The decline in 1810–11 alone interrupts a trend rise from 1803 to 1816.

Gross Barter Terms of Trade

Average	*Relative to 1791–5*	*Average*	*Relative to 1791–5*
1791–5 . .	100	1820–30 . .	97
1795–1805 . .	98	1825–35 . .	98
1800–10 . .	98	1830–40 . .	106
1805–15 . .	109	1835–45 . .	112
1810–20 . .	116	1845–9 . .	107
1815–25 . .	111		

The two waves (which, in fact, reach peaks and troughs, respectively, in 1816 and 1825, 1835 and 1848) emerge smoothly from these calculations.

41. Balance of Trade (Value of Exports minus Value of Imports)

Specific-cycle Behaviour. This series has been calculated by Schlote from his estimates of the real value of total imports and exports. Because of the unavoidable crudity of the price adjustment it can be regarded as only a roughly accurate measure of short-period changes in the trade balance. The average duration of specific cycles is shorter than for reference cycles, resembling import rather than export series in this respect. The average amplitude of movement is less than for most other foreign trade series; and this is due primarily to the lesser trend movement of the trade balance. From a peak in 1802, there is a trend decline to 1810. The series rises to a peak for the entire period in 1816. After the war there is a trend decline to 1825. The downward movement is interrupted from 1825 to 1835, but resumed thereafter, a trough for the whole period being reached in 1847. The predominating trend, then, is downward, interrupted most significantly in 1810–16 and 1825–35.

Reference-cycle Behaviour. On the average the trade balance tended to fall during the latter stage of reference expansion (III–V) and to rise during reference contraction (V–IX) and the first stage of expansion (I–III). The average pattern shows net contraction only in stage III–V, with the average rise in stage I–III less than in stages V–IX. A V–I expansion pattern yields moderately high indexes of conformity, especially in the post-war years. It would appear that the value of imports tended to increase more rapidly than the value of exports during periods of general prosperity, especially in the latter stages; and that depression caused a greater decline or a lesser rise in the value of imports than of exports.

The marked average decline in the trade balance in stage III–V (indicating a tendency for pressure on the balance of payments to increase) helps explain the money-market stringency which was a feature of the closing phases of most reference-cycle expansions. It has been suggested that abnormal wheat imports, particularly, contributed to such demands on the money market. Unfortunately one cannot gauge accurately the changing

value of wheat imports relative to the total. It is, however, of some significance that the average reference-cycle pattern for wheat imports is inverse to that for the trade balance; i.e. all stages exhibit average contraction, except III–V, with contraction in stage I–III considerably less than in stages V–IX. And, further, in at least five cases where the trade balance fails to conform to its average pattern in one or more stages, wheat imports move in such a way as to suggest a possible explanation:

Reference cycle	*Stage*	*Trade balance*	*Wheat imports*
1801–3 . .	I–V	rises	fall
1803–8 . .	III–V	rises	fall
1811–16 . .	III–V	rises	fall
1832–7 . .	V–IX	falls	rise
1842–8 . .	V–VII	falls	rise

This is not, of course, conclusive evidence that changes in the value of wheat imports were the crucial element in the cyclical behaviour of the trade balance. It is, however, clearly a relationship that calls for further and more detailed investigation.

42. Gross Barter Terms of Trade (Volume of Exports divided by the Volume of Imports)

Specific-cycle Behaviour. The gross barter terms of trade are calculated from Schlote's corrected version of the official value series. They can be regarded as a fairly reliable index of changes in the relative volumes of imports and exports. The average duration and amplitude of specific cycles closely resemble those for the trade balance. All absolute movements from year to year are in the same direction, with the following exceptions:[1]

Year	*Balance of trade*	*Gross barter terms of trade*
1811 . .	rises	fall
1833 . .	rises	fall
1839 . .	falls	rise
1844 . .	rises	fall
1848 . .	rises	fall

The rates of movement, of course, differ in many more instances.

The trend movement in the gross barter terms of trade is slightly upward over the whole period. This is compounded, broadly, of a constant trend to 1803, a rise to 1816, a fall to a low point for the entire period in 1825, a rise to 1835, a fairly constant trend movement to 1850. The fact that this series does not share the pronounced downward trend movement

[1] In those cases where the trade balance rises at a time when the gross barter terms of trade decline, it means that export prices have risen sufficiently more or fallen sufficiently less than import prices to reverse, in value terms, the relative movements of the two volumes.

of the trade balance indicates that export prices fell more than import prices over the whole period 1790–1850.

Reference-cycle Behaviour. The average reference-cycle behaviour of the gross barter terms of trade is almost identical with that for the trade balance; i.e. there is an average rise in all stages except III–V, when net contraction occurs. This follows, of course, from the close coincidence in absolute movements from year to year in the two series. The indexes of conformity to a V–I average pattern are relatively low for the whole period, although high if taken from 1816.

43. Net Barter Terms of Trade (Import Prices divided by Export Prices)

Specific-cycle Behaviour. The specific-cycles of this calculated series are longer in average length than reference-cycles, failing to reflect by absolute movements the following reference-cycles: 1826–9, 1829–32, 1842–5. In its mild average amplitude this series resembles the trade balance and gross barter terms of trade. The trend is clearly upward (i.e. 'unfavourable'), and may be divided into the following phases: a rise from 1806 to 1814, relative stability to 1826, a rise to 1840, an unbroken decline to 1847. Over the whole period import prices patently fell less than did export prices. This trend is not surprising in view of the enormous expansion and technical improvements in Britain's major export industries, and has, in itself, little relevance to the classic question of the 'gains from trade'.

Reference-cycle Behaviour. An average I–V expansion pattern yields rather high conformity to reference expansions, low, but positive, conformity to reference contractions and all business cycles. The steady upward movement from 1826 to 1834 and the decline from 1840 to 1847 principally weaken the conformity indexes.

There is some tendency for a contraction to appear in the latter stages of reference-cycle expansion. In eight of eleven reference cycles stage III–V exhibits a greater rate of decline or a lesser rate of rise than in stage I–III. The rise of the net barter terms of trade in stage I–III relative to stage III–V indicates that import prices were, on the whole, more immediately sensitive to cyclical expansion than export prices, but that export prices responded more powerfully to the latter stages of expansion. The broad I–V expansion pattern indicates, as well, a greater average amplitude of movement during reference cycles for import than export prices. The fact that import prices were set for the most part, in large, highly organized raw material commodity markets, as well as the more powerful downward trend in export prices, probably explains the net rise of this series during reference expansions.

44. Shipping Tonnage in Foreign Trade, entered and cleared

Specific-cycle Behaviour. This series might be expected to deviate from the volume of imports and exports, in that ships did not always carry a

full cargo. Ballast tonnage is thus included. Total tonnage, further, represents unweighted quantities, whereas the volumes of imports and exports are weighted by relative values in a base year. Timber imports, for example, were the most important bulk item in British foreign trade and are thus unfairly weighted, if value be taken as the criterion of importance. Coastwise shipping is, however, excluded, so that the tonnage entered and cleared is a fair, if rough, measure of total foreign trade.[1]

It exhibits, like exports, a fairly long cycle [64·0 (21·3)]. Both amplitude and duration of expansion are greater than for contraction. The amplitude of contraction, however, is somewhat less than for imports or exports. The upward secular trend, over the period covered, falls between those for the volume of imports and exports, which are, themselves, relatively close together.

Reference-cycle Behaviour. The greater III–V than I–III rate of expansion makes the average reference pattern somewhat more like that for imports than for exports. Like both volume series, it exhibits a broad I–V pattern, with perfect conformity to expansions. The following deviations from I–V reference conformity can be traced to one or the other of the volume series:

Showed by	*Volume of imports*	*Volume of exports*
Decline in 1821 . .	✓	
Rise in 1840 . .	✓	✓

The decline in 1820 and the rises in 1829, 1837, and 1846 are shared by neither imports nor exports. The movement of timber imports (which had a disproportionate effect on the total) probably explains the fall in 1820, the rises in 1829 and 1846. The slight rise in 1837, concentrated in tonnage entered, may indicate, to some extent, the return of ballast-loaded British ships, after the enormous exports of the previous boom year (1836).

In all other cases the series shows perfect cyclical conformity; i.e. at reference troughs (1816, 1826, 1832, 1842, 1848) and reference peaks (1818, 1825, 1831). Although in four cases there is net increase during reference contraction, in only one such instance is the rate of increase greater than during the previous or following reference expansion. The rate of increase in tonnage entered and cleared in 1829 is greater than during 1826–8, and equal to that from 1829 to 1831. Roughly, then, this series looks like a damped and smoothed combination of the import and export volumes.

[1] Although this series includes foreign ships, it reflects fairly well the total tonnage carried in British bottoms, because of the relative constancy of that percentage:

1814 . .	68·0	1840 . .	68·8
1825 . .	67·8	1850 . .	65·1

45. Shipping Tonnage in Coasting Trade, entered and cleared

This series represents, largely, coal shipments.[1] Until 1845 the total is above that for tonnage entered and cleared in foreign trade. In 1824 it is almost twice as great as tonnage in foreign trade. The average reference pattern shows mild but similar increases in stages I–III and V–IX. The sharp rises in 1828 and 1845, however, yield a substantially greater average rate of increase in stage III–V. In reference cycles 1832–7 and 1837–42, stage III–V also shows a greater rate of increase than any other; from 1829 to 1832, however, the pattern is irregular, with the greatest increase in V–VII. But the period is too short for very useful generalization about typical cyclical behaviour.

46. Shipping Tonnage belonging to the United Kingdom

Specific-cycle Behaviour. This series contains but few cycles, and these are hardly cycles in the same sense as in other series thus far examined. It represents adequately, however, the tremendous increase in shipbuilding during the Napoleonic Wars, and the relative stagnation until the forties. The total is greater in 1816 than in 1838. The major increases in new ships built and registered appear as minor increases in the total or a slackening in the rate of decline: 1817–18, 1822–6, 1830–5, 1843–7.

Reference-cycle Behaviour. The average reference pattern rises in all stages, but least in stage I–III. It will be recalled that, on the average, that stage showed the greatest average contraction in shipbuilding. The average amount of increase is the same for the following stages, but, due to their shorter average duration, the rate of increase is greater in stages V–IX. It should be emphasized that new ships built and registered were not the only variable affecting the total tonnage. Many of the new vessels were sold abroad, many were merely for replacement. These facts explain largely the insensitivity of the total.

[1] Clapham, i. 237.

TABLE 89*a*

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

Specific-cycle behaviour	(1) *Index of prices of domestic and imported commodities*	(2) *Index of prices of domestic commodities*	(3) *Index of prices of imported commodities*	(4) *Silberling's index of commodity prices*
PERIOD COVERED	1792–1850	1792–1850	1794–1848	1789–1849
NUMBER OF CYCLES	9	9	9	11
AVERAGE DURATION (in months)				
Expansion	37·3 (9·5)	33·3 (11·0)	32·0 (12·4)	37·1 (18·8)
Contraction	40·0 (21·3)	44·0 (18·7)	40·0 (29·3)	28·4 (17·3)
Full cycle	77·3 (23·1)	77·3 (23·1)	72·0 (24·0)	65·5 (18·0)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	21·7 (6·2)	27·1 (9·2)	14·2 (6·5)	15·2 (7·0)
Fall	22·9 (11·0)	27·2 (13·0)	20·4 (12·0)	16·6 (10·1)
Rise and fall	44 6 (13·5)	54·3 (16·9)	34·7 (10·1)	31·8 (14·0)
Movement per month				
Rise	0·6 (0·2)	0·8 (0·1)	0·4 (0·2)	0·5 (0·2)
Fall	0·7 (0·4)	0·7 (0·3)	0 6 (0·3)	0·6 (0·3)
Rise and fall	0·6 (0·2)	0·7 (0·2)	0·5 (0·1)	0·5 (0·1)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	92·4 (4·9)	89·1 (6·6)	98·4 (9·4)	95 6 (5·6)
„ III	103·0 (4·7)	104·1 (5·5)	106·0 (6·7)	102·9 (3·4)
„ V	114·1 (4·8)	116·2 (5·8)	112·7 (5·5)	110·8 (5·1)
„ VII	102·1 (4·3)	99·9 (3·7)	100·0 (4·6)	101·2 (3·5)
„ IX	91·2 (8·0)	89·0 (8·9)	92·2 (6·9)	94·2 (6·9)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·6 (0·3)	+1·0 (0·3)	+0·5 (0·2)	+0·5 (0·2)
„ III to V	+0·6 (0·2)	+0·7 (0·2)	+0·4 (0·2)	+0·5 (0·2)
„ V to VII	−0·8 (0·5)	−0·9 (0·6)	−0·7 (0·3)	−0·7 (0·3)
„ VII to IX	−0·8 (0·4)	−0·5 (0·3)	−0·6 (0·4)	−0·6 (0·4)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	−2·6 (12·0)	−1·1 (11·2)	−6·1 (12·6)	−1·7 (12·2)
Weighted average change per month from cycle to cycle	−0·01	−0·01	−0·09	−0·03

TABLE 89*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

(5) *E. B. Schumpeter's index of prices of consumers' goods, excluding cereals*	(6) *E. B. Schumpeter's index of prices of consumers' goods, including cereals*	(7) *Tucker's index of prices of consumers' goods*	(8) *Tucker's index of prices of food*	(9) *Tucker's index of prices of clothing*
1794–1819 (1)	1791–1822	1792–1852	1807–51	1807–49
4	6	11	7	9
21·0 (9·0)	34 0 (10·0)	30·5 (10·3)	32·6 (17·6)	22·7 (7·1)
54·0 (24·0)	28·0 (9·3)	34·9 (14·3)	42·9 (12·7)	33·3 (21·0)
75·0 (28·5)	62·0 (10·7)	65·5 (12·3)	75·4 (17·6)	56·0 (21·3)
9·0 (8·0)	22·0 (8·3)	15·5 (7·0)	21·1 (11·0)	8·2 (2·7)
18·2 (10·2)	20·8 (17·5)	14·8 (8·6)	24·3 (8 6)	9·9 (5·7)
27·2 (10·6)	42·8 (20·8)	30·4 (9·9)	45·4 (13·9)	18·1 (6 6)
0·4 (0·3)	0·7 (0·2)	0·5 (0·2)	0 7 (0·1)	0·4 (0·1)
0·4 (0·2)	0·5 (0·5)	0 5 (0·3)	0·6 (0·1)	0·4 (0·2)
0·4 (0·2)	0·7 (0 3)	0·4 (0·1)	0·6 (0·1)	0·3 (0·2)
100·5 (7·5)	92·2 (5 2)	95 2 (6 0)	93·0 (8·6)	97·8 (3·3)
94·0 (3·5)	102·7 (6·7)	101·3 (5·2)	104·3 (3·3)	102·0 (2·7)
91·5 (2·8)	114·2 (5·2)	110·7 (3·3)	114·1 (3·0)	106·0 (2·2)
101·5 (1·5)	101·5 (4·8)	101·9 (4·6)	100·7 (4·3)	101·1 (2·1)
109·8 (7·8)	93·3 (12·3)	95·9 (7 0)	89·9 (5·8)	96·1 (3·7)
−0 5 (0·5)	+0·7 (0·4)	+0·4 (0·2)	+0·7 (0·1)	+0·4 (0·2)
−0·2 (0·1)	+0·6 (0·4)	+0·6 (0·2)	+0·6 (0·1)	+0 4 (0·1)
+0·5 (0·2)	−0·9 (0·7)	−0·6 (0·4)	−0·7 (0 4)	−0·3 (0·2)
+0 3 (0·2)	−0·5 (0 4)	−0·4 (0·3)	−0·5 (0·2)	−0·4 (0·3)
+7·3 (10·9)	+4·0 (13·6)	+0·6 (10·2)	−6·2 (8·2)	−1·9 (4·1)
+0·09	+0·07	+0·01	−0·09	−0·03

[*Continued*

TABLE 89*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

Specific-cycle behaviour	(10) *Tucker's index of prices of fuel and light*	(11) *Tucker's index of prices of sundries*	(12) *Index of prices of domestic commodity exports*	(13) *Price of cotton yarn exports*
PERIOD COVERED	1806–51	1807–49	1809–49	1817–48
NUMBER OF CYCLES	7	6	7	5
AVERAGE DURATION (in months)				
Expansion	27·4 (14·2)	26·0 (11·3)	20·6 (9·8)	21·6 (15·4)
Contraction	49·7 (26·0)	58·0 (33·3)	48·0 (24·0)	52·8 (32·6)
Full cycle	77·1 (29·9)	84·0 (44·0)	68·6 (27·9)	74·4 (40·3)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	13·9 (5·8)	15·7 (9·9)	4·6 (2·8)	5·6 (3·1)
Fall	24·0 (11·1)	22·5 (11·5)	22·4 (9·8)	30·8 (17·0)
Rise and fall	37·9 (11·0)	38·2 (18·5)	27·0 (11·4)	36·4 (19·5)
Movement per month				
Rise	0 6 (0·3)	0·7 (0·4)	0·2 (0·2)	0·3 (0·1)
Fall	0·6 (0·3)	0·4 (0·3)	0·5 (0·1)	0·7 (0·2)
Rise and fall	0·5 (0·1)	0·6 (0·4)	0·4 (0·1)	0·5 (0·1)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	98·1 (5·8)	97·7 (8·0)	105 9 (4·7)	110·6 (11·5)
„ III	104·9 (4·4)	102·8 (7·2)	107·3 (4·6)	113·8 (11·0)
„ V	112·0 (3·4)	113·3 (7·4)	110·4 (4·5)	116·2 (11·4)
„ VII	100·1 (3·3)	99·8 (3·5)	97·6 (1·6)	95·8 (3·8)
„ IX	88·0 (8·0)	90·8 (5·5)	88·0 (5·4)	85·4 (7·3)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·6 (0·4)	+0·4 (0·2)	+0·2 (0·2)	+0·3 (0·1)
„ III to V	+0·6 (0·4)	+0·4 (0·2)	+0·3 (0·2)	+0·3 (0·2)
„ V to VII	−0·6 (0·3)	−0·6 (0·3)	−0·6 (0·2)	−0·8 (0·3)
„ VII to IX	−0·6 (0·3)	−0·4 (0·2)	−0·4 (0·1)	−0·6 (0·3)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	−13·0 (10·0)	−9·4 (12·7)	−18·8 (9·2)	−23·2 (10·8)
Weighted average change per month from cycle to cycle	−0·16	−0·10	−0·27	−0·29

TABLE 89*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

(14)	(15)	(16)	(17)	(18)
Price of cotton piece goods exports	*Price of raw cotton, including duty*	*Price of raw cotton, excluding duty*	*Price of Southdown wool*	*Price of British pig-iron*
1824–49	1794–1848	1794–1848	1791–1848	1793–1843
5	12	12	12	10
14·4 (3·8)	23·0 (9·2)	22·0 (10·0)	26·0 (15·0)	36·0 (26·4)
45·6 (21·1)	31·0 (15·0)	32·0 (16·0)	31·0 (14·2)	24·0 (12·0)
60·0 (24·0)	54·0 (19·0)	54·0 (21·0)	57·0 (21·0)	60·0 (31·2)
5·6 (4·7)	28·4 (18·2)	29·5 (19·2)	27·2 (13·0)	20·5 (12·9)
27·4 (13·7)	41·1 (18·1)	42·4 (18·8)	29·3 (17·9)	25·1 (19·9)
33·0 (14·8)	69·5 (18·5)	71·9 (32·9)	56·6 (27·5)	45·6 (29·7)
0·4 (0·3)	1·3 (0·7)	1·4 (0·8)	1·2 (0·6)	1·0 (0·6)
0 6 (0·2)	1·4 (0·6)	1 4 (0·6)	1·0 (0·5)	1·0 (0 6)
0·5 (0 2)	1·6 (0·6)	1·4 (0·6)	1·1 (0·4)	1 0 (0·6)
107 6 (5·1)	97·1 (12·1)	97·1 (12·6)	92·5 (11·6)	94·5 (5·4)
109·6 (4·7)	108·9 (10·7)	109·8 (10·6)	105·4 (8·0)	103·3 (3·4)
113·2 (6·2)	125·5 (12·6)	126·6 (13·0)	119·8 (9·4)	115·0 (10·6)
96·6 (1·9)	97·8 (6·4)	97·5 (6·9)	102·3 (8·7)	101·1 (2·9)
85·8 (7·8)	84·4 (8·2)	84·2 (9·0)	90·4 (10·0)	89·9 (9 3)
+0·3 (0·2)	+1·2 (0·8)	+1 3 (0·7)	+1·1 (0·6)	+0·8 (0·5)
+0·4 (0·4)	+1·5 (0·9)	+1·5 (0·9)	+1·2 (0·6)	+1·0 (0 8)
−0·8 (0·4)	1·8 (0·9)	−1·8 (0·9)	−1·1 (0·8)	−1·0 (0·6)
−0·4 (0·1)	−1·1 (0·7)	−1·1 (0·7)	−0·9 (0·5)	−1 0 (0·5)
−22·5 (8·5)	−14·2 (19 1)	−14·1 (19·7)	−1·7 (17·4)	−2·8 (12·2)
−0·36	−0·25	−0·25	−0·03	−0·05

[*Continued*

TABLE 89*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

Specific-cycle behaviour	(19) *Price of British bar-iron*	(20) *Price of Sunderland coal*	(21) *Price of British manufactured copper*	(22) *Price of fir timber, including duty*
PERIOD COVERED	1798–1850	1797–1846	1802–49	1792–1843
NUMBER OF CYCLES	12	10	9	12
AVERAGE DURATION (in months)				
Expansion	22·0 (10·0)	26·4 (12·5)	25·3 (12·1)	27·0 (13·5)
Contraction	30·0 (15 0)	32·4 (15·6)	37·3 (15·1)	24·0 (8·0)
Full cycle	52·0 (21·3)	58·8 (22·6)	62·7 (13·6)	51·0 (19·5)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	21·4 (16·8)	16·3 (10·1)	16·9 (5·0)	22·7 (13·8)
Fall	29·8 (20·5)	19·8 (8·6)	21·1 (7·2)	22·4 (15·4)
Rise and fall	51·2 (32·7)	36·1 (15·1)	38·0 (10·9)	45·1 (23·0)
Movement per month				
Rise	0·9 (0·6)	0·6 (0·3)	0·9 (0·5)	0·9 (0·5)
Fall	1·0 (0·4)	0·7 (0·3)	0·6 (0·2)	0·8 (0·4)
Rise and fall	0·9 (0·4)	0·6 (0·2)	0·6 (0·2)	0·9 (0·3)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	96·0 (9·5)	96·2 (7·0)	95·7 (3·4)	92·1 (9·6)
„ III	106·3 (5·3)	103·6 (4·2)	103·3 (3·9)	101·9 (5·4)
„ V	117·4 (10·7)	112·5 (4·9)	112·6 (3·6)	114·8 (8·0)
„ VII	98·8 (4·4)	100·0 (4·2)	100·1 (3·2)	103·9 (6·0)
„ IX	87·7 (10·6)	92·7 (4·5)	91·4 (4·6)	92·3 (10·6)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·9 (0·6)	+0·6 (0·4)	+0·9 (0·6)	+0·8 (0·4)
„ III to V	+0·9 (0·7)	+0·6 (0·3)	+0·9 (0·6)	+1·1 (0·6)
„ V to VII	−1·1 (0·5)	−0·8 (0·5)	−0·8 (0·2)	−0·8 (0·6)
„ VII to IX	−0·8 (0·4)	−0·6 (0·4)	−0·5 (0·4)	−0·8 (0·5)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	−8·4 (8·6)	−4·8 (6·0)	−6·2 (4·4)	+2·5 (15·4)
Weighted average change per month from cycle to cycle	−0·16	−0·08	−0·10	+0·05

TABLE 89*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

(23) *Price of British leather butts*	(24) *Gazette price of wheat*	(25) *Price of Jamaica sugar, including duty*
1794–1838	1792–1850	1794–1848
9	11	12
33·3 (13·6)	31·6 (11·3)	23·0 (9·2)
25·3 (5·0)	31·6 (12·7)	31·0 (18·2)
58·7 (14·8)	63·3 (15·1)	54·0 (20·0)
13·3 (10·2)	41·8 (15·3)	20 9 (11 2)
11·2 (6·2)	41·6 (21·7)	25·2 (11·8)
24·6 (13·3)	83·5 (31·5)	46·1 (19·8)
0·4 (0·3)	1·4 (0·6)	0·9 (0·3)
0·5 (0·3)	1·3 (0·6)	0·9 (0·4)
0·4 (0·2)	1·3 (0·5)	0·9 (0·3)
94·7 (5 6)	85·8 (12·9)	94·1 (8·2)
101·0 (2·2)	103·8 (8·5)	104·6 (4 9)
108·0 (5·3)	127·6 (10·0)	115·0 (6·0)
101·2 (4·2)	102·7 (7·5)	101·0 (2·3)
96·8 (4·5)	86·0 (13·5)	89·8 (7·3)
+0·4 (0·3)	+1·2 (0·7)	+0·8 (0·3)
+0·4 (0·3)	+1·6 (0·7)	+0·9 (0·4)
−0·6 (0·5)	−1·7 (1·1)	−1·0 (0·5)
−0·4 (0·2)	−0·9 (0·4)	−0·8 (0·5)
+2·2 (10·0)	−1·0 (16·0)	−2·9 (10·5)
+0·04	−0 02	−0·06

TABLE 89*b*

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

Reference-cycle behaviour	(1) *Index of prices of domestic and imported commodities*	(2) *Index of prices of domestic commodities*	(3) *Index of prices of imported commodities*	(4) *Silberling's index of commodity prices*
PERIOD COVERED	1793–1848	1793–1848	1793–1848	1793–1848
NUMBER OF CYCLES	13	13	13	13
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	99·8 (7·4)	99·2 (8·5)	100·5 (6·3)	99·4 (5·7)
„ III	99·2 (4·6)	98·4 (6 0)	101·5 (2·6)	99·9 (2·5)
„ V	102·7 (5·7)	103·2 (6·9)	101·1 (2·7)	102·5 (4·2)
„ VII	101·2 (5·2)	102·2 (6·9)	98·6 (2·7)	100·2 (4·1)
„ IX	98·5 (6·3)	99·5 (7·3)	95·8 (6·9)	97·8 (6·8)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−0·1 (0·6)	0·0 (0·7)	0·0 (0·4)	0·0 (0·4)
„ III to V	+0·1 (0·6)	+0·2 (0·6)	−0·1 (0·3)	+0·1 (0·4)
„ V to VII	−0·3 (0·4)	−0·2 (0·4)	−0·4 (0·6)	−0·3 (0·5)
„ VII to IX	−0·3 (0·4)	−0·3 (0·4)	−0·4 (0·7)	−0·3 (0·6)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	I–V	I–V	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	0 0 (0·5)	0·0 (0·5)	0·0 (0·3)	0·0 (0·3)
Reference contraction	−0·3 (0·4)	−0·3 (0·4)	−0·4 (0·6)	−0·3 (0·5)
Index of conformity to				
Reference expansion	+15	+8	+15	+23
Reference contraction	+46	+31	+38	+38
Business cycles	+48	+40	+24	+44

TABLE 89*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

(5) *E. B. Schumpeter's index of prices of consumers' goods, excluding cereals*	(6) *E. B. Schumpeter's index of prices of consumers' goods, including cereals*	(7) *Tucker's index of prices of consumers' goods*	(8) *Tucker's index of prices of food*	(9) *Tucker's index of prices of clothing*
1793–1819	1793–1819	1793–1848	1808–48	1808–48
7	7	13	9	9
97·6 (3·7)	95·9 (9·0)	99·2 (6·7)	101·8 (6·0)	100·9 (4·8)
98·0 (2·6)	100·6 (5·6)	98·6 (4·0)	98·0 (6·0)	99·1 (3·2)
101·6 (3·5)	102·4 (6·5)	101·4 (4·7)	99·6 (4·7)	100·2 (3·0)
102·0 (3·7)	101·6 (8·5)	101·8 (4·8)	100·7 (4·4)	100·4 (3·4)
103·6 (6·6)	101·9 (11·6)	100·3 (5·5)	98·8 (3·8)	99·4 (4·2)
−0·1 (0·3)	+0·1 (0·7)	−0·1 (0·5)	−0·1 (0·6)	−0·1 (0·3)
+0·2 (0·4)	−0·1 (0·9)	+0·1 (0·5)	+0·1 (0·4)	+0·1 (0·2)
+0·1 (0·6)	−0·2 (0·4)	0 0 (0·3)	0·0 (0 3)	0·0 (0·3)
+0 2 (0·5)	− 0·1 (0·5)	− 0·1 (0·3)	- 0·1 (0·3)	−0·1 (0·3)
V- I (1)	I–V	III -VII	III–VII	III VII
0·0 (0·3)	0·0 (0·7)	+0·1 (0·3)	+0·1 (0·4)	+0·1 (0·2)
+0·1 (0·5)	0·1 (0·4)	−0·1 (0·4)	−0·2 (0·4)	−0·2 (0 2)
+57	+43	+23	+11	+22
−14	+43	+ 8	+33	+44
− 23	+31	+16	+47	+29

[*Continued*

TABLE 89*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

Reference-cycle behaviour	(10) *Tucker's index of prices of fuel and light*	(11) *Tucker's index of prices of sundries*	(12) *Index of prices of domestic commodity exports*	(13) *Price of cotton yarn exports*
PERIOD COVERED	1808–48	1808–48	1801–48	1816–48
NUMBER OF CYCLES	9	9	11	7
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	104·9 (5·9)	101·7 (8·9)	106·8 (5·1)	109·6 (8·1)
„ III	101·1 (3·0)	100·2 (2·2)	100·0 (2·2)	101·6 (2·0)
„ V	99·4 (2·4)	100·0 (5·1)	99·6 (3·3)	100·3 (4·0)
„ VII	97·6 (3·1)	98·9 (4·3)	97·4 (3·3)	95·3 (3·9)
„ IX	96 8 (5·1)	96·1 (4·8)	93·8 (4·3)	90·3 (5·5)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−0·1 (0·4)	−0·2 (0·3)	−0·4 (0·3)	−0·4 (0·3)
„ III to V	−0·1 (0·3)	0·0 (0·3)	0·0 (0·3)	−0·1 (0·2)
„ V to VII	−0·2 (0·4)	−0·2 (0·3)	−0·3 (0·3)	−0·6 (0·4)
„ VII to IX	−0·1 (0·4)	−0·3 (0 2)	−0·4 (0·3)	−0·6 (0·4)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	I–V	I–V	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	−0·1 (0·2)	−0·1 (0·2)	−0·2 (0·2)	−0·2 (0·2)
Reference contraction	−0·2 (0·4)	−0 3 (0·3)	−0·3 (0·2)	−0·6 (0·4)
Index of conformity to				
Reference expansion	−33	−33	−64	−71
Reference contraction	+56	+78	+73	+71
Business cycles	+24	+47	+14	+85

TABLE 89*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

(14)	(15)	(16)	(17)	(18)
Price of cotton piece goods exports	*Price of raw cotton, including duty*	*Price of raw cotton, excluding duty*	*Price of Southdown wool*	*Price of British pig-iron*
1826–48	1793–1848	1793–1848	1793–1848	1793–1848
5	13	13	13	13
106·2 (4·2)	103·8 (12·6)	103·7 (12·7)	96·3 (14·2)	100·7 (7·9)
104·4 (2·3)	103·7 (4·2)	103·8 (4·8)	101·6 (4·8)	98·2 (6·6)
102·6 (3·1)	100·8 (8·9)	100·8 (9·5)	108·8 (6·2)	106·6 (11·6)
96·8 (2·6)	96·2 (4·2)	96·2 (4·4)	101·0 (7·1)	102·4 (7·3)
87·2 (3·0)	90·3 (10·0)	89·8 (10 0)	94·1 (11·3)	97·8 (6·5)
−0·1 (0·2)	−0·1 (0·8)	−0·1 (0·8)	+0·5 (0·8)	−0 2 (0·7)
−0·2 (0·2)	−0·3 (0 6)	−0·3 (0·6)	+0·5 (0·6)	+0 2 (0·8)
−0·7 (0·3)	−0·7 (1·3)	−0 8 (1·4)	−1·0 (1·0)	−0·5 (0·8)
−1·0 (0 1)	−0 8 (1·3)	−0·8 (1·3)	−1·0 (1·0)	−0·5 (0·8)
I–V	I–V	I -V	I–V	I–V
−0·2 (0·1)	−0·2 (0·5)	−0·2 (0·6)	+0·5 (0·6)	0·0 (0·5)
−0·8 (0·2)	−0·8 (1·3)	−0 8 (1·3)	- 1·0 (1·0)	−0·5 (0·8)
− 60	− 8	−15	+ 54	+46
+100	+ 38	+23	+ 54	+ 31
+100	+16	+20	+ 100	+ 32

[*Continued*

TABLE 89*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

Reference-cycle behaviour	(19) *Price of British bar-iron*	(20) *Price of Sunderland coal*	(21) *Price of British manufactured copper*	(22) *Price of fir timber, including duty*
PERIOD COVERED	1793–1848	1797–1848	1793–1848	1793–1848
NUMBER OF CYCLES	13	12	13	13
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	102·8 (10·7)	99·4 (4·6)	99·1 (6·7)	99·2 (8·3)
„ III	96·7 (8·3)	102·3 (3·8)	99·4 (3·6)	97·9 (5·8)
„ V	107·5 (11·2)	100·1 (4·6)	104·2 (5·8)	103·4 (6·4)
„ VII	103·2 (10·3)	98·8 (3·9)	101·9 (4·3)	102·2 (7·3)
„ IX	96·5 (10·3)	96·8 (6·7)	97·8 (5·6)	99·6 (10·5)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−0·4 (0·5)	+0·2 (0·3)	+0·1 (0·5)	−0·2 (0·7)
„ III to V	+0·4 (0·9)	−0·1 (0·4)	+0·2 (0·3)	+0·2 (0·8)
„ V to VII	−0·5 (0·9)	−0·2 (0·6)	−0·3 (0·6)	−0·3 (0·8)
„ VII to IX	−0·6 (0·9)	−0·2 (0·6)	−0·4 (0·5)	−0·4 (0·8)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	I–V	I–V	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	0·0 (0·5)	0·0 (0·2)	+0·1 (0·3)	0·0 (0·5)
Reference contraction	−0·6 (0·8)	−0·4 (0·6)	−0·4 (0·5)	−0·3 (0·8)
Index of conformity to				
Reference expansion	0	−25	+8	0
Reference contraction	+23	+33	+31	+46
Business cycles	+20	+17	+48	+16

TABLE 89*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Wholesale Commodity Price Series

(23) *Price of British leather butts*	(24) *Gazette price of wheat*	(25) *Price of Jamaica sugar, including duty*
1793–1848	1793–1848	1793–1848
13	13	13
98·5 (4·7)	98·5 (16·7)	100·5 (9·9)
100·8 (2·4)	99·0 (9·8)	101·9 (6·4)
101·2 (3·8)	105·1 (13·0)	101·6 (7·6)
100·2 (3·2)	102·8 (10·1)	98 7 (6 4)
97·9 (3·5)	98·5 (13·3)	94·8 (5·7)
+0·1 (0·2)	0·0 (1·3)	0·0 (0·7)
0 0 (0·3)	+0·1 (1·3)	−0·2 (0·8)
−0·2 (0·3)	−0·4 (1·1)	−0·4 (0·8)
−0·3 (0·2)	−0 5 (1·1)	−0·5 (0·8)
I–V	III–VII	I–V
+0·1 (0·2)	0·0 (0·9)	−0·1 (0 6)
−0·2 (0·2)	−0·2 (0·9)	−0·4 (0·8)
+15	+23	+31
+38	+ 8	+31
+44	+ 4	+40

TABLE 90*a*

Measures of Average Monthly Cyclical Behaviour: Wholesale Commodity Price Series

Specific-cycle behaviour	(1) *Index of prices of domestic and imported commodities*	(2) *Index of prices of domestic commodities*	(3) *Index of prices of imported commodities*	(4) *Price of raw cotton, excluding duty*	(5) *Price of British pig-iron*	(6) *Price of British bar-iron*
PERIOD COVERED	1792–1850	1792–1850	1792–1848	1790–1849	1795–1803; 1817–43	1798–1843
NUMBER OF CYCLES	10	18	14	17	8	12
TIMING OF SPECIFIC CYCLES AT:						
Reference peak						
Number of leads, lags, coincidences	4, 5, 3	5, 5, 2	5, 2, 2	5, 2, 3	1, 3, 1	3, 3, 1
Average lead (−) or lag (+) in months	−0·4 (4 4)	−1·4 (4 6)	−0 4 (5 5)	−2 7 (4 4)	+0·2 (2 6)	−1·1 (3 9)
Reference trough						
Number of leads, lags, coincidences	7, 5, 0	7, 4, 0	4, 1, 3	6, 4, 0	1, 3, 2	2, 6, 0
Average lead (−) or lag (+) in months	−0·2 (3 8)	+1·7 (6·9)	−0·8 (1·2)	−0·9 (4·3)	+6·8 (8 8)	+6·1 (4 6)
AVERAGE DURATION						
Expansion	14·8 (6 3)	15 6 (6·9)	18 5 (8 6)	16·6 (8 7)	23·1 (13 2)	17·6 (8·1)
Contraction	21·8 (11·0)	23·1 (13·8)	29·7 (22·1)	24·6 (13·1)	27 1 (11·4)	27 1 (14·3)
Full cycle	36·7 (13·5)	38 7 (15·8)	48 2 (26·6)	41·3 (17 9)	50 2 (20·5)	44·7 (16 9)
AVERAGE AMPLITUDE OF RELATIVES						
Total movement						
Rise	16·4 (7·3)	22 2 (10 4)	15 8 (6·1)	40 7 (21 5)	35 8 (16·6)	22·1 (16·4)
Fall	17·2 (11·9)	22 2 (15 5)	20 2 (9·8)	48·5 (22·8)	43·1 (24·6)	32 2 (17·4)
Rise and fall	33 6 (18·6)	44·3 (23 1)	36 0 (12·3)	89 2 (41·1)	78 9 (40 6)	54 3 (25·9)
Movement per month						
Rise	1·2 (0 5)	1·5 (0·6)	1·0 (0·4)	3·3 (1·8)	2·1 (1·1)	1·5 (1·1)
Fall	0 8 (0 4)	1 1 (0·4)	1 1 (0 6)	2 6 (1 4)	1·7 (0 9)	1 4 (0 8)
Rise and fall	0 9 (0·4)	1 2 (0·4)	0 9 (0 3)	2 4 (1 0)	1 8 (0·8)	1·4 (0·8)
AVERAGE STANDINGS OF RELATIVES IN						
Stage I	93·3 (4·8)	92·3 (7 9)	96·6 (7 0)	92·9 (13 6)	93·5 (5 9)	97·2 (11·1)
„ II	97·2 (3·7)	97·1 (6·4)	99·9 (7·0)	98 6 (13·5)	100 9 (7·6)	102·3 (12·4)
„ III	103·3 (3 8)	103·1 (4·9)	104 5 (6·5)	110 2 (13·2)	104·5 (7·6)	107 8 (9·1)
„ IV	106·7 (4 2)	109 6 (6·2)	109 8 (5·8)	123 9 (15·1)	117 6 (8·7)	116 2 (6·8)
„ V	108·1 (5 0)	112·1 (7·2)	111·5 (5·7)	128·3 (15·4)	115·2 (9 8)	114·0 (10 3)
„ VI	103·9 (2 7)	106·7 (4 5)	105·4 (2·2)	108·5 (8 0)	102·9 (5·6)	105·1 (6·9)
„ VII	99·5 (2·9)	100 4 (4 4)	98 6 (3 1)	95·4 (8 0)	94·6 (3 0)	96·7 (4·3)
„ VIII	94 1 (5·1)	93·5 (6 1)	93 4 (4·6)	85 4 (7·8)	84 1 (8 9)	87 8 (6·1)
„ IX	92·9 (6·5)	92·4 (8·9)	92·4 (5·8)	84·8 (9·7)	86·8 (14·2)	86·9 (10·4)
AVERAGE RATES OF CHANGE (per month)						
From I to II	+1·5 (1·1)	+1 9 (1 2)	+1·1 (0·6)	+2·8 (1·9)	+2 7 (1·2)	+2 0 (1 0)
„ II to III	+1 5 (0·8)	+1·4 (1·2)	+1·1 (1·0)	+3 0 (2·5)	+1·8 (3·2)	+1·6 (1·7)
„ III to IV	+1 1 (0·9)	+1 6 (1 1)	+1·2 (0 7)	+4 8 (4·4)	+1·6 (1·1)	+1·7 (1 9)
„ IV to V	+0 2 (0 8)	+0 3 (1 0)	+0·1 (0·9)	+0·7 (2 8)	−0·9 (1·6)	−1·0 (1·3)
„ V to VI	−1·2 (0 7)	−1·5 (1 2)	−1·3 (0·5)	−4·5 (2·2)	−2·7 (1 2)	−2 5 (1·6)
„ VI to VII	−0 6 (0 6)	−1 2 (1 0)	−1·4 (1·2)	−3 1 (2·7)	−1·2 (1 2)	−1·0 (0 6)
„ VII to VIII	−0·8 (0 4)	−1 4 (1·0)	−1·1 (0·9)	−2·6 (2 8)	−2·1 (1·0)	−1·3 (1 0)
„ VIII to IX	−0 1 (0 5)	+0 4 (1·3)	−0·1 (0 5)	+0·4 (1·4)	+1·1 (1·5)	0 0 (1·3)
SECULAR MOVEMENTS (in percentages)						
Average change from cycle to cycle	−0·8 (10·1)	−0 3 (10 8)	−3·8 (12·3)	−9·3 (22·3)	−4·5 (17·5)	−7·5 (8·2)
Weighted average change per month from cycle to cycle	−0·02	−0·01	−0·08	−0·23	−0·08	−0·18
RANDOM MOVEMENTS	Moderate	Mild	Mild	Mild	Moderate	Mild

TABLE 90*b*

Measures of Average Monthly Cyclical Behaviour: Wholesale Commodity Price Series

Reference-cycle behaviour	(1) *Index of prices of domestic and imported commodities*	(2) *Index of prices of domestic commodities*	(3) *Index of prices of imported commodities*	(4) *Price of raw cotton, excluding duty*	(5) *Price of British pig-iron*	(6) *Price of British bar-iron*
PERIOD COVERED .	1794–1848	1794–1848	1794–1848	1794–1848	1794–1804; 1816–48	1794–1848
NUMBER OF CYCLES .	14	14	14	14	11	14
AVERAGE STANDINGS OF RELATIVES IN						
Stage I . . .	97·8 (6·2)	97 4 (7 6)	98·5 (6 1)	101·2 (13·7)	103·6 (13 2)	101 6 (11·9)
„ II . . .	98 7 (5 2)	98 4 (6·4)	99·7 (4 1)	104·1 (10 1)	100 8 (10 1)	98 5 (10 8)
„ III . . .	100·2 (5 0)	99 6 (6 1)	102 2 (2 6)	107·0 (7 0)	97 6 (7·1)	98 9 (7 9)
„ IV . . .	103·1 (3 3)	103·4 (4·3)	101·6 (3 6)	104 3 (8·1)	102 5 (5·8)	104 5 (5 6)
„ V . . .	104·9 (4·0)	105 6 (5·2)	102 2 (3·0)	107·7 (13·5)	111·2 (18·8)	111·4 (14·7)
„ VI . . .	103 6 (5·1)	104 6 (6·4)	101·4 (2·5)	100 9 (9 1)	106 9 (12 4)	107 9 (11 0)
„ VII . .	100 5 (6 0)	101·4 (8·0)	97 9 (4 7)	90 9 (4·0)	103 1 (8·1)	104 3 (11 1)
„ VIII . .	96·5 (5·4)	97 4 (6 6)	94·1 (5 9)	87·5 (12 1)	100·2 (9 8)	97 7 (11 9)
„ IX . . .	96 4 (5 6)	97·1 (7 3)	94 6 (6·9)	90 0 (15 7)	99·3 (12 1)	95·5 (13 4)
AVERAGE RATES OF CHANGE (per month)						
From I to II .	+0 5 (0 9)	+0·5 (1 0)	+ 0 4 (0 7)	+ 1 5 (2 8)	- 0 8 (1 6)	− 0 5 (1 4)
„ II to III . .	+0 4 (0 9)	+0 5 (1 1)	+0 3 (0 6)	+0 4 (1 8)	- 0 7 (1 6)	+0 1 (0 8)
„ III to IV .	+0 3 (0 4)	+0 4 (0 5)	− 0 1 (0·4)	− 0 6 (1·5)	+0 2 (0 9)	+ 0·4 (0 8)
„ IV to V . .	+0·4 (0·8)	+0 5 (1 1)	+0·1 (0·7)	+0·4 (1 7)	+0 7 (1 9)	+0 7 (1 5)
„ V to VI . .	− 0·4 (1·0)	− 0 4 (1 2)	− 0 3 (0 7)	- 2 2 (2 3)	− 1 3 (2 4)	− 1 0 (2 0)
„ VI to VII .	− 0 6 (0 8)	− 0·6 (0 9)	− 0·7 (0·9)	− 2 1 (2·4)	− 0 6 (1 6)	− 0 5 (1 5)
„ VII to VIII .	− 0·8 (0·6)	− 0·8 (0·7)	− 0·7 (0 6)	− 0·4 (1·8)	− 0 4 (1·0)	− 1 1 (0·8)
„ VIII to IX .	0·0 (1 3)	− 0 1 (1 6)	+ 0 1 (0 7)	+ 1 0 (2 3)	0 0 (0 8)	− 0 5 (1·0)
CONFORMITY TO BUSINESS CYCLES						
Expansion stages of series . . .	I–V	I–V	VIII–V	VIII–V	II–V	II–V
Average change per month of relatives during stages matched with						
Reference expansion	+0 4 (0·4)	+0 5 (0 5)	+0 2 (0 2)	+ 0·4 (0·7)	0·0 (1·0)	+0 3 (0 7)
Reference contraction	− 0 5 (0·4)	− 0 5 (0 5)	- 0 6 (0 6)	− 1 2 (1 6)	- 0 5 (0 8)	0 8 (0 7)
Index of conformity to						
Reference expansion	+57	+57	+ 50	+43	+ 36	+ 29
Reference contraction	+71	+ 71	+57	+29	+27	+ 57
Business cycles. .	+81	+ 70	+ 74	+ 52	+10	+52

Chapter IX

CYCLICAL PATTERNS OF PRICES

Introduction

The data on prices are both abundant and familiar. They have been dealt with, by most historians, in the form of indexes; but the emphasis here as in the *History* is on the analysis of individual prices. Even in the treatment of the various indexes included, an attempt is made to trace their behaviour in terms of their individual components. Most available series are raw-material prices, and this, of course, is a serious weakness in the data. Several calculated export price indexes have been used in an attempt to indicate the movement of manufactured goods prices; but the essential lack of such data remains an important limitation on the whole analysis.

Individual prices vary widely in the average duration and amplitude of movement of specific cycles. In view of the wide use of price indexes (which conceal such divergences), this well-known lack of consistency is especially worth emphasizing. The individual prices analysed here are the following: wheat, cotton (raw and manufactured), coal, iron (pig and bar), copper (processed), leather (semi-manufactured), wool (raw and manufactured), sugar (raw), and timber. The indexes represent groupings of domestic, import, export, and several types of consumers' goods prices, as well as two indexes (one weighted and one unweighted) of 'all prices'. The individual prices cover the most important articles of import and the raw materials related to the largest domestic industries.

The average durations of specific cycles for most individual price series examined are longer than for reference cycles, indicating that the annual figures failed to reflect one or more reference cycles. Except for wheat, pig-iron, leather, and timber prices, the average duration of contraction is greater than for expansion. The two phases in the wheat price series are of equal length. In the case of the latter two exceptions the net trend movement for the whole period covered is upward. Extremes of amplitude are represented by cotton and wheat (with large movements) and leather (with small movements). The table opposite gives the average amplitude of movement for each of the individual prices and for the related import and/or export series. All cover the full period 1790–1850, unless otherwise indicated. In all but one case (sugar) the average amplitude of expansion of the price movement is less than for the related import or export volume. The average amplitude of expansion, however, is greater for the total price index (weighted) than for the index of total production, although less than for total imports and exports. In several cases the average amplitude of contraction of prices is greater than for the related volumes series. But in every instance the ratio of the amplitude of expansion to the amplitude of contraction is greater for the volumes than for prices. Broadly, then, prices,

Average Amplitude of Movement in Specific Cycles

	Expansion	*Contraction*	*Full cycle*
Timber price	+22·7 (13·8)	−22·4 (15·4)	45·1 (23·0)
Quantity timber imports (1790–1841)	+43·5 (22·2)	−36·2 (25·4)	79·7 (42·5)
Raw cotton price, including duty	+28·4 (18·2)	−41·1 (18·1)	69·5 (18·5)
Volume cotton imports	+48·5 (21·8)	−32·7 (17·9)	81·1 (27·8)
Volume cotton goods exports	+52·9 (19·7)	−20·3 (10·4)	73·2 (27·6)
Iron (bar) price	+21·4 (16·8)	−29·8 (20·5)	51·2 (32·7)
Iron (pig) price	+20·5 (12·9)	−25·1 (19·9)	45·6 (29·7)
Volume iron exports	+30·4 (12·4)	−16·7 (8·6)	47·1 (13·2)
Copper price	+16·9 (5·0)	−21·1 (7·2)	38·0 (10·9)
Volume copper exports (1815–50)	+35·4 (16·9)	−23·0 (13·8)	58·4 (21·1)
Wheat price	+41·8 (15·3)	−41·6 (21·7)	83·5 (31·5)
Quantity net wheat imports	+143·7 (67·1)	−138·0 (62·9)	281·7 (95·9)
Domestic raw wool price	+27·2 (13·0)	−29·3 (17·9)	56·6 (27·5)
Volume wool imports	+68·8 (35·3)	−55·7 (35·7)	124·5 (66·5)
Volume wool exports	+30·7 (14·8)	−23·4 (7·6)	54·1 (16·6)
Sugar price	+20·9 (11·2)	−25·2 (11·8)	46·1 (19·8)
Sugar imports	+16·6 (9·1)	−11·2 (8·1)	27·8 (14·7)
Total price index Silberling (unweighted)	+15·2 (7·0)	−16·6 (10·1)	31·8 (14·0)
Total price index (weighted)	+21·7 (6·2)	−22·9 (11·0)	44·6 (13·5)
Total production (Hoffmann)	+17·5 (6·6)	− 5·2 (2·0)	22·8 (8·2)
Total volume imports	+25·1 (11·1)	−14·2 (9·6)	39·3 (19·2)
Total volume domestic exports	+34·1 (14·1)	−15·8 (6·9)	49·9 (15·5)

on the average, rose less and fell more than did production and the volume of foreign trade.

This relationship follows, of course, from the fact that the volume series all have upward secular trends, while the prices, over the whole period, either decline or rise only slightly. In all cases there is a period of upward and one of downward trend. The secular peaks occur as early as 1799 (cotton) and as late as 1825 (pig-iron). Domestic manufactured prices, on the whole, tended to decline before 1814, when the import price index reaches its peak. This is most clearly indicated in the average price of domestic goods exports, which declines from 1803. The individual prices follow, led by the series with largest net downward secular movement over the whole period:[1]

	Trend
Raw cotton (incl. of duty)	−0·25
Copper	−0·10
Coal	−0·08
Sugar	−0·06
Pig-iron	−0·05
Wool	−0·03
Wheat	−0·02
Leather	+0·04
Timber	+0·05

[1] The measure of secular trend given is the weighted average per month movement from cycle to cycle.

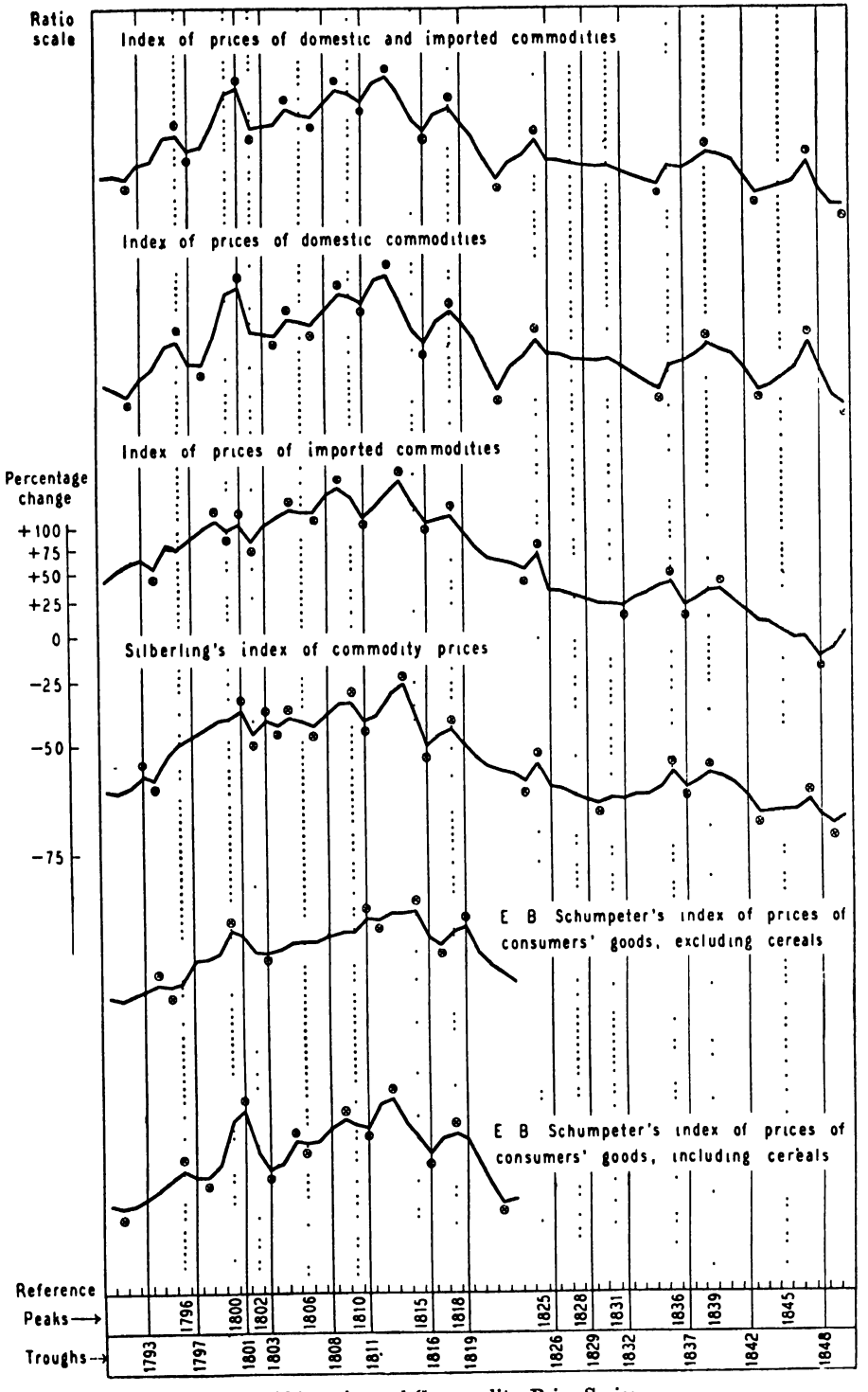


FIG. 136 *a*. Annual Commodity Price Series

Unweighted and weighted indexes of total prices have been analysed. The weighted index, influenced strongly by the behaviour of the wheat price, shows a greater average amplitude of movement and a lesser net decline after 1814. Several turning-points, as well, are changed by weighting, but the unweighted index does not, on the whole, exhibit better cyclical conformity than the weighted series.

The following table arrays all the various price indexes analysed, in the order of magnitude with respect to average duration, average amplitude, and net secular trend. The series with the largest duration, amplitude, and downward trend head the list, &c.:

Duration[a]	*Amplitude*	*Secular trend*[b]
Sundries (T)	Domestic index	Domestic commodity exports index
Domestic index	Food (T)	Fuel and light (T)
Total index	Total index	Sundries (T)
Fuel and light (T)	Consumers' goods index incl. cereals (Sc)	Food (T)
Food (T)	Sundries (T)	Import index
Consumers' goods index, excl. cereals (Sc)	Fuel and light (T)	Clothing (T)
Import index	Import index	Total unweighted index (S)
Domestic commodity exports index	Total unweighted index (S)	Domestic index
Total consumers' goods index (T)	Total consumers' goods index (T)	Total index
Total unweighted index (S)	Consumers' goods index excl. cereals (Sc)	Total consumers' goods index (T)
Consumers' goods index, incl. cereals (Sc)	Domestic commodity exports index	Consumers' goods index, incl. cereals (Sc)
Clothing (T)	Clothing (T)	Consumers' goods index, excl. cereals (Sc)

[a] (T) indicates a Tucker index; (S) indicates the Silberling index; (Sc) indicates the E. B. Schumpeter index; the indexes not followed by such designation are the weighted series constructed in the course of this study.

[b] All series except the Tucker consumers' goods index and E. B. Schumpeter's indexes exhibit net negative movement per month from cycle to cycle, over the whole period—a fair measure of secular trend.

In general, annual prices do not emerge from the reference-cycle analysis as very satisfactory indexes of general business activity. During the early years, war conditions affect them, producing, for example, a counter-cyclical decline in 1802 (due to peace and good harvests) and a counter-cyclical rise in 1808 (due to the continental blockade). In the period of secular price decline prices tended to rise only during the latter stages of general prosperity. The minor reference-cycle expansions (1826–8, 1829–31) are barely reflected in price movements. At times, even when prices did rise in the course of reference expansion, their movement conveys a completely misleading conception of the course of output and employment, e.g. in the cycles from 1819 to 1825 and from 1842 to 1848. Nevertheless, the most appropriate average pattern is I–V. The most significant exceptions occur in the wheat price, which exhibits, in several important instances, a III–VII expansion, and transmits that character to indexes which contain it or articles of food affected by the same harvest influences; and, as noted in

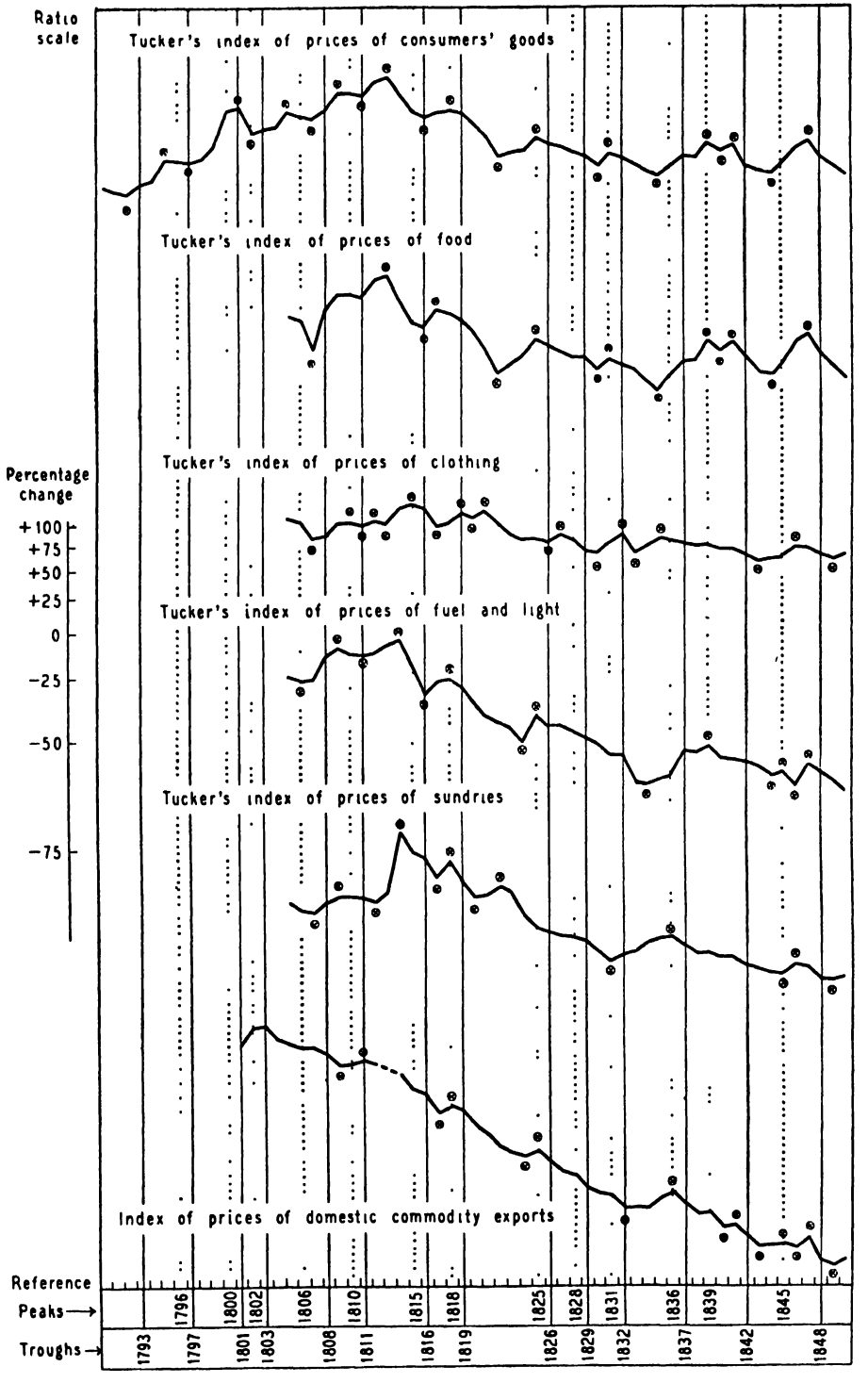

Ratio scale
Tucker's index of prices of consumers' goods
Tucker's index of prices of food
Tucker's index of prices of clothing
Tucker's index of prices of fuel and light
Tucker's index of prices of sundries
Index of prices of domestic commodity exports
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 136 *b*

the treatment of foreign trade series, the forces set in motion by a rise in the wheat price help to determine the pattern of total imports and the trade balance.

The assumption underlying the use of prices as a cyclical indicator is that they will move roughly with monetary demand ($MV+M'V'$) and thus with business expansion and contraction. It is implied that changes in supply conditions (roughly, T), in the short run, will not obscure that relation. Prices, however, in these years, were under constant pressure from the side of supply. In the case of the agricultural prices, especially, short-period movements occurred principally as a result of harvest fluctuations; while manufactured prices were affected steadily downward by technological development and an increased scale of operations. The generally false conception of the period from 1815 to 1850 as one of chronic depression derives principally from a contemplation of price indexes as a measure of general business activity. That method has led one writer to conclude:[1]

> It appears that there is only one case (from 1815 to 1850) of what is clearly a cycle, in the modern sense of the word, indicated in all the materials consulted. That is the period lasting from the late twenties into the early forties.

The Silberling index shows its only protracted break in the secular decline from about 1830 to 1839. One might, indeed, conclude from it that the only extended cyclical movement ran from 'the late twenties into the early forties'. Statistics of production and foreign trade, of course, tell quite a different story.

The average reference-cycle patterns vary among individual prices. Most series, on the average, exhibit the greatest expansion or the smallest contraction in stage III–V, although the price of raw cotton is an important exception. The average patterns usually conceal diverse behaviour in individual cycles. As noted earlier[2] the latter stages of major cycle expansions tended to be accompanied by price rises, while, at best, several of the minor cycle expansions, after 1815, can be traced only in a slackened rate of decline. During the war years prices were somewhat more responsive to reference-cycle expansions. It should be remembered, however, that most of the prices analysed here are annual averages, and, in general, they are less sensitive in their movements than the monthly data.

A: 1-3. Indexes of Prices of Domestic and Imported Commodities and Total Index (Annual)

Specific-cycle Behaviour. The average specific cycles in both indexes are longer than reference cycles. The dating of specific cycles in the two series only roughly coincide, but the number of specific cycles is identical. The average duration of specific cycles is shorter during the war years than after, when prices rose significantly only in the major reference cycles.[3]

[1] Sweezy, *Monopoly and Competition in the English Coal Trade, 1550–1850*, p. 162.

[2] See above, pp. 538–9.

[3] The rise from 1837 to 1840 in the import index and the rise to 1839 in the domestic index are exceptions to this characteristic.

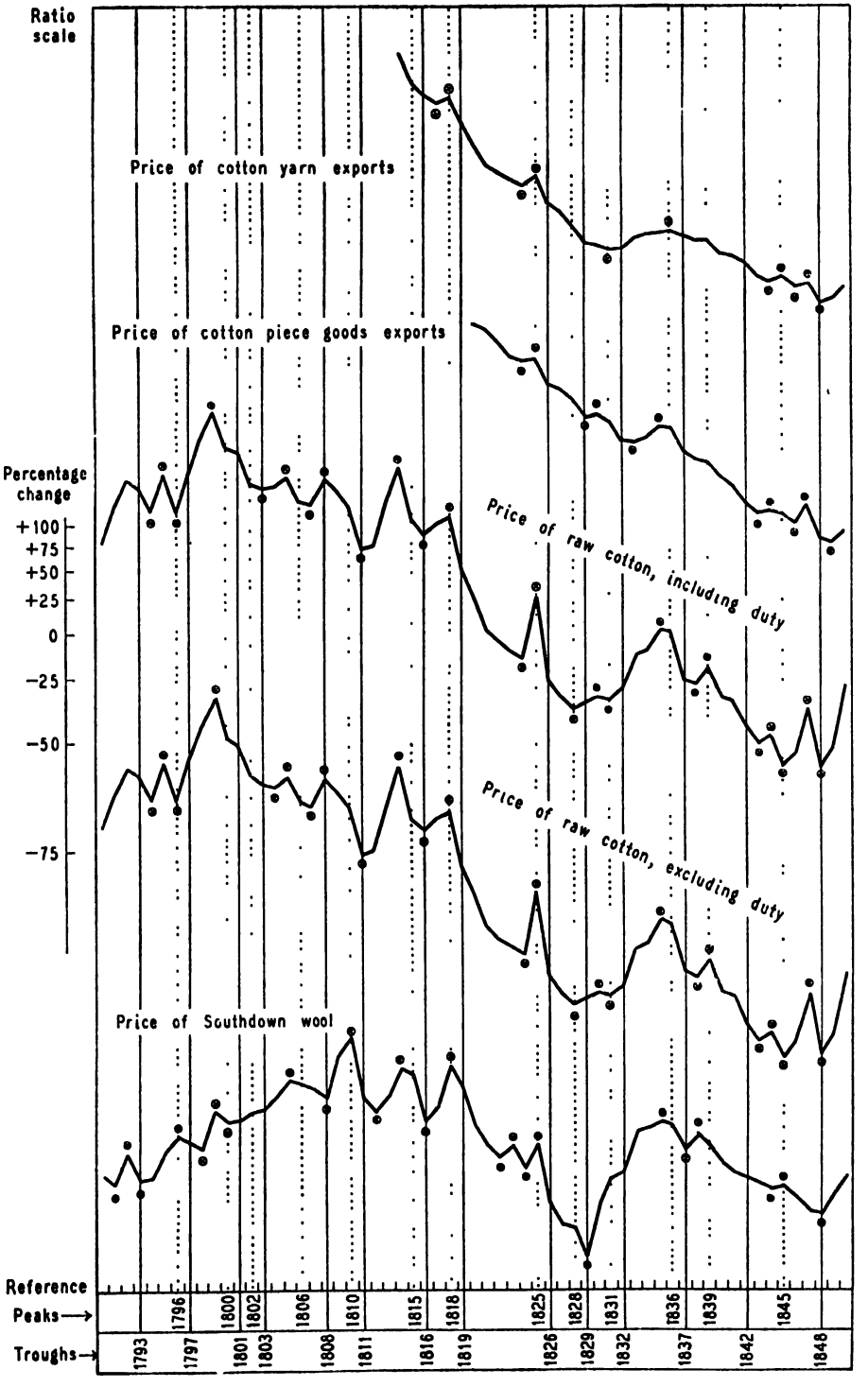

Ratio scale
Price of cotton yarn exports
Price of cotton piece goods exports
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Price of raw cotton, including duty
Price of raw cotton, excluding duty
Price of Southdown wool
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 136 c

The average duration of expansion is less than for contraction, for the whole period, in both series; but in the period of rising secular trend (measured to the cyclical trough in 1816) the import index shows longer average duration for expansion than in the subsequent period, while the domestic index shows longer average durations in the period after 1816 for both phases.

The domestic index, because of the influence of the wheat price, exhibits considerably greater amplitude of movement than the import index; the average amplitude of fall is greater than for rise in the latter series, but about equal in the former. The secular trend, in net, is downward for import prices, but negligible for domestic prices, as in the case of the wheat price. Only in 1850 does the domestic index reach a figure lower than that in 1792. The net secular increase in the period of rising prices is slightly greater for the domestic than the import index; the fall thereafter, of course, is greater in the latter series.

Reference-cycle Behaviour. Like the wheat price the most consistent feature of the reference-cycle behaviour of the domestic price index is the substantial average III–V expansion. As measured by the average standings, all other stages exhibit average decline, the smallest fall coming in stage I–III, the largest in VII–IX. The III–V expansion is not merely a characteristic of the wheat price, but appears, as well, in pig-iron, and can be traced in other non-agricultural domestic commodity prices.

The import index, however, shows average decline in all stages except I–III. The decline in stage III–V is very slight, that during reference contraction clearly pronounced. The index resembles, in the relations among the stages, the average pattern for the price of raw cotton which declined in all stages, but least in I–III. In seven of thirteen cases, however, the series exhibits average III–V expansion, and in four of these, stage III–V shows greater average increase than I–III. The average pattern, then, conceals quite diverse behaviour in individual cycles.

The total price index is more nearly like the domestic than the import series, the former receiving a weight of 75 per cent., on the basis of the value of the commodities represented.[1] All turning-points in the total index coincide with those in the domestic index, except the troughs in 1798 and 1804, which, in the total index, occur in 1797 and 1802.

The import price series exhibits greater conformity to reference expansions and contractions than the domestic price series, but the index of conformity to all business cycles is less. In the period from 1793 to 1808 the rise in import prices during each reference contraction is greater than during each of the previous and following expansions. The special forces tending to raise import prices in 1793, 1797, 1801, 1803, and 1806–8 are all traceable to unique war conditions.[2] After 1808 the index of conformity to reference contractions is perfect; but the net fall during the reference expansions from 1819 to 1825, 1826 to 1828, and 1842 to 1845 yields a low

[1] See Vol. I, p. 485.

[2] See Vol. I, pp. 10–11, 27–31, 61–3, 83–7.

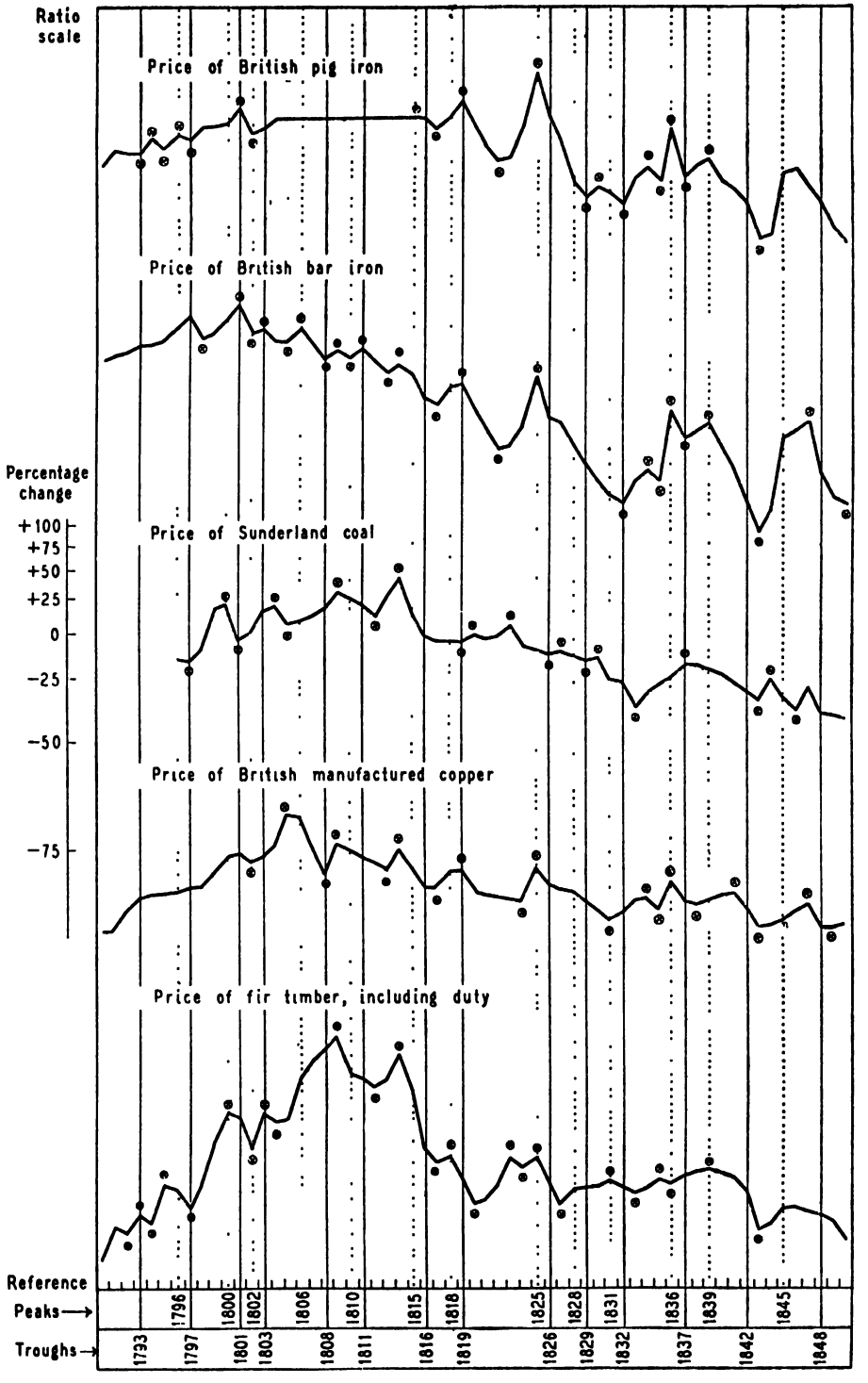

Ratio scale
Price of British pig iron
Price of British bar iron
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Price of Sunderland coal
Price of British manufactured copper
Price of fir timber, including duty
Reference
Peaks
Troughs
1733
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 136 *d*

expansion conformity. In the early years conformity to reference expansions is lowered by the decline in 1802 (due to the peace) and the decline from 1809 to 1810 which exactly cancels the rise from 1808 to 1809. The principal failures of the domestic index to conform may be traced in the movements of the wheat price.

The total price index exhibits better conformity to contractions and to all reference cycles than its components; but its conformity to reference expansions is affected by the lower conformity of the domestic index. The fact that the conformity to contractions and all business cycles is greater than for the component series results simply from the fact that the fall in import prices in 1837 is sufficient to counteract the counter-cyclical rise in the domestic series.

B: 1-3. Indexes of Prices of Domestic and Imported Commodities and Total Index (Monthly)

Specific-cycle Behaviour. A considerable number of relatively brief movements (e.g. 1803–4, 1822–3 in the domestic index) which are obscured in the annual averages appear as cycles in the monthly series, yielding eighteen cycles in the domestic and fourteen in the imported index. The average duration of specific cycles is shorter during the war years than thereafter for imported commodity prices; the reverse is true for domestic prices, though the post-war cycles in the two series are not significantly shorter. Both series show, on the average, longer contractions than expansions; this difference is, however, much more marked for the post-war period of declining trend. The monthly figures bear out the greater total amplitude of the domestic index—as well as the larger amplitude of fall than rise in the imported price index. The principal characteristic revealed in the monthly, but obscured in the annual, analysis is the tendency of commodity markets to experience frequent movements. The use of annual data smooths the contours of the price curves to a greater extent, probably, than in the case of foreign trade or production series. This hypothetical judgement stems merely from the fact that commodity prices were set in large markets, speculative in character.

Reference-cycle Behaviour. The reference-cycle behaviour of the domestic price index is not quite so similar to that of the wheat price, when the former is taken in monthly form. The average fall during I–III in the annual series appears here simply as a lesser rate of increase. This behaviour can, however, hardly be designated as typical in view of the fact that the index falls during the I–II stages of six reference cycles and during the II–III stages of five. In general, the conformity of the domestic index to reference expansions is less than its conformity to reference contractions.

The import index shows on the average a substantial and consistent rise in stages I–III and fall in stages V–VIII. The slight average fall in III–IV and rise in IV–V are movements which are not at all typical of individual reference cycles in this series.

Unlike the results for the annual series, the imported prices exhibit lesser conformity to reference expansions and contractions than the domestic index, but the index of conformity to all business cycles is greater.

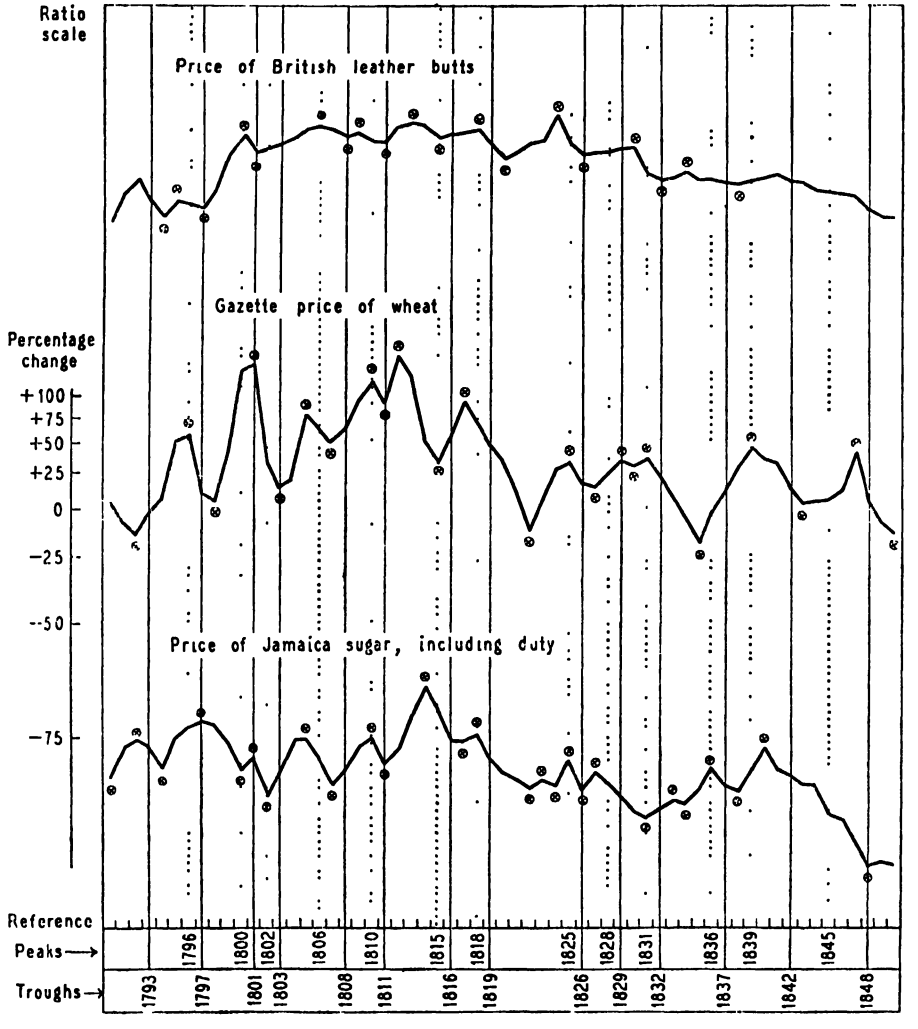


FIG. 136 *e*

A: 4. Silberling's Index of Commodity Prices

Specific-cycle Behaviour. The Silberling unweighted index of commodity prices contains two more specific cycles than the weighted index constructed in the course of this study: 1802–4, 1830–7. Largely because of the heavy weight given to the price of wheat (which exhibits a large average amplitude), the latter index exhibits slightly greater average amplitude of movement. The upward trend is less in the weighted (1792–1813) than the

unweighted index (1791–1814); the downward movement thereafter is also less. The net trend (average per month change from cycle to cycle) for the whole period (slightly downward in both indexes) is more pronounced in the Silberling than in the weighted index.

Reference-cycle Behaviour. Silberling has claimed for his index a high degree of sensitivity to general business fluctuations. If this were true one could expect perfect I–V conformity. The average pattern, as in the other individual price series and indexes examined, is best taken as I–V. But the Silberling index, like the others, shows only moderate positive conformity to that pattern. This would indicate that the index cannot be regarded as a shorthand measure of business cycles.

Although the average pattern yields slight net I–III expansion (unlike the weighted index), in only seven of thirteen I–III stages does the index actually rise. The same number of exceptions exists in the weighted series. The comparison of their averages in this stage does not reveal any significant difference. In fact the average patterns are strikingly similar. The main effect of weighting is to shift the following turning-points:

Price Indexes

Peaks		*Troughs*	
Weighted	*Unweighted*	*Weighted*	*Unweighted*
1809	1810	1792	1791[a]
1813	1814		
		1822	1824
		1835	1837
		1850	1849

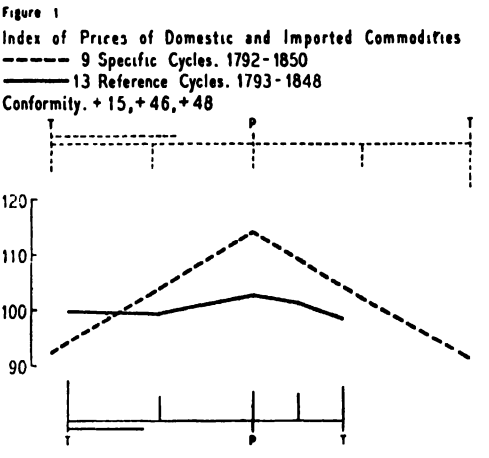
[a] Although the Silberling index declines in 1791 the decline is so small, relative to the rises in 1790 and 1792, that no specific cycle has been marked off. A trough, however, is taken in 1789.

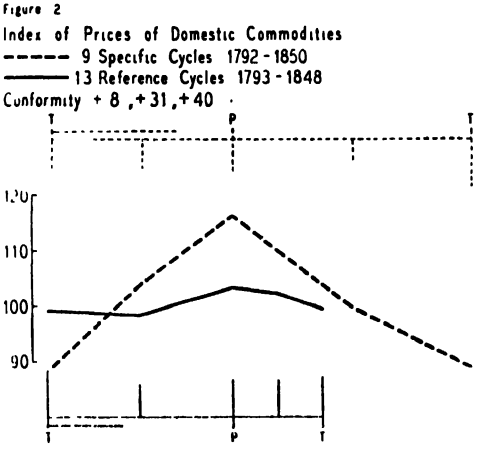
Except for the two extra cycles in the Silberling index, noted earlier, the other principal difference is the absolute decline from 1796 in the weighted index, which appears only as a slackening in the rate of rise in the unweighted series.

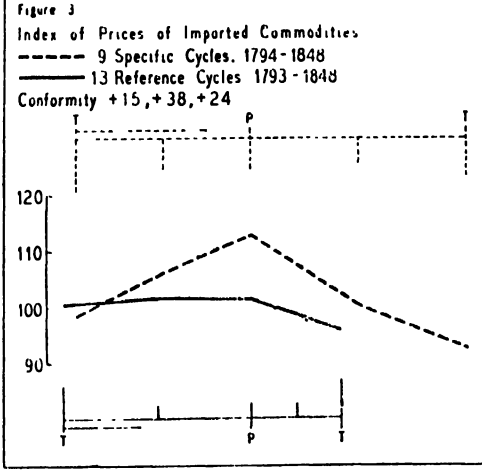
A: 5-6. E. B. Schumpeter's Indexes of Prices of Consumers' Goods, inclusive and exclusive of Cereals

The years in these series end with the beginning of the last quarter: i.e. each runs from 1 October to 29 September. The commodities include twenty-two articles of food and drink and only nine articles of fuel, light, and clothing. Although these are all contract prices, they exhibit considerable mobility, indicating that the contracts were for relatively short periods.

The index (inclusive of cereals) closely resembles the Tucker total index, despite the difference in the dating of the years. Over comparable periods







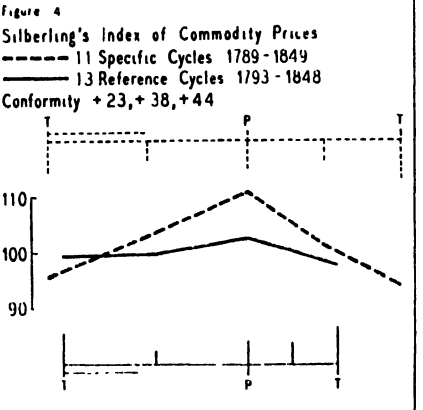


FIG. 137 *a*. Cyclical Patterns of Annual Commodity Price Series

the duration of the specific cycles in the two series is similar, although the average amplitude of the Tucker index is less. Because of its larger number of components this lesser amplitude may be considered a normal statistical phenomenon. The following specific-cycle turning-points differ:

Peaks		*Troughs*	
Schumpeter	*Tucker*	*Schumpeter*	*Tucker*
1796	1795	1791	1792
		1798	1797
		1803	1802
		1806	1807

The E. B. Schumpeter index of consumers' goods prices (inclusive of cereals) is best characterized as of I–V expansion. Its indexes of conformity are all positive but reflect two contrary movements each, during reference expansions and contractions. The series, in net, falls in 1801–2 and 1811–15, and expands during the reference contractions, 1800–1 and 1806–8. All of these movements can also be traced in the Tucker indexes.

The Schumpeter index (exclusive of cereals) has a lesser average amplitude than the inclusive series and omits, as well, the cycle with a peak in 1805. In addition, the rise in 1823 in the inclusive index permits the marking off of an extra cycle. They share, however, a similar broad movement in the post-war years. The series (exclusive of cereals) in net shows a much more pronounced upward trend than the total index. The fall in the wheat price after 1813 was not shared by the non-agricultural commodities in the Schumpeter index, nor was the rise during the war years as great in the index, exclusive of cereals.

The reference-cycle pattern for the Schumpeter index (exclusive of cereals) rises in all stages,[1] with the most pronounced increases in stages III–V and VII–IX; the former resulting from the large increases in 1800 and 1818, the latter from the rise in 1808. Any reference pattern chosen for this series must be essentially arbitrary. The V–I inverted designation has little analytic significance.

A: 7-11. Tucker's Indexes of Prices of Consumers' Goods: Food, Clothing, Fuel and Light, Sundries, and Total Consumers' Goods

Specific-cycle Behaviour. The total index of consumers' goods prices is composed of four sub-indexes, weighted as follows (1815–50):[2] Food (67), Clothing (18), Fuel and light (9), Sundry manufactures (6). The duration of the specific cycles is longer than for the raw-material prices examined below, although there is considerable variation among the sub-indexes.

[1] The negative average monthly rate of change in stage I–III results from the relatively short duration of I–III stages in those cycles where the series falls during that stage.

[2] From 1805 to 1815 the weights are as follows: Food (75), Clothing (14), Fuel and light (7), Sundry manufactures (4).

Figure 5

E B. Schumpeter's Index of Prices of Consumers' Goods, Excluding Cereals

------ 4 Specific Cycles 1794-1819

——— 7 Reference Cycles. 1793-1819

Conformity. +57, −14, −23

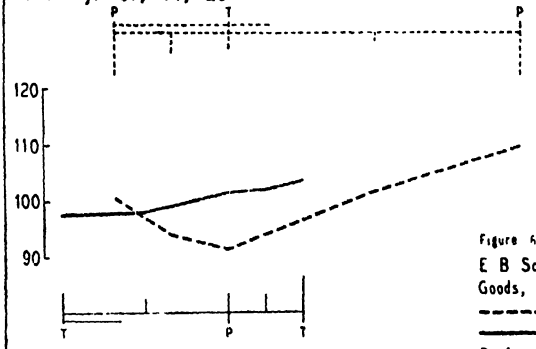


Figure 6

E B Schumpeter's Index of Prices of Consumers' Goods, Including Cereals

------ 6 Specific Cycles 1791-1822

——— 7 Reference Cycles. 1793-1819

Conformity +43, +43, +31

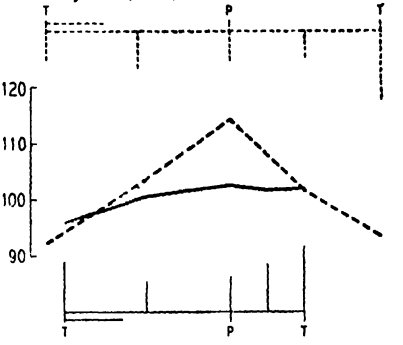


Figure 7

Tucker's Index of Prices of Consumers' Goods

------ 11 Specific Cycles 1792-1852

——— 13 Reference Cycles 1793-1848

Conformity +23, +8, +16

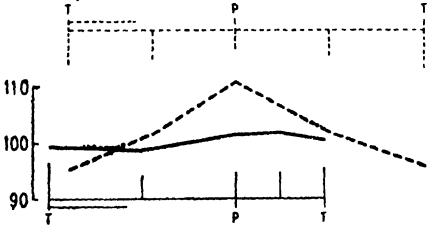


Figure 8

Tucker's Index of Prices of Food

------ 7 Specific Cycles 1807-1851

——— 9 Reference Cycles 1808-1848

Conformity +11, +33, +47

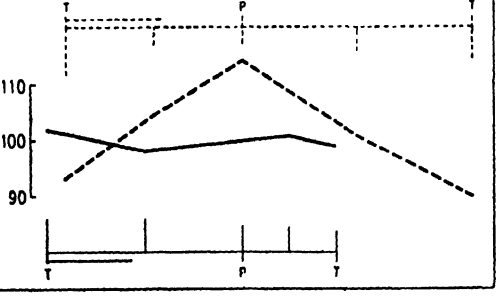


FIG. 137 *b*

Their average amplitudes, as well, are (except for the food sub-index) somewhat less than for other prices except for leather butts, which is also essentially a consumers' goods price. There are, of course, obvious objections to comparing cycles in an index number with individual price movements; and these generalizations must be supplemented by an analysis of the more significant individual components.

All series show a net downward secular trend over the period 1805–50. The upper secular turning-points come within the years 1813–15. The following table arrays the four sub-indexes in descending order of magnitude with respect to average duration, average amplitude, and net downward secular trend, 1805–50:

Average duration	*Average amplitude*	*Secular trend*[a]
Sundries	Food	Fuel and light (1814)
Fuel and light	Sundries	Sundries (1814)
Food	Fuel and light	Food (1813)
Clothing	Clothing	Clothing (1815)

[a] The year given in parentheses indicates the upper secular turning-point.

The food sub-index would appear to have been most significantly affected by the price of wheat. Only the following turning-points disagree in the two series:

Peaks		*Troughs*	
Wheat	*Food*	*Wheat*	*Food*
1812	1813	1815	1816
		1843	1844

It will be noticed that in each of these cases the food sub-index lags behind the wheat price. In addition to these discrepancies, the rise in the wheat price in 1810 and its fall in 1811 are paralleled by such slight movements in the food sub-index that no specific cycle can be marked off; the food sub-index declines in 1828 in the face of a rising wheat price; in 1841 the sub-index rises, while the wheat price merely declines, at a lesser rate. Large movements in the food sub-index, nevertheless, seem to have been controlled by the movements of the wheat price or by the same forces which produced those movements. Wheat, as such, does not appear in the Tucker food sub-index, although bread and wheat flour are given about 24 per cent. of the total weight. There are, as well, other foodstuffs which might be expected to respond to wheat harvest movements, although not with perfect consistency, e.g. potatoes, oatmeal, hops, malt, peas, &c.

Because of its large weight it is, of course, to be expected that movements in the food sub-index be reflected in the behaviour of the total consumers' goods index. The only discrepancy that exists in the two indexes with regard to turning-points is a one-year difference in a single peak: the food index reaches a high point in 1817, the total, in 1818.

Figure 9

Tucker's Index of Prices of Clothing

------ 9 Specific Cycles: 1807-1849

——— 9 Reference Cycles: 1808-1848

Conformity: +22, +44, +29

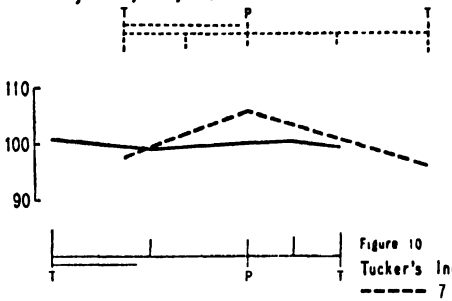


Figure 10

Tucker's Index of Prices of Fuel and Light

------ 7 Specific Cycles· 1806-1851

——— 9 Reference Cycles 1808-1848

Conformity -33, +56, +24

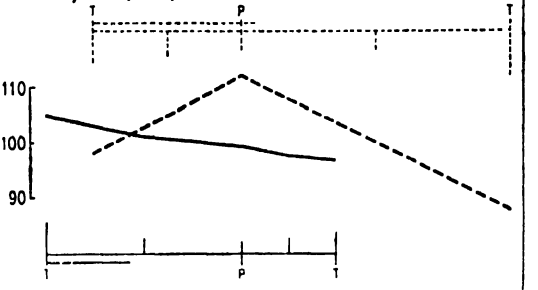


Figure 11

Tucker's Index of Prices of Sundries

------ 6 Specific Cycles 1807-1849

——— 9 Reference Cycles 1808-1848

Conformity. -33, +78, +47

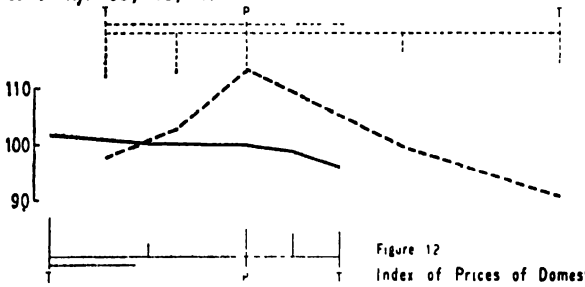


Figure 12

Index of Prices of Domestic Commodity Exports

------ 7 Specific Cycles. 1809-1849

——— 11 Reference Cycles. 1801-1848

Conformity. -64, +73, +14

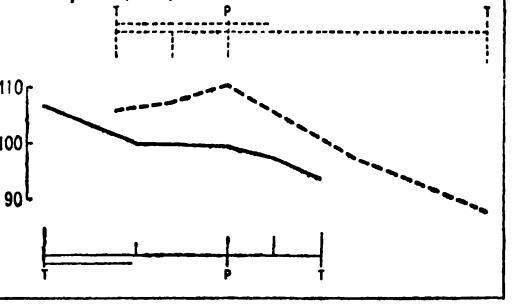


Fig. 137 *c*

The movements of the fuel and light sub-index conform broadly to those of the coal price. Coal receives a weight of two-thirds, candles of one-third. The price used, however, is a retail price in London, which apparently fluctuated less than the wholesale price analysed below. The secular trend (1805–50) is almost exactly the same as for Sunderland coal.

The clothing sub-index shows the least pronounced movements of any prices thus far analysed. The great advances in textile manufacture would appear to have affected little the commodities for which Tucker found continuous quotations. His clothing groups (suits, coats, shoes, stockings, and hats) contain woollens, largely, suits and coats receiving a weight of more than half. There are, further, no women's garments included except for the period 1819–35, when a weight of less than 3 per cent. is given to an item of women's apparel. The upward trend from 1805 to 1815, and the downward trend thereafter, are evident, but to a lesser extent than in the other sub-indexes.

The large decline in the prices of sundry manufactures, after 1814, would seem better to reflect the consequences for the British consumer of the cotton textile revolution than the clothing sub-index. It contains the following items related to cotton manufacture: bedding, sheets, cotton goods, mops, cover-lids. These receive, in all, more than three-fourths of the total weight. As in the case of the cotton price the rate of secular decline falls off appreciably in the latter two decades.

Reference-cycle Behaviour. The food sub-index exhibits III–VII average expansion. The total index, also, is best generalized as III–VII. The pronounced average V–VII contractions in the fuel and light and sundries sub-indexes (which have been designated I–V expansions), however, make for less clear-cut average III–VII expansion in the total than in the food sub-index. The clothing sub-index, like food, shows a clear average III–VII expansion. This lag in consumers' goods behind wholesale prices is a conventional cyclical phenomenon. The most evident consequence of cyclical expansion on the behaviour of the fuel and light and sundries sub-indexes is the lesser average rate of fall in stage III–V than I–III. Their relatively rapid V–IX decline, in conjunction with this phenomenon, has led to their designation as I–V series.

All the Tucker indexes exhibit positive conformity to reference expansions, contractions, and all business cycles, except fuel and light prices and sundries, which have low negative conformity to expansion, due to the powerful secular decline which affects them.

A: 12. Index of Prices of Domestic Commodity Exports

Specific-cycle Behaviour. The ratio of the real to the official value of domestic exports yields a crude price index.[1] This index is significant

[1] The official value series is weighted with prices current in 1696, presumably 1694 prices; the ratio of the two series is a somewhat treacherous measure of average export price movements. The cotton price, for example, fell considerably, relatively to other

Figure 13

Price of Cotton Yarn Exports

------ 5 Specific Cycles. 1817-1848

——— 7 Reference Cycles. 1816-1848

Conformity: - 71, + 71, + 85

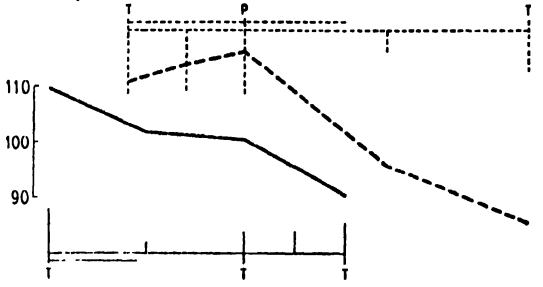


Figure 14

Price of Cotton Piece Goods' Exports

------ 5 Specific Cycles. 1824-1849

——— 5 Reference Cycles. 1826-1848

Conformity - 60, +100, +100

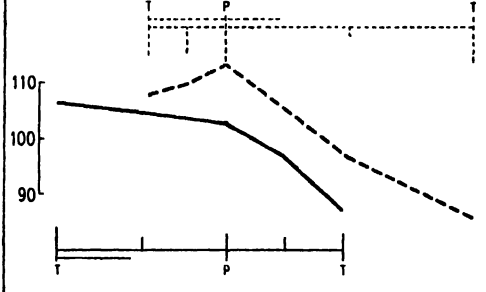


Figure 15

Price of Raw Cotton, Including Duty

------12 Specific Cycles: 1794-1848

———13 Reference Cycles: 1793-1848

Conformity: - 8, + 38, + 16

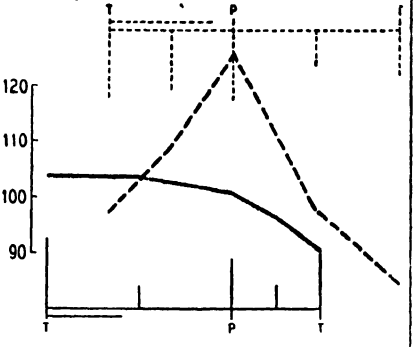


Figure 16

Price of Raw Cotton, Excluding Duty

------12 Specific Cycles 1794-1848

———13 Reference Cycles 1793-1848

Conformity - 15, + 23, + 20

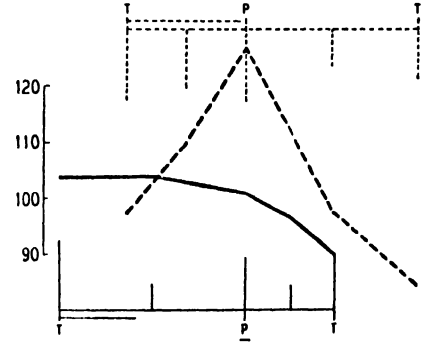


Figure 17

Price of Southdown Wool

------12 Specific Cycles: 1791-1848

———13 Reference Cycles: 1793-1848

Conformity + 54, + 54, + 100

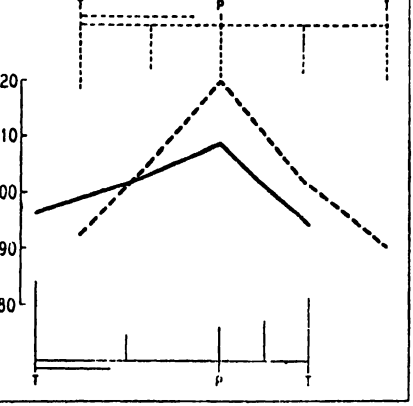


FIG. 137 *d*

because it represents, for the most part, manufactured goods. The only other manufactured goods prices which have been analysed are the average price of cotton yarn and piece goods exports.

The trend is so steeply and steadily downward that the average duration of specific cycles is fairly long [68·6 (27·9)]. The average duration of contraction is more than twice as long as for expansion. The average amplitude of movement, on the whole, is moderate, but very slight during expansion. In no case does the series rise consecutively for more than two years. The secular trend is downward from a peak in 1803. Like other individual prices and indexes that trend is most considerably broken in the reference-cycle expansion, 1832–6. The trend movement (from 1820) resembles, but is less than, that for the average value of cotton piece goods exported. In general the character of the index movements is strongly affected by the large part cotton textile manufactures played in total domestic exports.

Reference-cycle Behaviour. All reference stages exhibit average contraction. The average contraction in stage III–V is very slight and represents the net result of upward and downward movements.[1] Stage III–V moved as follows during the various reference expansions:

Net fall during III–V	*Net rise during III–V*
1803–6	1801–2
1811–15	1808–10
1819–25	1816–18
1826–8	1832–6
1829–31	1837–9
	1842–5

Although in the reference expansion 1819–25 stage III–V shows net decline, there is a rise from 1824 to 1825. With this exception, as well as the very slight rise in 1839, it will be seen that this array conforms exactly to our designation of major and minor business cycles. It may be said broadly, then, that a major cycle expansion was required before the average price of domestic exports rose; and this holds for the war years as well as for the period after 1815.

The average rate of decline is slightly greater in stage I–III than in stage V–VII. This is due principally to the counter-cyclical rises in 1811

prices in the period between 1694 and 1810. The enormous increase in the volume of cotton exports, in conjunction with the high 1694 price, gave them a greater weight in the official than in the real value series, where the secular fall in price partially counterbalanced the increase in volume. This sort of discrepancy in weighting probably explains the strange rise in the ratio in 1811, a year when prices, on the whole, fell sharply. That movement is the only flagrant error that results; but this calculated average price must be used with caution.

[1] The relative average rates of movement in stages I–III and III–V in this index differ from the raw cotton and cotton piece goods series which, although they also decline in all stages, show greater III–V than I–III average contraction. The contrary relative movements of iron, copper, and other export prices were sufficient to alter the behaviour of total export prices as compared with that for cotton goods. And, even among cotton manufactures exported, the average price of yarn (of lesser importance than piece goods) exhibits lesser decline in stage III–V than I–III.

Figure 18

Price of British Pig Iron

------ 10 Specific Cycles: 1793 - 1843

——— 13 Reference Cycles: 1793 - 1848

Conformity: + 46, + 31, + 32

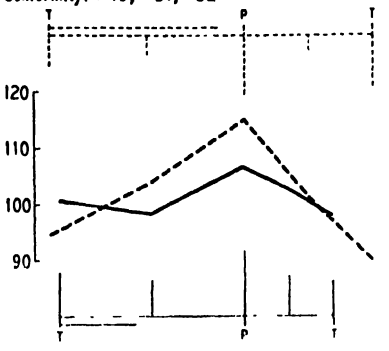


Figure 19

Price of British Bar Iron

------ 12 Specific Cycles. 1798 - 1850

——— 13 Reference Cycles 1793 - 1848

Conformity 0 , + 23, + 20

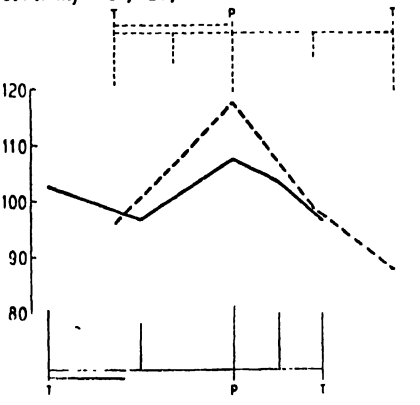


Figure 20

Price of Sunderland Coal

------ 10 Specific Cycles 1797 - 1846

——— 12 Reference Cycles 1797 - 1848

Conformity - 25, + 33, + 17

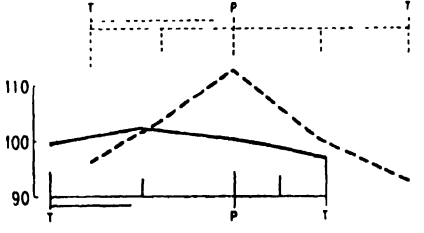


Figure 21

Price of British Manufactured Copper

------ 9 Specific Cycles 1802 - 1849

——— 13 Reference Cycles 1793 - 1848

Conformity + 8 , + 31, + 48

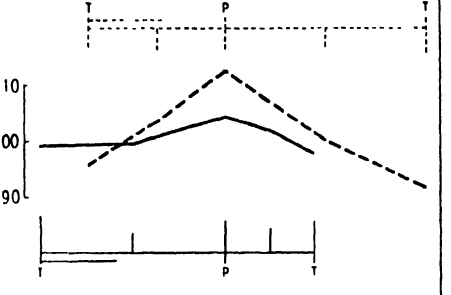


Figure 22

Price of Fir Timber, Including Duty

------ 12 Specific Cycles 1792 - 1843

——— 13 Reference Cycles 1793 - 1848

Conformity 0 , + 46, + 16

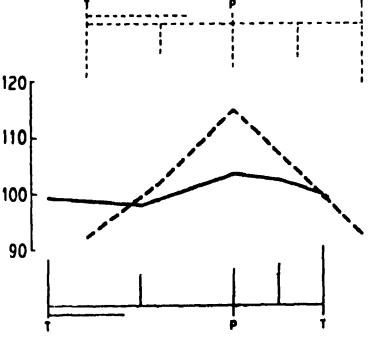


Figure 23

Price of British Leather Butts

------ 9 Specific Cycles 1794 - 1838

——— 13 Reference Cycles 1793 - 1848

Conformity. + 15, + 38, + 44

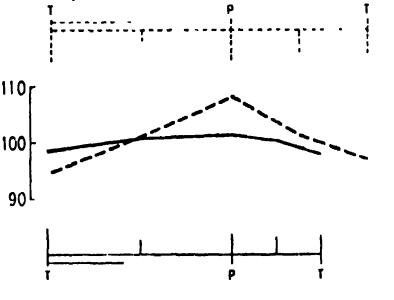


FIG. 137 *e*

and 1847. Nevertheless, the series is best designated as average I–V expansion. In nine of eleven reference expansions stage III–V shows a greater rate of increase or lesser rate of decline than stage I–III. In only one case (1815) is there a movement contrary to that pattern.[1] The other exception occurs in the reference expansion from 1829 to 1831, when the average rates of decline in stages I–III and III–V are equal. In only four of eleven reference cycles is there either a net increase or a lesser rate of decline during reference contraction than during the previous reference expansion: 1803–8, 1808–11, 1811–16, 1816–19.

The indexes of conformity to a I–V pattern are negative for expansion, positive for contraction, and all business cycles. But the many exceptions indicated by them emphasize once again that annual prices are a poor cyclical indicator in a rapidly advancing economy.

A: 13-16. Price of Cotton Yarn Exports; Price of Cotton Piece Goods Exports; Price of Raw Cotton, including and excluding Duty (Annual)

Specific-cycle Behaviour. The cost in Britain of raw cotton was the most important single factor in determining the price movements of manufactured cotton goods. The long period decline of the latter was, of course, aided by the rapid mechanization of the industry; and wage movements, in their relative stickiness, tended to make the secular decline in manufactured cotton prices somewhat less than in raw cotton. The two types of prices, however, are properly to be analysed together.

Specific cycles in the price of raw cotton (both including and excluding duty) are of about the same average duration as for production series, except that contraction is the longer phase. Their amplitude, because of the striking secular decline, is relatively larger, with movement in the contraction phases much greater than in expansion. The secular trend is downward except from 1790 to 1799.[2] It proceeds, however, at varying rates, with the decline from 1799 to 1811 and from 1835 to 1845 considerably less rapid than that from 1814 to 1828. The only protracted interruption occurred from 1828 to 1835.

[1] Prices reached their peak in 1814, but owing to large exports to the United States in 1815 (after the end of the War of 1812), the reference peak has been taken as 1815, although the continental markets were already depressed in that year. In most cycles where prices rose at all, the peak year conforms to the reference peak; e.g. 1825, 1836, 1845.

[2] Tooke's explanation of the movements of the cotton price in this period can hardly be improved upon (*High and Low Prices*, Pt. IV, pp. 21–3): 'The price rather fell during the first years from 1793. The rise subsequent to 1795 was owing to scantiness of supply, the average importation for five years, from 1793 to 1798, both years included, having been less than in the five years preceding 1793. This scantiness of supply occurring at a time when there was a great demand, partly speculative, for our cotton manufactures to the Continent, prices rose nearly 100 per cent., but fell again on the great recoil of the Hamburg speculation in 1799. . . . It would be difficult for the most determined advocate for either of the exclusive theories of currency or war demand, to bring the fluctuations of this article in aid of their systems.'

The changes in duty on raw cotton are listed fully elsewhere.[1] Broadly, the duty was raised progressively from 1798 to 1809, with the exception of the period of peace in 1801–2, when the duty was completely removed. From 1809 to 1845 the duty was lowered, and removed in August of the latter year. The cotton price, excluding duty, thus exhibits a slightly lesser peak in 1799, and a greater fall to 1809. From 1809 (the peak for duty on cotton) until 1845 the secular decline in the raw cotton price excluding

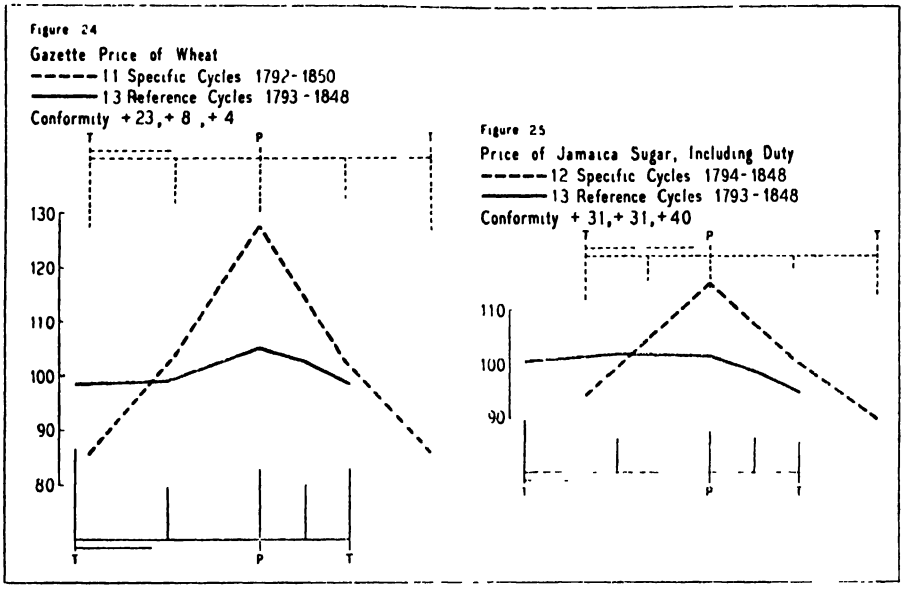


FIG. 137*f*

duty is less. After 1845, of course, the two series coincide. The only specific-cycle turning-point shifted by the exclusion of duty is the trough in 1803, created, in the inclusive figure, by the rise in duty imposed in July of that year. The raw cotton price excluding duty has its trough in 1804.

The average declared values of yarn and piece goods exports are fair measures of the price of manufactured cotton goods. They show, over comparable periods, cycles of longer average duration and lesser average amplitude than those of raw cotton. The average duration and amplitude of rise are extremely small. The downward secular trend of piece goods is greater than for yarn—both measured from 1820. Piece goods were the product of a more advanced stage of manufacture, and their greater decline is probably to be attributed to the effects of the progressively increased use of machinery after 1820. It is significant that the downward trend in the yarn price is almost identical with that in raw cotton, which may indicate that the principal improvements in the technique of its manufacture came before 1820. Both series, in the interruptions to the downward trend, seem

[1] See Vol. I, p. 480.

to reflect the raw cotton price movements: piece goods in 1825, 1829, 1833–5, 1847; yarn in 1818, 1825, 1831–6, 1843–4, 1847.

Reference-cycle Behaviour. The raw cotton price (including duty) exhibits average decline in all reference stages. The averages of the average standings are progressively smaller; i.e. the greatest average decline comes in stage VII–IX, the next greatest, V–VII, &c. Stages I–V were therefore matched with reference expansions. The series has negative conformity to reference expansions, but, rather surprisingly, it exhibits only fairly good average conformity to reference contractions; i.e. there are a number of cases of rise during reference contractions, 1796–7, 1806–8, 1828–9, 1831–2.[1] The rise in 1797 (confined to the latter months of the year) probably indicates the response in Britain to the end of the financial crisis of the early months. In the following year both cotton imports and manufactured exports rose sharply as the Hamburg trade expanded.[2] The rise in 1808, on the other hand, reflects the American Embargo. It is accompanied by a large decline in the volume of imported cotton at a time when manufactured cotton exports increased.

The price rises in 1829 and 1831 are probably related to the extraordinary increase in cotton exports (broken only in 1831) that runs from 1826 to 1836. Imports declined in both 1829 and 1832. In these cases, then, the price rise may represent merely the divergent movements of supply (imports) and demand (exports). It is, however, difficult to establish whether the decline in imports was due to inadequate American cotton crops or to tight money conditions in England.[3]

The behaviour of the cotton price from 1831 to 1835 would seem to indicate that, to some extent, the increase in the demand from the British cotton industry was outpacing the increase in the American supply. If the percentage growth in British exports is set against the percentage growth in the American cotton crop, the following ratios emerge:[4]

1825–8 . .	0·54	Falling raw cotton price
1828–35 . .	0·81	Rising raw cotton price
1835–42 . .	0·47	Falling raw cotton price

[1] In addition, there is a counter-cyclical rise from 1845 to 1847, more than outweighed, however, by the decline in 1848.

[2] Tooke, *High and Low Prices*, Pt. IV, pp. 22 and 76.

[3] For estimates of the American cotton crops, see Donnell, *History of Cotton*, p. 170; for the minor monetary difficulties of these years, see Vol. I, pp. 234–8.

[4] Donnell, p. 302. The figures given are percentage growths between the same years:

	Growth of British exports	*American cotton crop*
	(*in per cent.*)	
1825–8 . .	14	26
1828–35 . .	56	69
1835–42 . .	17	36

The relationship, unfortunately, cannot be traced back beyond 1825: 'previous to this year (1825) there were no full and reliable statistics, either commercial or official, of the cotton production and trade (American)' (ibid., p. 101).

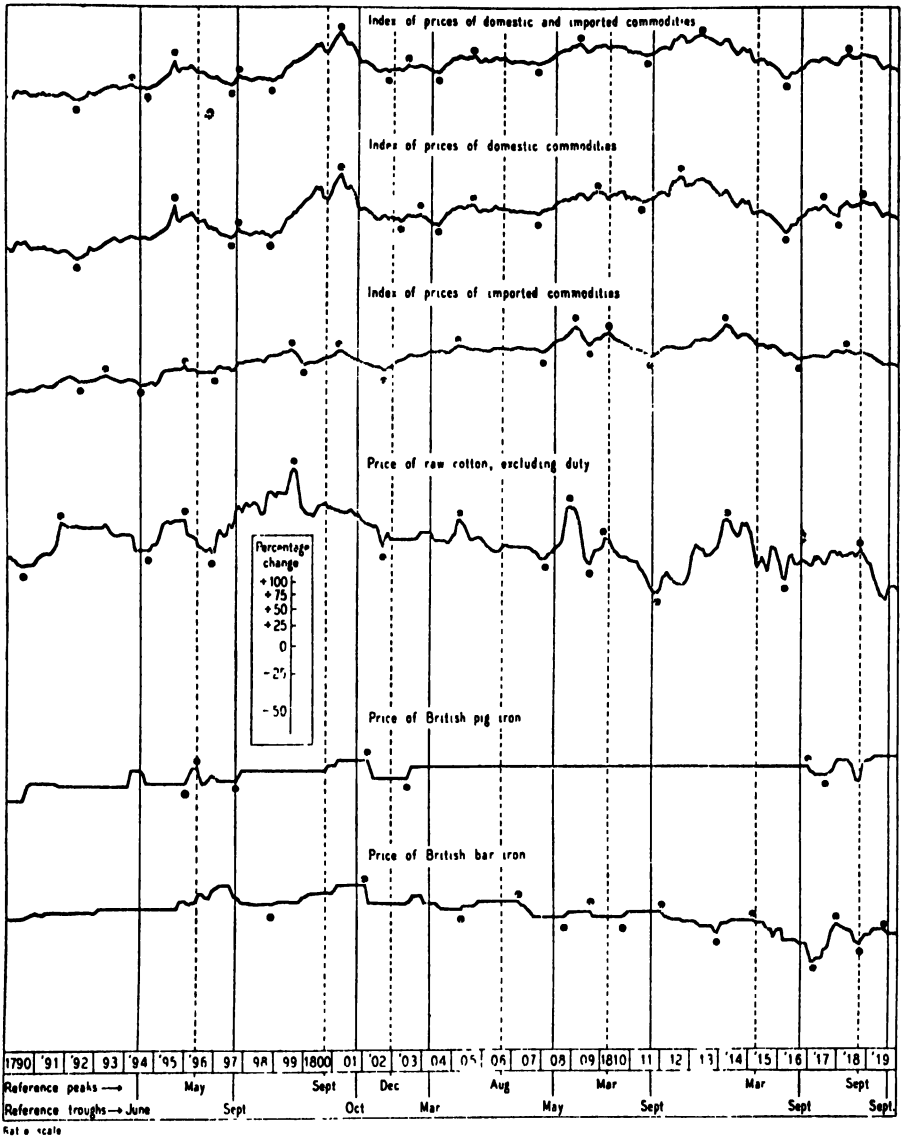


FIG. 138 *a*. Monthly Commodity Price Series

There were, of course, other variables. An increasing volume of the American crop was employed at home, a circumstance which would tend to accentuate this relationship; but, as well, Britain was receiving increased amounts of cotton from other sources.[1] Nevertheless, the counter-secular

[1] The United States furnished so large a part of the British raw cotton supply that it is doubtful if other sources counteracted its influence in any very important way during these years. In 1821 the United States supplied 71 per cent. of the total; in 1825, 61 per cent.; in 1828, 67 per cent.; in 1835, 78 per cent.; in 1842, 78 per cent.

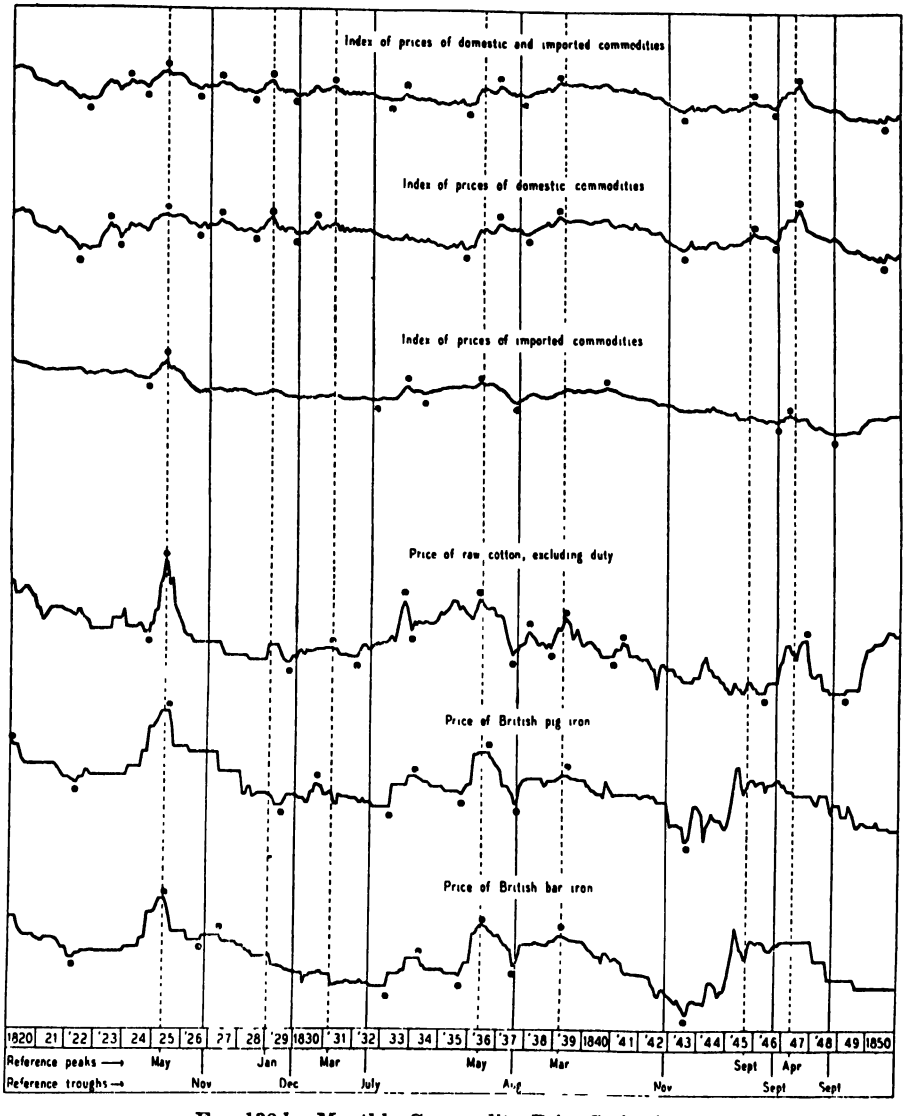


FIG. 138 *b*. Monthly Commodity Price Series (cont.)

movement of the cotton price from 1828 to 1835 is probably to be explained by this relationship, as is the resumption of the downward trend after 1835; for the thirties saw in the United States a mighty surge into the farther reaches of the New South.

The principal upward movements, after 1835, occurred in 1839 and 1846–7. The rise of the cotton price in 1839 was a direct outgrowth of the British-financed American cotton speculation of that period; while the rise in 1846–7 was caused by diseased American crops and the money market

crisis in England.[1] In 1847 the price rise was accompanied by a sharp fall in raw cotton imports. In general, then, the raw cotton price was, at best, irregularly, sensitive to general business conditions.

The piece goods price is more sensitive to reference-cycle movements than either yarn or raw cotton prices. It exhibits perfect conformity to contractions and all business cycles: in net, it declines during all expansions (except 1832–6), but the rate of decline is consistently smaller than in the preceding and following reference contractions. The slight rise in the price of yarn, in 1832 (reflecting the rise in raw cotton) alone, is responsible for that series' lesser conformity.

B: 4. Price of Raw Cotton, excluding Duty (Monthly)

Specific-cycle Behaviour. The monthly price of cotton (excluding duty) exhibits five more specific cycles than the annual series. The average duration, as a result, is shorter than for annual production series. It is approximately equal to the average duration of import series which, even when taken annually, reflect the speculative character of the markets which determined their flow. The average amplitude and the rate of change of the monthly cycles is, of course, much larger than for the annual cycles.

Reference-cycle Behaviour. The average pattern rises during stages VIII–III and IV–V. Cotton prices increased most consistently during stages I–III and IV–V; the price fell most regularly during stages V–VII. There were random fluctuations in each reference cycle and in only one cycle did the cotton price rise without interruption from VIII–V and decline without interruption from V–VIII. The indexes of conformity to this pattern, nevertheless, are positive and moderately high, unlike those obtained for the annual series. The conformity to reference expansion is better than to reference contraction, again contrasting with the results yielded by the annual pattern.

The tendency for the price of cotton to rise in anticipation of the upturn in general business did not manifest itself so clearly in the annual as in the monthly series. This lead occurred in seven of the fourteen reference cycles. The average rate of rise was greatest from I–III, while the rate of decline was greatest from V–VII.

A: 17. Price of Southdown Wool

Specific-cycle Behaviour. The average duration of specific cycles is only slightly greater than for reference cycles: three reference cycles are not reflected by changes in the direction of the movements of this series: 1801–3, 1826–9, and 1829–32; while it contains two specific cycles for which there are no equivalent reference cycles: 1791–3 and 1822–4. The average amplitude of movement of the wool price is fairly large, exceeded only by wheat and cotton among the series analysed. The net secular trend

[1] Donnell, pp. 339–40.

is downward, with a peak in 1810. There is a substantial rise in the thirties, followed by a but slightly broken fall to 1848.[1] The failure of the price to rise during the forties, when the woollen industry was expanding rapidly, may be attributed essentially to the increased supplies of raw wool, in part from Australia.[2]

Reference-cycle Behaviour. The domestic raw wool price, although its movement was strongly influenced by supply conditions, emerges as a highly sensitive cyclical series. If a I–V pattern is applied the index of conformity to all business cycles is perfect, those for expansion and contraction are positive and fairly high.[3] Specific-cycle turning-points do not coincide in all cases with the reference dates, and there are several cases of counter-cyclical movements; but the relative rates of movement conformed even when the direction of movement did not. But for the rises in price in 1801, 1803, and 1832 the index of conformity to reference contractions would be perfect; but for the net declines in the course of the reference expansions 1819–25, 1829–31, and 1842–5, conformity to reference expansions would be perfect.

A: 18. Price of British Pig-iron (Annual)

Specific-cycle Behaviour. The rather long average specific cycle for the price of pig-iron stems largely from the constant figure for the period 1804–15. If the average duration is taken omitting that period (the specific cycle, 1802–17) the figure is 46·7 months, considerably less than for the price of raw cotton. The average amplitude of movement is less than for cotton prices. The average duration of rise is greater than that of fall; if the period 1802–17 is removed, the average durations of expansion and contraction are nearly the same.

From 1790 to 1801 there is an upward secular trend in the price of pig-iron. The dependence of the industry on imported iron, for the most part from Sweden, largely explains this movement. The peak in the imported iron prices comes in 1801 (excluding duty). Rising labour costs and interest rates, as well as (from the side of demand) government munition orders were other price-raising factors in these years.

[1] For an account of the rise in the domestic wool price from 1829 to 1832, see Vol. I, pp. 226–8; for the continued, but lesser increase to 1835, ibid., p. 265. H. Heaton emphasizes, as an explanation for the rise in the wool price in the thirties, a falling off in the raw wool supply in the years after 1825. The low prices of that period apparently discouraged the British wool growers who 'neglected their flocks and turned their attention elsewhere. A bad attack of sheep rot in 1831 had depleted flocks still further, and British wool production fell to a low level.' ('An Early Victorian Business Forecaster', *Economic History*, Jan. 1933, pp. 562–3.)

[2] See above, pp. 789–90, the analysis of raw wool imports.

[3] The explanation for this high degree of cyclical conformity seems to lie in the almost complete inelasticity of the raw wool supply. Heaton's forecaster wrote in 1844 (loc. cit., p. 560): 'Wool is a raw material perhaps more sensitive to variations in the demand than any other. Its quantity can neither be readily diminished nor increased.' Trend movements, however, as we have seen, were affected by changes in supply conditions.

Figure 1

Index of Prices of Domestic and Imported Commodities

------ 19 Specific Cycles: 1792-1850

——— 14 Reference Cycles: 1794-1848

Conformity: +57, +71, +81

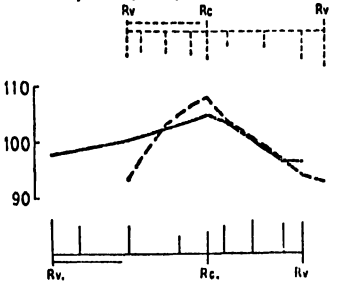


Figure 2

Index of Prices of Domestic Commodities

------ 18 Specific Cycles: 1792-1850

——— 14 Reference Cycles: 1794-1848

Conformity: +57, +71, +70

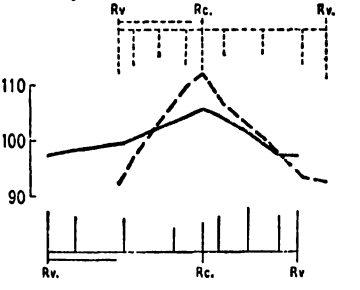


Figure 3

Index of Prices of Imported Commodities

------ 14 Specific Cycles 1792-1848

——— 14 Reference Cycles: 1794-1848

Conformity: +50, +57, +74

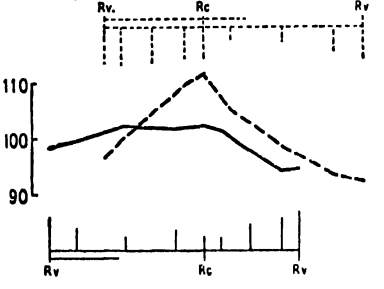


Figure 4

Price of Raw Cotton, Excluding Duty

------ 17 Specific Cycles 1790-1849

——— 14 Reference Cycles 1794-1848

Conformity. +43, +29, +52

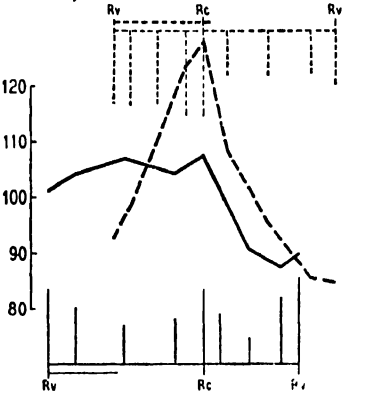


Figure 5

Price of British Pig Iron

------ 8 Specific Cycles 1790-1801, 1817-1843

——— 11 Reference Cycles 1794-1804, 1816-1848

Conformity +36, +27, +10

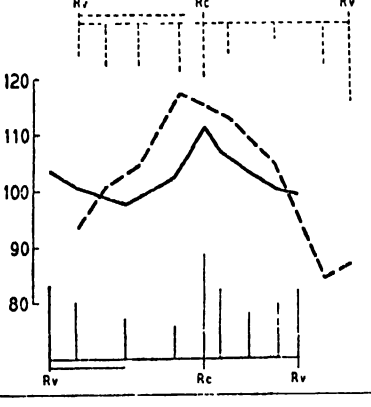


Figure 6

Price of British Bar Iron

------ 12 Specific Cycles 1798-1813

——— 14 Reference Cycles 1794-1848

Conformity +29, +57, +52

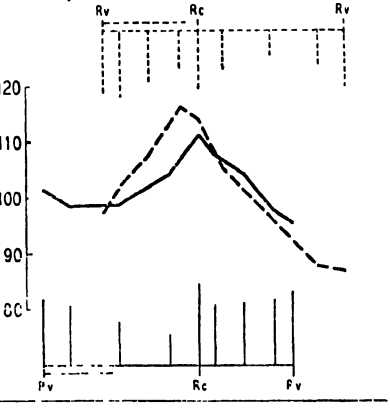


FIG. 139. Cyclical Patterns of Monthly Commodity Price Series

The downward secular trend over the whole period is much less than for cotton. Pig-iron is one of the very few price series with a secular peak beyond 1814 (1825). Technical advance in the production of pig-iron was less rapid than in the manufacture of bar-iron and in finished iron goods. The secular decline, as measured from 1815 to 1850, was slightly greater for bar- than for pig-iron, and substantially greater for the average price of hardware, cutlery, &c., exports, than for pig-iron.

The comparative rigidity of the pig-iron price is attributable to the prevalence of price-fixing in the industry. Combinations among ironmasters in the midlands, South Wales, Yorkshire, and Derbyshire were formed towards the end of the eighteenth century, with the aim of regulating the price and conditions of sale of pig- and bar-iron. Gary dinners were regularly held to fix prices over considerable periods. From 1804 to 1816 the monopoly control of the pig-iron price appears to have been completely successful, for the price was absolutely constant during that period. Bar-iron, however, was less susceptible of regulation, and individual producers appear to have broken away from time to time.[1] The price break in 1817, following upon the cessation of war orders, was temporarily ended by the development of a new demand for iron from the gas-light industry; but price cutting began again in 1820. By 1822 the price of pig-iron was lower than it had been in any year since 1791. The price staged an impressive recovery during the boom of 1824–5, reaching, in the latter year, its high point for the whole period 1790–1850.

The high tariff on foreign bar-iron gave added protection to the trade associations during their ascendancy. The gradual lowering of the duty (beginning January 1826) paralleled the decline in the monopoly powers of the combinations. Ironmasters' meetings were still arranged, but the combinations could not count on the loyalty of individual producers to the same extent as during the war period. The price of pig-iron fell except during the latter stages of cyclical expansions.[2]

Reference-cycle Behaviour. The pig-iron price exhibits average decline in all stages except III–V. A rising rate in stage III–V (over and above stage I–III) appears, however, in only four reference expansions: 1816–18,[3] 1819–25, 1832–6, 1842–5. On much wider evidence these have been designated as major cycle expansions. A strong pressure from the side of demand

[1] The ironmasters of South Wales held meetings at Newport, fixing prices for foundry and forge pigs and for bar-iron each quarter from 1803 onwards. In 1810 the prices were left 'open for every one to sell as he likes' (Ashton, pp. 177–8). The author mentions frequent complaints of underselling made against members of the Yorkshire and Derbyshire industry.

[2] Ashton gives the best available description of the activities of the combinations of producers in the iron industry (pp. 177–85). Tooke (*High and Low Prices*, Pt. IV, p. 38) notes a 'singular degree of uniformity' in this period, but fails to explain the agency responsible.

[3] Iron price movements from 1817 to 1822 were affected especially by variations in the French demand. The counter-cyclical rise in 1819 is explained by Tooke as having been caused by 'a considerable demand on a very extensive scale' in that year (op. cit., Pt. IV, p. 38). In 1820 the French government virtually cut off iron imports into the country.

on the price of iron might be expected from the nature of the latter stages of expansion of such cycles, involving, as they did, large-scale investment in new fixed capital. It will be recalled, as well, that the volume of iron exports, too, exhibited a greater III–V than I–III expansion, especially in the major cycles after 1815. Thus an increased foreign demand could be expected to supplement the domestic pressures on the pig-iron price in those III–V stages.

In the reference cycle 1793–7 the iron price shows I–V conformity. The abnormal rise in price in 1801 was probably connected with the imposition of an embargo by Russia on iron exports as well as an increase in the import duty.[1] The counter-cyclical decline in 1802 was almost certainly a consequence of the temporary peace which existed through the greater part of that year. The constant price from 1804 to 1815 (in fact to December 1816) indicates a remarkably rigid monopoly control.

Unlike cotton the pig-iron price shows positive conformity to both reference expansions and contractions. But for the period of constant price, the indexes of conformity would be considerably higher. After 1815 there are only two counter-cyclical movements: the rise in 1819, and the fall in 1826–8 at a greater rate than during the following contraction. The first deviation has been explained in terms of special movements in the French demand; the second has been traced in the *History*.[2]

B: 5. Price of British Pig-iron (Monthly)

Specific-cycle Behaviour. The monthly series for pig-iron prices exhibits one cycle less than the annual series owing to the omission, for formal technical reasons, of the movement from 1793 to 1795.[3] The average amplitude of the monthly cycles is, of course, much larger than for the annual cycles; and the net falling secular trend, as reflected in the downward tilt of the specific-cycle pattern, is much more pronounced. The average duration of expansion is less than that of contraction.[4] There are no clear-cut leads and lags at turning points.

Reference-cycle Behaviour. The average pattern rises only during stages III–V. This tendency of pig-iron prices to rise during the later stages of expansion is fairly typical, occurring in the cycles 1797–1801, 1816–19, 1819–26, 1832–7, 1837–42, 1846–8. Only the two minor cycles (1826–9 and 1830–2) show clear-cut declines during those reference stages. The fall of the pig-iron price during the early stage of reference revival is much more consistent than its decline in the latter stages of reference contractions.

[1] Tooke, Pt. IV, p. 37.

[2] Vol. I, pp. 229–32.

[3] This cycle, which appears clearly in the annual price series only, was omitted from the monthly analysis because of its brief duration. The price shows an actual expansion during the one month from Jan. to Feb. 1794, remains constant for four months until June, declines for two months, and then remains fixed from Aug. 1794 to Dec. 1795 (at which point we date the first cycle).

[4] All monthly measures are exclusive of the period of constant prices from 1803 to 1817.

A: 19. Price of British Bar-iron (Annual)

Specific-cycle Behaviour. Principally because it does not share the long period of constant price (1804–16), the average duration of specific cycles of iron bars is shorter than for iron pigs. From 1790 to 1802, however, iron bars exhibit two less specific cycles than iron pigs. After 1817 the only differences in the direction of movement of the two series are the failures of the price of iron bars to rise with pig iron in 1830 and to fall in 1847. For the same reason, and because its downward trend is greater, the average amplitude of movement of bars is greater than for pigs. The fact that the monopoly control of the bar-iron price was less successful than in the case of pig-iron has been mentioned above. Regulation of bar-iron collapsed in 1810, was resumed again in 1811, and continued until 1824 when the meetings of the South Wales producers were terminated.[1] From 1811 to 1824, however, the price fluctuated considerably, arguing the absence of complete control by the trade association over the price policies of individual ironmasters. In view of technical improvements in the iron industry it is not surprising that semi-manufactured iron (bars) should have fallen more in price than pigs. The downward trend is evident from 1801 (the secular peak) and is broken significantly only during the subsequent major cycle expansion.

Reference-cycle Behaviour. The powerful downward trend in this series makes for a higher conformity index to reference contractions than reference expansions, when a I–V average pattern is applied. During the war years (especially before 1803) when the industry depended heavily on foreign iron-ore supplies, the pattern is highly irregular. The rise in 1797, 1801, 1803, and 1811, in addition to the counter-cyclical increases in 1819 and 1846–7, make for some traces of a III–VII expansion pattern.

This sequence of movement is strengthened by the tendency of the iron price to rise rather late in the course of reference expansion. After 1816 there are five of seven instances of I–III contraction. The average pattern, in fact, shows absolute increase only in stage III–V. The indexes of conformity to a III–VII pattern are higher for reference contraction and all business cycles than when I–V is applied. In only one case (the continued rise in 1846–7), however, can the rise in the iron price in stage V–VII be related to a demand which lagged beyond the reference-cycle turning-point because of the long period of gestation of capital construction involving the use of iron.[2] It is the fortuitous behaviour of the iron supply during the war years which essentially determines the higher mathematical conformity to a III–VII pattern. I–V better describes its typical cyclical behaviour.

B: 6. Price of British Bar-iron (Monthly)

Specific-cycle Behaviour. There are an equal number of cycles in the monthly and in the annual series. The greater average amplitude of the

[1] Ashton, pp. 177–8.

[2] See Vol. I, pp. 320–3.

monthly cycles is, of course, to be expected. No consistent leads and lags at turning-points can be ascertained.

Reference-cycle Behaviour. The more detailed reference-cycle pattern yielded by the monthly data shows an expansion through stages II–V and a moderately high conformity to this pattern. The average rate of rise in stages II–III is slight, yet it contrasts with the pattern for pig-iron which, on the average, does not rise until stage III. Except for this difference the reference-cycle patterns of the two series are rather similar.

A: 20. Price of Sunderland Coal

Specific-cycle Behaviour. The coal price contains an average cycle somewhat longer than that for cotton and for pig-iron (excluding 1804–15). Its average amplitude of movement is less than for either cotton or iron. The upward secular trend (to 1814) is greater than for iron prices in that period, and, of course, for cotton, which fell from 1799. Although there was considerable expansion in the number and output of mines, the coal industry enjoyed no technical advance comparable to that in the iron industry; nor did it experience the decline in raw-material costs which affected the cotton trade. The partial dependence of the coal price on coastwise shipping rates—raised during the war years—helps to explain this greater upward trend. There is no reason to believe that canal rates—which might have influenced the iron price—moved comparably. In fact, the canal building (in the early nineties especially) probably yielded lower rates in the ensuing years. Finally, the price of coal was subject to greater relative taxation than either iron or cotton.

The downward movement after 1814 (interrupted strongly from 1833 to 1837) is greater than for pig-iron measured from that date, but less than the decline in the average export price of manufactured iron. Falling transport costs, lower taxes, and a great expansion in the scale of the industry explain this movement. But if reductions in the coal tax are excluded the secular fall from 1814 is less, even, than for pig-iron. From about 1828 the falling tendency was reinforced by the weakening control of the Newcastle Vend, the mine-owners' monopoly association.[1]

Reference-cycle Behaviour. The average standings show a rise only in stage I–III. This is a puzzling pattern. Since the iron industry was the largest coal consumer one would expect to find a concordance in the behaviour of the two prices: i.e. an average rise in stage III–V. For coal the most consistent movement is the decline in stage III–V.

Average declines in stage III–V occur in the following instances: 1806, 1810, 1815, 1818, 1825, 1828, 1831, 1839, 1845. In only three cases is there a III–V expansion (1800, 1802, 1836). The explanation for the average III–V decline seems to be partially in the behaviour of the coal monopoly. In the years when the Vend area virtually represented total coal output

[1] See Vol. I, pp. 232–3, 262–3, 293, 323–4.

the mine-owners there were quick to co-operate during mild depression and in the early stages of recovery.[1] There would appear, however, during periods of prosperity, a persistent tendency for the controls to lapse. Like the Newport iron manufacturers in the boom year 1810, the price was 'open for every one to sell as he likes'. The supply conditions in the coal industry were apparently such as to yield, under those competitive conditions, a fall in prices despite general prosperity. This process can be traced clearly only in 1824–5 and possibly in 1827–8; and on the basis of the iron monopoly's behaviour it may be concluded that 1810 was another such case. In addition, the final break-up of the coal monopoly in 1845 (and the fall in price in that year) resulted from exactly this process of production by members of the Vend, beyond the agreed limits, in response to a prosperity demand.[2] In the cycles with peaks in 1818 and 1839 there is no rise in stage I–III, so that they do not conform to the average pattern. The decline in 1831, further, is a consequence largely of the removal of the government tax on sea-borne coal, while the decline in 1815 is, in part, to be associated with a reduction in that tax.[3]

The index of conformity to reference contractions is positive, but does not represent very uniform behaviour. The series, in net, rises during the following contractions: 1802–3, 1806–8, 1836–7. The first two cases probably reflect the war influences then operative; in the latter instance the coal price declined during a part of the year (1837), probably reflecting a declining industrial demand. The higher average price for 1837 as a whole, however, may be considered, in part, a result of the successful workings of the monopoly controls. The coal price, like iron, rose in 1847, but the fall in the following year produces net decline for the reference contraction 1845–8.

This price is of considerable interest because, until 1845, it was affected by monopoly controls. The evidence is such, however, that one can generalize little about the net consequence of their influence. Prima facie its lesser amplitude of movement than iron would seem significant; but it must be remembered that coal was a consumers' as well as a producers' good. McCulloch concluded that the monopoly price was no greater than a competitive price would have been.[4] A more recent analyst states:[5]

> It is obvious at a glance that the Limitation did not significantly distort the trend picture. It is still, of course, conceivable that the absolute height of either the quantity or price series, or both, might have been different had there been no regulation; but, as has already been pointed out, this cannot be put to any test and is therefore a mere speculation.

A final significant characteristic of this series is that, after 1819, the most substantial rises come in the major cycles. During the minor cycles (1826–9,

[1] At several points, however, severe depression tended to weaken the monopoly controls, notably 1828–32 and 1838–42.

[2] See Vol. I, pp. 323–4.

[3] For a list of changes in the government tax on coal, see Sweezy, p. 38 n.

[4] Op. cit., i. 357.

[5] Sweezy, pp. 161–2.

1829–32, 1837–42) the secular decline was, at best, only slightly interrupted. The close connexion between the coal and iron industries is a sufficient explanation for this phenomenon, which might, in fact, have been expected to appear more strongly than it does.

A: 21. Price of British Manufactured Copper

Specific-cycle Behaviour. The copper price (copper sheets) has the longest average specific cycles of any of the price series thus far analysed except cotton yarn. The average amplitude of movement is, however, rather small. The average amplitude and duration of rise are less than for fall. Although the trend is clearly downward from 1805 to 1850, the price is higher in 1850 than in 1790; in other words, the rise from 1790 to 1805 was not completely obliterated in the ensuing years. Copper prices show a greater amplitude of movement than copper production, although a lesser amplitude than copper exports. It should be remembered, however, that the production figures represent ore, while the price represents semi-manufactured copper, and exports, manufactured brass and copper goods.

Reference-cycle Behaviour. Like the iron price, copper shows greatest average expansion in stage III–V. There is very slight average expansion in stage I–III. Although it does not appear in the average pattern there is some tendency towards III–VII conformity. This is most clearly evident in the cycles 1816–19, 1837–42, and 1842–8;[1] but the concentration of contraction in stage I–III in the reference cycle 1819–26 also indicates this typical capital goods tendency. The average decline in stage V–VII is less than VII–IX, a characteristic also of the price of iron. Nevertheless the series has been matched with stages I–V.

Tooke's description of the forces operating on the copper price follows:[2]

> Copper is an object of expenditure by government for the purpose of bolts and sheathing to ships of war. The transports which were in the government service were, likewise, mostly required to be copper sheathed. The price, accordingly, advanced upon the breaking out of the war, although not very considerably during the first few years of it. In 1796 a new source of demand arose from the measures taken by government for a new copper coinage, which was partially issued in 1797. The greatest advance, however, took place in 1805, when an increased demand for the purposes of a fresh coinage, which was issued in the following year, in sufficient quantity to fill the circulation, added to the other sources of demand, gave rise to an extensive speculation, and drove the price up to £220 per ton, a height which it never exceeded, and rarely afterwards reached. After 1808 it fell nearly progressively till the termination of the war, during the two last years of which it was at £130 and £135 per ton. . . . It rose a little, for a short time, upon the peace in 1814, and again in 1817. This last considerable rise was in consequence of a demand for export. The subsequent decline is easily

[1] To these might be added the fact that in the period 1790–1801, when the series fails to show any absolute decline, a sharp slackening in the rate of rise occurs in the year after the reference troughs: i.e. in 1794 and 1798, not 1793 and 1797.

[2] *High and Low Prices*, Pt. IV, pp. 24–5.

accounted for: first, by a greatly increased produce in this country, and, secondly, by a new foreign source of supply to Germany and France, and to the East Indies, which, till 1819, were almost exclusively supplied from hence.

From 1825 on, the downward secular trend continues. As in the prices of coal and iron, the largest rises can be associated with the major cycle expansions. The gentle rise in price from 1838 to 1841 probably represents an increased demand for copper during the shipbuilding boom of those years. The delayed copper price peaks in 1819 and 1847 may also be associated with ship-building.[1] The steady decline from 1825 to 1831, however, ignores the minor cycle expansions, 1826–8 and 1829–31. The tonnage of new ships built also declined from 1825 to 1830, but rose, unlike the copper price, in 1831.

The index of conformity is lower for expansion than for contraction but is positive in both instances. The index of conformity for all business cycles is higher than for either expansion or contraction, indicating that in certain instances changes in the rate of movement conform to the reference pattern, although absolute movements do not.

A: 22. Price of Fir Timber, including Duty

Specific-cycle Behaviour. From 1790 to 1807 the price is for Memel pine; after that date the American timber price is given. In 1808 the virtual closing off of the Baltic forced British importers to shift rapidly to the American sources of supply. Memel timber in that year was virtually unavailable, its price astronomically high.

The average duration of timber-price specific cycles is longer than for timber imports, and its amplitude of movement is considerably smaller than for imports. The average amplitude and duration of rise are about equal to the amplitude and duration of fall. The price in 1850 is very close to the price in 1790. There is, however, a very sharp upward secular trend from 1790 to 1809, a sharp decline from 1814 to 1820, and a slight secular fall thereafter, broken decisively only in the prosperity phases of the major cycle expansions (1820–5, 1833–9,[2] 1843–5).

Tooke thus describes the influences playing on the supply side of the imported timber market from 1790 to 1823:[3]

The chief ingredient in the value of fir timber, after deducting the duty, is the expense of conveyance. Upon the peace with America, in 1783, the price fell 50 per cent., and, after a little fluctuation, rose in 1791, upon the Russian armament, which raised freights in the Baltic, and occasioned apprehensions for the security of our intercourse with that quarter. There was no further advance during the two first years after the breaking out of the war with France. The rise in the autumn of 1795 was connected with an advance of freight, which was occasioned, at that time, by an unusually extensive employment of shipping for

[1] See above, p. 709 ('Tonnage of Ships built and registered in the United Kingdom').

[2] The timber price is higher in 1839 than in 1835–6. The brick-production series also seems to indicate that building was on an even greater scale in 1837–40 than in the previous expansion (1832–6).

[3] *High and Low Prices*, Pt. IV, pp. 71–3.

the conveyance of naval stores, and for the importation of corn. It then declined again, and, till 1799, was not higher than it had been in the American war. But, in 1799 and 1800, two causes combined to raise the price: viz. the advance in freights, which is always the consequence of large importations of corn; and restrictive regulations by the Emperor Paul against the exportation of timber, which were soon followed by a general embargo on the British shipping in the Russian ports. In 1806 the occupation of Prussia by the French was a fresh cause of advance, as it rendered one of the greatest sources of supply precarious. To this cause of advance was superadded another and still greater in 1808, by the hostility of Russia and Denmark, which excluded us from direct intercourse with the Baltic, and the freight alone of timber, in the course of that and the following year, rose, in some instances, to £10 per load. After the close of 1808, however, the high price having checked the consumption, and the license system having removed some of the difficulties of importation, the price fell considerably; but the freight and expenses of conveyance continued high, till the close of 1821. It was about this time that a heavy additional duty was laid on the importation of timber from the north of Europe, which operated as a great bounty on the shipment of timber from Canada. The importation from our colonies in America thenceforward increased rapidly, more especially after the peace with the United States, which had the double effect of reducing the rate of freight, and of bringing the timber of the United States through our colonies, duty free, into this country. These large supplies from that quarter, and the reduced cost of importation from the Baltic, sufficiently account for the subsequent fall. My observations on the fluctuations of fir timber have been confined to that from the Baltic. The American timber embraces a greater variety of qualities, and the variation in price may sometimes arise from the different qualities that happen to be at market.

Tooke's conclusions are drawn with respect to the timber price excluding duty. In addition to the cost-raising factors he enumerated, the duty rose in 1795, 1797, 1801, 1802, 1803, 1804, 1805, and 1806 on Memel pine; and in 1813, 1819, 1821, and 1840 on American pine. The total duty in 1840 was 10·5*s.* per load. In 1842 the duty was lowered to 1*s.*, largely accounting for the sharp decline in the average price in 1843.

Reference-cycle Behaviour. Unlike the timber import series, which exhibits rises in stages I–III and III–V, the timber price shows net average expansion only in stage III–V. Imports, however, show much more pronounced average expansion in III–V than in I–III, and this characteristic of capital goods series is shared by the price.

The indexes of conformity are low, especially for the expansion stages. During the war years the most important counter-cyclical movements are explained by the Peace of Amiens which yielded a fall in price due largely to a fall in freight rates, and the Baltic blockade of 1807–8, which caused a rise during reference contraction. Like many other price series the average for timber in 1809 and 1814 is greater than in the peak years 1810 and 1815. After 1815, however, the series is more consistent. In every reference expansion there is a rise in stage III–V; in each of the major cycle expansions there is absolute decline or no movement in stage I–III. In these

respects, then, the average pattern, after 1815, conforms closely to that for brick production and timber imports. It is significant, too, that the case of no net movement (reference expansion 1832–6) occurs in an instance when brick production rose from the first year of recovery. In all but two cycles after 1815 the price of timber exhibits absolute decline during contraction. The exceptions are the failure of the price to fall in 1829 and the rise in 1837. In both years timber imports rose slightly. In each of the three reference contractions which consist of more than one year the decline in stage VII–IX is greater than V–VII (1839–42, 1845–8) or the expansion is less (1806–8). The average pattern clearly reflects this tendency, which is also observable in brick production and timber imports.

A: 23. Price of British Leather Butts

Specific-cycle Behaviour. Leather butts were used very widely in the manufacture of leather goods, and their price is probably representative of the semi-processed material. The average duration of specific cycles is fairly close to that for the coal, copper, and iron prices. The average amplitude of movement, however, is very much less than for most other price series. In view of the fact that leather was used heavily in the manufacture of consumption goods sold largely at home, the lesser amplitude is not surprising. The price in 1850 is above that in 1790; but there is a gentle declining trend from 1813 to 1850 (although the absolute peak comes in 1824). From 1797 to 1800 there is a sharp upward movement. Trends calculated from 1790 to 1797 and from 1800 to 1813 would be, virtually, straight lines.

Leather, during the tanning stage, was one of the commodities (like bricks) subject to an excise. In 1812 the tax was raised from 1½*d.* to 3*d.* per lb.; in 1830 the tax was removed.[1] Both changes are reflected in the movement of the price of leather butts.

Total production in the British leather industry ranked third or fourth in total value, being exceeded only by cotton, wool, and possibly iron. However, only about 3 or 4 per cent. of Britain's leather output was exported, and hence export figures cannot be relied upon to cast much light on leather price movements.[2] Moreover, it is difficult to compare the movements of production for tanned hides and goatskins compiled by Selma Fine with the price series, not only because the Fine series refer to years ending 5 July, but also because the tanning data are in two parts. One series is based on an excise which was levied per dozen hides, the other based on a tax imposed per lb. There is little parallelism between the two series and no accurate summation is possible without some knowledge of the average weight of hides.

Reference-cycle Behaviour. On the average this series exhibits expansions during stages I–V with the more pronounced rise during stage I–III. Deviations from this pattern are more marked after 1819, though no reason for this shift in behaviour can be advanced. Since, in general, consumers'

[1] McCulloch, ii. 133. [2] Ibid., ii. 133–4.

goods prices do not conform as regularly to business cycles as producers' goods, the higher conformity before 1819 may well be the phenomenon requiring explanation. There seems to be some tendency for the peak in leather prices to anticipate reference-cycle peaks after 1819. This occurs in every cycle except the one which culminates in 1839.

On balance, the series shows higher conformity to reference contractions than to reference expansions. The index of conformity to all business cycles is higher than either the conformity indexes for reference expansion or contraction, indicating a tendency for rates of change to move cyclically even when absolute changes do not.

A: 24. *Gazette* Price of Wheat

Specific-cycle Behaviour. The wheat price contains cycles of longer average length than reference cycles [63·3 (15·1)]. Its average amplitude, as well, is greater than for most production and export series, but about the same as for raw-material imports. Among the price series it exhibits the largest average amplitude. Because of the long duration of its cycles, however, the average rate of change is only moderately large. The secular trend (in net, very slightly downward 1790–1850) may be broken into three phases: a rise from 1790 to 1812, a sharp fall to 1822, and a relatively constant secular level thereafter. The movements of the wheat price have been traced in some detail in the *Price* sections of the *History*. The productivity of the domestic harvest appeared as the most important single influence on its year-to-year fluctuations. The margin of foreign wheat available for import, and its cost, however, often affected the extent of price movements.

Reference-cycle Behaviour. The average standings vary greatly, and the reference pattern represents no very consistent central tendency. The most regular feature of the series' behaviour is the rise in stage III–V, which appears in ten of thirteen reference expansions. The exceptions occurred during expansions from 1801–2, 1811–15, and 1816–18. In five reference stages V–VII there is net rise in the wheat price (1800–1, 1815–16, 1828–9, 1836–7, 1845–7). An average III–VII pattern yields only a slightly lower conformity index for contraction, and a slightly higher index for expansion than I–V. The latter pattern has, however, a better index for all business cycles. Poor domestic harvests (which caused a rising wheat price) necessitated increased grain imports, and in most of the important financial crises there was an element of pressure from the drain of bullion to finance such imports.[1] Similarly, a low wheat price lessened the pressure on the money market. It is significant that the major booms of the twenties, thirties, and forties were all preceded by a sharp decline in the wheat price, indicating abundant domestic harvests.[2] Because of this connexion with

[1] See above, p. 792, 'Quantity of Wheat Imports'.

[2] For a contemporary observation on this relation, see James Wilson, *Fluctuations of Currency, Commerce, and Manufactures*, pp. 63 ff.: 'We must admit, that the first

business-cycle movements, and because, in five cases, the price rise continued through one or both contraction stages, the series, perhaps, may be better viewed as typically III–VII than I–V; however, the statistical measures yield no very uniform pattern of behaviour.

A: 25. Price of Jamaica Sugar, including Duty

Specific-cycle Behaviour. The duration of specific cycles varies widely, and the average [54·0 (20·0)] represents cases ranging from two to ten years. The long contraction from 1840 to 1848, especially, distorts the average. The average amplitude is moderate, closely approximating that for the price of timber, of the series analysed. Broadly there is a rise from 1790 to 1814, a secular decline thereafter, interrupted from 1831 to 1840. The net movement for the whole period is downward, but at a lesser average per month rate than for the prices of copper, coal, or cotton.

Tooke thus describes the forces affecting the price of sugar from 1790 to 1823. It will be noted that the principal price-raising factors until 1814, as in most other cases, stem from the supply side of the market:[1]

> Sugar has been very commonly referred to as an article, the variations of which might be brought to prove the effects of war demand, or of an indefinite depreciation of paper, as suited the views of the parties who maintained either of the exclusive theories. . . . It so happens that the first great rise in the price of sugar occurred at the close of 1791, before any idea was entertained of our being involved in a war with France; and in 1792 it reached as great an elevation as it ever afterwards attained, with two exceptions, viz. the period of the great Hamburgh Speculation, between 1796 and 1799, a period, be it observed, in which the circulation of paper is admitted even by the advocates of indefinite depreciation to have been remarkably contracted; and again the extravagant speculation on the prospect of peace in 1813 and 1814. The occasion of the rise in 1791 requires only to be mentioned to satisfy the reader that it was fully adequate to produce such an effect. The revolution in the French part of St. Domingo was the occasion of the destruction of all the sugar plantations in that island. . . . It was, therefore, the destruction of St. Domingo as a source of supply, and not the war, which conferred on our West India planters a monopoly of production that enabled them to derive such large profits during several years, which happened to coincide with a state of war.

and most imperative call upon the national income of the country, upon its consumptive ability, must be the first necessaries of food; that to this provision all other considerations must give way; that everything else must be considered relatively as luxuries, which are indulged in only in proportion to the ability remaining after the first necessaries are secured. . . . In this manner has the most imperative portion of the national expenditure varied and fluctuated, and leaving therefore so much less in some years, and so much more in other years to expend in all other objects of lesser necessity, of taste and luxury; the obvious and necessary tendency of which must be to give in some years a most unnatural excitement and encouragement to manufacturing and commercial pursuits.' This statement of the connexion between wheat imports and new investment is illustrated (ibid., pp. 66–8) by an analysis of the manner in which the boom from 1832 to 1836 was fostered by a series of good harvests and consequent declines in wheat imports.

[1] *High and Low Prices*, Pt. IV, pp. 55–60.

But the encouragement arising from profits so large naturally occasioned a great increase of cultivation, and sugar being an article which yields a return of produce upon an extended cultivation more quickly than coffee, the increased supply came sooner into operation in reducing the profits of the planters; and, as is usual on such occasions, was sufficient for some time to depress those profits below the ordinary level. As early as 1799 the supply seems to have out-run what the consumption at the advanced prices could carry off, and thenceforward they declined. The importations in 1801 and 1802 were of extraordinary magnitude, and these concurring with the restoration of peace, which reduced the charges of conveyance, accelerated the decline; but the low price here, rendered still cheaper to the foreign consumer by the diminished charges of freight and insurance, occasioned a very large export from hence, and produced a rally *before* the renewal of the war in 1803. After 1804 the price resumed its tendency downwards, and in 1807, before our exclusion from direct intercourse with the ports of Russia, our imports being less, and our exports greater, than they had been in the preceding year, the *Gazette* average of British plantation sugar fell to 30*s*. 9*d*., which is the lowest point of depression that it had ever reached, with the exception of short intervals in the two last years. Foreign sugar, not being admitted for consumption in this country, was lowest in 1811, when the anti-commercial decrees of the French were in full operation.

It was only . . . upon the prospect of the emancipation of the continent at the close of 1812 that prices recovered effectually. And I have already shown to what an extravagant height they were raised by the speculation on the peace in 1814. The decline from 1814 is not more than commensurate with the enormous increase of supply which has since been poured into Europe, and which seems to have reached its acme in 1821. The increased produce of the Havannah, the Brazils, and the East Indies, and of our own settlements of Demerara and Berbice, are quite adequate to have produced this effect. The glut has in the course of the last few months somewhat abated, and the price is higher than it was previous to the late rumours of war [i.e. of an invasion of Spain by France, in 1823].

From 1823 to 1850 the trend in the sugar price is downward, although there is a considerable interruption in the thirties. The sharp decline from 1825 to 1830 was apparently caused by an accumulation of stocks which outran even the rapidly increasing rate of consumption.[1] An upturn (from 1831) came only when stocks had been worked off. The rise in 1834–6 is to be accounted for by adjustments in the West Indies, to the freeing of the slave population, and to the prevailing view that production would decrease under the new system.[2] In the face of general prosperity conditions in Britain this led to a considerable speculative rise in price. The second upward surge in 1839–40 can be traced to a failure of the West Indian supply. Imports fall sharply in those two years. The fall in price from 1840 to 1848 was accompanied by a sharp rise in total sugar imports,[3] whereas the

[1] Tooke, *History of Prices*, ii. 211. Total sugar imports, in fact, rose considerably from 1825 to 1831.

[2] Ibid., p. 265.

[3] The outpacing of demand by supply in these latter years is illustrated by the following market report quoted by Tooke (ibid. iv. 421): '22nd December, 1847. *Sugar*. Sugar has suffered greater depression during the past month than any other article of

rising price from 1831 to 1840 was accompanied by a trend decline in imports.

The price of sugar was affected, as well, by frequent tariff charges. By 1814 the tariff amounted to fully 30*s.*; at the end of the period the duty added 33 per cent. to the bond price (about 23*s.*).

Reference-cycle Behaviour. The reference pattern for the price of sugar exhibits net expansion only in stage I–III. The average decline in stage III–V, however, is very much less than in the two reference contraction stages. The indexes of conformity are all positive, but low. There are numerous exceptions to the average I–V pattern which best generalizes its cyclical character.

As the analysis of the major movements in this series has indicated, the irregular supply conditions for West Indian sugar might be expected to result in irregularity with respect to reference cycles. Moreover, cyclical shifts in the British demand for sugar were, of course, less pronounced than for raw materials.

importance, the greater ease of the money market not having afforded it any relief: the present stocks in this country are enormous as compared with last year, and the portion held by suspended houses has pressed rather heavily on the market: added to which, the latest accounts from the colonies give prospect of a very abundant supply from most quarters.'

TABLE 91*a*

Measures of Average Annual Cyclical Behaviour: Financial Series

Specific-cycle behaviour	(1) *Number of bankruptcies*	(2) *Bullion in the Bank of England*	(3) *Total public and private advances by the Bank of England*	(4) *Total private advances by the Bank of England*
PERIOD COVERED	1793–1848 (i)	1796–1847	1797–1844	1798–1843
NUMBER OF CYCLES	14	11	8	14
AVERAGE DURATION (in months)				
Expansion	24·0 (6·9)	22·9 (9·0)	36·0 (30·0)	21·4 (8·1)
Contraction	23·1 (11·1)	32·7 (15·5)	34·5 (16·5)	17·1 (5·9)
Full cycle	47·1 (17·9)	55·6 (19·2)	70·5 (28·5)	38·6 (9·8)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	38·0 (20·7)	68·7 (32·4)	29·5 (24·8)	46·1 (24·5)
Fall	43·7 (27·7)	62·0 (28·4)	36·2 (18·0)	46·9 (29·8)
Rise and fall	81·7 (33·7)	130·7 (42·2)	65·8 (22·1)	92·9 (50·2)
Movement per month				
Rise	1·7 (1·1)	3·2 (1·2)	1·0 (0·6)	2·2 (1·2)
Fall	1·9 (1·0)	2·1 (1·1)	1·0 (0·4)	2·5 (1·3)
Rise and fall	1·8 (0·7)	2·5 (0·8)	1·0 (0·3)	2·4 (1·0)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	115·1 (14·5)	77·3 (27·4)	93·4 (14·8)	83·3 (13·6)
„ III	92·5 (7·3)	107·0 (18·4)	109·0 (6·8)	108·3 (11·7)
„ V	77·1 (8·2)	146·0 (13·8)	122·9 (9·6)	129·4 (15·0)
„ VII	93·1 (8·6)	105·1 (23·2)	107·1 (10·0)	105·0 (12·7)
„ IX	120·8 (23·2)	84·0 (17·3)	86·6 (17·2)	82·5 (18·1)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−2·0 (1·5)	+2·9 (1·2)	+1·1 (0·7)	+2·4 (1·6)
„ III to V	−1·4 (0·9)	+3·4 (1·4)	+1·0 (0·6)	+2·0 (1·2)
„ V to VII	+1·6 (1·1)	−2·7 (1·8)	−0·8 (0·3)	−2·6 (1·9)
„ VII to IX	+2·2 (1·3)	−1·5 (1·3)	−1·3 (0·6)	−2·4 (1·4)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+5·2 (18·7)	+8·2 (21·2)	−12·9 (27·3)	−1·5 (34·0)
Weighted average change per month from cycle to cycle	+0·11	+0·16	−0·20	−0·04

TABLE 91*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

(5) *Bills and notes discounted at the Bank of England*	(6) *Bank of England notes in circulation*	(7) *Total bills of exchange created*	(8) *Small bills of exchange created*	(9) *Medium bills of exchange created*	(10) *Large bills of exchange created*
1798–1849	1792–1848	1817–49	1817–53	1817–49	1817–49
14	13	7	9	7	7
23·1 (9·6)	26·8 (16·8)	30·9 (12·7)	20·0 (12·4)	32·6 (14·2)	29·1 (11·3)
20·6 (8 6)	24·9 (12·2)	24·0 (13·7)	28·0 (21·3)	22·3 (8·8)	25·7 (15·7)
43·7 (11·8)	51·7 (16·2)	54·9 (12·7)	48·0 (29·3)	54·9 (12·7)	54·8 (12·7)
61·2 (33·4)	13·9 (9·9)	20·4 (11·1)	5·4 (3·5)	13·0 (5·7)	30·6 (16·4)
62·6 (41·4)	10·0 (7·2)	20·4 (11·2)	10·0 (6·0)	14·1 (7·6)	29·0 (14·9)
123·8 (69·6)	23·9 (11·9)	40·9 (16·2)	15·4 (6·7)	27·1 (9·9)	59·6 (23·9)
2·8 (1·3)	0·5 (0·1)	0·7 (0·2)	0·4 (0·2)	0·4 (0·1)	1·1 (0·4)
3·2 (2·0)	0·4 (0·2)	1·0 (0·6)	0·6 (0·5)	0·7 (0·4)	1·4 (0·8)
2·7 (1·2)	0·5 (0·1)	0·7 (0·2)	0·4 (0·2)	0 5 (0·2)	1·1 (0·4)
79·3 (14·2)	94·5 (7·3)	92·9 (5·0)	99·4 (3·4)	95 6 (2·8)	89·6 (7·9)
108·7 (13·0)	101·2 (2·7)	100·4 (2·8)	102·4 (2·1)	101·7 (2·0)	101·6 (4·5)
140·5 (23·2)	108·4 (4·5)	113·3 (6·0)	104·9 (2·1)	108·6 (3·5)	120·1 (9·3)
105·0 (15·7)	103·5 (4·7)	104·1 (3·9)	99·8 (1·6)	101·1 (3·0)	105·6 (6·0)
77·9 (21·8)	98·4 (7·2)	92·9 (8·1)	94·9 (4·1)	94·4 (5·5)	91·1 (10·7)
+2·7 (1·8)	+0·5 (0·1)	+0·5 (0·3)	+0·4 (0·2)	+0·4 (0·1)	+0·9 (0·5)
+2·8 (1·4)	+0·5 (0·2)	+0·9 (0·3)	+0·3 (0·2)	+0·4 (0·2)	+1·3 (0·5)
−3·6 (3·0)	−0·4 (0·2)	−1·0 (0·6)	−0·6 (0·5)	−0·8 (0·5)	−1·5 (0·9)
−2·8 (1·9)	−0·3 (0·2)	−1·1 (0·6)	−0·5 (0·4)	−0·6 (0·5)	−1·4 (0·8)
−0·8 (31·8)	+4·8 (12·5)	+1·5 (9·3)	−5·1 (2·6)	−0·7 (6·1)	+5·5 (12·3)
−0·02	+0·09	+0·03	−0·11	−0·01	+0·10

[*Continued*

TABLE 91*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

Specific-cycle behaviour	(11) *Total deposits in the Bank of England*	(12) *London bankers' deposits in the Bank of England*	(13) *Bank-rate of discount*	(14) *Market-rate of discount*
PERIOD COVERED	1809–48	1832–48 (i)	1825–50	1828–50
NUMBER OF CYCLES	8	4	4	5
AVERAGE DURATION (in months)				
Expansion	31·5 (16·5)	27·0 (10·5)	18·0 (6·0)	24·0 (14·4)
Contraction	27·0 (16·5)	21·0 (9·0)	57·0 (33·0)	28·8 (15·4)
Full cycle	58·5 (25·5)	48·0 (12·0)	75·0 (27·0)	52·8 (18·2)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	34·2 (24·3)	33·8 (24·2)	33·0 (14·5)	52·2 (27·8)
Fall	31·1 (23·6)	47·0 (24·0)	36·8 (14·8)	56·8 (32·2)
Rise and fall	65·4 (37·1)	80·8 (11·8)	69·8 (28·2)	109·0 (60·0)
Movement per month				
Rise	1·0 (0·3)	1·2 (0·6)	1·9 (0·4)	2·4 (1·2)
Fall	1·0 (0·3)	2·2 (1·2)	1·0 (0·7)	2·1 (0·8)
Rise and fall	1·0 (0·2)	1·8 (0·4)	1·1 (0·6)	1 9 (0·5)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	91·0 (17·2)	106·8 (22·2)	91·0 (5·0)	82·8 (9·8)
„ III	102·1 (10·2)	96·0 (15·0)	103·8 (4·2)	106·0 (2·0)
„ V	125·2 (14·8)	73·0 (4·5)	124·0 (9·5)	135·0 (20·8)
„ VII	106·1 (8·1)	91·8 (9·8)	101·0 (2·5)	101·2 (6·2)
„ IX	94·1 (18·4)	120·0 (26·0)	87·2 (8·2)	78·2 (11·4)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·7 (0·3)	−0·6 (0·4)	+1·6 (0·4)	+2 3 (1·0)
„ III to V	+1·2 (0·4)	−1·8 (1·5)	+2·2 (0·8)	+2 6 (1·5)
„ V to VII	−1·3 (0·7)	+2·0 (1·5)	−1·2 (0·8)	−2·5 (1·5)
„ VII to IX	−0·7 (0 4)	+2·4 (1·1)	−0 9 (0·6)	−1 8 (0 6)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	0·0 (20·0)	+10·0 (22·7)	+1·0 (4·0)	+1·0 (7·0)
Weighted average change per month from cycle to cycle	0·00	+0·23	+0·01	+0.02

TABLE 91*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

(15) *Tooke's market-rate of interest*	(16) *Yield on 3 per cent. Consols*	(17) *Computed rate of interest on exchequer bills*	(18) *Interest on landed securities*	(19) *Rent per acre of agricultural land*	(20) *Rent per acre of agricultural land*
1833–52	1798–1848 (i)	1801–45	1822–48 (i)	1802–51	1789–1850
4	9	7	5	11	21
30·0 (12·0)	41·3 (19·3)	34·3 (15·9)	33·6 (8·6)	34·9 (24·6)	17·1 (7·8)
27·0 (16·5)	25·3 (9·8)	41·1 (23·0)	28·8 (5·8)	18·5 (9·5)	17·7 (6·5)
57·0 (10·5)	66·7 (26·1)	75·4 (24·5)	62·4 (7·7)	53·5 (26·6)	34·9 (8·3)
59·5 (34·8)	18·4 (6·0)	20·3 (11·5)	18·4 (6·5)	9·0 (6·9)	32·0 (18·5)
68·0 (35·5)	11·9 (4·1)	29·3 (11·2)	19·0 (8·8)	5·6 (3·5)	30·3 (18·2)
127·5 (69·0)	30·3 (7·3)	49·6 (21·1)	37·4 (8·3)	14·6 (10·0)	62·3 (29·9)
2·4 (1·8)	0·6 (0·3)	1·0 (0 9)	0·6 (0·2)	0·3 (0·1)	2·1 (1·3)
3·0 (1·0)	0·5 (0·2)	0·9 (0·3)	0·7 (0·3)	0·3 (0·2)	2·0 (1·4)
2·2 (1·0)	0·6 (0·2)	0·7 (0·3)	0·6 (0·1)	0·3 (0·1)	1·9 (1·0)
80·5 (15·0)	109·3 (4·5)	93·7 (7·5)	107·8 (5·0)	96·2 (3·4)	87·8 (11·8)
106·5 (4·2)	98·9 (1·3)	109·0 (7·4)	96·6 (2·5)	100·0 (1·6)	105·1 (5 3)
140·0 (24·0)	90·0 (2·6)	114·0 (7·7)	89·4 (1·7)	105·2 (3·7)	119·7 (9·6)
100·8 (7·8)	97·6 (3·0)	94·9 (6·1)	100·2 (2·1)	102·3 (2·6)	103·5 (5·7)
72·0 (11·5)	102·8 (3·4)	84·7 (6·0)	108·4 (8·1)	99·5 (3·0)	89·4 (12·8)
+2·1 (1·5)	−0·7 (0·3)	+1·2 (1·1)	−0·7 (0·1)	+0·3 (0·2)	+2·2 (1·4)
+2·6 (2·1)	−0·6 (0·4)	+0·7 (1·0)	−0·5 (0·3)	+0·3 (0·2)	+2·0 (1·2)
−3·6 (2·2)	+0·6 (0·3)	−1·0 (0·5)	+0·8 (0·1)	−0·3 (0·2)	−2·1 (1·4)
−2·3 (0·4)	+0·5 (0·3)	−0·7 (0·5)	+0·5 (0·4)	−0·3 (0·2)	−1·9 (1·5)
−15 0 (17·3)	−5·9 (3·6)	−10 3 (11·6)	−4·2 (5·8)	+2·4 (3·4)	+0·4 (10·8)
−0·25	−0·09	−0·14	−0·07	+0·05	+0·01

[*Continued*

TABLE 91*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

Specific-cycle behaviour	(21) *Rent per acre of agricultural land*	(22) *Price per acre of agricultural land*	(23) *Index of prices of shares, including mines*	(24) *Index of prices of shares, excluding mines*
PERIOD COVERED	1822–51	1789–1849	1813–50	1813–50
NUMBER OF CYCLES	7	18	8	7
AVERAGE DURATION (in months)				
Expansion	30·9 (16·7)	20·7 (8·7)	24·0 (15·0)	32·6 (16·7)
Contraction	18·9 (9·8)	19·3 (9·0)	31·5 (14·2)	30·9 (11·3)
Full cycle	49·7 (19·1)	40·0 (10·7)	55·5 (24·4)	63·4 (17·6)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	5·4 (3·1)	53·4 (26·3)	31·0 (28·8)	21·1 (13·0)
Fall	3·4 (1·8)	51·9 (29·1)	32·5 (23·4)	18·6 (8·7)
Rise and fall	8·9 (3·8)	105·3 (46·6)	63·5 (50·8)	39·7 (20·5)
Movement per month				
Rise	0·2 (0·0)	3·0 (1·8)	1·0 (0·5)	0·6 (0·2)
Fall	0·3 (0·2)	3·0 (1·8)	1·2 (0·9)	0·7 (0·4)
Rise and fall	0·2 (0·1)	2·8 (1·3)	1·0 (0·5)	0·6 (0·2)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	97·4 (1·9)	82·8 (14·6)	93·2 (10·8)	92·7 (6·0)
„ III	100·0 (0·7)	104·5 (10·7)	100·0 (8·0)	98·4 (4·1)
„ V	102·9 (1·3)	136·2 (15·8)	124·2 (20·6)	113·9 (8·1)
„ VII	101·0 (1·1)	103·7 (10·9)	100·1 (3·2)	105·4 (5·9)
„ IX	99·4 (1·5)	84·3 (16·4)	91·8 (6·2)	95·3 (6·5)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·2 (0·0)	+2·5 (1·9)	+0·7 (0·4)	+0·4 (0·2)
„ III to V	+0·2 (0·1)	+3·4 (1·9)	+1·3 (0·8)	+0·9 (0 3)
„ V to VII	−0·3 (0·2)	−3·5 (2·1)	−1·8 (1·8)	−0·6 (0·4)
„ VII to IX	−0·3 (0·2)	−2·5 (1·9)	−0·6 (0·2)	−0·8 (0·4)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+2·3 (2·7)	+1·1 (12·4)	+1·9 (13·2)	+7·0 (5·7)
Weighted average change per month from cycle to cycle	+0·05	+0·03	+0·03	+0·11

TABLE 91*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

(25)	(26)	(27)	(28)	(29)	(30)
Rate of exchange: Hamburg on London	*Rate of exchange: Paris on London*	*Advances by the Bank of England to Government*	*Net public revenue from taxes*	*Total public expenditures*	*Total public debt*
1791–1848 (i)	1805–45 (i)	1797–1847	1811–47	1803–49	1792–1845
17	11	9	8	10	5
20·4 (7·0)	22·9 (7·9)	34·7 (22·5)	28·5 (13·5)	24·0 (19·2)	67·2 (78·7)
19·8 (10·1)	20·7 (11·1)	32·0 (16·9)	25·5 (13·9)	31·2 (18·2)	60·0 (33·6)
40·2 (13·9)	43·6 (14·1)	66·7 (23·4)	54·0 (12·0)	55·2 (27·8)	127·2 (85·4)
4·9 (4·4)	4·2 (4·7)	29·4 (21·2)	6·4 (3·3)	17·3 (14·7)	21·8 (33·3)
5·1 (5·5)	4·7 (5·9)	54·0 (40·7)	9·0 (6·8)	17·7 (8·8)	3·4 (2·9)
9·9 (8·9)	8·9 (10·0)	83·4 (43·2)	15·4 (8·5)	35·0 (17·4)	25·2 (33·9)
0·3 (0·3)	0·2 (0·2)	1·0 (0·7)	0·3 (0·1)	0·8 (0·4)	0 1 (0·1)
0·2 (0·2)	0·2 (0·1)	1·6 (0·9)	0·4 (0·3)	0·7 (0·3)	0·0 (0·0)
0·2 (0·2)	0·2 (0·2)	1·3 (0·5)	0·2 (0·1)	0·7 (0·2)	0·1 (0·1)
101·6 (2·6)	101·1 (1·6)	103·7 (24·8)	98·1 (2·4)	96·3 (8·0)	88·8 (19·1)
99·6 (1·5)	99·5 (1·5)	116·6 (21·0)	102·1 (2·2)	103·9 (4·3)	100·6 (1·5)
96·7 (2·9)	96·9 (3·6)	133·1 (21·7)	104·5 (2·2)	113·6 (7·6)	110·6 (14·2)
99·1 (1·4)	98·9 (1·8)	99·4 (16·3)	99·9 (1·6)	102·8 (7·3)	108·2 (13·5)
101·8 (3·1)	101·6 (3·9)	79·1 (24·7)	95·5 (4·5)	95·9 (8·9)	107·2 (13·5)
−0·2 (0·2)	−0·2 (0·2)	+1·0 (0·7)	+0·3 (0·2)	+0·7 (0·4)	+0·1 (0·1)
−0·3 (0·3)	−0·2 (0·2)	+1·0 (0·8)	+0·2 (0·1)	+0·8 (0·4)	+0·1 (0·1)
+0·2 (0·1)	+0·2 (0·1)	−1·8 (1·2)	−0·4 (0·2)	−0·8 (0·4)	−0·1 (0·1)
+0·2 (0·2)	+0·2 (0·2)	−1·4 (0·7)	−0·4 (0·3)	−0·6 (0 3)	0·0 (0·0)
+0·2 (4·1)	+1·1 (3·8)	−21·0 (28·5)	−3·0 (6·9)	−5·3 (8·6)	+6·8 (13·6)
+0·01	+0·03	−0·31	−0.06	−0·10	+0·06

[*Continued*

TABLE 91*a* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

Specific-cycle behaviour	(31) *Total public debt*	(32) *Funded public debt*	(33) *Funded public debt*	(34) *Unfunded public debt*
PERIOD COVERED	1814–48 (i)	1792–1845	1816–45	1795–1842 (i)
NUMBER OF CYCLES	5	6	5	10
AVERAGE DURATION (in months)				
Expansion	60·0 (33·6)	62·0 (67·3)	21·6 (11·5)	21·6 (9·6)
Contraction	21·6 (7·7)	44·0 (28·0)	48·0 (28·8)	34·8 (20·2)
Full cycle	81·6 (40·3)	106·0 (61·3)	69·6 (16·9)	56·4 (16·3)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	2·6 (2·3)	19·3 (29·5)	1·6 (1·1)	31·7 (21·2)
Fall	0·4 (0·5)	3·3 (2·3)	2·6 (1·9)	29·8 (25·1)
Rise and fall	3·0 (2·4)	22·7 (30·8)	4·2 (2·2)	61·5 (38·1)
Movement per month				
Rise	0·0 (0·0)	0·1 (0·1)	0·1 (0·0)	1·4 (0·8)
Fall	0·0 (0 0)	0 2 (0·2)	0·2 (0·2)	0·8 (0 5)
Rise and fall	0·0 (0·0)	0·1 (0·1)	0·1 (0·0)	1·1 (0 6)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	101·6 (1·5)	90·3 (15·8)	99·8 (1·0)	111·3 (16·7)
„ III	100·0 (0·0)	100·8 (0·8)	100·6 (0·7)	90·6 (13·4)
„ V	99·0 (0·8)	109·7 (13·8)	101·4 (0 9)	79·6 (11 6)
„ VII	99·4 (0·7)	108·0 (13·0)	100·2 (0·3)	94·7 (7·0)
„ IX	99·4 (0·7)	106·3 (12·5)	98·8 (1·0)	109·4 (14·6)
AVERAGE RATES OF CHANGE (per month)				
From I to III	0·0 (0·0)	+0·1 (0·1)	0·0 (0·0)	−1·8 (1·2)
„ III to V	0 0 (0·0)	+0·2 (0·1)	+0·1 (0·1)	− 1·0 (0·6)
„ V to VII	0 0 (0·0)	−0·1 (0·1)	−0·1 (0·1)	+ 0·8 (0·6)
„ VII to IX	0·0 (0·0)	−0·1 (0·1)	0·0 (0·0)	+0 9 (0 6)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	−2·2 (1·4)	+6·6 (12·2)	−1·0 (1·5)	+4·4 (25·7)
Weighted average change per month from cycle to cycle	−0·03	+0·07	−0·02	+0·08

TABLE 91*b*

Measures of Average Annual Cyclical Behaviour: Financial Series

Reference-cycle behaviour	(1) *Number of bankruptcies*	(2) *Bullion in the Bank of England*	(3) *Total public and private advances by the Bank of England*	(4) *Total private advances by the Bank of England*
PERIOD COVERED	1793–1848	1797–1848	1797–1842	1797–1842
NUMBER OF CYCLES	13	12	11	11
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	115·2 (15·2)	85·2 (20·8)	104·5 (19·8)	117·6 (39·2)
„ III	84·9 (7·5)	117·5 (18·5)	95·0 (4·7)	80·1 (10·5)
„ V	87·9 (13·1)	95·2 (15·0)	102·9 (10·1)	105·5 (21·7)
„ VII	106·2 (12·3)	92·8 (14·5)	101·6 (8·0)	108·3 (16·4)
„ IX	120·2 (18·6)	97 4 (26·2)	100·1 (9·9)	110·9 (19·5)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−2·0 (1·3)	+1·9 (2·2)	−0·7 (1·4)	−2·8 (3·5)
„ III to V	+0·2 (1·0)	−1·6 (1·5)	+0·4 (0·7)	+1·4 (1·1)
„ V to VII	+2·4 (1·6)	−0·3 (1·7)	−0·2 (0·6)	+0·6 (1·8)
„ VII to IX	+2·1 (1·6)	+0·1 (2·1)	−0·2 (0·6)	+0·6 (1·8)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	V–I (i)	VII–III	III–VII	III–VII
Av. change per month of relatives during stages matched with				
Reference expansion	−0·9 (0·9)	+1·4 (1·7)	+0·3 (0·4)	+1·2 (0·5)
Reference contraction	+2·2 (1·6)	−1·1 (1·0)	−0·4 (0·9)	−0·9 (1·9)
Index of conformity to				
Reference expansion	−69	+50	+55	+100
Reference contraction	−85	+67	+ 9	+ 27
Business cycles	−84	+57	+24	+ 67

[*Continued*

TABLE 91*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

Reference-cycle behaviour	(5) *Bills and notes discounted at the Bank of England*	(6) *Bank of England notes in circulation*	(7) *Total bills of exchange created*	(8) *Small bills of exchange created*
PERIOD COVERED . . .	1797–1848	1793–1848	1816–48	1816–48
NUMBER OF CYCLES . . .	12	13	7	7
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	117·8 (37·7)	98·2 (6·8)	96·1 (4·8)	102·3 (2·9)
„ III	74·4 (14·9)	100·0 (4·2)	95·1 (2·4)	99·9 (1·6)
„ V	101·6 (19·6)	101·4 (4·9)	111·0 (6·6)	100·3 (1·8)
„ VII	115·2 (23·4)	101·1 (4·9)	106·6 (4·8)	99·3 (2·2)
„ IX	112·9 (26·2)	101·7 (5·6)	96·1 (7·9)	96·9 (3·9)
AVERAGE RATES OF CHANGE (per month)				
From I to III . . .	−3·1 (3·5)	+0·2 (0·3)	0·0 (0·3)	−0·1 (0·2)
„ III to V . . .	+1·6 (1·1)	+0·1 (0·5)	+0·8 (0·3)	0·0 (0·2)
„ V to VII . . .	+1·6 (2·5)	0·0 (0·3)	−0·8 (0·7)	−0·2 (0·4)
„ VII to IX . . .	+0·6 (2·7)	+0·1 (0·4)	−1·1 (0·7)	−0·3 (0·4)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series .	III–VII	VII–III	I–V	III–VII
Av. change per month of relatives during stages matched with				
Reference expansion . .	+1·5 (0·8)	+0·2 (0·2)	+0·4 (0·2)	0·0 (0·1)
Reference contraction . .	−1·7 (2·0)	0·0 (0·4)	−0·9 (0·6)	−0·2 (0·0)
Index of conformity to				
Reference expansion . .	+100	+69	+71	−14
Reference contraction . .	+ 45	+15	+86	+71
Business cycles . . .	+ 86	+20	+85	+62

TABLE 91*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

(9) *Medium bills of exchange created*	(10) *Large bills of exchange created*	(11) *Total deposits in the Bank of England*	(12) *London bankers' deposits in the Bank of England*	(13) *Bank-rate of discount*	(14) *Market-rate of discount*
1816–48	1816–48	1808–48	1832–48	1819–48	1826–48
7	7	9	3	6	5
98·3 (3·5)	93·7 (6·8)	96·7 (15·6)	112·0 (26·0)	104·2 (5·8)	104·0 (8·8)
97·0 (1·4)	92·4 (3·2)	101·3 (8·1)	107·7 (15·6)	94·2 (4·9)	80·6 (10·9)
106·9 (3·6)	116·4 (10·6)	103·8 (7·8)	76·7 (5·6)	95·2 (8·5)	104·8 (14·2)
103·7 (2·8)	110·3 (7·3)	100·7 (9·0)	88·3 (9·6)	104·0 (7·0)	115·0 (13·6)
96·9 (5·3)	95·6 (10·4)	96·4 (10·2)	125 7 (16·2)	102·3 (8 3)	97·8 (10·1)
0·0 (0·2)	0·0 (0·4)	+0·2 (0·8)	−0·1 (1·0)	−0·6 (0 4)	−1·8 (0·9)
+0·6 (0·2)	−1·3 (0·4)	−0·1 (1·0)	−2·1 (1·8)	+0·1 (0·7)	+1·6 (1·2)
−0·5 (0·5)	−1·1 (1·1)	−0·7 (0·8)	+1·4 (1·4)	+0·8 (0·9)	+0·5 (1·1)
−0·7 (0·5)	−1·5 (1·0)	−0·7 (0·8)	+2·9 (0·4)	+0·2 (0·8)	−1·0 (1·3)
I–V	I–V	I–V	V–I (i)	III–VII	III–VII
+0·2 (0·2)	+0·6 (0·3)	0·0 (0·7)	−1·2 (1·0)	+0·2 (0·4)	+1·1 (0·6)
−0·6 (0·4)	−1·3 (0·9)	−0·7 (0·8)	+2·1 (0·9)	−0·4 (0·4)	−1·5 (0·9)
+ 86	+86	+22	− 33	+50	+ 60
+100	+71	+56	−100	+50	+100
+100	+85	+53	−100	+45	+100

[*Continued*

TABLE 91*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

Reference-cycle behaviour	(15) *Tooke's market-rate of interest*	(16) *Yield on 3 per cent. Consols*	(17) *Computed rate of interest on exchequer bills*	(18) *Interest on landed securities*
PERIOD COVERED	1832–48	1793–1848	1793–1848	1819–48
NUMBER OF CYCLES	3	13	13	6
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	95·0 (5·3)	102·5 (5·5)	98·3 (9·6)	103·0 (3·7)
„ III	74·7 (11·6)	98·8 (2·8)	98·2 (5·8)	101·2 (4·2)
„ V	109·3 (14·2)	96·6 (4·8)	103·2 (9·0)	92 2 (3·8)
„ VII	129·0 (15·3)	99·5 (4·0)	103·8 (10·4)	97·2 (3·2)
„ IX	97·0 (16·7)	101·5 (5·9)	96·2 (10·3)	103·7 (7·8)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−1·4 (1·1)	−0·3 (0·4)	0·0 (0·6)	0·0 (0·4)
„ III to V	+2·2 (1·2)	−0·1 (0·3)	+0·3 (0 7)	−0·5 (0·2)
„ V to VII	+1·2 (1·6)	+0·4 (0·5)	−0·2 (0·8)	+0·4 (0·5)
„ VII to IX	−1·7 (1·4)	+0·4 (0·6)	−0·6 (1·0)	+0·6 (0·6)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	III–VII	V–I (i)	III–VII	V–I (i)
Av. change per month of relatives during stages matched with				
Reference expansion	+1·6 (0·6)	−0·2 (0·3)	+0·2 (0·6)	−0·3 (0 1)
Reference contraction	−2·3 (0·6)	+0·4 (0·5)	−0·4 (0·7)	+0·5 (0·5)
Index of conformity to				
Reference expansion	+100	−46	+31	−67
Reference contraction	+100	−15	+31	−67
Business cycles	+100	−36	+28	−64

TABLE 91*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

(19) *Rent per acre of agricultural land*	(20) *Rent per acre of agricultural land*	(21) *Rent per acre of agricultural land*	(22) *Price per acre of agricultural land*	(23) *Index of prices of shares, including mines*	(24) *Index of prices of shares, excluding mines*
1801–48	1793–1848	1816–48	1793–1848	1811–48	1811–48
11	13	7	13	8	8
98·0 (2·4)	100·5 (14·0)	98·1 (1·9)	103·4 (25·5)	96·2 (13·5)	95·9 (7·6)
98·5 (2·1)	94·5 (13·2)	98·7 (1·2)	91·8 (19·7)	99·2 (7·2)	99·1 (3 6)
101·7 (3·2)	98·1 (14·4)	101·4 (1·8)	94·0 (17·1)	118·5 (23·2)	107·5 (9·2)
101·6 (1·6)	99·2 (11·0)	101·1 (0·7)	100·1 (11·6)	106·2 (14·0)	102 8 (6·2)
101·6 (2·6)	100·0 (12·5)	100·4 (1·9)	105·6 (20·8)	93·9 (7·6)	97·6 (6·7)
0·0 (0·2)	−0·5 (1·8)	+0·1 (0·1)	−1·1 (3·1)	+0·2 (0·4)	+0·2 (0·3)
+0·2 (0·2)	+0 4 (1·6)	+0·2 (0·1)	+0·2 (1·4)	+0·6 (1·2)	+0·4 (0·7)
−0·1 (0·3)	+0·2 (1·4)	−0·1 (0·2)	+0·8 (2·0)	−1·8 (1·8)	−0·6 (0·5)
− 0·1 (0·4)	+0·3 (1·5)	−0·2 (0·2)	+0·8 (2·8)	−1·7 (1·8)	−0·6 (0 6)
I–V	I–V	I–V	III–VII	I–V	I–V
+0·1 (0·1)	0·0 (0·9)	+0·1 (0·1)	+0·3 (0·9)	+0·4 (0·8)	+0·3 (0·4)
−0·1 (0·4)	+0·2 (1·2)	−0·2 (0·2)	−0·2 (1·5)	−1·8 (1·8)	−0·6 (0·6)
+73	+8	+57	+23	0	+50
− 9	0	+43	+ 8	+100	+62
+19	+4	+62	+12	+ 73	+73

[*Continued*

TABLE 91*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

Reference-cycle behaviour	(25) *Rate of exchange: Hamburg on London*	(26) *Rate of exchange: Paris on London*	(27) *Advances by the Bank of England to Government*	(28) *Net public revenue from taxes*
PERIOD COVERED	1793–1848	1803–48	1797–1848	1801–48
NUMBER OF CYCLES	13	10	12	11
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	100·1 (4·4)	100·2 (3·6)	107·8 (24·9)	96·7 (6·2)
„ III	100·2 (1·5)	100·0 (1·0)	110·2 (17·5)	99·1 (2·6)
„ V	99·1 (1·9)	100·0 (0·8)	91·4 (15·4)	101·7 (3·0)
„ VII	99·8 (2·7)	100·5 (2·5)	90·8 (18·6)	101·1 (3·0)
„ IX	100·4 (4·4)	100·5 (4·3)	89·6 (18·0)	100·5 (4·7)
AVERAGE RATES OF CHANGE (per month)				
From I to III	0·0 (0·3)	−0·1 (0·3)	+0·3 (0·6)	+0·1 (0·4)
„ III to V	−0·1 (0·2)	0·0 (0·1)	−1·0 (1·8)	+0·2 (0·3)
„ V to VII	+0·1 (0·4)	+0·1 (0·3)	−0·3 (0·9)	−0·1 (0·3)
„ VII to IX	+0·1 (0·3)	0·0 (0·3)	−0·3 (1·0)	−0·1 (0·3)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	V–I (i)	V–I (i)	I–V	I–V
Av. change per month of relatives during stages matched with				
Reference expansion	0·0 (0·2)	0·0 (0·1)	−0·4 (1·1)	+0·2 (0·3)
Reference contraction	+0·1 (0·3)	+0·1 (0·3)	−0·3 (0·9)	−0·1 (0·3)
Index of conformity to				
Reference expansion	−15	−20	+17	+55
Reference contraction	−46	−30	+ 8	+45
Business cycles	−48	−47	+ 9	+57

TABLE 91*b* (*cont.*)

Measures of Average Annual Cyclical Behaviour: Financial Series

(29)	(30)	(31)	(32)	(33)	(34)
Total public expenditures	*Total public debt*	*Total public debt*	*Funded public debt*	*Funded public debt*	*Unfunded public debt*
1801–48	1793–1848	1811–48	1793–1848	1816–48	1793–1848
11	13	8	13	7	13
98·7 (8·2)	95·4 (5·9)	98·8 (2·9)	95·2 (5·8)	100·0 (1·1)	96·8 (15·1)
101·6 (4·6)	98·7 (2·0)	100·2 (0·4)	98·6 (2·0)	100·0 (0·0)	102·7 (8·6)
100·5 (5·8)	102·2 (3·6)	100·1 (1·0)	102·5 (3·9)	99·9 (0·5)	95·6 (10·8)
98·2 (4·0)	103·2 (4·4)	100·1 (1·0)	103·4 (4·3)	100·1 (0·7)	97·2 (12·9)
96·4 (6·8)	103·9 (5·0)	100·0 (1·0)	104·1 (5·1)	99·7 (1·0)	98·7 (14·5)
0·0 (0·5)	+0·2 (0·2)	0·0 (0·1)	+0·2 (0·2)	0·0 (0·1)	+0·2 (1·0)
0·0 (0·6)	+0·2 (0·3)	0·0 (0·0)	+0·2 (0·3)	0·0 (0·0)	−0·2 (1·1)
−0·4 (0·6)	+0·1 (0·2)	0·0 (0·0)	+0·1 (0·2)	0·0 (0·1)	+0 3 (1·1)
−0·4 (0·7)	+0·1 (0·2)	0·0 (0·0)	+0·1 (0·2)	−0·1 (0·1)	+0 2 (0·9)
I–V	I–V	V–I (i)	I–V	I–V	V–I (i)
0·0 (0·4)	+0·2 (0·3)	0·0 (0·1)	+0·2 (0·2)	0·0 (0·0)	0 0 (0·8)
−0·4 (0·6)	+0·1 (0·2)	0·0 (0·0)	+0·1 (0·2)	0·0 (0·1)	+0 2 (1·0)
+18	+31	−12	+46	0	−15
+36	−31	+12	−23	+14	−23
+24	0	− 7	+20	+15	−68

TABLE 92*a*. *Measures of Average Quarterly Cyclical Behaviour: Financial Series*

Specific-cycle behaviour	(*1*) *Total bills of exchange created*	(*2*) *Medium bills of exchange created*	(*3*) *Large bills of exchange created*
PERIOD COVERED	1826–48	1826–48	1826–49
NUMBER OF CYCLES	6	6	6
AVERAGE DURATION (in months)			
Expansion	26·5 (10·5)	24·0 (11·0)	26·5 (10·5)
Contraction	17·5 (10·3)	20·5 (10·3)	19·5 (12·0)
Full cycle	44·0 (14·7)	44·5 (17·5)	46·0 (13·3)
AVERAGE AMPLITUDE OF RELATIVES			
Total movement			
Rise	25·5 (10·8)	16·0 (6·3)	39·3 (14·4)
Fall	22·2 (8·8)	14·7 (5·2)	33·7 (13·0)
Rise and fall	47·7 (14·2)	30·7 (9·7)	73·0 (17·7)
Movement per month			
Rise	1·0 (0·2)	0·7 (0·1)	1·6 (0·3)
Fall	1·7 (0·7)	0·8 (0·2)	2·2 (0·8)
Rise and fall	1·2 (0·3)	0·7 (0·1)	1·6 (0·2)
AVERAGE STANDINGS OF RELATIVES IN			
Stage I	89·3 (6·1)	93·7 (3·3)	85·5 (11·7)
„ II	95·0 (5·7)	97·7 (3·3)	94·5 (9·2)
„ III	97·8 (2·8)	99·8 (2·8)	99·8 (7·4)
„ IV	105·8 (2·9)	103·3 (1·4)	111·3 (5·3)
„ V	114·8 (6·1)	109·7 (3·9)	124·8 (9·8)
„ VI	112·2 (5·9)	106·2 (3·9)	117·3 (8·8)
„ VII	106·7 (6·2)	102·0 (4·0)	104·7 (9·0)
„ VIII	98·8 (8·9)	98·2 (5·5)	97·5 (10·8)
„ IX	92·7 (8·7)	95·0 (6·0)	91·2 (10·6)
AVERAGE RATES OF CHANGE (per month)			
From I to II	+1·1 (0·6)	+1·0 (0·6)	+1·8 (0·6)
„ II to III	+0·3 (0·4)	+0·5 (0·2)	+0·8 (0·6)
„ III to IV	+1·2 (0·7)	+0·4 (0·4)	+1·8 (0·9)
„ IV to V	+1·6 (0·5)	+1·0 (0·4)	+2·4 (0·8)
„ V to VI	−0·9 (0·6)	−1·0 (0·3)	−1·9 (0·4)
„ VI to VII	−1·7 (1·2)	−0·8 (0·4)	−2·8 (2·4)
„ VII to VIII	−1·9 (1·2)	−0·6 (0·6)	−1·7 (0·9)
„ VIII to IX	−2·0 (1·0)	−0·8 (0·3)	−2·0 (1·7)
SECULAR MOVEMENTS (in percentages)			
Average change from cycle to cycle	+6·0 (8·0)	+1·6 (5·3)	+8·8 (13 0)
Weighted average change per month from cycle to cycle	+0·13	+0·03	+0·18
RANDOM MOVEMENTS	Mild	Mild	Mild
SEASONAL AMPLITUDE	2·7	2·1	3·8

TABLE 92*b*. *Measures of Average Quarterly Cyclical Behaviour: Financial Series*

Reference-cycle behaviour	(*1*) *Total bills of exchange created*	(*2*) *Medium bills of exchange created*	(*3*) *Large bills of exchange created*
PERIOD COVERED	1826–48	1826–48	1826–48
NUMBER OF CYCLES	6	6	6
AVERAGE STANDINGS OF RELATIVES IN			
Stage I	90·8 (5·8)	96·0 (3·7)	85·7 (8·0)
„ II	94·0 (7·0)	97·5 (3·2)	90·5 (10·2)
„ III	96·8 (4·8)	97·5 (2·8)	95·7 (7·6)
„ IV	102·2 (3·3)	101·0 (1·7)	103·7 (5·1)
„ V	108·2 (3·8)	104·5 (1·7)	112·3 (6·9)
„ VI	111·8 (7·4)	106·7 (5·7)	119·0 (12·0)
„ VII	109·5 (10·7)	104·2 (4·5)	114·0 (16·0)
„ VIII	102·3 (10·1)	99·3 (5·7)	103·8 (14·8)
„ IX	92·8 (9·5)	95·5 (6·7)	90·8 (12·4)
AVERAGE RATES OF CHANGE (per month)			
From I to II	+0·8 (0·6)	+0·4 (0·7)	+1·1 (0·9)
„ II to III	+0·6 (0·6)	−0·1 (0·5)	+1·2 (0·9)
„ III to IV	+0·8 (0·6)	+0·5 (0·5)	+1·2 (0·8)
„ IV to V	+0·9 (0·4)	+0·6 (0·3)	+1·2 (0·9)
„ V to VI	+0·9 (2·0)	+0·5 (1·7)	+1·8 (3·3)
„ VI to VII	−0·3 (1·0)	−0·8 (0·5)	−1·3 (1·7)
„ VII to VIII	−1·4 (0·9)	−0·8 (0·5)	−2·1 (1·2)
„ VIII to IX	−2·3 (1·2)	−0·8 (0·3)	−3·2 (1·7)
CONFORMITY TO BUSINESS CYCLES			
Expansion stages of series	I–VI	I–VI	I–VI
Average change per month of relatives during stages matched with			
Reference expansion	+0·6 (0·3)	+0·3 (0·2)	+1·0 (0·4)
Reference contraction	−1·5 (0·6)	−0·8 (0·3)	−2·3 (1·0)
Index of conformity to			
Reference expansion	+100	+ 67	+100
Reference contraction	+100	+100	+100
Business cycles	+100	+100	+100

TABLE 93*a*

Measures of Average Monthly Cyclical Behaviour: Financial Series

Specific-cycle behaviour	(1) *Number of bankruptcies*	(2) *Bullion in the Bank of England*	(3) *Total public and private advances by the Bank of England*	(4) *Bills and notes discounted at the Bank of England*
PERIOD COVERED	1790–1851 (i)	1797–1847	1794–1845	1794–1849
NUMBER OF CYCLES	18	13	14	19
TIMING OF SPECIFIC CYCLES AT:				
Reference peak				
Number of leads, lags, coincidences	10, 1, 2	5, 0, 0	4, 4, 0	1, 7, 1
Average lead (−) or lag (+) in months	−4·5 (4·2)	−9 0 (5·2)	+0·6 (5·1)	+3·4 (3·8)
Reference trough				
Number of leads, lags, coincidences	10, 1, 1	4, 0, 2	2, 4, 0	1, 9, 1
Average lead (−) or lag (+) in months	−4 4 (3 0)	−4 2 (2 8)	+2 7 (10 9)	+6·5 (5·3)
AVERAGE DURATION (in months)				
Expansion	25·8 (11·2)	21·5 (9·2)	22 1 (12·7)	18·8 (8·7)
Contraction	14·8 (6·9)	25 2 (14·5)	21·1 (9·8)	15·8 (7·7)
Full cycle	40·7 (13·1)	46 7 (20 7)	43·2 (13·8)	34·7 (9 6)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	66·2 (31 9)	78 5 (33 6)	33 1 (13·4)	83 1 (44 0)
Fall	74 4 (34 6)	72 2 (29·8)	35 9 (20·4)	81·7 (47·1)
Rise and fall	144 5 (44 6)	150 7 (45·4)	69 0 (20·4)	164 7 (84·1)
Movement per month				
Rise	2·8 (1·3)	3 9 (1·3)	1·9 (1·0)	5·1 (3·0)
Fall	6·4 (3·5)	3·6 (1·3)	1·7 (0·6)	5 1 (2 2)
Rise and fall	3·9 (1 5)	3·6 (0 8)	1·7 (0·6)	4·8 (2 2)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	138·4 (27·8)	60 6 (29·6)	89·1 (12·3)	73 5 (22 5)
,, II	111·6 (15·9)	80·6 (23·4)	95·7 (11·2)	87·5 (19·6)
,, III	93·4 (7·1)	106 2 (12·4)	105 9 (8·2)	105 5 (21·7)
,, IV	78·9 (5 7)	135·2 (13·3)	116·4 (7·5)	134·8 (20·4)
,, V	75·4 (9·8)	142·0 (16·9)	120·9 (7·2)	152·2 (20·4)
,, VI	88·6 (8·7)	125 6 (11·5)	109·6 (6·1)	125·9 (30·9)
,, VII	102·4 (12·7)	101·9 (15·6)	97·1 (8·4)	96·3 (17·5)
,, VIII	137·1 (27 4)	77·5 (19·4)	89·7 (11·9)	78·1 (20·1)
,, IX	146·1 (32 9)	72·6 (21·0)	87·1 (14 1)	75·1 (19·4)
AVERAGE RATES OF CHANGE (per month)				
From I to II	−5·6 (3·9)	+4·0 (2·8)	+3·3 (2·3)	+5·3 (4·4)
,, II to III	−2·5 (1·8)	+4·4 (2 1)	+3·1 (3·2)	+4·5 (4·0)
,, III to IV	−1 9 (1·1)	+4·6 (1·6)	+3 0 (2·9)	+5·5 (3·4)
,, IV to V	−0·8 (1·9)	+1·5 (1·8)	+0 9 (1·4)	+3·7 (5·0)
,, V to VI	+6·4 (4·4)	−3·0 (1 7)	−3·1 (1·7)	−8·5 (4·4)
,, VI to VII	+3 7 (5·1)	−4·0 (2·8)	−2·3 (1·5)	−5 9 (3·7)
,, VII to VIII	+9 5 (6·5)	−4·0 (1·9)	−1·2 (0·6)	−4·6 (3·2)
,, VIII to IX	+3 6 (5·3)	−1·0 (1·9)	−0·4 (1·0)	−0·5 (2·2)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+5·1 (18 6)	+7·8 (21·5)	−3·0 (24·2)	+2·3 (33·3)
Weighted average change per month from cycle to cycle	+0·13	+0·17	−0·07	+0·07
RANDOM MOVEMENTS	Moderate	Mild	Mild	Mild
SEASONAL AMPLITUDE	14·7	..	8·8	8·8

TABLE 93*a* (*cont.*)

Measures of Average Monthly Cyclical Behaviour: Financial Series

(5) *Advances on bills of exchange and stock by the Bank of England*	(6) *Bank of England notes in circulation*	(7) *London bankers' deposits in the Bank of England*	(8) *Market-rate of discount*	(9) *Yield on 3 per cent. Consols*
1832–47	1824–45 (1)	1832–48 (1)	1828–50	1790–1848 (1)
4	6	5	6	15
1, 1, 0	1, 1, 0	3, 1, 0	0, 6, 0	7, 1, 1
−0·5 (5 5)	−1·5 (7·5)	−3·0 (4·5)	+7·5 (2·5)	−6·2 (3·7)
0, 3, 0	1, 3, 0	2, 2, 1	0, 7, 0	2, 4, 0
+8·7 (4 9)	+1·8 (4·8)	−1·2 (3·0)	+13·7 (7·7)	+3·2 (6·8)
15·5 (5 2)	25·9 (9 9)	21·6 (8·1)	19·8 (9·4)	25·9 (13·2)
27·0 (14·5)	16·7 (11·0)	16·6 (2·9)	23·7 (13·9)	20·3 (9·4)
42·5 (10 0)	42·0 (14·7)	38·2 (8·7)	43·5 (17·2)	46·2 (14 2)
142·2 (63·8)	12·2 (6·5)	68·2 (38·2)	73·0 (31·0)	17·6 (7 8)
120·2 (61·4)	13·0 (5·0)	74·4 (37·7)	77·8 (39·8)	17·0 (8·9)
262·5 (106·8)	25·2 (6·5)	142·6 (26·3)	150·8 (67·4)	34·6 (13·1)
16 2 (15 2)	0·5 (0·2)	2·9 (1·1)	4·5 (2·1)	0·9 (0·5)
4 9 (1·2)	1 5 (1 0)	4 3 (1·7)	3·8 (1·4)	1 0 (0·5)
6 2 (2·0)	0·7 (0·2)	3·9 (0·7)	3·5 (1·3)	0 9 (0·4)
59·5 (34·0)	106·2 (5 2)	124·0 (28·0)	81·0 (15·0)	107·7 (7·1)
84 2 (37·8)	101·5 (3·7)	107·4 (30 5)	97·3 (16·7)	103·8 (5·7)
111·0 (44·5)	97·7 (3·0)	96·8 (12·2)	115·0 (17·3)	98·9 (3 8)
173·0 (70·0)	94·7 (2·4)	78·8 (6·2)	142·3 (30·1)	93·0 (3·2)
188·0 (48 0)	96·0 (3·0)	71·2 (5·8)	140·3 (22·4)	90·9 (3 4)
129·8 (19·2)	99 3 (5·1)	78·4 (3·9)	109·8 (10·8)	93 5 (2·2)
98·0 (28·5)	100·7 (4·2)	92·0 (14·4)	93·8 (10·8)	98·3 (3·9)
83·8 (23·2)	106·5 (6·0)	128·6 (22·5)	75·0 (11·3)	104·7 (5·3)
85 0 (33·5)	106·8 (5·1)	136 0 (32·4)	75·3 (11·4)	107·1 (7·5)
−8 6 (19·8)	−1·2 (0·5)	−5·5 (2·9)	+6·8 (2·6)	−1·0 (0 6)
+14·8 (17·6)	−0·6 (0·3)	−0·5 (3·4)	+1·3 (5·8)	−0·7 (0·5)
+ 28 2 (31 9)	−0·4 (0 2)	−2·7 (2·3)	+5·5 (3·2)	−1·0 (1·0)
+0 8 (10·0)	+1·0 (1·9)	−1·9 (2·3)	−1·3 (2·9)	−0·4 (0·3)
−11·5 (7·6)	+1·9 (1·7)	+3·0 (2·3)	−7·9 (4·0)	+0 8 (0 5)
−5·1 (3·2)	+0·5 (0·6)	+2·8 (3·0)	−2·3 (0·8)	+0·9 (0·7)
−2·4 (1·9)	+2 2 (1·6)	+6·5 (3·1)	−3·3 (1·8)	+1·5 (1·2)
+1·8 (3·5)	−0·4 (1·2)	+1·5 (5·4)	−0 2 (1·1)	+0·5 (0·8)
+10·3 (56·2)	0·0 (6·6)	+10·0 (17·0)	+2·0 (7 2)	−1·0 (7·7)
+0·23	0·00	+0·27	+0·04	−0 02
Moderate	Mild	Very pronounced	Mild	Mild
19·6	2·69	18·8	..	..

[*Continued*

TABLE 93*a* (*cont.*)

Measures of Average Monthly Cyclical Behaviour: Financial Series

Specific-cycle behaviour	(10) *Index of prices of shares, including mines*	(11) *Index of prices of shares, excluding mines*	(12) *Rate of exchange: Hamburg on London*	(13) *Advances by the Bank of England to Government*
PERIOD COVERED	1813–49	1813–49	1791–1848 (l)	1795–1843 (l)
NUMBER OF CYCLES	10	8	15	9
TIMING OF SPECIFIC CYCLES AT:				
Reference peak				
Number of leads, lags, coincidences	5, 1, 1	4, 1, 1	7, 3, 0	1, 3, 0
Average lead (−) or lag (+) in months	−5·6 (5·2)	−4 8 (5·2)	−3·6 (5·9)	−0·5 (4·8)
Reference trough				
Number of leads, lags, coincidences	4, 4, 1	3, 3, 1	4, 7, 1	0, 2, 0
Average lead (−) or lag (+) in months	+1·8 (7·3)	+2·0 (7·7)	+2·2 (4·5)	+8·0 (4·0)
AVERAGE DURATION (in months)				
Expansion	21·2 (13·6)	32·0 (17·0)	19·9 (6·5)	32·8 (14·1)
Contraction	22 9 (8·1)	23·1 (8·4)	25·7 (12·0)	30·6 (18·6)
Full cycle	44·1 (19·4)	55·1 (20·6)	45·5 (16·7)	63·3 (24·4)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	35·0 (29·8)	25·5 (14·8)	7·8 (6·6)	66·0 (30·2)
Fall	36·6 (25·6)	23·4 (11·6)	8·1 (7·4)	55·3 (28·6)
Rise and fall	71 6 (55·4)	48·9 (24·4)	15·9 (14 0)	121·3 (37·0)
Movement per month				
Rise	1·5 (0·6)	1·0 (0·4)	0 3 (0·1)	2·1 (0·8)
Fall	1 5 (0·8)	1·1 (0·5)	0·3 (0·2)	3 0 (2 3)
Rise and fall	1·5 (0 6)	0·9 (0·2)	0·3 (0·2)	2·2 (0 8)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	89·0 (12·4)	90·1 (6·8)	103·8 (3·3)	130·1 (24·6)
,, II	93·2 (9·8)	92·9 (6·1)	102·1 (1·8)	111·8 (20 6)
,, III	99 3 (5·8)	97·9 (2·9)	100·0 (1·1)	102 9 (10·8)
,, IV	110·1 (2·8)	107·4 (3·5)	97·9 (1·7)	81·6 (8 3)
,, V	128·0 (28·0)	114·8 (9·2)	96·0 (3·3)	69·1 (8·1)
,, VI	115·4 (16·4)	109·9 (6·9)	97·8 (1·9)	86·3 (9·6)
,, VII	99·9 (3·1)	104·0 (5·8)	99·9 (0·8)	96·1 (12·3)
,, VIII	92·1 (3 9)	95·1 (5·4)	102·5 (2·6)	112·9 (24·6)
,, IX	86·2 (5·2)	91·8 (7·0)	104·2 (4·3)	117·4 (20·9)
AVERAGE RATES OF CHANGE (per month)				
From I to II	+1·2 (0·6)	+0·7 (0·4)	−0·4 (0·4)	−3·5 (1·0)
,, II to III	+1 2 (1·3)	+0·3 (0·6)	−0·3 (0·2)	−0·7 (1 5)
,, III to IV	+2 0 (1·2)	+1·5 (1·0)	−0·3 (0·1)	−2·4 (1·3)
,, IV to V	+1·9 (2·7)	+1·0 (0·8)	- 0·4 (0·4)	−1·9 (1·7)
,, V to VI	−2·8 (2·2)	−1·2 (0·6)	+0·3 (0·2)	+5·7 (3·7)
,, VI to VII	−2·3 (1·8)	−0·9 (0·6)	+0·3 (0·2)	+4 0 (6 2)
,, VII to VIII	−1·1 (0·4)	−1·3 (0·5)	+0·3 (0·4)	+3 5 (3 6)
,, VIII to IX	−1 8 (1 8)	−0·8 (0 7)	+0·2 (0 2)	−2 0 (5 1)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	+1·8 (14 2)	+6·4 (6·4)	+0·4 (3·6)	−11·0 (32·0)
Weighted average change per month from cycle to cycle	−0·04	+0·12	+0·01	−0·17
RANDOM MOVEMENTS	Moderate	Moderate	Mild	Pronounced
SEASONAL AMPLITUDE	..	..	..	14·8

TABLE 93*b*

Measures of Average Monthly Cyclical Behaviour: Financial Series

Reference-cycle behaviour	(1) *Number of bankruptcies*	(2) *Bullion in the Bank of England*	(3) *Total public and private advances by the Bank of England*	(4) *Bills and notes discounted at the Bank of England*
PERIOD COVERED	1794–1848	1794–1848	1794–1842	1794–1848
NUMBER OF CYCLES	14	14	12	14
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	111·9 (16·6)	104·7 (25·0)	98·0 (16·8)	95 9 (27·5)
„ II	97·6 (12·3)	116·6 (18·5)	94 2 (10·3)	79·1 (12·8)
„ III	83·3 (10·2)	118·5 (15·7)	97·1 (4·1)	79·0 (12 9)
„ IV	81·5 (8·7)	100·1 (13·8)	100·2 (8·0)	91·5 (14·9)
„ V	84·6 (11·4)	82·9 (12·4)	104·9 (8·1)	119 7 (22·4)
„ VI	101·1 (9·6)	77·2 (15·9)	104·4 (9·3)	137·1 (20·7)
„ VII	126·8 (18·3)	76·6 (22·2)	108·2 (8·7)	149·3 (42·7)
„ VIII	125·6 (13·5)	95·3 (25·4)	101·2 (7·9)	122·5 (32·1)
„ IX	117·7 (14·3)	111·9 (32·0)	95·4 (11·1)	99·2 (30·9)
AVERAGE RATES OF CHANGE (per month)				
From I to II	−3 3 (2·9)	+2·0 (3·8)	−0·6 (1·7)	−3 2 (4 2)
„ II to III	−2·1 (1·8)	−0·3 (2·4)	+0·4 (1·0)	+0·7 (2 4)
„ III to IV	+0·1 (2·1)	−3·0 (2·6)	+0·2 (0 8)	+2·2 (2 1)
„ IV to V	+1·4 (2·4)	−3·5 (3·1)	+0·6 (2·1)	+5·1 (4·9)
„ V to VI	+5·3 (3·1)	−2·0 (2·8)	−0·2 (1 4)	+6 0 (4·9)
„ VI to VII	+5·5 (4·6)	−0·3 (2·3)	+0·9 (1·9)	+3 4 (7 2)
„ VII to VIII	−0·1 (3·1)	−3·1 (2·7)	−1·3 (1·2)	−5 6 (5·7)
„ VIII to IX	−2·5 (2·1)	+4·5 (4·9)	−1·5 (1·6)	−7·4 (6 4)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	IV–VIII (i)	VII–III	I–V	II–VII
Av. change per month of relatives during stages matched with				
Reference expansion	−1·6 (1·1)	+1·5 (2·2)	+0·2 (0·7)	+2 1 (1 2)
Reference contraction	+2·3 (0·7)	−1·9 (1·5)	−0·5 (0·9)	−5 5 (4·1)
Index of conformity to				
Reference expansion	− 86	+29	+25	+100
Reference contraction	−100	+86	+42	+ 71
Business cycles	−100	+59	+65	+100

[*Continued*

TABLE 93*b* (*cont.*)

Measures of Average Monthly Cyclical Behaviour: Financial Series

Reference-cycle behaviour	(5) *Advances on bills of exchange and stock by the Bank of England*	(6) *Bank of England notes in circulation*	(7) *London bankers' deposits in the Bank of England*	(8) *Market-rate of discount*
PERIOD COVERED	1832–46	1819–48	1832–48	1826–48
NUMBER OF CYCLES	3	7	4	6
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	81·7 (55·6)	103·6 (6·3)	136·8 (21·5)	90·5 (11·8)
„ II	66·3 (45·1)	104·7 (3·8)	119·5 (41·2)	81·5 (8·3)
„ III	94·3 (14·4)	101·9 (4·5)	97·0 (26·5)	81·5 (8·5)
„ IV	149·7 (24·9)	101·3 (2·5)	83·5 (20·0)	98·7 (5·4)
„ V	139·7 (21·6)	99·4 (3·1)	84·0 (5·0)	109·7 (8·8)
„ VI	128·3 (41·1)	96·9 (2·4)	89·0 (12·5)	127·3 (8·7)
„ VII	121·0 (38·0)	99·1 (4·5)	89·8 (20·0)	128·2 (18·6)
„ VIII	89·7 (8·2)	98·3 (3·4)	122·0 (15·6)	101·5 (18·7)
„ IX	93·3 (17·1)	99·4 (4·7)	140·5 (12·0)	86·8 (16·9)
AVERAGE RATES OF CHANGE (per month)				
From I to II	−3·9 (5·5)	+0·4 (0·8)	−4·0 (2·5)	−1·8 (1·7)
„ II to III	+1·4 (2·9)	−0·2 (0·5)	−4·4 (3·2)	+0·5 (2·4)
„ III to IV	+4·4 (2·2)	−0·3 (0·3)	+0·6 (5·6)	+3·1 (1·7)
„ IV to V	−1·1 (2·5)	−0·7 (0·6)	−1·0 (3·2)	+4·7 (4·9)
„ V to VI	−1·4 (5·7)	−0·8 (0·4)	+2·2 (3·9)	+5·8 (5·0)
„ VI to VII	+0·1 (14·2)	+0·4 (1·1)	−0·7 (6·0)	+0·5 (2·8)
„ VII to VIII	−7·4 (7·8)	−0·2 (0·5)	+5·8 (4·0)	−5·0 (2·0)
„ VIII to IX	+1·8 (6·8)	+0·1 (0·6)	+2·9 (4·2)	−4·0 (2·8)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	VI–II (i)	V–I (i)	III–VI
Av. change per month of relatives during stages matched with				
Reference expansion	+1·0 (1·8)	−0·4 (0·3)	−2·2 (2·1)	+3·5 (1·4)
Reference contraction	−2·4 (0·8)	+0 2 (0·2)	+2·6 (1·9)	−1·9 (1·2)
Index of conformity to				
Reference expansion	+ 33	−71	−50	+100
Reference contraction	+100	−43	−50	+100
Business cycles	+ 60	−69	−71	+100

TABLE 93*b* (*cont.*)

Measures of Average Monthly Cyclical Behaviour: Financial Series

(9)	(10)	(11)	(12)	(13)
Yield on 3 per cent. Consols	*Index of prices of shares, including mines*	*Index of prices of shares, excluding mines*	*Rate of exchange: Hamburg on London*	*Advances by the Bank of England to Government*
1794–1848	1811–48	1811–48	1794–1848	1794–1848
14	9	9	14	14
102·4 (8·0)	97·3 (16·5)	95·6 (10·2)	101·6 (4·9)	109·9 (26·2)
101·6 (6·0)	98·1 (13·4)	96·1 (9·0)	101·5 (3·5)	110·9 (17·9)
97·1 (4·1)	101·1 (7·9)	100·9 (4·5)	99·6 (2·1)	103·6 (16·1)
95·9 (3·9)	108·2 (5·6)	106·2 (3·6)	98·8 (1·6)	94·7 (12·8)
97·1 (3·7)	115·8 (21·2)	107·3 (7·0)	98·9 (1·7)	92·8 (14·4)
99·3 (3·3)	110·0 (16·4)	104·8 (7·1)	99·4 (2·0)	85·6 (16·8)
102·6 (4·1)	99·6 (8·0)	101·0 (5·1)	100·0 (3·0)	86·8 (17·6)
102·0 (5·4)	94·6 (6·0)	98·0 (5·1)	100·9 (4·1)	93·7 (22·3)
100·9 (7·1)	94·1 (7·2)	96·4 (6·5)	101·9 (5·1)	102·6 (34·5)
−0·2 (0·6)	0·0 (0·8)	0·0 (0·6)	−0·1 (0·4)	+0·9 (2·2)
−0·4 (0·7)	+0·1 (0·9)	+0·5 (0·7)	−0·3 (0·3)	−2·6 (4·5)
+0·2 (0·7)	0·0 (1·2)	+0·1 (0·9)	−0·1 (0·3)	+0·3 (3·5)
+0·2 (0·5)	+0·2 (1·8)	0·0 (0·7)	+0·1 (0·3)	−0·4 (2·2)
+0·7 (0·9)	−1·9 (1·8)	−0·9 (0·7)	+0·1 (0·4)	−2·5 (3·0)
+0·7 (1·1)	−1·8 (2·4)	−0·8 (1·0)	+0·1 (0·5)	0·0 (2·3)
−0·1 (0·5)	−0·8 (0·9)	−0·5 (0·6)	+0·2 (0·4)	+1·4 (2·6)
−0·3 (0·8)	−0·2 (1·2)	−0·6 (0·7)	+0·3 (0·4)	+2·3 (3·6)
IV–VII (i)	I–IV	I–IV	IV–I (i)	VI–II (i)
−0·2 (0·3)	+0·1 (0·9)	+0·2 (0·7)	−0·2 (0·3)	−1·3 (1·7)
+0·5 (0·5)	−0·6 (0·4)	−0·4 (0·3)	+0·2 (0·2)	+1·2 (1·9)
−50	− 11	+ 33	−36	−29
−57	+100	+100	−57	−14
−59	+ 41	+ 53	−56	−33

Chapter X

CYCLICAL PATTERNS RELATING TO FINANCIAL ACTIVITY

Introduction

This chapter presents series related to the Bank of England, the value of inland bills of exchange created, interest rates, the foreign exchanges, security prices, bankruptcies, public finance, and agricultural rent. The statistics are, on the whole, accurate and inclusive. Perhaps their most serious weakness, as a group, is the lack of any accurate data on country-bank note circulation before 1833 and other forms of private credit. One cannot proceed from Bank of England lending (or even inland bills of exchange) to generalization about the effective volume of money. Cash transactions, and book credit, further, constituted the mechanism of a large proportion of total money exchanges, especially in periods of relative monetary ease; and accurate statistics on their size or movement are not available. Nor can one speculate very fruitfully on the velocity of circulation of either cash or credit money, although the growth of joint-stock banking, the increased use of cheques, and improvements in transport would lead one to assume a secular rise.

As data for the business-cycle analyst, as opposed to the general economist or historian, the value of the average patterns of behaviour of the Bank of England and government finance series is somewhat diminished by the abnormal situation during the war years, when the government borrowed heavily, and when (after 1797) a bullion standard was not operative. More broadly, of course, a comparison of the war and post-war behaviour of Bank of England and government finance is of great interest.

Money market series, on the whole, reflect, in their movement, all reference cycles that have been marked off in these years. The average duration of specific cycles for the bullion reserve, private discounts, medium and large bills of exchange, and Bank notes in circulation, all approximate (in the period for which these series are available) the average duration of reference cycles. With one possible exception (the reference cycle 1803–8) every upper turning-point was accompanied by a tightening of the money market, although these crises did not in all cases coincide in time with the annual reference date, and rarely, if ever, with the monthly date. In the major cycle upper turning-points financial crises tended, in fact, consistently to lag behind the reference peak. Thus, although there was almost universally a monetary response to the beginnings of cyclical contraction, this is not to be taken necessarily as evidence for a strictly monetary explanation of the upper reference-cycle turning-point.

The average amplitude of movement of the monetary series is relatively large, with a much more even distribution between average amplitude of

rise and fall than in the case of production and foreign trade series. Average amplitudes, however, vary widely, as the following table (not inclusive) indicates:

	Average amplitude of specific cycles (rise and fall)
Bullion in the Bank of England	130·7 (42·2)
Bills and notes discounted at the Bank of England	123·8 (69·6)
Market-rate of discount	109·0 (60·0)
Number of bankruptcies	81·7 (33·7)
Bank-rate of discount	69·8 (28·2)
Total deposits in the Bank of England	65·4 (37·1)
Index of price of shares, including mines	63·5 (50·8)
Large bills of exchange created	59·6 (23·9)
Computed rate of interest on exchequer bills	49·6 (21·1)
Yield on 3 per cent. Consols	30·3 (7·3)
Medium bills of exchange created	27·1 (9·9)
Bank of England notes in circulation	23·9 (11·9)
Small bills of exchange created	15·4 (6·7)
Rate of exchange: Hamburg on London	9·9 (8·9)
Index of prices of domestic and imported commodities	44·6 (13·5)
Volume of total exports	39·9 (24·0)
Volume of total imports	39·3 (19·2)
Hoffmann's index of total production	22·8 (8·2)

The substantial deviations from the average amplitudes reflect the varying severity of the financial crises that occurred. In general, as one would expect, the major reference cycles were associated with larger movements in the monetary series than the minor cycles.

From the perspective of the monetary data, the years 1790–1850 can be broken roughly into three trend periods. The first embraces the war years, when both public and private advances at the Bank increased and the bullion reserve fell away. The yield on Consols and government rate on exchequer bills reach their peaks fairly early in the period, but exhibit no strong downward tendency until after 1815. In net, of course, the exchanges weakened in this interval, but began to recover towards the pre-war norm in 1811, owing principally to a sharply improved trade balance.

From 1815 through the early twenties occurred a period of financial adjustment. The exchanges returned to normal; public and private lending, deposits at the Bank, and interest rates declined rapidly. From about 1824 on, the trend in bills of exchange, private discounts, and total deposits at the Bank of England is irregularly upward. This trend is shared by the bullion reserve. The foreign exchanges, with a gold standard operative from 1821, fluctuate only slightly, about a constant level. The trend movement of short-term interest rates is horizontal, although there is a clearly marked tendency for the amplitude of movement to increase, peaks being successively higher, troughs lower. The Consol yield, as a measure of the long-term rate, declines slightly over this final trend period.

The Bank's bullion reserve and bills and notes discounted exhibit

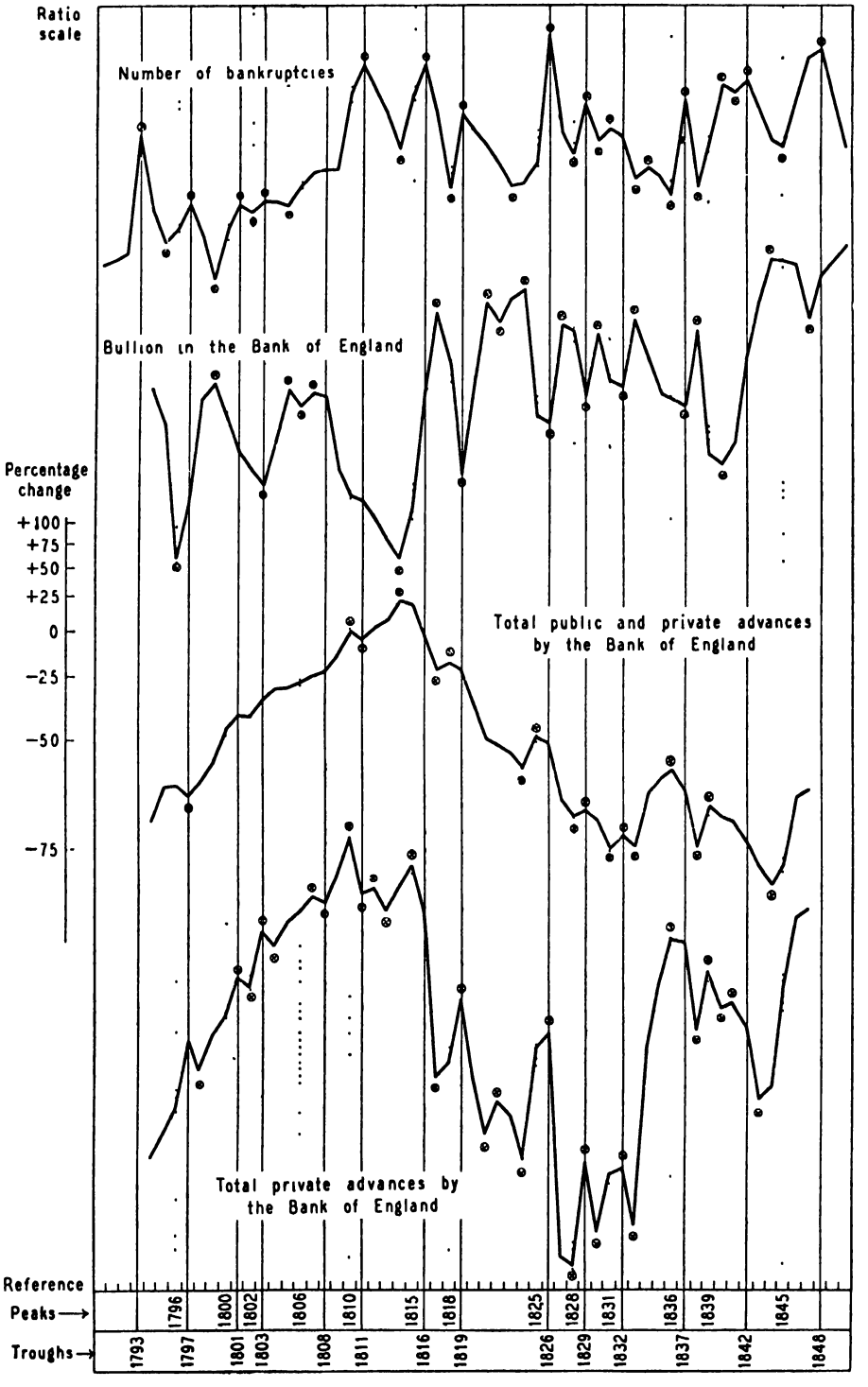


FIG. 140 *a*. Annual Financial Series

consistent VII–III and III–VII expansion patterns, respectively. In the early stages of expansion bullion tended to increase at the Bank, and the demand for loans to decline: in the latter stages of expansion and the early stages of contraction (the periods of most intense financial panic) the pressure for Bank loans and on the bullion reserve increased: in the latter stage of contraction, as easy money conditions returned, borrowers withdrew from the Bank and the bullion reserve rose. The market-rate of interest responded to the same pressures, showing excellent III–VII conformity. The Bank-rate, although somewhat less sensitive to market conditions, exhibits a like pattern, with a consistent lag behind the market-rate. The Consol yield, however, although its behaviour shows some of the same influences, is best taken as of V–I expansion, in the annual series. Large and medium bills of exchange, more normal types of credit than Bank discounts, show I–V expansion, with some tendency to lag, at the peak, but much less consistently than Bank discounts.

Bankruptcies and the foreign exchanges move inversely with business cycles (V–I expansion), while the securities indexes show rather high positive conformity (I–V expansion), with the greatest rate of increase concentrated in stage III–V. To the extent that this rise in the latter stage of prosperity represents the relatively increased attractiveness of speculative investment, it explains the rise in the yield of Consols during the latter stages of the post-war major cycle expansions (1824–5, 1835–6, 1844–5).

It may seem paradoxical that the exchanges should have been strengthening in stage V–VII, at a time when the bullion reserve was declining and interest rates were rising. The explanation for this seeming paradox may be found in the timing of internal and external drains on the reserve. One of the factors tending to produce upper turning-points was an external drain, associated with a fall in the trade balance in stage III–V. In these circumstances the exchanges sagged. The decline in the reserve at that point was, in large part, a consequence of external pressure. The financial crisis which followed (V–VII) served to correct the exchange rates by reducing imports relative to exports and diminishing the foreign drain on the reserves. It was, however, in the nature of the financial crises that they be accompanied by an attempt by individual firms and private bankers to make their positions as liquid as possible. The decline in bullion from V–VII can generally be identified with this type of domestic pressure. Since these drains were primarily internal the Bank felt free to lend liberally at the expense of its reserves. The discount rates were high—not to discourage borrowing,[1] but because the market demand was abnormal, and the Bank quite willing to exercise its virtually monopolistic position in times of stress. But these domestic liquidity panics did not weaken the exchanges.

[1] So long as money could be had, borrowers were willing to pay three and four times as much as they normally had to. As Hawtrey has pointed out, the peak levels reached by interest rates during periods of stringency are no indication of the actual cost of borrowing. The rates are quoted per annum, and if money is tight for a matter of days, or even weeks, the cost, over such a period, is hardly prohibitive.

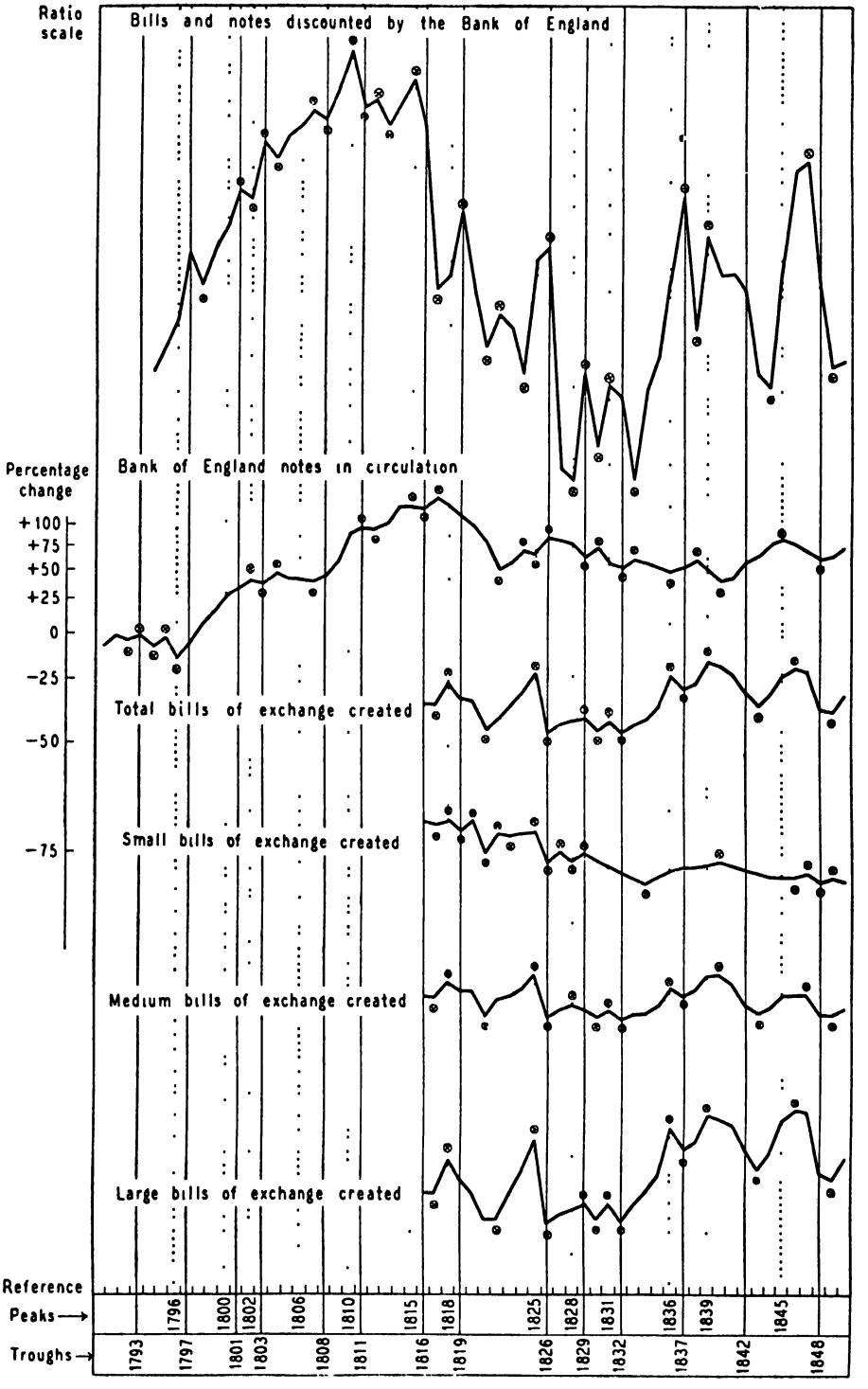

Ratio scale
Bills and notes discounted by the Bank of England
Percentage change
Bank of England notes in circulation
+100
+75
+50
+25
0
−25
−50
−75
Total bills of exchange created
Small bills of exchange created
Medium bills of exchange created
Large bills of exchange created
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 140*b*

The exchanges began to improve, in fact, almost simultaneously with the onset of general contraction.

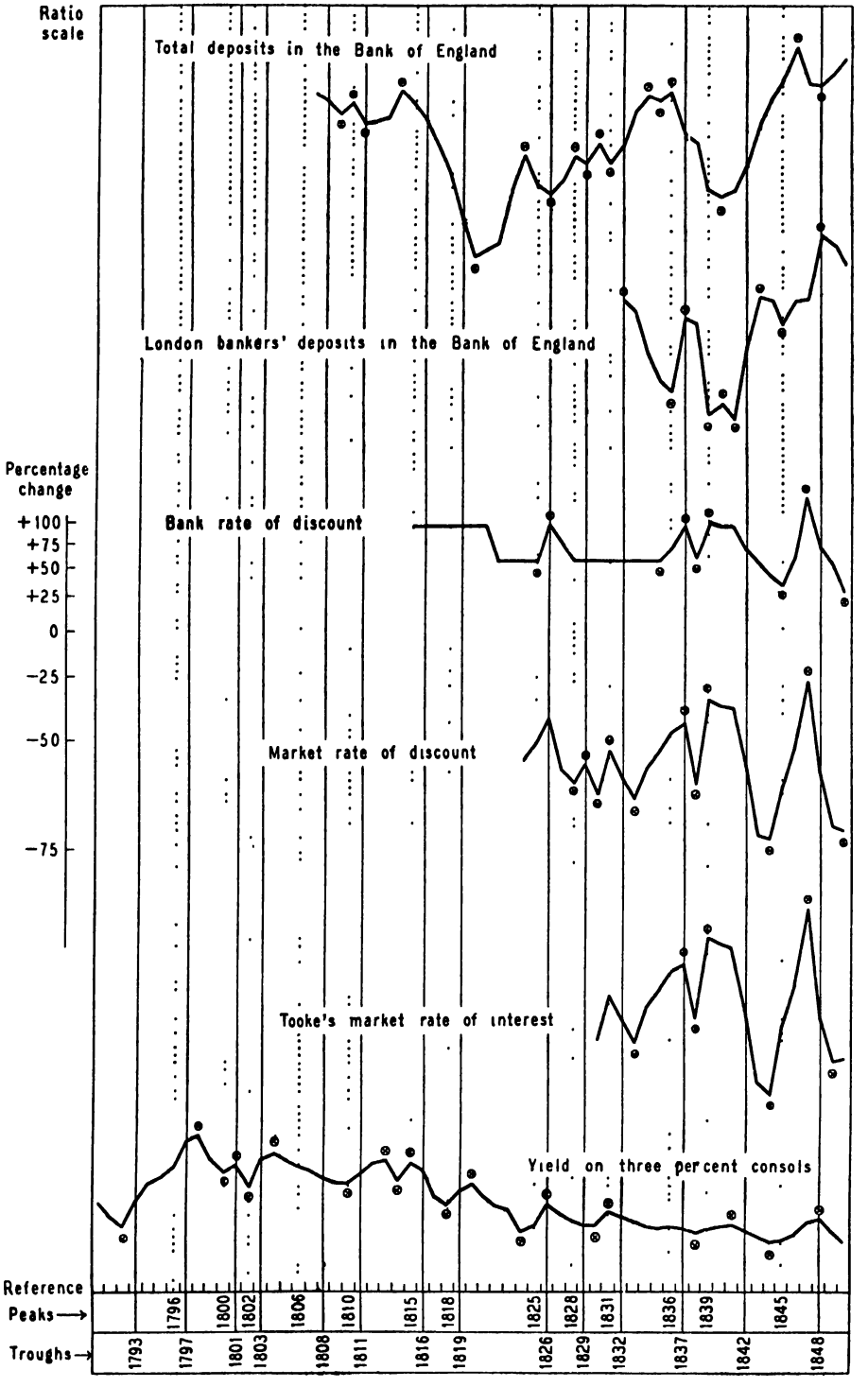
In general, the annual data on the money market show easy money as a condition common to the latter stages of depression and the early stages of prosperity. The money market tightened late in the course of the boom, and crises tended to occur some time after the upper reference turning-points. Increased borrowing at the Bank of England can, under normal conditions, be taken as evidence of tightness elsewhere in the credit system. It is thus significant that inland bills of exchange begin to rise in the early stages of prosperity sooner than discounts at the Bank. If all types of effective money were represented among the series, one could, almost certainly, establish a I–V average increase—this despite the tendency of prices to rise consistently only in the latter stages of expansion. And it should be remembered that the Bank's increased lending in the early stages of contraction (V–VII) is, as it were, the inverse of decreased lending, and increased hoarding elsewhere in the monetary circulation. In short, the pervasive III–VII expansion pattern for the monetary series available does not contravene the common-sense conclusion that $MV+M'V'$ rose and fell with general business fluctuations.

Except for net tax revenue (which has fairly high I–V conformity) the data on public finance do not exhibit any very consistent relation to reference-cycle movements. They reveal the manner in which the war was financed, and the slow reduction in the total debt thereafter. Government short-term borrowing and the unfunded debt decline sharply from 1815 to the end of the period, indicating the government's conversion of its obligations into long-term securities and its relative unimportance as a borrower in the money market.

A: 1. Number of Bankruptcies (Annual)

Specific-cycle Behaviour. This series was analysed on an inverted basis; that is, peaks were treated as specific-cycle troughs, and troughs as specific-cycle peaks. Bankruptcies contain one more specific cycle than there are reference cycles in the period 1790–1850. The series fails to reflect the reference-cycle 1808–11, rising without an absolute break from 1805 to 1811; on the other hand, bankruptcies rise in 1834 and decline in 1841 sufficiently to justify specific cycles, paralleling no reference-cycle movement. The average amplitude of movement is large, although less than for the Bank's bullion reserve, discounts, or the short-term market-rates of interest. There is, in net, an upward trend in the number of bankruptcies over the whole period. From 1810 to 1850, however, a virtually straight trend line would best describe the character of the long-run movement of the series, which, in view of the growing number of enterprises in Britain, is somewhat surprising.

Reference-cycle Behaviour. Bankruptcies exhibit a high degree of conformity to a V–I expansion pattern; i.e. they fall during general prosperity


Ratio scale
Total deposits in the Bank of England
London bankers' deposits in the Bank of England
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Bank rate of discount
Market rate of discount
Tooke's market rate of interest
Yield on three per cent consols
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
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1842
1845
1848

FIG. 140*c*

and rise during depression. Bankruptcies on the whole, however, rose slightly during stage III–V, indicating that in some cases their rise anticipated the peak in general business activity. The annual data reveal eight cases of a rise in bankruptcies in the peak reference-cycle year. In all but one case, however, peak years in bankruptcies coincide with reference-cycle troughs: a specific-cycle peak occurs in 1831, not in 1832.

But for the counter-cyclical fall in bankruptcies in 1832 the index of conformity to stages matched with reference contractions would be perfect. The irregularities reflected in the expansion index result from a net increase in bankruptcies during expansion stages of the reference cycles 1803–8 and 1808–11. The fact that the increase in bankruptcies in 1808–10 (a reference expansion) was greater than during the previous and following reference contractions accounts for the single irregularity in the index of conformity to all business cycles.

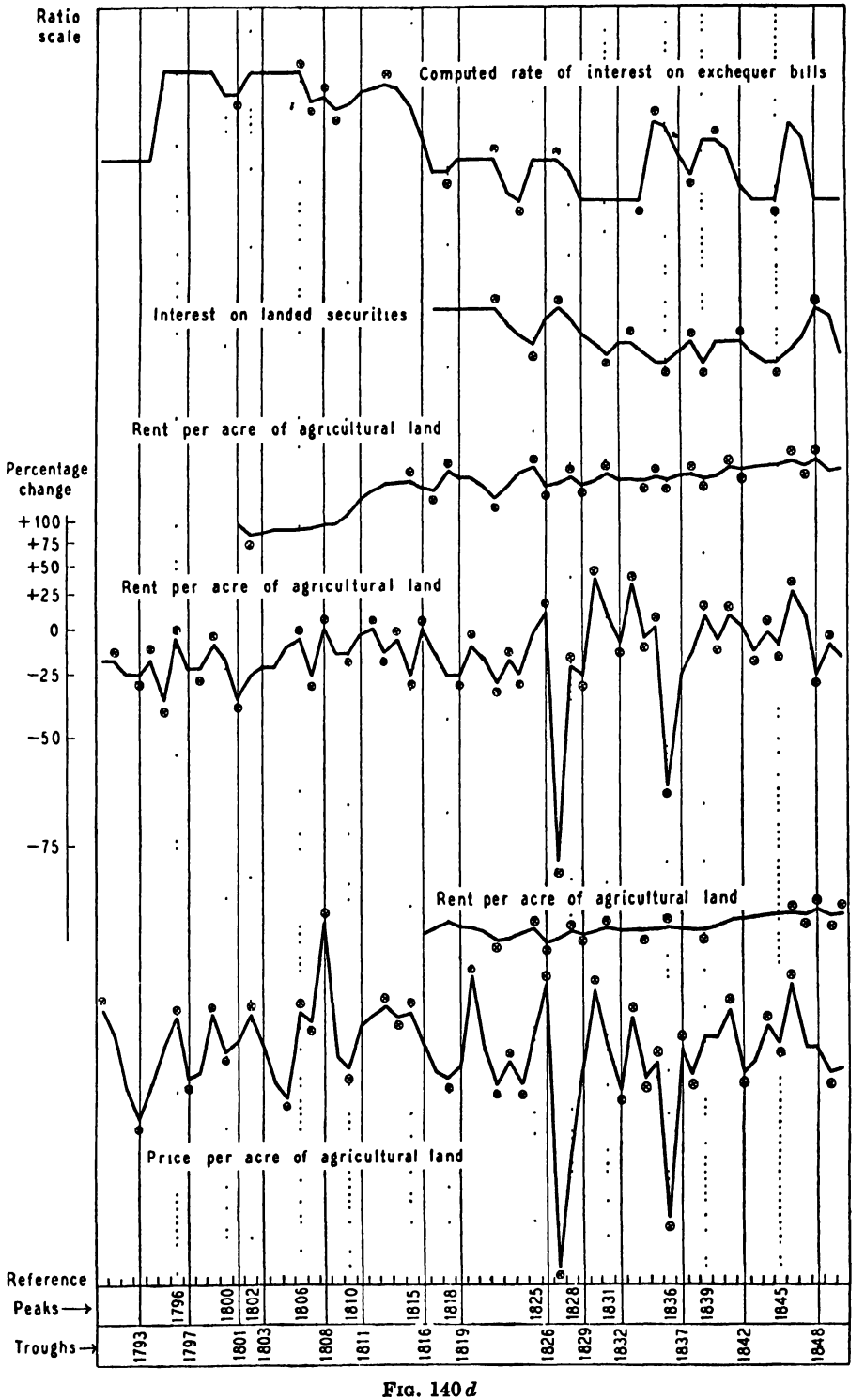
C: 1. Number of Bankruptcies (Monthly)

Specific-cycle Behaviour. The monthly series has four more specific cycles than the annual series. The average duration of expansions greatly exceeds that of contractions, in contrast to their relations in the annual series. The total average amplitude of movement, though considerably damped by the elimination of the seasonal fluctuations, is about 80 per cent. larger than in the annual series. The difference between the average rates of change is even greater.

The average duration of the monthly specific cycles is somewhat smaller than for the monthly reference cycles. Bankruptcies show cyclical movements which do not reflect general business fluctuations. The weeding out of firms is a process which is not necessarily confined to reference contraction. Thus there were specific cycles in bankruptcies in the course of reference expansions from 1832 to 1834, from 1837 to 1839, and from 1846 to 1847.

Reference-cycle Behaviour. Expansion in stages IV–VIII best describes the cyclical behaviour of bankruptcies. This means that bankruptcies, broadly, increased during depression and declined during prosperity, but tended to increase in anticipation of the peak in general business and to fall off for some time before the lower turning-point. The annual data suggest this relationship, but the monthly data reveal it unmistakably. The highest rate of mortality of firms occurred during stages V–VII and the lowest during stages I–III.

In only one phase did bankruptcies fail to conform to the IV–VIII pattern. During the reference expansion from 1808 to 1810 bankruptcies were increasing (but at a lesser rate than in the preceding and following contractions). The prices of imported commodities suffered a severe decline in the early months of 1809 (the index of imported commodities falls over 30 points during the course of this relapse). Firms speculating in the import markets must have been affected by this price fall, resulting in the inauguration of a wave of liquidation.


Ratio scale
Computed rate of interest on exchequer bills
Interest on landed securities
Rent per acre of agricultural land
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Rent per acre of agricultural land
Rent per acre of agricultural land
Price per acre of agricultural land
Reference
Peaks →
Troughs →
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
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1842
1845
1848

FIG. 140 *d*

A: 2. Bullion in the Bank of England (Annual)

Specific-cycle Behaviour. The average duration of specific cycles in this series is slightly longer than that for reference cycles. During the war years two reference cycles are not reflected in the annual average of bullion in the Bank (1801–3 and 1808–11); after 1815 the series contains one more specific than reference cycle (1819–22). The average duration of contraction is greater than for expansion, a relation that holds for all but four specific cycles. The average amplitude and rate of movement are large. The average amplitudes of expansion and contraction are roughly similar, with the amplitude of expansion somewhat greater than for contraction, due to the net upward secular trend. That net movement, however, is not continuous. Bullion fluctuates violently about a fairly constant level (about £4 million) from 1794 to 1815. It then rises to a new secular level (about £7·5 million), maintained from 1816 to 1842. The last few years of the period saw a rapid rise to a new high level (about £12 million).

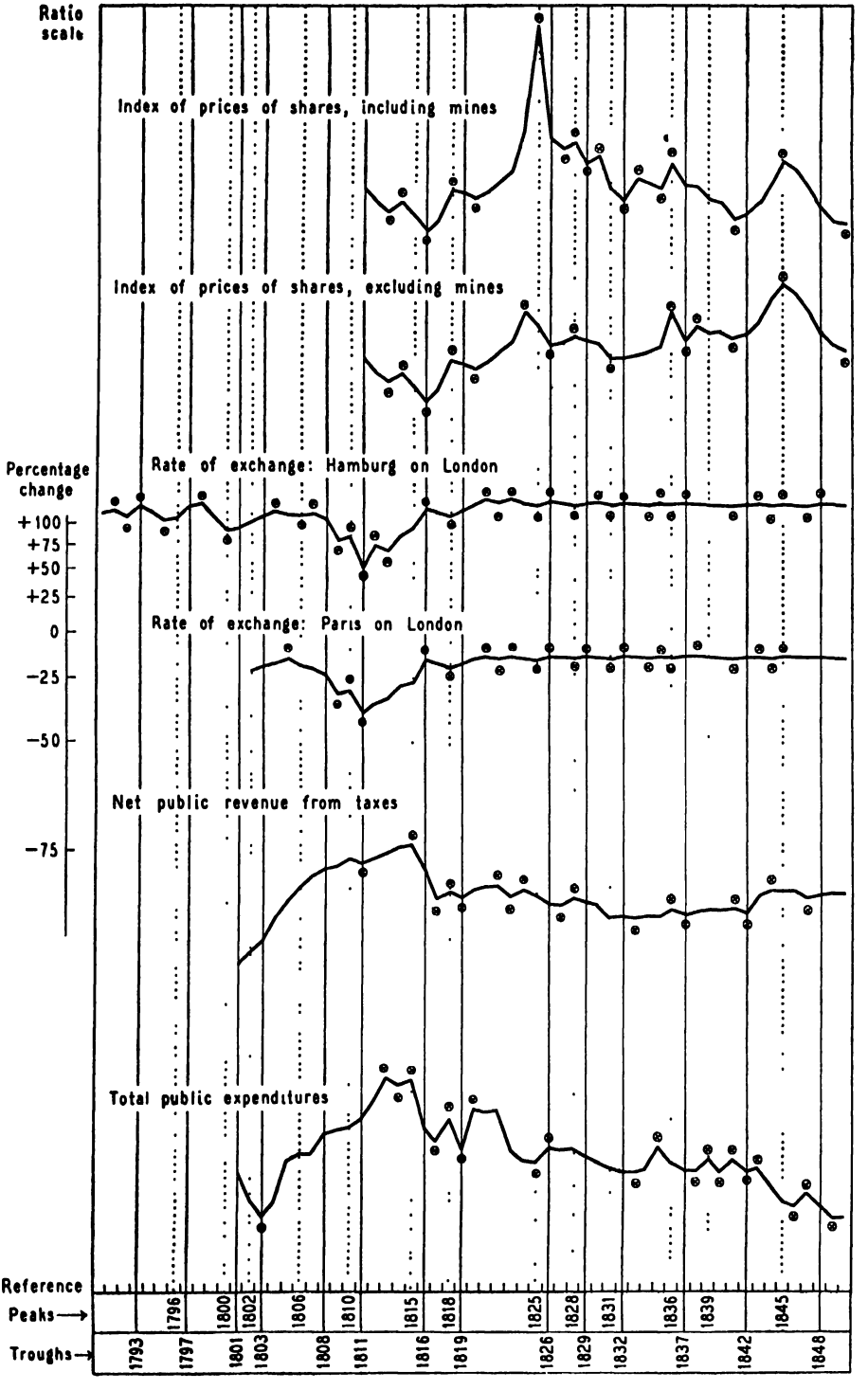
Reference-cycle Behaviour. The average pattern shows expansion in stages VII–III. The more consistent movement is the rise in stage I–III. The early stages of prosperity were accompanied, then, by a rising bullion reserve in the Bank of England. As prosperity wore on, the reserve tended to decline. After 1815 in only one cycle (1842–8) does stage III–V fail to exhibit absolute contraction.[1] The bullion reserve, on the average, continued to decline for some time after the upper turning-point during the period of financial crisis. The final stage of reference contraction (VII–IX), in the two post-war cycles where it can be distinguished in the annual figures, saw an absolute rise (1841–2, 1847–8). The average pattern implies that a rise in the bullion reserve preceded the turn upward in general business activity.

After 1816 the indexes of conformity to the VII–III pattern are perfect. During the war years, however, a number of irregular movements occur. The fact that the Bank was not subject to a bullion standard from 1797 might be expected to weaken the conformity of the reserve to cyclical fluctuations. Heavy payments abroad to finance the British armies and continental allies explain the continued fall from 1807 to 1814, which does not reflect clearly the two reference cycles, 1808–11, 1811–16.[2] The steady decline from 1799 to 1803 similarly fails to reflect the cycle 1801–3.

The extent to which the Suspension Act might be expected to have affected the conformity of the bullion reserve is indicated vividly by a calculated series giving the proportion of bullion to total advances. After 1798 the proportion falls to an extremely low level, about which it fluctuates only slightly. The decline is from about 4 per cent. in 1798 to an average of about 1·5 per cent. during the remaining war period. From 1820 to 1840 the proportion fluctuates vigorously about a level of roughly 5 per cent.

[1] For an account of the persistence of easy money conditions until late in expansion (1842–4), see Vol. I, pp. 329–31.

[2] See Vol. I, pp. 103–7, 131–5.


Ratio scale
Index of prices of shares, including mines
Index of prices of shares, excluding mines
Percentage change
Rate of exchange: Hamburg on London
+100
+75
+50
+25
0
Rate of exchange: Paris on London
−25
−50
Net public revenue from taxes
−75
Total public expenditures
Reference
Peaks→
Troughs→
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
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1825
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1842
1845
1848

FIG. 140 e

The low figures after 1797 indicate clearly the significance of the abandonment of the bullion standard.

The extraordinarily consistent reference-cycle pattern after 1815 constitutes important evidence on the relation of the Bank of England to cyclical fluctuations. It would appear that the pressure on the bullion reserve came, for the most part, in the latter stages of expansion, continuing into the early stages of contraction. The concordance of other banking series to this pattern will emerge in subsequent analysis. But it should be noted here that the concentration of withdrawal from the bullion reserve in stage III–V also fits the sharp average increase in the adverse trade balance and the rise in wheat imports and general prices in that stage. The impact of the major crises in 1818–19, 1825–6, 1836, 1839, and 1847 emerges clearly in sharp contractions (V–VII) in the bullion reserve, due to internal rather than external drains.

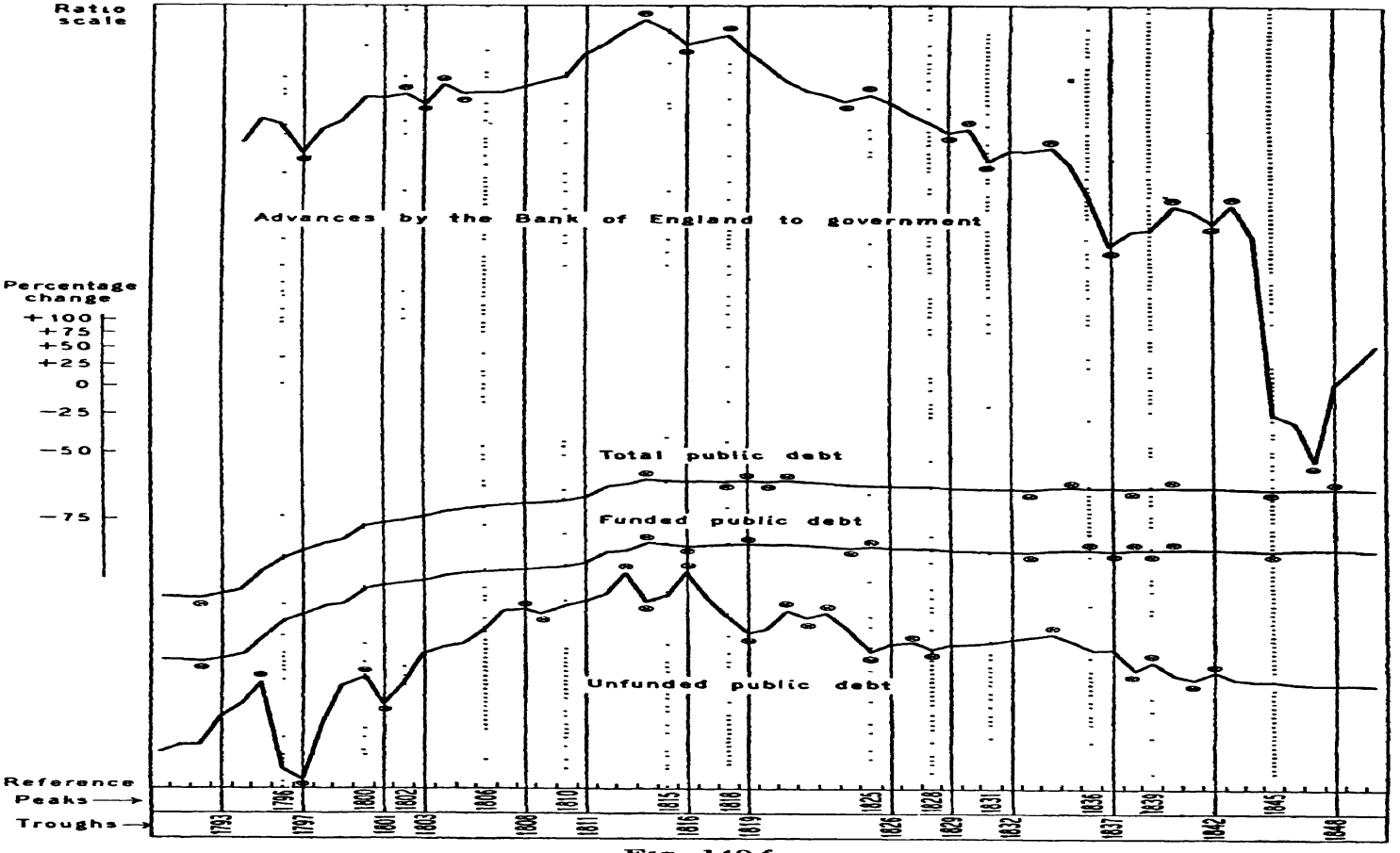
C: 2. Bullion in the Bank of England (Monthly)

Specific-cycle Behaviour. Although specific cycles in the annual series had a longer duration on the average than did the annual reference cycles, the monthly specific and reference cycles are, on the average, approximately equal in duration. Like the annual series, during the war years, the monthly data fail to reflect two reference cycles (1801–4 and 1808–11); after 1815 the monthly series contains two specific cycles for which there are no corresponding reference cycles (1819–22 and 1832–5), but skips the reference cycle 1837–42. Until 1832 there is one-to-one correspondence between the annual and the monthly specific cycles. Thereafter, however, two specific cycles can be marked off in the monthly data which are not observable in the annual series (1832–5 and 1839–46). In sum, the dating of the monthly specific cycles corresponds to that of the annual specific cycles except in the period after 1832. In net there are two more monthly specific than annual cycles.

The difference between the average duration of expansion and contractions is less marked in the monthly than in the annual data, but still exists. The average duration of contractions is greater than for expansions, a relation that holds for all but four specific cycles. Both the average amplitude and rate of movement are considerably larger in the monthly cycles.

Reference-cycle Behaviour. The average pattern of the monthly series shows expansion in stages VII–III. During this expansion the most consistent movement is the rise in stage VII–VIII, a fact which did not emerge clearly from the annual data because there are only three cases when contraction lasted longer than one year. There is no instance of a failure of the bullion reserve to show absolute contraction between stages III–V. The decline in stage V–VI occurs almost as regularly as in the two stages preceding the upper turning-point, but much less so in stage VI–VII.

The indexes of conformity to the VII–III pattern would be perfect in the post-war period, except for a counter-cyclical movement in stages


Ratio scale
Advances by the Bank of England to government
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Total public debt
Funded public debt
Unfunded public debt
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1806
1808
1810
1811
1815
1816
1818
1819
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1842
1845
1848

Fig. 140*f*

VII–III of the last cycle (October 1846 to September 1848). During the whole period there is only one instance of a contrary movement during the stages matched with reference contraction (in the cycle from October 1811 to September 1816). In the annual series net expansion during stages III–VII also occurs in the 1803–8 cycle, but the monthly series does not behave irregularly in this cycle. The index of conformity to reference expansions is smaller for the monthly than for the annual series because in the initial and terminal reference cycles, which are not covered by the annual data, the monthly bullion figures were declining.

A: 3. Total Public and Private Advances by the Bank of England (Annual)

Specific-cycle Behaviour. The Bank's advances to private borrowers constituted a fluctuating percentage of its total lending. At the start of the wars, advances made to the account of the Treasury were 77 per cent. of the Bank's portfolio of loans; in 1845 this figure had fallen to 6 per cent. In the intervening years private borrowing, as a proportion of total advances, rose during the war, declined to its lowest percentage in 1836, and rose steadily thereafter.[1] Total advances of the Bank, as a result, reflect only broadly the movement of its components. The total rises at an almost constant rate from the trough in 1797 to the peak in 1810, although two troughs appear in the advances to the government during that period, and three troughs in private advances. The trough in 1811 is a reflection of the decline in private borrowing, for public borrowing continues strongly upward from 1805 to 1814. The sharp cyclical movements in private advances throughout the war period otherwise cause no perceptible similar fluctuations in the total. Until 1831, in fact, the total series more nearly resembles advances to the government, except that turning-points of several cycles in the latter are shifted a year in the total. Thereafter the turning-points are similar to those of private advances. In net, total advances exhibit one specific cycle less than advances to the government, and six less than private advances. The amplitude of movement is smaller than for either of the components. The total has a period of secular rise, until 1814, as in advances to the government (the peak is reached in 1810 by private advances), followed by a steep secular decline. The rising trend in private advances from 1828 cancels a portion of the falling trend in government advances, so that the total from 1828 to 1841 is fairly level.

[1] Private and public advances constituted the following percentages of the total advances made by the Bank at five-year intervals:

Year	Private	Public
1795 . .	23	77
1800 . .	33	67
1805 . .	46	54
1810 . .	55	45
1815 . .	38	62
1820 . .	19	81
1825 . .	28	72
1830 . .	15	85
1835 . .	55	45
1840 . .	62	38
1845 . .	94	6

Figure 1

Number of Bankruptcies

------ 14 Specific Cycles 1793 - 1848

——— 13 Reference Cycles 1793 - 1848

Conformity - 69, - 85, - 84

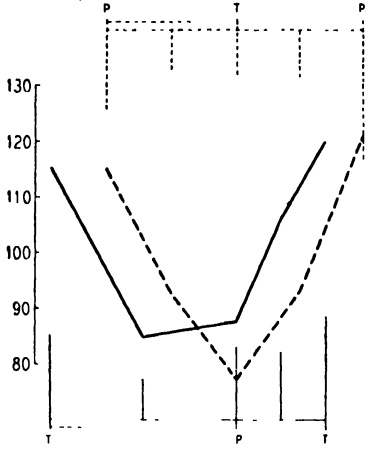


Figure 2

Bullion in the Bank of England

------ 11 Specific Cycles 1796 - 1847

——— 12 Reference Cycles 1797 - 1848

Conformity + 50, + 67, + 57

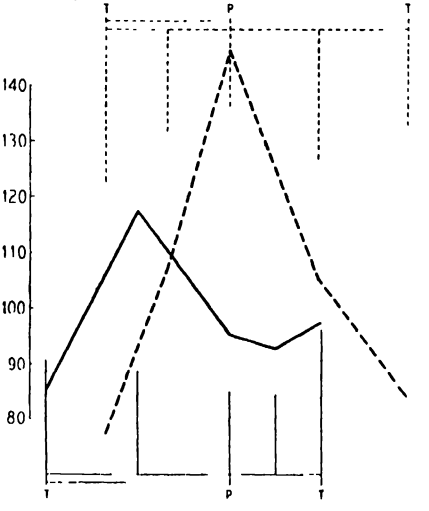


Figure 3

Total Public and Private Advances by the Bank of England

------ 8 Specific Cycles 1797 - 1844

——— 11 Reference Cycles 1797 - 1842

Conformity + 55, + 9, + 24

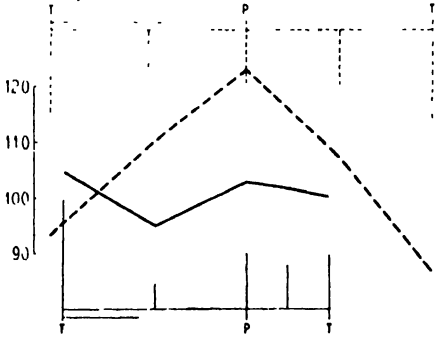


Figure 4

Total Private Advances by the Bank of England

------ 14 Specific Cycles 1798 - 1843

——— 11 Reference Cycles 1797 - 1842

Conformity + 100, + 27, + 67

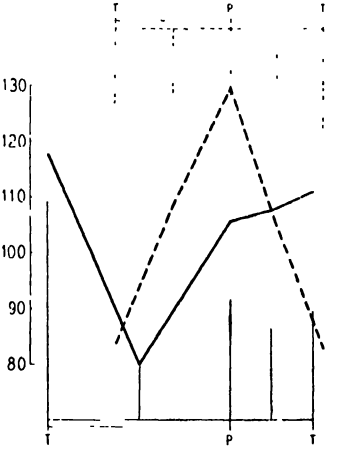


FIG. 141 *a*. Cyclical Patterns of Annual Financial Series

The trend in net over the whole period is declining; that is, from the initial trough of the first specific cycle to the terminal trough of the last cycle.

Reference-cycle Behaviour. As in the case of the component series, the average pattern is not a satisfactory determinant of the appropriate stages to match with reference expansion, inasmuch as there is little regularity in the behaviour of the series during individual reference cycles. During the war period there is only one stage of absolute decline, the contraction in 1811. After that date there are two cycles with a I–V pattern, two with a V–I pattern, and three reference cycles showing a rise only in stage III–V.

Stages III–VII have been matched with reference expansion, yielding somewhat better conformity during expansions than during contractions. There are three counter-cyclical movements during stages matched with reference expansions, i.e. the cycles with peaks in 1815, 1828, and 1831. Only one of the five counter-cyclical movements during stages matched with reference contraction occurs during the post-war period, i.e. the cycle with the trough in 1832. There is, patently, no analytic significance to be attached to this series above that of its components.

C: 3. Total Public and Private Advances by the Bank of England (Monthly)

Specific-cycle Behaviour. There are fourteen specific cycles in the monthly series as compared with eight in the annual. The average durations, as a result, are completely different: 43·2 (13·8) months in the monthly, as against 70·5 (28·5) months in the annual series. The total average amplitudes are not dissimilar, but the average rate of change for the monthly data is larger.

The monthly data reflect the movements of private advances more faithfully from 1794 to 1817 than the annual series. The annual series, with but two specific cycles during the war period, obliterates the fluctuations in private advances because of the strong upward trend and larger percentage importance in the total of public borrowing.

Reference-cycle Behaviour. No consistent pattern emerges for this series over the whole period. During the war years advances rose consistently during stages I–V and generally declined during stages V–IX. After the war advances rose regularly only in stages IV–V and VI–VII. The series shows moderately high conformity to a I–V pattern. Traces of a II–VII pattern characteristic of the behaviour of the Bank's private discounts are present in the fluctuations of total advances, and the indexes of conformity to this pattern have also been computed. They show better conformity to reference expansion and to all cycles, but lesser conformity to reference contractions than the I–V pattern.

A: 4–5. Total Private Advances and Bills and Notes Discounted at the Bank of England (Annual)

Specific-cycle Behaviour. Until 1832 these two series are identical. From 1829 the Bank undertook to ease the market by advancing at lower

Figure 5

Bills and Notes Discounted by the Bank of England

------ 14 Specific Cycles 1798 - 1849

——— 12 Reference Cycles 1797 - 1848

Conformity +100, + 45, +86

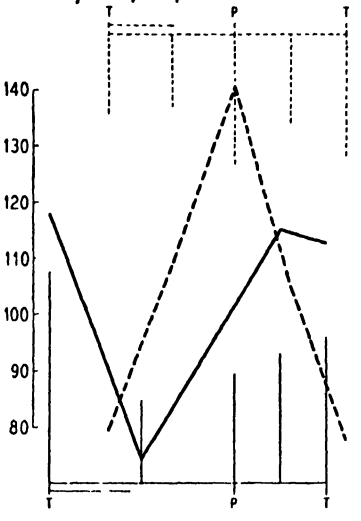


Figure 6

Bank of England Notes in Circulation

------ 13 Specific Cycles 1792 - 1848

——— 13 Reference Cycles 1793 - 1848

Conformity + 69, + 15, + 20

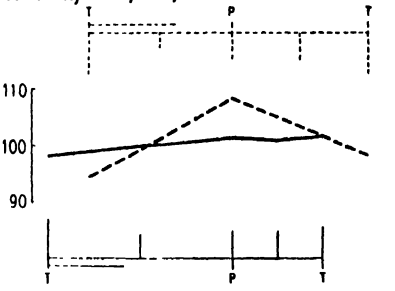


Figure 7

Total Bills of Exchange Created

------ 7 Specific Cycles 1817 - 1849

——— 7 Reference Cycles 1816 - 1848

Conformity + 71, + 86, + 85

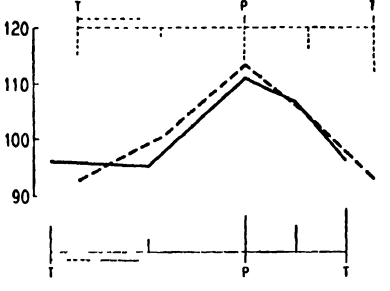


Figure 8

Small Bills of Exchange Created

------ 9 Specific Cycles 1817 - 1853

——— 7 Reference Cycles 1816 - 1848

Conformity - 14, + 71, + 62

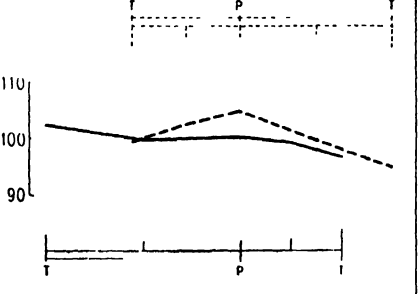


Figure 9

Medium Bills of Exchange Created

------ 7 Specific Cycles 1817 - 1849

——— 7 Reference Cycles 1816 - 1848

Conformity + 86, + 100, + 100

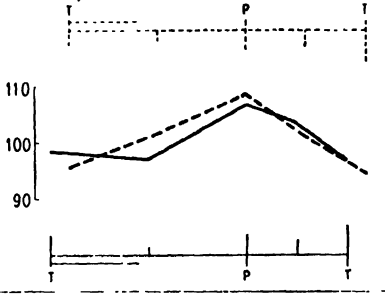


Figure 10

Large Bills of Exchange Created

------ 7 Specific Cycles 1817 - 1849

——— 7 Reference Cycles 1816 - 1848

Conformity + 86, + 71, + 85

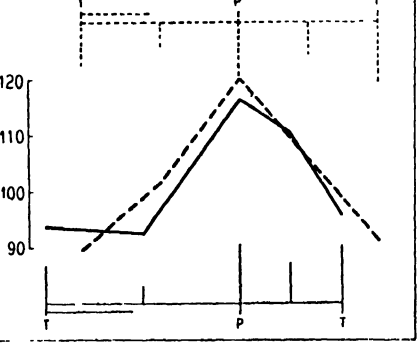


FIG. 141 *b*

rates and with less stringent collateral requirements during the quarterly periods when the Treasury tightened the market by collecting taxes. These special loans, when added to bills and notes discounted, constitute total private advances.

Both series contain fourteen specific cycles; but the discount series (unlike advances) exhibits so small a rise in 1841 that no specific cycle has been marked off at that point. On the other hand, advances are not available beyond 1847 and the cycle with a trough in 1849, therefore, does not appear. In both cases the average duration of specific cycles is shorter than in the case of bullion. During the war years there are three more specific cycles in the discount than in the bullion series. After 1815 the number of cycles in discounts is but one greater than in bullion.

The trend is strongly upward from 1794 to 1810. After a lesser peak in 1814 the series declines to its secular low point in 1828. A secular rise follows to the end of the period. In net the trend movement is slightly downward; but this is an obvious case where the average conceals more than it reveals. The introduction of the temporary advances yields a greater secular rise after 1832.

Reference-cycle Behaviour. Both series exhibit average patterns which are best designated as of III-VII expansion: the inverse of average bullion reserve movements. The differences in the movement of their average patterns in stages V–VII and VII–IX are attributable to the fact that the discount series contains the cycle from 1842 to 1848, whereas private advances are not available beyond 1847, so that the last reference cycle is missing. The clearly marked V–VII rise and VII–IX fall in that cycle are sufficient to alter significantly the average pattern in its contraction stages. In six of twelve reference cycles covered by the discount series one-year contractions showed an absolute rise; in three cases of one-year contraction the series falls; in two of the three cases where reference contraction covered more than one year the series rises in stage V–VII and falls in stage VII–IX. For the reference contraction stages, then, the average pattern for the annual data does not represent very consistent behaviour.

For reference expansion stages, however, the average pattern summarizes highly uniform behaviour in the individual cycles. All but one I–III stage shows contraction (1809); all but two III–V stages show expansion (1802, 1828). So far as the Bank of England is concerned it may be concluded, then, that the early stages of general business expansion were marked by a lessening demand for private credit (and a mounting bullion reserve), while the latter stages saw an increase in credit granted (and a falling bullion reserve). The broad tendency for discounts to increase beyond the upper turning-point is a result, of course, of the Bank's position as *dernier ressort* during periods of financial crisis—a relation evident consistently throughout the whole period, even though crudely reflected in the average pattern for the annual data.

The indexes of conformity for discounts are perfect for expansion,

Figure 15

Tooke's Market Rate of Interest

----- 4 Specific Cycles 1833-1852

——— 3 Reference Cycles 1832-1848

Conformity +100, +100, +100

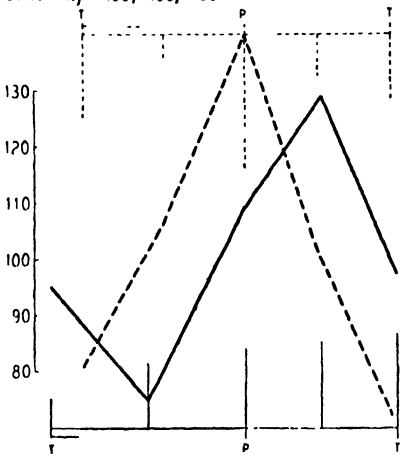


Figure 16

Yield on Three Percent Consols

----- 9 Specific Cycles 1798-1848

——— 13 Reference Cycles 1793-1848

Conformity -46, -15, -36

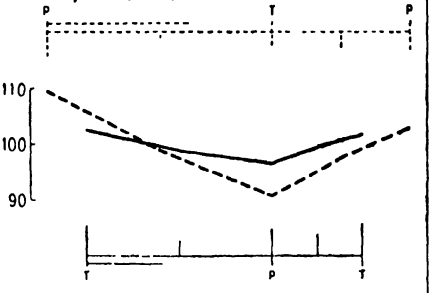


Figure 17

Computed Rate of Interest on Exchequer Bills

----- 7 Specific Cycles 1801-1845

——— 13 Reference Cycles 1793-1848

Conformity + 31, + 31, + 28

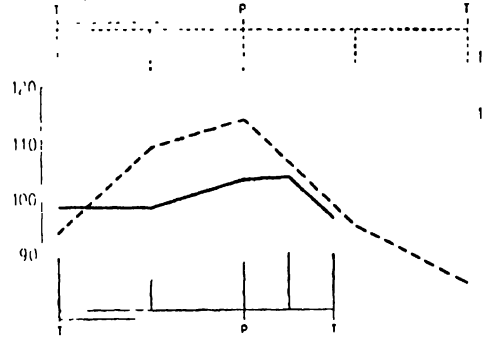


Figure 18

Interest on Landed Securities

----- 5 Specific Cycles 1822-1848

——— 6 Reference Cycles 1819-1848

Conformity -67, -67, -64

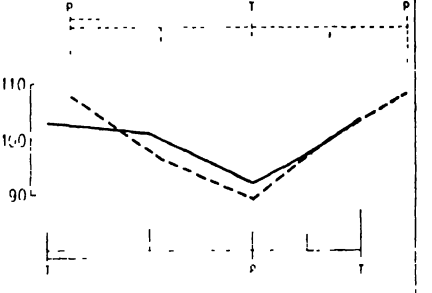


Figure 19

Rent per Acre of Agricultural Land

----- 11 Specific Cycles 1802-1851

——— 11 Reference Cycles 1801-1848

Conformity + 73, - 9, + 19

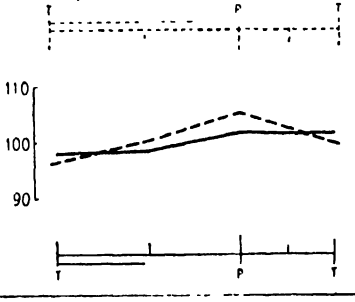


Figure 20

Rent per Acre of Agricultural Land

----- 21 Specific Cycles 1789-1850

——— 13 Reference Cycles 1793-1848

Conformity + 8, 0, + 4

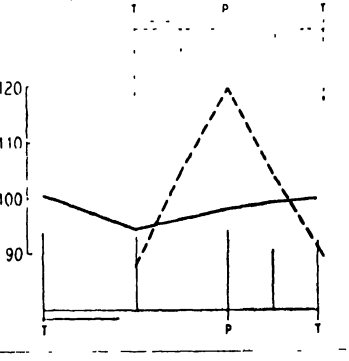


FIG. 141 *d*

rising from 1794 to 1798, the effect of the inclusion of this cycle in the monthly series is to raise the measure of average secular change.

The monthly data on advances are not comparable with the annual series which is a sum of (*a*) bills and notes discounted, and of (*b*) advances on bills of exchange and stock. Only the latter are included in the monthly data. There is an additional specific cycle in the monthly series not found in the annual data after 1832. The dating of the monthly cycles is singularly different from that of the annual specific cycles. The difference in the amplitude of movement of the two series is also striking. Monthly advances on bills of exchange from 1832 on have the largest average amplitude of any of the finance series.

Reference-cycle Behaviour. The more refined monthly analysis yields a II–VII average pattern of expansion for discounts in contrast with the III–VII pattern of expansion for discounts in the annual data. The most consistent increases occur in stages III–VI, but on the average discounts are also rising during stages II–III and VI–VII. There is a net rise in every reference cycle in stages III–V, exactly matching the opposite behaviour of the bullion reserve in those stages. The declining tendency in stages VII–IX is pronounced, unlike the indecisive behaviour of discounts in the annual reference contractions.

As in the case of the annual series, the index of conformity to reference expansion is perfect. Of the three instances of expansion during stages matched with reference contraction in the annual series, only one is also found in the monthly series (the cycle from April 1804 to May 1808). Monthly discounts also expanded in stages VII–III of the cycle from July 1794 to September 1797, which is not contained in the annual data. Both these instances of expansion during reference contraction, however, were at a lesser rate than in the preceding and following reference expansions, so that the index of conformity to business cycles as a whole is perfect.

The results yielded by the reference-cycle analysis of the Bank's advances on bills of exchange, &c., are inconclusive. Only three reference cycles are contained in the data, and they do not behave consistently. Except in stages III–IV (when all the cycles showed increases) and VII–VIII, when all the cycles showed decreases, one of the cycles always moved contrary to the other two.

A: 6. Bank of England Notes in Circulation (Annual)

Specific-cycle Behaviour. The average duration of specific cycles in Bank notes is about the same as for reference cycles, although there is no simple relation between Bank notes and general business fluctuations. There are considerable deviations from the average, with a number of cycles only two or three years in length, and one each of six, seven, and eight years. Its amplitude is moderate, much less than for bullion, discounts, and large and total inland bills of exchange. The secular trend, in net, is upward. From 1796 to 1817 there is a rapid rise, from 1817 and 1823 there is a fall to a new

Figure 21

Rent per Acre of Agricultural Land

------ 7 Specific Cycles 1822-1851

——— 7 Reference Cycles 1816-1848

Conformity +57, +43, +62

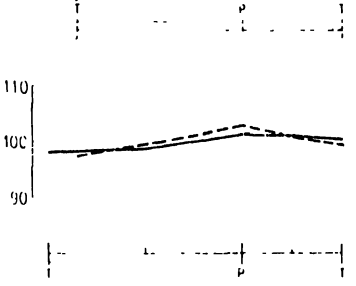


Figure 22

Price per Acre of Agricultural Land

------ 18 Specific Cycles 1789-1849

——— 13 Reference Cycles 1793-1848

Conformity +23, + 8, +12

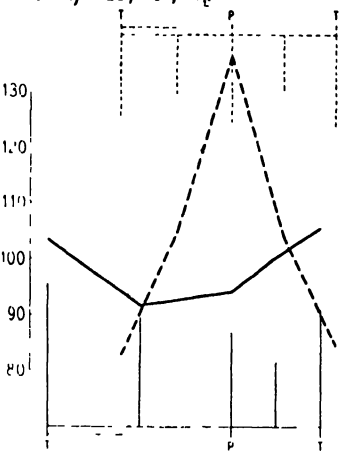


Figure 23

Index of Prices of Shares, Including Mines

------ 8 Specific Cycles 1813-1850

——— 8 Reference Cycles 1811 1848

Conformity 0, +100, + 73

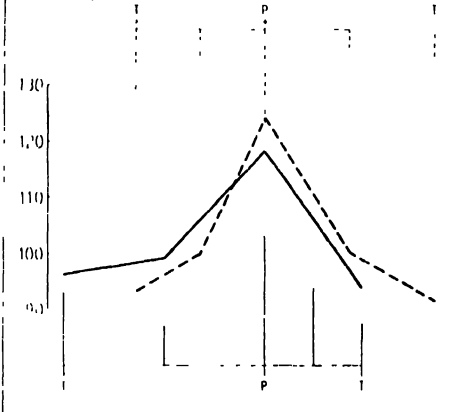


Figure 24

Index of Prices of Shares, Excluding Mines

------ 7 Specific Cycles 1813-1850

——— 8 Reference Cycles 1811 1848

Conformity + 50, + 62, + 73

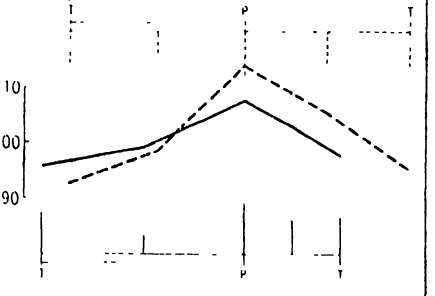


Figure 25

Rate of Exchange Hamburg on London

------ 17 Specific Cycles 1791-1848

——— 13 Reference Cycles 1793-1848

Conformity -15, -46, -48

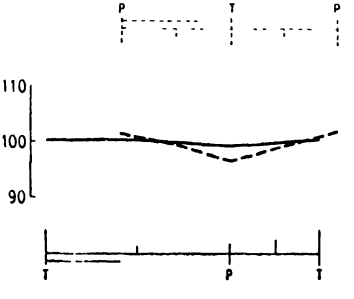


Figure 26

Rate of Exchange Paris on London

------ 11 Specific Cycles 1805 1845

——— 10 Reference Cycles 1803-1848

Conformity -20, -30, -47

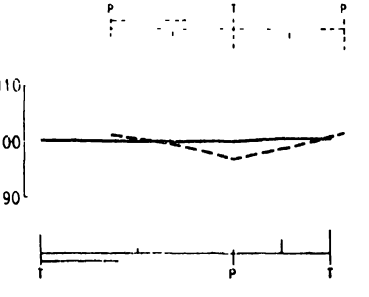


FIG. 141 e

secular level, which is maintained fairly steadily until 1840. A new period of rising secular trend seems to follow in the last decade. The rise from 1796 to 1817 is connected with the substitution of Bank notes for the metallic coinage withdrawn, and with the increases in the monetary circulation caused by increased government and private loans by the Bank. The decline to 1822 represents the effect on Bank notes of the preparations for and the actual return (1821) to a metallic circulating medium. After that time there was a secular decline in the use of Bank notes relative to other forms of currency (largely bank deposits). The rise in the note circulation in the forties is probably a result of the spread of branches of the Bank of England, whose notes tended to supersede the country-bank note circulation.

A part of the Bank notes in circulation was not used by individuals but was held in reserve by London and country bankers. These reserves fluctuated under the impulse of forces quite different from those governing the whole body of credit currency. In addition, the Bank usually paid for bullion presented to it with notes. Silberling concludes:

> The notes, indeed, reflect only in a rough way the expansion and contraction of the Bank's credit accommodation, since they were issued, not only in the course of lending operations, but also (and in large volume after the War) in exchange for specie. The latter operation, which represents in large measure the passage of Yorkshire and London bankers' reserves into the Bank in return for notes, and vice versa, introduces a disturbing complication, not suspected or allowed for by earlier writers, which renders the note statistics practically valueless as an index of currency expansion and contraction.

Reference-cycle Behaviour. The most consistent movement represented in the reference-cycle pattern is the increase in stage I–III. This is almost surely connected with the increase in the Bank's bullion reserve in that stage. In net the average pattern rises in stage III–V. This average, however, conceals divergent behaviour in the war and post-war years. In five of the seven reference cycles after 1816 Bank notes decline in that stage, as one would expect from the consistent sharp decline in the bullion reserve. Consistency in the movements of the two series in other stages, however, is tempered by the fact that bankers, when they sought specie from the Bank, especially in the latter stages of expansion and during financial crisis, did so to increase their liquidity. Bank notes were an important form of cash, and it could be expected that, at a time of stringency, bankers would seek to acquire bullion by means other than the surrender of Bank notes (largely discounts). The influence of this liquidity factor on the note issue thus makes for a less pronounced III–VII contraction than in the case of bullion. The impulse to hold notes as a form of cash would, of course, be less in the early, easy money stages of expansion (I–III). But in the crises of 1825–6 and 1836–7 Bank notes (like discounts) increase beyond the upper turning-point (peaks in 1826[1] and 1838). After 1844, of course, the

[1] The increase in 1826 was partially due to the discrediting of country-bank notes at that time.

Figure 27

Advances by the Bank of England to Government

----- 9 Specific Cycles 1797-1847

——— 12 Reference Cycles 1797-1848

Conformity +17,+ 8 ,+9

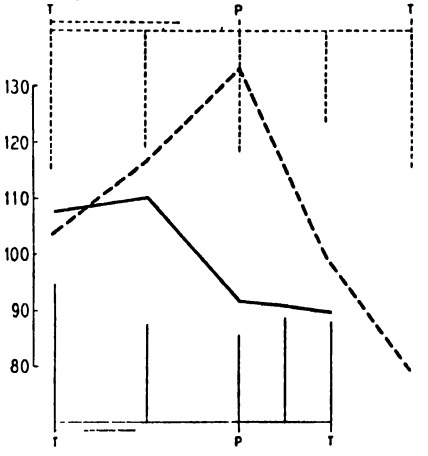


Figure 28

Net Public Revenue from Taxes

----- 8 Specific Cycles 1811-1847

——— 11 Reference Cycles 1801-1848

Conformity +55,+45,+57,

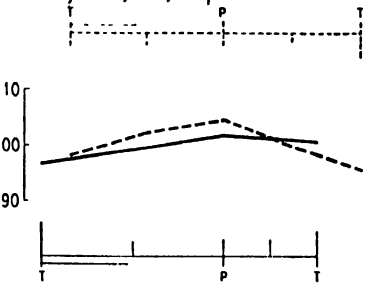


Figure 29

Total Public Expenditures

----- 10 Specific Cycles 1803-1849

——— 11 Reference Cycles 1801-1848

Conformity +18,+36,+24

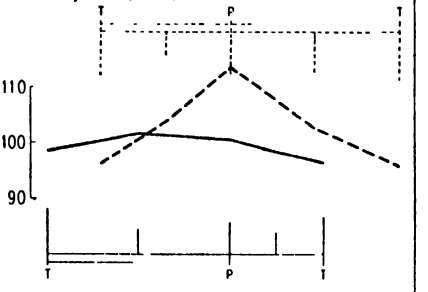


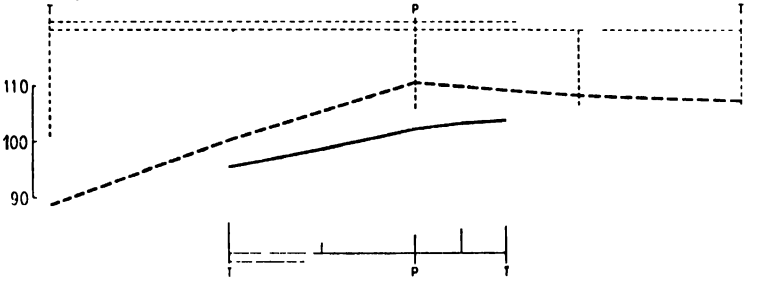
Figure 30

Total Public Debt

----- 5 Specific Cycles 1792-1845

——— 13 Reference Cycles 1793-1848

Conformity +31,-31, 0



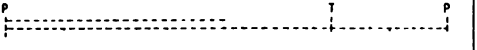


Figure 31

Total Public Debt

----- 5 Specific Cycles 1814-1848

——— 8 Reference Cycles 1811-1848

Conformity -12,+12,-7

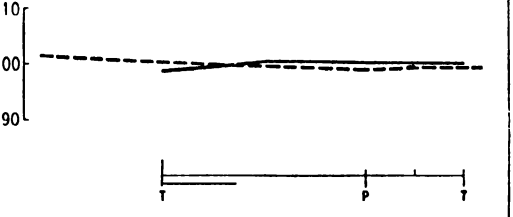


FIG. 141*f*

volume of Bank notes was strictly limited. And although the government relaxed the limitation during the crisis of 1847, there was no significant increase in the note issue. The fears of the money market were immediately allayed.[1]

When gold was desired for shipment abroad, however, the classic method of acquisition remained the redemption of Bank of England notes. And thus the general pattern, in the post-war years, is more like that for the bullion reserve (average VII–III expansion) than for Bank discounts (average III–VII expansion), although the note circulation shows evidence of both types of influence.

The index of conformity to stages matched with reference expansion is fairly high, owing to the consistent I–III rise (+69). The other indexes are positive but low, with the behaviour during the war years and the period of return to a specie circulation contributing most of the irregularities. The last five reference cycles (1829–48) show perfect indexes of conformity to the VII–III pattern.

C: 6. Bank of England Notes in Circulation (Monthly)

Specific-cycle Behaviour. Monthly data on Bank notes in circulation are not available before 1819. Over a comparable period the monthly series has one more specific cycle than the annual series (February 1841 to November 1843). The average duration of expansions is somewhat shorter than for contractions in the monthly series. This is also the case in the annual series from 1819 on, but less so over the whole period.

Reference-cycle Behaviour. The VI–II average pattern yielded by the monthly data shows that the circulation began rising sooner after the upper point, and began declining earlier in reference expansion than the annual data reveal. The individual cycles show a greater consistency of behaviour in stages III–VI than in any of the others. In the annual data the increase in stages I–III is the most regular feature of the individual reference-cycle pattern, but there is no such consistency of behaviour in the stages of expansion of the individual monthly reference cycles.

The note issue thus tended to increase with discounts in stage VI–VII when the bullion reserve was still declining, and to decrease in stage II–III when bullion and discounts were still increasing. Too much significance probably should not be attached to this aspect of the behaviour of the Bank circulation, in view of the limited period over which the monthly data run, and the indecisive nature of the average pattern. Presumably borrowers took their discounts in the form of notes in stage VI–VII for the sake of liquidity, or, if they were bankers, in an attempt to restore reserves.

Because a VI–II pattern contains more stages of expansion in reference contraction than in reference expansion, the monthly note circulation is classed as 'inverted'. The VII–III pattern, characteristic of the annual data, overlaps equally on reference expansions and contractions, and is

[1] See Vol. I, pp. 331–6.

Figure 32

Funded Public Debt

----- 6 Specific Cycles 1792-1845

——— 13 Reference Cycles 1793-1848

Conformity +46, -23, +20

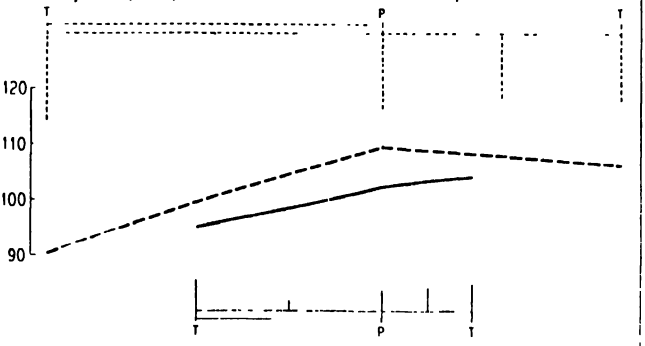


Figure 33

Funded Public Debt

----- 5 Specific Cycles 1816-1845

——— 7 Reference Cycles 1816-1848

Conformity 0, +14, +15

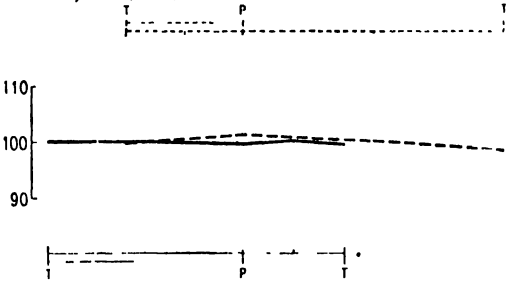


Figure 34

Unfunded Public Debt

-----10 Specific Cycles 1795-1842

———13 Reference Cycles 1793-1848

Conformity -15, -23, -68

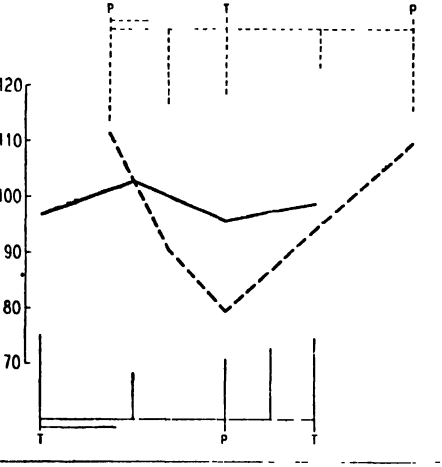


Fig. 141 *g*

arbitrarily treated as positive. The indexes of conformity of the monthly series are therefore negative, showing its inverted relation to reference expansions, contractions, and all business cycles. Except for the last two cycles, the series shows perfect negative conformity.

A: 7–10. Total, Small, Medium, and Large Bills of Exchange created (Annual)

Specific-cycle Behaviour. The adjectives modifying the bills of exchange describe their average unit amount; in addition, large bills constitute the greatest percentage of the total value, roughly 50 per cent. Medium bills account for about 40 per cent. of the total.

Small bills of exchange contain two more specific cycles than the other series, yielding a shorter average duration. Large and medium bills contain the same number of cycles, equal, over the period covered, to the number of reference cycles. Large and medium bills contain longer average expansion than contraction; small bills exhibit longer average contraction, as a result of two specific cycles where contraction is much longer than expansion (1828–34 and 1848–53). In their average amplitudes these three series vary with the size of the bill, i.e. large bills exhibit the greatest average amplitude, &c. In all cases the average amplitude of movement is substantially smaller than for Bank of England discounts or advances. In general, large bills were drawn between merchants, manufacturers, and wholesale dealers, medium bills between smaller firms and between large wholesale merchants and better-class retailers, and small bills between retailers and consumers. Their relative average amplitudes are thus what one might expect, in view of the position of each group in business fluctuations.

Large bills have a net upward trend; medium bills fluctuated about a fairly stationary trend line, although the average per month change from cycle to cycle is slightly negative; small bills show a clear secular decline. The total figure, of course, has a net upward trend.

Reference-cycle Behaviour. On the average these series all show a rise only in stage III–V. The average decline in stage I–III, however, is much less marked than in the case of Bank discounts or advances. And, in general, large and medium bills tended to rise sooner, in the course of reference expansion, than credit advances at the Bank. This is revealed clearly by the following table, which indicates, in a number of instances, the relation between reference troughs and troughs in the various private credit series:

Reference troughs	*Specific-cycle troughs*		
	Large bills	*Medium bills*	*Bank discounts*
1819 . .	1822	1821	1824
1826 . .	1826	1826	1828
1832 . .	1832	1832	1833
1837 . .	1837	1837	1838
1842 . .	1843	1843	1844

The more immediate sensitivity to general business revival of inland bills than Bank discounts is explained by their more direct relation to industrial and commercial activity. They were used as a means of industrial and commercial short-term financing. Recourse to the Bank, on the other hand, was generally an indication of tightness elsewhere in the banking system. It is not surprising, then, that the average patterns for medium and large bills is better taken as I–V than III–VII.

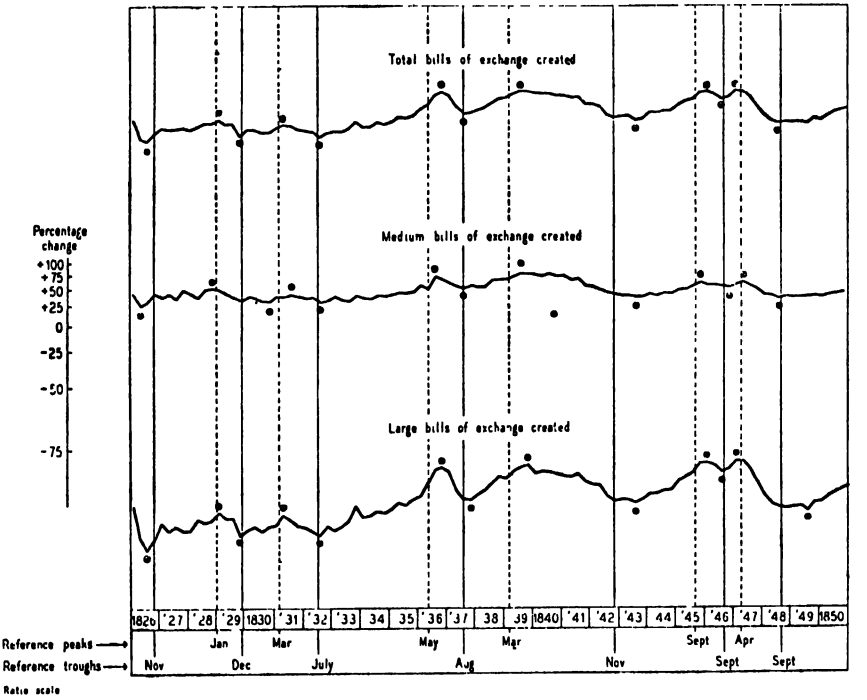


FIG. 142. Quarterly Financial Series

There is, nevertheless, some evidence of a lag at the peak in bills of exchange as well as the lag at the trough noted above. In times of financial crisis bills were created to economize available cash holdings:[1]

. . . whenever there is any pressure upon the money market, as indicated by a rise in the rate of discount, then the volume of the bill circulation is very much increased, and vice versa.

The explanation seems to me to be one which I have always heard given by persons who had the best means of observing the character of the Bill Circulation, and the variations in that circulation. The explanation I have always received is this: that in quiet ordinary times the great operations of credit are carried on, not by means either of coin, or bank notes, or bills of exchange, but are carried on by entries in ledgers. In quiet ordinary times the ledger is the real

[1] *Evidence before the Select Committee on Bank Acts* (1857, Sess. 2), x, Pt. I, pp. 126, 136 7; Newmarch, questions 1426, 1522, 1523, 1525.

instrument of exchange; but when any difficulty arises; when, for example, under such circumstances as I have suggested, there is a rise in the Bank rate of discount, and a probability of a limitation being introduced at the Bank as to the échéance of bills admitted to discount, then the transactions naturally resolve themselves into drawing bills of exchange, those bills of exchange being not only more convenient as regards legal proof of the transaction which has taken place, but also being more convenient in order to effect purchases elsewhere, and being pre-eminently convenient as a means of credit by which capital can be raised. That is the explanation which I have always received, and that I believe to be the true explanation. Q. Then the creation, at that period, of bills of exchange is an effort on the part of persons in business to borrow money from their bankers ?—A. That, no doubt, is one reason for their creation. . . . I intended to say that bills of exchange, in times of high interest, and of anything like discredit, are created for three reasons, the first of those reasons is that they form decisive evidence of the debt; they confirm and fix the transaction. In the next place they are intended to serve the place of currency, because a man who is not of very high standing is more likely to accomplish a purchase if he can offer a bill of exchange which bears his own name, and bears also the names of two or three other persons, than by merely tendering his own security. That is a second reason why bills of exchange are increased in times of difficulty. The third reason, which is generally supposed, I think, as far as I am at present able to judge, to be the least important of those reasons, would be the convenience of being able to present the bill for discount.

The annual figures reveal this relationship by absolute increases in the year after the reference peak in only two cases for both large (1829, 1846) and medium (1840, 1846–7) bills of exchange. The relatively slight rates of decline for large and medium bills in 1819, 1837, and 1841 probably reflect the same characteristic, which, in the average pattern, emerges as a lesser V–VII than VII–IX rate of decline. Using more sensitive quarterly data Silberling notes a consistent lag between the upper turning-points in prices and bills of exchange.[1] Large and medium bills of exchange can be characterized, then, as I–V series, with some tendency to lag at both troughs and peaks, much less clearly marked, however, than in the case of Bank discounts.

Small bills of exchange show no very consistent cyclical pattern, although the series shares the average rise in stage III–V which characterizes large and medium bills of exchange. The most consistent movement is the average I–III decline, which occurs in all but one individual cycle (1826–9). Because of the consistency of that decline and its greater rate than for the average decline in stage V–VII, the series has been designated as of III–VII expansion.

The indexes of conformity are highest for medium bills of exchange. But for the lack of net movement during the reference expansion 1829–31 all the indexes would be perfect. Similarly, but for the rise in 1829 which

[1] 'British Prices and Business Cycles, 1779–1850', *Review of Economic Statistics*, 1923, pp. 245–6.

exceeds the rise during the preceding and following reference expansions, the indexes for large and total bills of exchange would all be perfect. Small bills, however, exhibit low negative conformity in stages matched with reference expansions, although fairly high positive conformity in stages matched with reference contractions and to all business cycles.

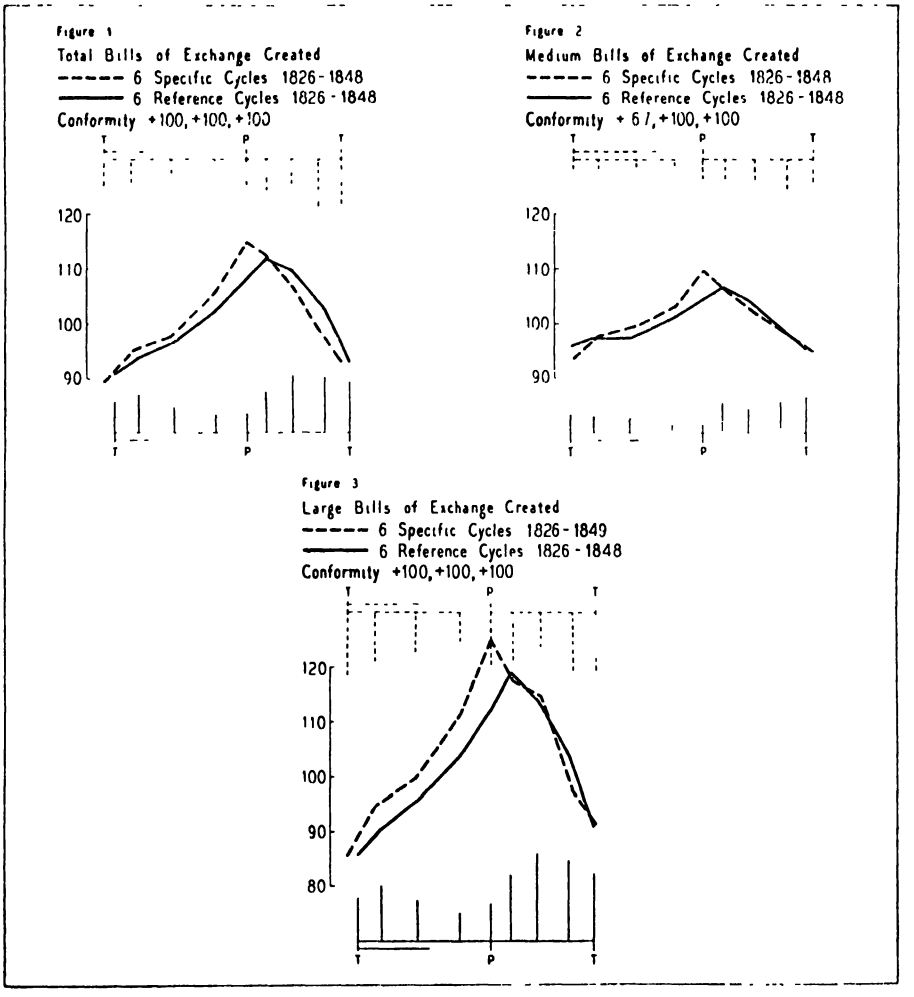


FIG. 143. Cyclical Patterns of Quarterly Financial Series

B: 1-3. Total, Medium, and Large Bills of Exchange created (Quarterly)

From 1826 these series are available in quarterly form. Small bills of exchange have not been analysed, since the annual data seem to indicate that they were relatively unimportant in business fluctuations. Over the period covered quarterly bills of exchange exhibit the same number of

specific as reference cycles. The average amplitudes of movement stand in the same relative relation as the annual data, although in each case the amplitude is larger when taken quarterly. The upward trend movement is also greater; but this results merely from the fact that the level of the series in 1826 is considerably lower than in 1816, when the annual analysis begins.

Each of the three series is taken as of I–VI average expansion. To this pattern large and total bills of exchange exhibit perfect conformity indexes. All indexes of conformity for medium bills of exchange would also be perfect but for the fact that there is no net upward movement during the reference expansions 1826–9 and 1846–7. In both instances this behaviour results from a decline in stage V–VI. The immediate sensitivity of this series to these minor cycle contractions is not inconsistent with its general designation as of I–VI average expansion. The lag beyond the peak appears clearly in three cases, and those cycles in which it fails to appear have all been designated as minor cycles: 1826–9, 1829–32, 1846–8.

Perhaps the most significant result of the quarterly as opposed to the annual analysis is to indicate more precisely the extent to which large and medium bills of exchange tended to lag in their response to general contraction. The I–VI average which emerges, as compared with the II–VII average for bank discounts (monthly), properly reveals the lesser extent to which bills of exchange were employed as a means of financing in times of severe monetary stringency.

A: 11. Total Deposits in the Bank of England

Specific-cycle Behaviour. The average duration of specific cycles is somewhat greater than for reference cycles, owing to the uninterrupted declines from 1814 to 1820 and 1836 to 1840 which fail to reflect, in absolute movements, the cycles 1816–19 and 1837–42. This is partly counterbalanced by the 'extra' specific cycle from 1831 to 1835. The average amplitude of movement is moderate, although greater than for the note circulation. The average duration and amplitude of expansion is greater than for contraction, yielding, in net, an upward secular trend. Bank deposits rose during the war years to a peak in 1814, and then declined sharply to 1820, as the advances and deposits of the government in the Bank fell off. From 1820 to 1850 a powerful upward secular trend is evident, with the three periods of most substantial increase coinciding roughly with major cycle expansions: 1820–4, 1831–6, 1840–6.

Until 1828, at least, the movement of the series is dominated by changes in public deposits. At that point, for the first time, private exceed public deposits. The high figures for 1835–6 are swollen by the West India Compensation and East India deposits; the sharp decline in 1837 is due principally to their withdrawal, and the extraordinary peak in 1846 can be traced to the deposits with the government on railway shares.[1]

Reference-cycle Behaviour. Total deposits exhibit a I–V average pattern,

[1] See Vol. I, pp. 331–3.

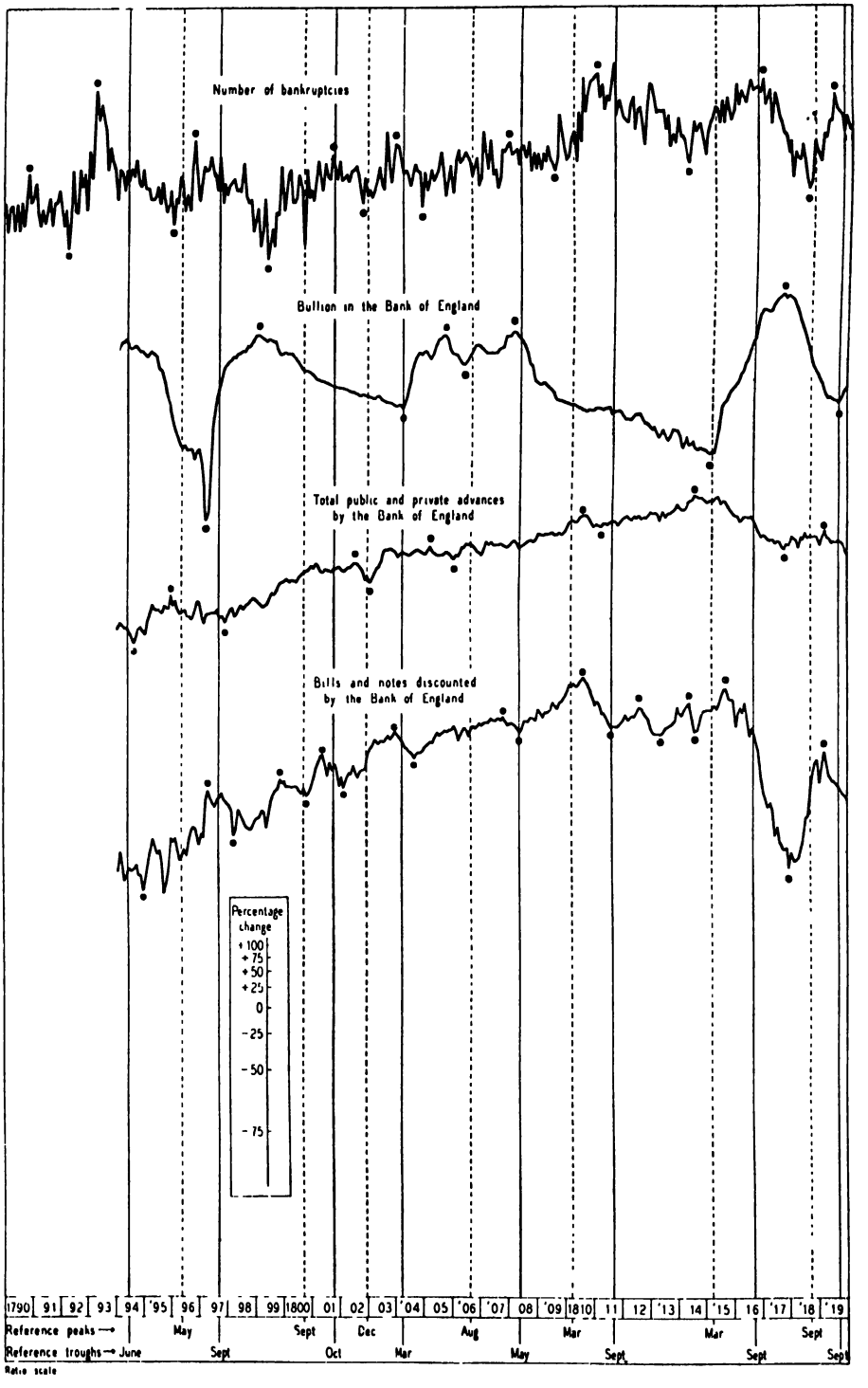


FIG. 144 *a*. Monthly Financial Series

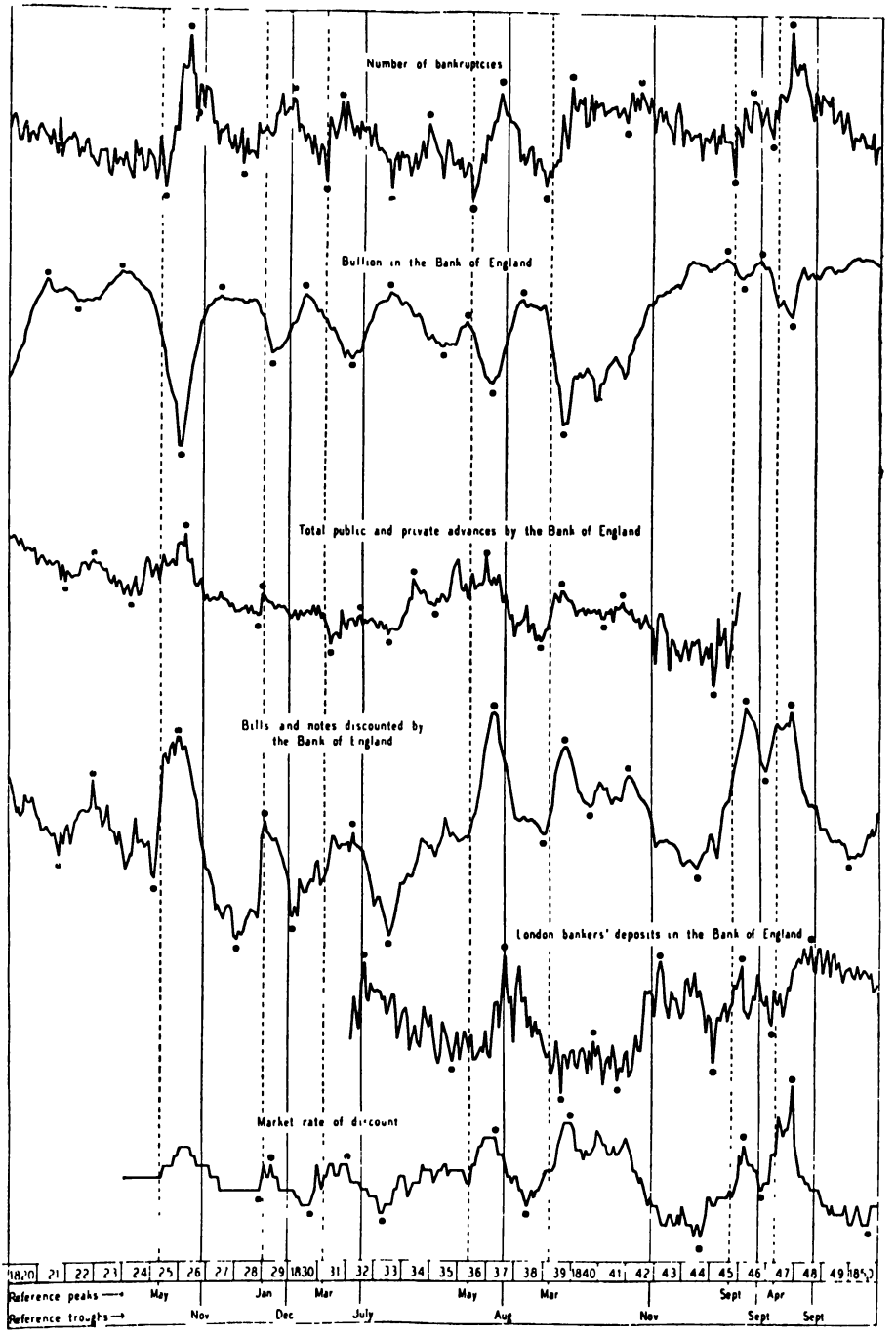


FIG. 144 *b*. Monthly Financial Series (cont.)

with low positive indexes of conformity. The average movement of London bankers' deposits, a component of the total, was inverse to business cycles (V–I expansion). The preponderating position of government deposits until 1828 makes reference-cycle analysis of limited interest for the early period.[1] All that may usefully be said, as to general cyclical behaviour, is that there is a rough positive coincidence of movement. The conformity index for contractions is higher than for expansions owing to the failure of deposits (in net) to rise in 1808–10, 1816–18, 1837–9. The exceptions for contraction are the counter-cyclical rises in 1832 and 1839–42.

A: 12. London Bankers' Deposits in the Bank of England (Annual)

Reference-cycle Behaviour. Although this series is available only after 1832, its rather consistent reference-cycle behaviour justifies its analysis. The best average pattern is V–I expansion, indicating broadly that the London bankers increased their reserve deposits during depression and drew upon them during prosperity. Those withdrawals tended to be concentrated in the latter stages of expansion. The average pattern exhibits much more pronounced III–V than I–III contraction. And in one cycle (1842–8) there is net increase during stages I–III. Similarly the rate of increase is much greater in the latter stages of contraction (VII–IX). One might expect that bankers' deposits would not increase until after the most severe financial strain had passed, which usually was some time after the upper reference turning-point. The indexes of conformity to the V–I pattern would all be perfect but for the rise from 1842 and 1843. Aside from its cyclical characteristics the sharp trend rise after 1841 is its most notable feature.

C: 7. London Bankers' Deposits in the Bank of England (Monthly)

Specific- and Reference-cycle Behaviour. Reference expansion typically occurred in stages V–I in the monthly as well as the annual data on bankers' deposits. This pattern is, however, markedly irregular in the last two monthly reference cycles. Bankers' deposits rose as early as stage III–IV in the last cycle, and declined in stages VI–VII and VIII–IX in the preceding cycle. The peculiar money-market conditions in both these cycles were responsible for this uncharacteristic behaviour. The break in shares in July 1845 necessitated an extraordinary increase in bankers' balances to offset the accompanying credit restriction. The peak in shares anticipated the turning-point in general business, and thus led to a rise in bankers' balances somewhat earlier than usual. Following this interval of tight money, however, the market eased, and bankers' deposits declined.[2] The early rise in bankers' deposits in the next and last cycle was a result of a second wave of stringency inaugurated by railway calls and financial

[1] The possible relations between business cycles and government revenue (and thus Bank deposits) are treated below, No. 28.

[2] See Vol. I, pp. 329–33.

difficulties on the Continent.[1] This crisis came in two phases, the early one having its climax during a stage of reference expansion, and the second and more pronounced coinciding with reference contraction. Not too much significance should be attached to the differences between the monthly and the annual numerical measures of conformity for this series. It is sufficient to note that the monthly pattern bears out the evidence of the annual series with regard to typical cyclical movement.

A: 13. Bank-rate of Discount

Specific-cycle Behaviour. The Bank-rate was never lower than 5 per cent. until 1822; and not until 1832, when the Usury Laws were somewhat relaxed, was the rate permitted to rise above 5 per cent. The average duration of specific cycles is slightly greater than for reference cycles over the period covered, largely because of the constant Bank-rate on commercial paper from 1828 to 1835. The average amplitude of movement is markedly less than for the market-rate of interest, although the flexibility of the Bank-rate increased considerably in the last decade. The net trend movement is slightly downward,[2] although, as in the case of the market-rate, the peaks are progressively higher (1837, 1839, 1847), the troughs progressively lower (1838, 1845, 1850).

Reference-cycle Behaviour. The average pattern is best taken as III–VII with the largest increase in stage V–VII, due to the extraordinary rise in the Bank-rate in 1846–7. In two significant cases even the annual data reveal some tendency for the Bank-rate to lag behind the market-rate at troughs—a relation clearly evident in the monthly statistics. The market-rate rose in 1833 and 1844, the Bank-rate in 1835 and 1845. The Bank-rate, further, until the middle thirties at least, is notably less sensitive than the market-rate, failing to reflect the minor cycles 1826–9 and 1829–32.

A: 14-15. Market-rate of Discount (Annual)

Specific-cycle Behaviour. These two market-rate series are virtually identical over the period which they both cover. The principal differences in year-to-year movement are the failure of Tooke's series to decline in 1841, and the mild rise in 1850, when the Overend Gurney rate falls slightly. The following analysis will refer to the latter rate, which is available as early as 1824.

The duration of specific cycles equals, for the period covered, the average duration of reference cycles. The average amplitude of movement is much greater than for the yield on Consols and the rate on exchequer bills. The net trend, as measured by the average per-month movement from cycle to cycle, is slightly upward, but there is, in fact, no clear-cut secular

[1] See Vol. I, pp. 333–6.

[2] The slight positive trend figure given in our table of cyclical averages is accounted for entirely by the slightly higher level of the 1835–8 cycle over that of 1825–35.

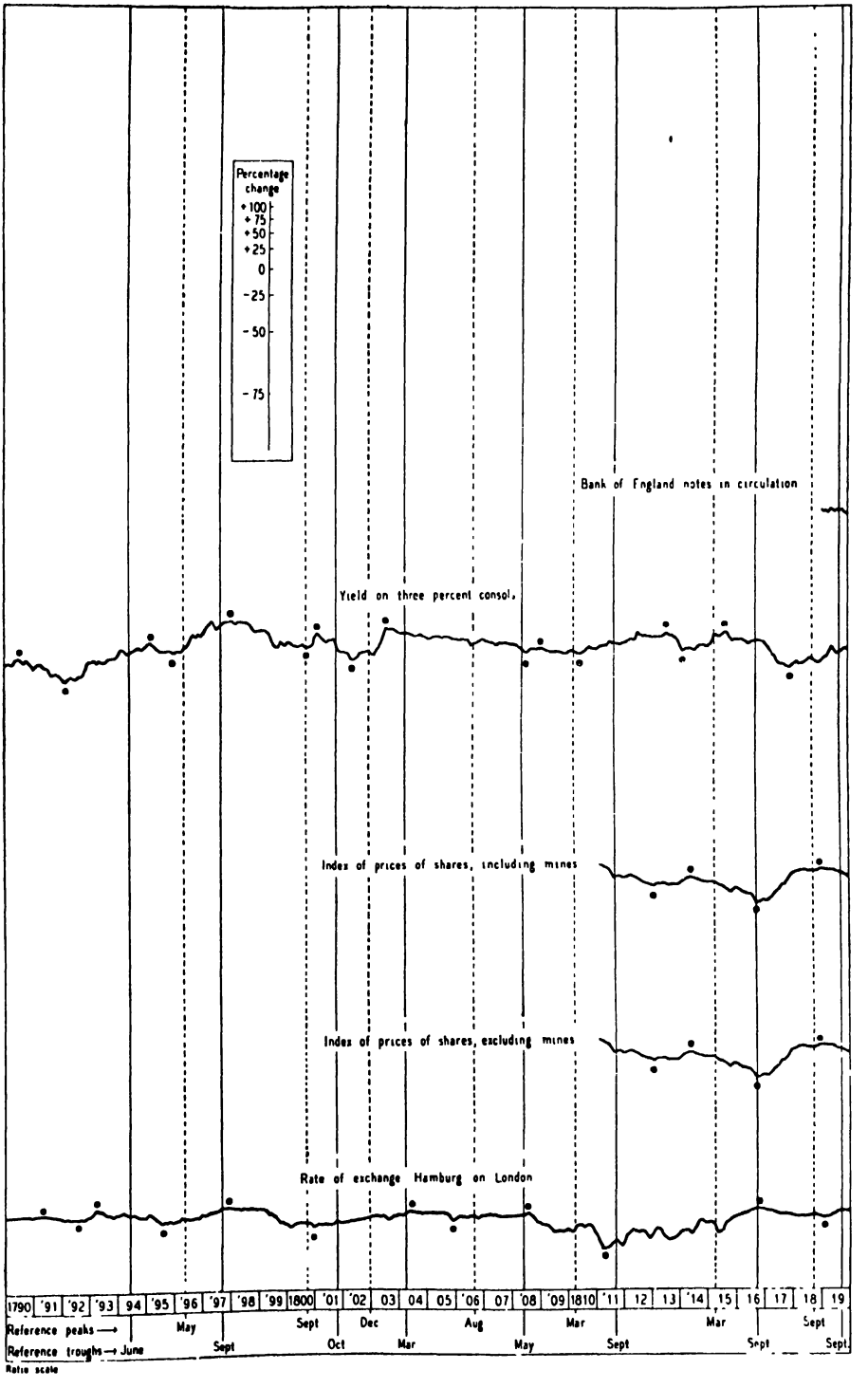


FIG. 144 *c*. Monthly Financial Series

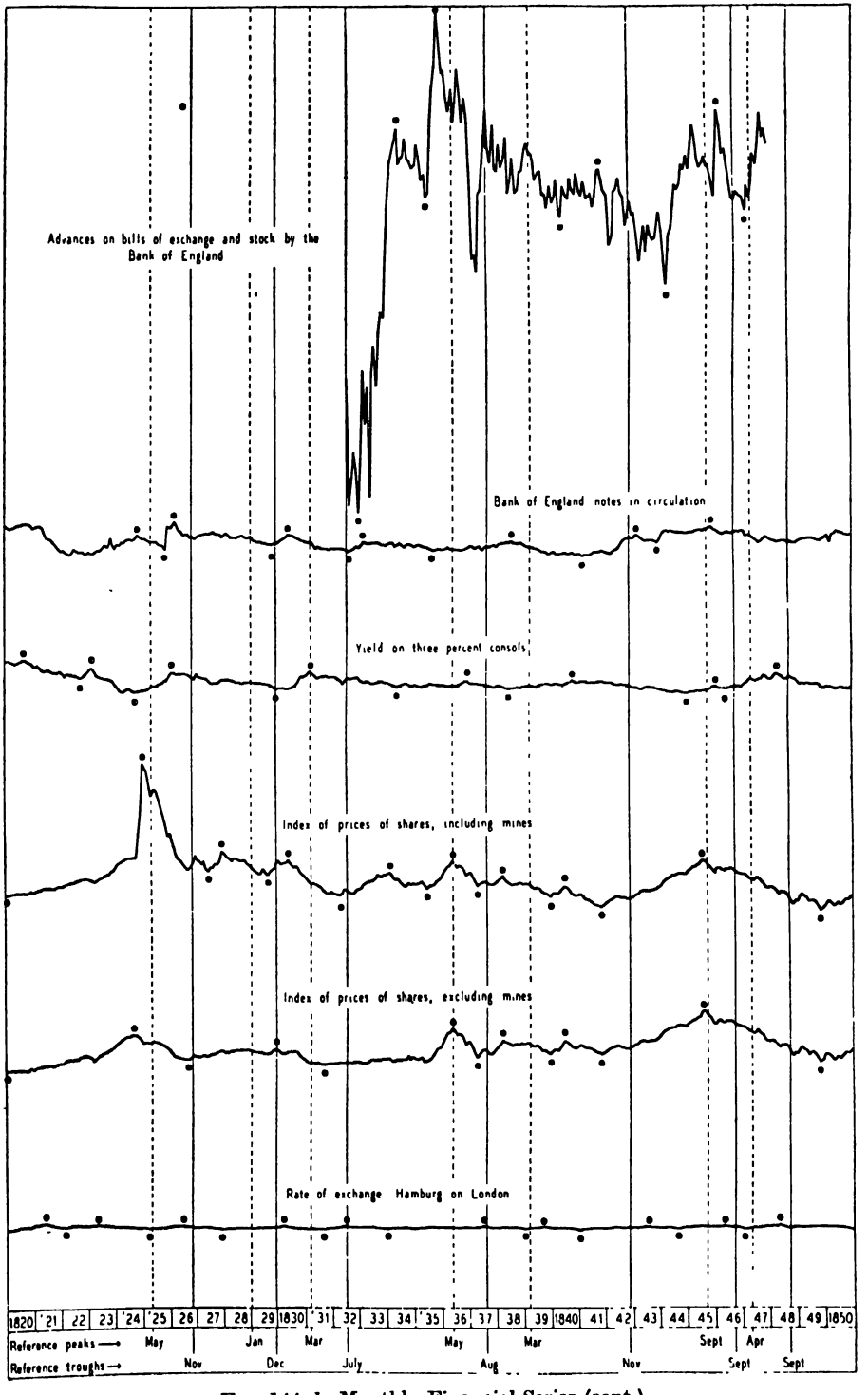


FIG. 144 *d*. Monthly Financial Series (cont.)

movement. The troughs in 1828, 1830, 1833, 1844, and 1852 are, successively, lower, and the peaks in 1826, 1839, and 1847, are, successively, higher, indicating that the amplitude of movement tended to increase during the three decades covered.

Reference-cycle Behaviour. The average reference pattern is one of III–VII expansion. All indexes of conformity would be perfect but for the failure of the interest rate to rise in 1828 (the III–V stage of the reference cycle, 1826–9). The rate of decline in 1828 is, however, less than during stage I–III (1827), and the minor monetary crisis of 1829 (stages V–IX) emerges in an absolute rise in the interest rate. The III–VII pattern, then, may be regarded as an excellent average. Tooke's interest rate series, available from 1830, exhibits perfect conformity indexes, lacking, as it does, the slightly irregular cycle from 1826 to 1829.

The cyclical behaviour of the Bank's bullion reserve and private discounts would lead one to expect, as was noted earlier, average III–VII expansion for short-term money rates—this, of course, on the assumption that the pressures on the Bank in the latter stage of expansion and the early stage of contraction would affect the money market as a whole. In fact the institutional relations between the Bank and the money market were such that pressures on the Bank's reserve resulted directly from, and usually may be taken as evidence of, a general tightness in the market. Once the Bank took action, however, it influenced, in turn, the temper of the whole money market and market rates.

C: 8. Market-rate of Discount (Monthly)

Specific-cycle Behaviour. The monthly rate of discount contains one more specific cycle than the annual series, in total six cycles. For each specific cycle there is a corresponding reference cycle, and the average durations are thus approximately equal.

Reference-cycle Behaviour. The rate of discount exhibits perfect conformity to a III–VI pattern. The average pattern rises in stage VI–VII also, but this movement is not an invariable characteristic: in three of the cycles the rate is upward, and in three downward in that stage. The rate of rise of the discount rate increases throughout the stages of expansion, and the rate of decline decreases throughout the stages of contraction. That is, as the money market progressively tightened, the discount rate was pushed up higher and higher over equal time intervals. As the pressure relaxed, a substantial fall in the discount rate occurred immediately, the subsequent declines being smaller. The discount rate and the bullion reserve thus both lend support to the view that easy money-market conditions tended to precede reference expansion. The lack of consistency in the movements of the annual rate during the reference cycle from 1826 to 1829 is not in evidence in the corresponding monthly reference cycle, where conformity to the average pattern emerges.

A: 16-17. Yield on 3 Per Cent. Consols and Computed Rate of Interest on Exchequer Bills (Annual)

Specific-cycle Behaviour. Both government interest rate series exhibit average specific cycles longer than reference cycles. Over comparable periods they contain the same number of specific cycles. The average amplitude of movement is greater for the exchequer bill rate than the Consol yield. The trend movements in the two series are, of course, similar, although the Consol yield would appear to be the more sensitive of the rates, showing more frequent absolute change. The exchequer bill rate was calculated by dividing for each year the total outstanding volume of bills by total interest payments; the Consol rate is derived from an annual Consol price, averaged from monthly data.

Both rates exhibit a sharp net rise in the first decade of the period, when the government was relying most heavily on loans in its war-finance policy. The rates, in net, decline slightly from 1799 to 1814, although the sagging trend is more marked in Consols. They share, as well, a sharp fall from 1814 to 1824, as the government ceased its borrowing operations on the previous scale. The Consol rate thereafter shows a mild downward trend to a low point in 1844. The exchequer bill rate never went lower than its 1824 level (2·3 per cent.), although that figure was reached in 1829-34, 1843-5, and 1848–50. The net percentage change from cycle to cycle, in both series, is downward.

Reference-cycle Behaviour. In view of the movements of bullion, discounts, and inland bills of exchange one would expect interest rates in general to show average III-VII expansion patterns. During the war years, of course, the government loan rates were under special influences and conformity to the normal pattern could not be expected. An average III–VII expansion, nevertheless, emerges clearly for the exchequer bill rate. The annual yield on Consols fails, on the average, to exhibit average III-V expansion, although the decline in I- III is clearly marked, and the decline in stage III-V is less than in stage I–III. After 1816, only four of seven reference-cycle stages III-V show absolute decline, whereas all seven I–III stages decline. Of the four cases of decline three show lesser declines than in the previous I–III decline. One may trace, then, some of the elements of an average III–VII expansion even in the annual yield on Consols. As indicated below, the monthly Consol series shows a clear IV–VII expansion, anticipating, in its rise, the upper turning-point.

The Consol rate was not directly influenced by the bullion reserve and credit advances at the Bank.[1] Its movement (aside from the role of non-

[1] R. G. Hawtrey (*A Century of Bank Rate*, pp. 146 7) quotes the testimony of Samuel Gurney before the Committee on Commercial Distress (1847-8), questions 1867 9: 'Q. Are not the prices of public funds, both foreign funds and home funds, in a great degree regulated by the rate of interest?— A. Much less than is supposed. Q. As money becomes scarce and dear, does not the price of Consols and of Dutch stock and other foreign stock fall? A. It has its effect, but it is by no means the only ground for variations in this matter; for instance we have had periods when money on Consols has been

economic factors in affecting the price of Consols) depended, after the wars, on two sorts of influences—the demand for Consols as a safe form of investment, and their use as a security easily convertible into cash. An increase in the former demand caused, principally, the uniform rise in price and fall

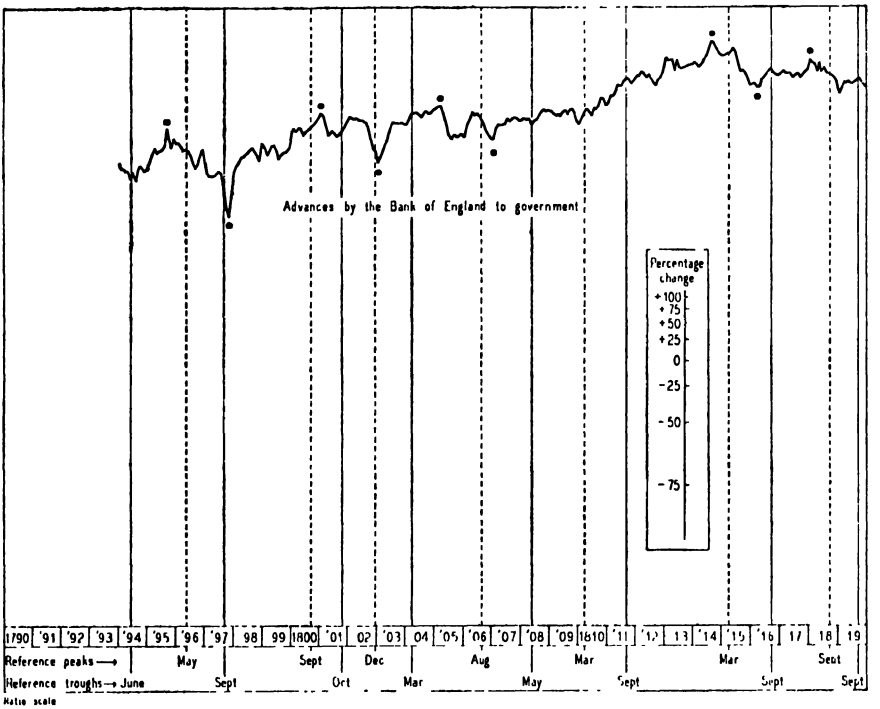


FIG. 144 *e*. Monthly Financial Series

in yield during the early stages of prosperity (I–III), when investible income was increasing, but before much speculative spirit existed in the long-term market. In the latter stages of the major booms one could expect the demand for Consols as an investment to fall off in competition with issues of higher expected yield.[1] An element of this kind of pressure on the Consol

worth 10 per cent. What is the effect of that? It amounts for six weeks perhaps to 25*s*. only in the £100. If the value of money becomes permanently high in the country it affects the value of Consols heavily; but if it is only for a particular period it does not affect it much. Q. Last spring had not the raising of the rate of interest and the scarcity of money an immediate effect in reducing the price of all public stocks?—A. A very slight effect; if the Bank raises the rate of interest from 3 per cent. to 4 per cent., it does not affect the price of Consols many shillings in the £100, but if the value of money permanently increases, it affects prices very materially.'

[1] Hawtrey, pp. 149–50, thus expresses the relation between long- and short-term interest rates: 'Trade activity stimulates the demand for working capital and for fixed capital, in order that output may be extended to meet a growing consumption demand. Bank rate is put up to prevent the demand for working capital causing an undue expansion of credit. At the same time the prices of fixed-interest securities fall, not only or principally as a direct effect of the rise of the short-term rate of interest, but

price can be detected in 1824–5, 1835–6, and 1844–5.[1] During panics (1825–6, 1839, 1846–7) the downward trend in the Consol price was accentuated by brief intervals when, in the struggle for liquidity, Consols were dumped on the market or used as collateral for bank loans. In depression, after financial stringency had ended, there was a tendency for the Consol

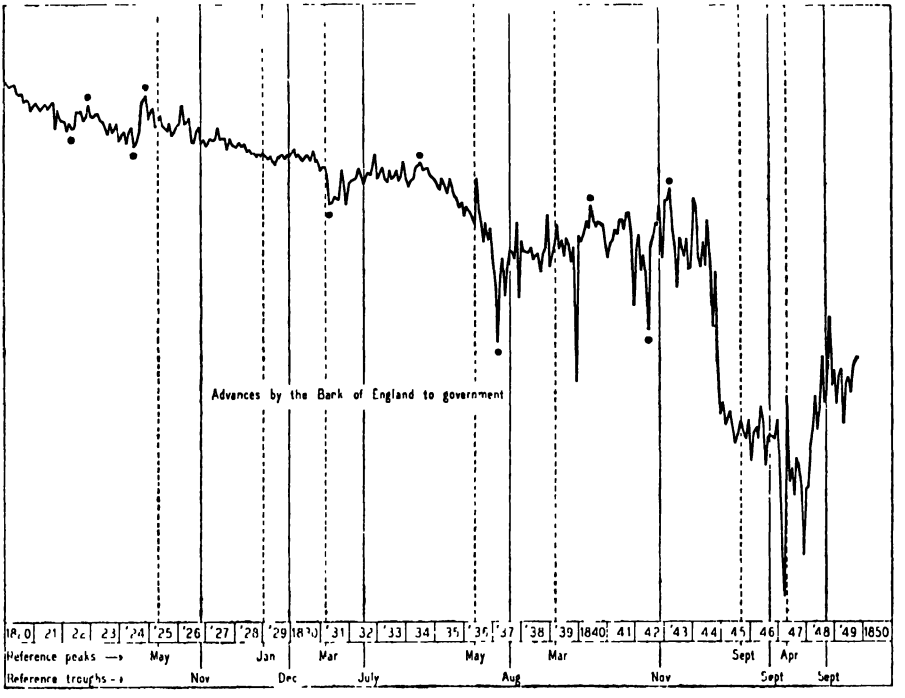


FIG. 144 *f*. Monthly Financial Series (cont.)

price to rise again. This movement fails to appear in the average pattern for the yield on Consols, owing to the numerous one-year reference contractions.

Over the whole period the Consol yield is best characterized as of V–I

because traders sell securities held in reserve in order to raise capital, investors and speculators are attracted by the good prospects of industrial shares, and banks sell securities to make room for increased advances and discounts. To describe the tendency more broadly, we may say that the expansion of demand raises the level of profits on commercial and industrial investment and makes them more attractive competitors with fixed-interest bearing securities. At a time of depression profits decline, and there is a diminished demand for working capital, and both long-term and short-term rates of interest fall. There is, it is true, a falling off of savings, which would tend to raise the rate of interest with a given demand for long-term capital. But at a time of depression the resources of the long-term investment market are reinforced by the proceeds of liquidation of a mass of redundant working capital. That is partly because traders who find themselves encumbered with idle cash balances invest their surplus funds, and partly because banks, finding their advances and discounts shrink more than their deposit liabilities, buy securities to fill the gap.'

[1] See Vol. I, pp. 221, 258–9, 319–20.

expansion. This pattern yields better conformity to stages matched with reference expansion than to stages matched with reference contractions: in other words the net decline in the Consol yield during general business expansion is the more consistent movement. For the exchequer bill rate the indexes of conformity to the III–VII pattern are positive but low. Calculated from 1816 to 1848 the indexes, however, are somewhat higher. For the war years the indexes of conformity for expansion and contraction are, in fact, zero.

C: 9. Yield on Three Per Cent. Consols (Monthly)

Specific-cycle Behaviour. The monthly series contains six more specific cycles than the annual data, three within the war period, and one each in the three succeeding decades. The monthly average duration is, as a result, about two-thirds of the annual figure. The average amplitudes are approximately the same, but the rate of rise is somewhat greater in expansions as well as contractions in the monthly series. The average percentage change from cycle to cycle in the monthly series is zero, the positive changes in the war period cancelling the negative changes thereafter.

Reference-cycle Behaviour. The pattern of a rising yield on Consols in late reference expansion and early contraction which did not emerge in the annual data, despite the fact that such was the typical behaviour to be expected from this series, is clearly discernible in the monthly data. The typical monthly pattern shows IV–VII expansion. The decline in yield from VII–IV represents somewhat more consistent behaviour in the individual cycles than does the rise from IV–VII, but the upward movement in the latter stages preponderates. The influences on the Consol rate which would tend to produce a IV–VII expansion have been described in the analysis of the annual series.

Despite the fact that during the war years the rate on Consols was subject to special pressures, conformity to the normal pattern in that period is very high. The yield rose during only one cycle when it normally should have declined. This counter-cyclical movement occurred in the first reference cycle, which coincides with the start of the war. That the price of Consols should have fallen during stages I–IV under the strain of this event is understandable. The only other instance of a movement contrary to expectations occurred during the IV–VII stages of the reference cycle from April 1804 to May 1808. The yield on Consols declined, principally because of the improvement in the government's financial situation and the more moderate remittances abroad. In both these war cycles the normal repercussions of cyclical fluctuations on the Consol yield were overshadowed by the wider military and political influences affecting the government's credit.

In the post-war period the movements of the yield diverge from the IV–VII pattern in the two minor reference cycles 1826–9, 1830–2. The

price of Consols rose almost steadily throughout the cycle from December 1826 to December 1829. This movement probably represents a flight to Consols from the speculative excess of the previous years. The rate of decline in stages IV–VII of this cycle, however, is lower than in stages VII–IV, resulting in perfect conformity for the cycle as a whole. The counter-cyclical movements of the yield during the reference cycle from January 1830 to July 1832 are directly related to the circumstances surrounding the passage of the Reform Bill. The Consol price fell until March 1831 because of tightness in the money market induced by the political agitation and alarmist predictions by anti-reformers.[1] Thereafter the price of public securities recovered. 'The cause of this buoyant state of the funds is, without doubt, the conviction, which is general in the monied circles, that the Ministry are firm, that they are determined, and that they will be able to carry the reform bill.'[2]

In the last reference cycle, the rise in yield from December 1846 to April 1847 results in a counter-cyclical movement in the VII–IV stages matched with reference expansions. The crisis in the spring of 1847 (caused in part by heavy grain imports) tightened the money market and weakened the exchanges. The Consol rate reflected the impact of these developments with especial severity, because Consols were dumped in an effort to meet commitments on railway shares.

These exceptions do not prevent the measures of conformity to the IV–VII pattern from being moderately high. The signs, of course, are negative inasmuch as more stages of expansion occur in reference contraction than in reference expansion.

A: 18. Interest on Landed Securities

Specific-cycle Behaviour. This series may be considered 'a correct statement of the rate at which money was lent on first-class landed securities'. The average duration of specific cycles is somewhat longer than for reference cycles, owing principally to the uninterrupted decline from 1827 to 1831. The average amplitude of movement is less than for any other interest rate series analysed, except the yield on Consols. The net trend is slightly downward.

Reference-cycle Behaviour. Like the Consol yield (taken annually), but unlike other interest rates, which exhibit III–VII expansion patterns, this series is best taken as V–I. The indexes of conformity to a V–I average pattern would be perfect but for the rise in the rate in 1828, and the fall in 1829. In general this series seems responsive to the same forces which affected other interest rates; but it exhibits a consistent lag which shifts the average trough from III to V, the average peak from VII to IX. This lag is probably, in part, a consequence of the fact that interest agreements on landed securities ran for longer periods than did commercial paper; although if monthly data were available it is possible that, like Consols, its

[1] See *The Times*, Friday, 4 Mar. 1831. [2] Ibid., 18 Oct. 1831.

Figure 1

Number of Bankruptcies

18 Specific Cycles 1790-1851

14 Reference Cycles 1794-1848

Conformity - 86, -100, -100

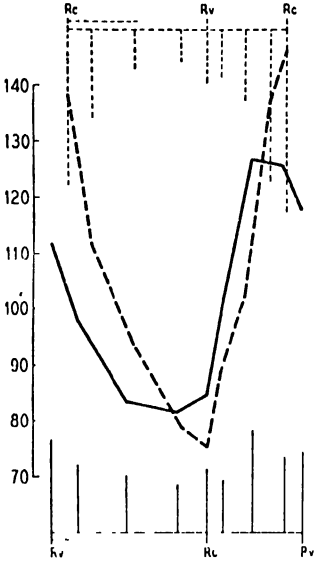


Figure 2

Bullion in the Bank of England

13 Specific Cycles 1797-1847

14 Reference Cycles 1794-1848

Conformity + 29, + 86, + 59

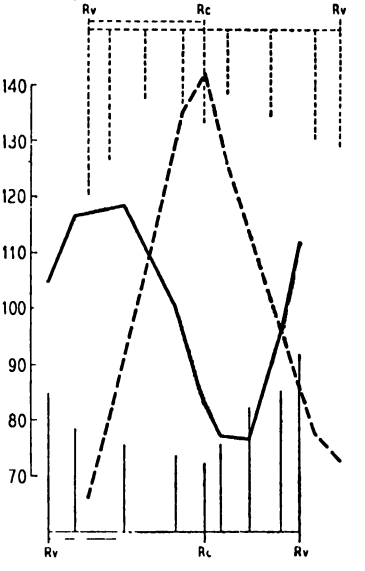


Figure 3

Total Public and Private Advances by the Bank of England

14 Specific Cycles 1794-1845

12 Reference Cycles 1794-1842

Conformity + 25, + 42, + 65

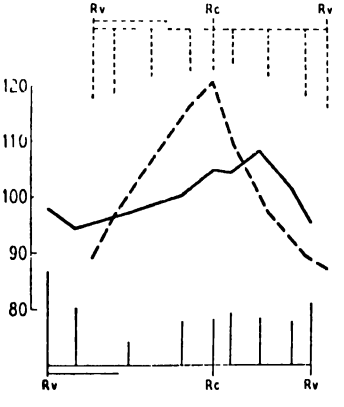


Figure 4

Bills and Notes Discounted by the Bank of England

19 Specific Cycles 1795-1849

14 Reference Cycles 1794-1848

Conformity + 100, + 71, + 100

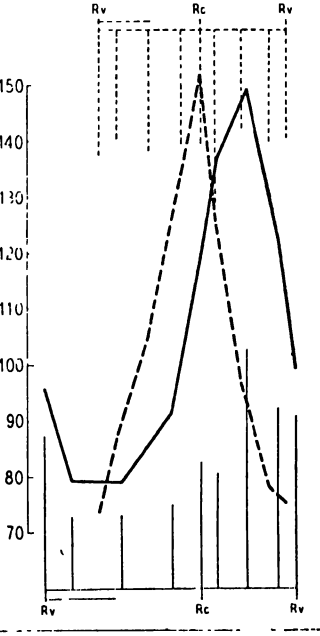


FIG. 145 *a*. Cyclical Patterns of Monthly Financial Series

rise might anticipate the upper turning-point, its decline the lower turning-point.

A: 19-22. Rent per Acre of Agricultural Land in Selected Counties of Great Britain; and Average Price per Acre of Agricultural Land

Specific-cycle Behaviour. The three agricultural land series presented in this analysis differ widely in their behaviour. The series beginning in 1816 contains seven specific cycles from 1822 to 1851; the one beginning in 1801 contains nine specific cycles over the same period, and the one beginning in 1790, eleven. The amplitude of movement in the latter series is much more pronounced than in the other two, and its fluctuations completely different in some years from the other two series (e.g. in 1827 a very deep trough occurs in the series beginning 1790; it is a year of rising rents in the other two series). It is obvious that no one of these series constitutes an adequate and representative sample.

Rents varied with the type of lease existing between landlord and tenant. A lease which permitted the landlord to evict the tenant at will would more likely carry a rental sensitive to change in the factors determining its amount per acre. Even a year-to-year lease, with the stipulation that tenant or landlord could give notice of change after six months' time, would probably call for a rental payment that would be responsive to changes in the price of wheat and any overhead costs incurred by the owner in maintaining the land. Leases of seven to fourteen years, which were not uncommon, however, would surely yield an insensitive rent series. In the description of the derivation of the rent series, the compilers do not indicate what type of lease predominated on the estates from which the data on rent were collected. The significance of the basic statistics is therefore difficult to assess.

The relation between the turning-points in the rent series and the price of wheat is not clear-cut. In the rent series covering the longest period of years almost twice as many specific cycles have been marked off as in the wheat price series, so that the designation of leads and lags is rendered exceedingly treacherous. In the remaining two rent series the problem is not much simpler. After 1822 there are seven cases of one-year lag in the wheat price turning-points behind the turning-points in the rent of agricultural land. In three years turning-points coincide. Before 1822 there are only two specific cycles in the series beginning 1801 as against four specific cycles in the wheat price, so that comparison in dating is difficult. It might perhaps be expected that rental values would lag behind the price of wheat because of the comparatively long life of most leases and their slow adjustment to new economic conditions. This relationship does not emerge from the series examined.

The turning-point in the upward secular trend of the wheat price from 1792 comes in 1812. There is no equivalent percentage rise in rentals over

Figure 5

Advances on Bills of Exchange and Stock by the Bank of England

------ 4 Specific Cycles 1832-1847

——— 3 Reference Cycles 1832-1846

Conformity +33, +100, +60

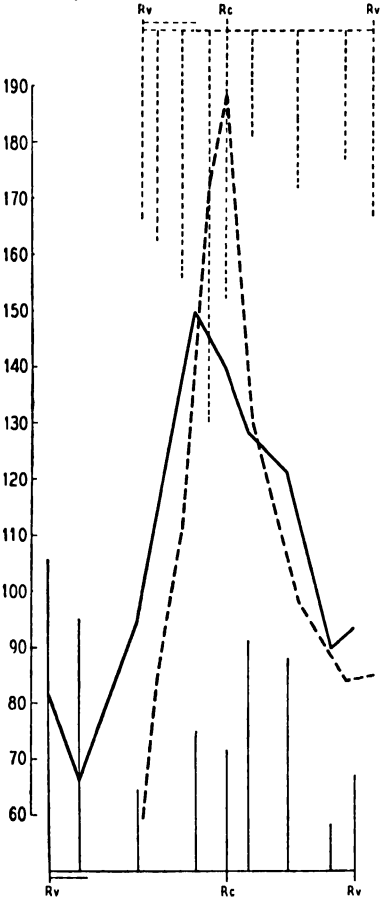


Figure 6

London Bankers' Deposits in the Bank of England

------ 5 Specific Cycles 1832-1848

——— 4 Reference Cycles 1832-1848

Conformity −50, −50, −71

Figure 7

Bank of England Notes in Circulation

------ 6 Specific Cycles 1824-1845

——— 7 Reference Cycles 1819-1848

Conformity −71, −43, −69

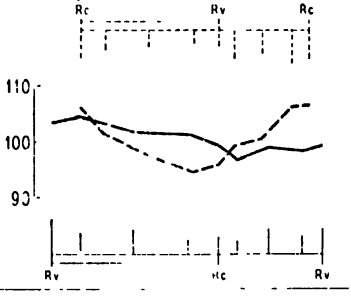


Figure 8

Market Rate of Discount

------ 6 Specific Cycles 1828-1850

——— 6 Reference Cycles 1826-1848

Conformity +100, +100, +100

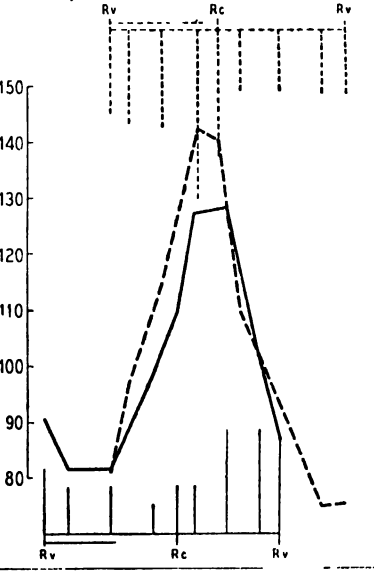


FIG. 145 *b*

that period. The dating of the comparable turning-point in the upward secular trend in rent is obscure, in no case coinciding with that for wheat. The sharp reversal in the trend of the price of wheat after 1812 which brings the price in 1850 to the level of 1792 is not duplicated in the rent series, which show at most a levelling-off tendency during the period after the war-rise, but no perceptible negative slope. The greatest similarity exists between the two series which represent the rent per acre on estates in Lincoln, Essex, &c. The series beginning in 1801 shows the rent actually received for 70,000 acres of agricultural land while that from 1816 is based on a somewhat larger sample—120,000 acres. (It has been estimated that the cultivated agricultural acreage of England and Wales amounted to 27½ million acres.) The compiler of these series has stated:[1]

> The information covers but a very small part of the actual agricultural area of England, and is open to the criticism that there is no guarantee of its representative character, but in so far as a general agreement is shown, the returns may, I think, be regarded as typical of the rise and fall in rents in England generally, though they cannot always be taken as an absolute indication of the average rent over the whole country.

Over the period for which they overlap, 1816–50, the two series exhibit similar mild amplitude and upward secular trend. The series which extends back to 1801, however, exhibits a sharp rise in the period 1802–18. From about that time to 1839 there is but a slight trend movement at best. Some net rise is evident through the forties in both series.

The pronounced rise in rent during the early years of the century is attributable to at least three factors affecting the demand and supply of grain:

(*a*) The growth in the population and the increased demand for produce.
(*b*) The high prices of grain consequent largely on poor harvests and obstructed imports. The first of these was counteracted, to some extent, by the increase in productivity, resulting from improved agricultural techniques.
(*c*) The inclosure of common fields which increased the capital value of land and its rental value.

Thompson mentions the results of an inquiry made by the Board of Agriculture in 1804 which showed that there was an increase in rent in England between 1790 and 1804 of about 40 per cent. He remarks that probably insufficient allowance was made in this inquiry for large areas of poor, low-rented land, and does not even feel certain that his own figures from 1801 to 1820 represent the average tendency of rents in England during these years. He concludes, however, that some such general rise actually did take place, largely in consequence of the depreciation of the currency.

[1] Robert J. Thompson, 'An Inquiry into the Rent of Agricultural Land in England and Wales during the Nineteenth Century', *Journal of the Royal Statistical Society*, lxx (1907), p. 589.

Figure 9

Yield on Three Percent Consols

------15 Specific Cycles 1790-1848

————14 Reference Cycles 1794-1848

Conformity -50,-57,-59

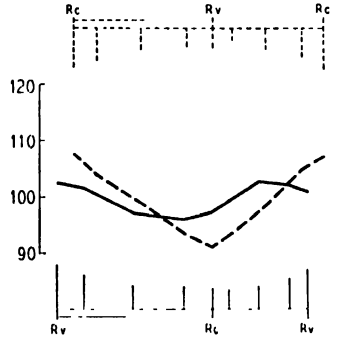


Figure 10

Index of Prices of Shares, Including Mines

------10 Specific Cycles 1813 1849

————9 Reference Cycles 1811-1848

Conformity -11,+100,+41

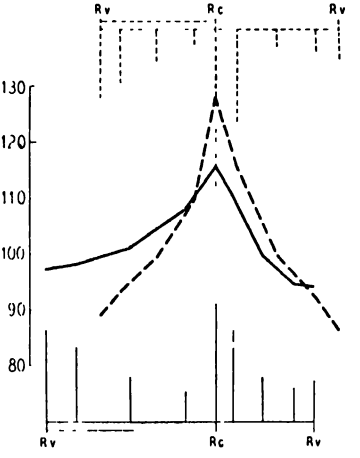


Figure 11

Index of Prices of Shares, Excluding Mines

------ 8 Specific Cycles 1813-1849

———— 9 Reference Cycles 1811-1848

Conformity +33,+100,+53

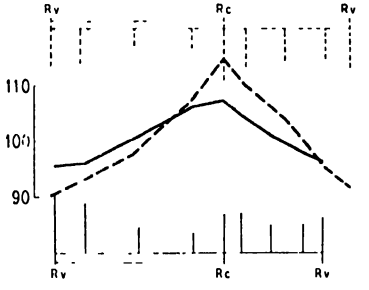


Figure 12

Rate of Exchange Hamburg on London

------15 Specific Cycles 1791-1849

————14 Reference Cycles 1794 1849

Conformity -36,-57,-56

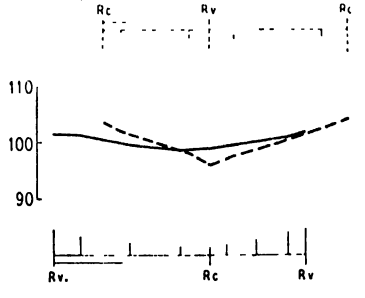


Figure 13

Advances by the Bank of England to Government

------ 9 Specific Cycles 1795-1843

————14 Reference Cycles 1794-1848

Conformity -29,-14,-33

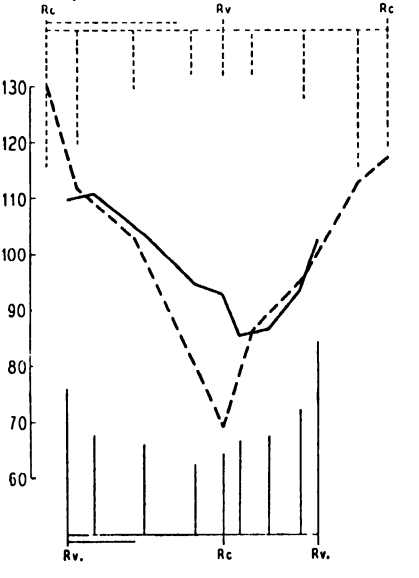


FIG. 145 c

McCulloch pointed out that rents might not have been raised to the extent that general prices rose because many long leases would not have been subject to renewal during this period.

Agriculture ceased to flourish after 1818 and the relative stagnation of returns from rent is apparent in the series beginning in 1816, which covers a larger area than the similar series starting in 1801. The decline in the price of grain produced a fall in rent. The Select Committee on the State of Agriculture of 1833[1] reported that

> the landlords in every part of the United Kingdom, though in different degrees, have met the fall of price (since 1820) by a reduction of rent, except where during the war the rents on their estates had not been raised, or where by a large expenditure of capital permanent improvements have enriched the nature of the soil itself. The spread of the drill system of husbandry, a better rotation of cropping, a more judicious use of manures, especially of bones . . . improvement in the breed both of cattle and of sheep, have all contributed to counterbalance the fall in price, and to sustain that surplus profit in the culture of the soil on which rent depends.

Signs of revival appeared beginning in the forties. Improved drainage and the application of scientific methods increased land values as did the enlargement of the market for farm produce by the coming of the railway.

Of all the agricultural series, the price per acre of agricultural land shows the widest amplitude. The wide fluctuations are evidently random in some years, inasmuch as the compilers state that the accident of a fine estate being sold in one year, and a poor one in the next, or of a forced sale, elevated or depressed the price. The abnormally low price in 1827 in conjunction with the relatively large acreage disposed of gives the impression of being at least one example of a random movement. In analysing the series, however, the absence of information on the character of these movements led us to mark off cycles at all turning-points. Some of them are, without doubt, spurious.

The cyclical movements of the price series are reminiscent of those characterizing the rent series beginning in 1790, but the resemblance is not close. The correlation between the price at which land sold and its rental value must have been greater than these series reveal. The trend of the price series is slightly upward over the whole period.

Reference-cycle Behaviour. The rent series beginning in 1816 shows the highest numerical conformity to reference dates. Since the sample on which this series is based appears to be superior to the ones described by the other rent series, some significance may be attached to the conformity. All the rent series have been analysed as showing I–V expansions, but only the series beginning in 1801 and in 1816 typically exhibit this pattern. Like the price of wheat, the price of agricultural land has been designated as showing a III–VII expansion.

[1] *P.P.* 1833, v (612), p. x.

A: 23-24. Indexes of Prices of Shares, including and excluding Mines[1] (Annual)

Specific-cycle Behaviour. The average duration of specific cycles is equal to that for reference cycles in the index including mine shares. The exclusive index has one less cycle. The inclusive index has longer contractions relative to expansions than the exclusive index, reflecting the downward pressure exerted by mine shares after 1825. The average amplitude of movement is greater for the inclusive index. The average amplitude of movement of the exclusive index is only slightly greater than for the price of Consols. There is a clear-cut upward trend in the exclusive index. The inclusive index, however, rises sharply to 1825, and, in net, falls in the following twenty-five years, at a decelerating rate.

Reference-cycle Behaviour. Both indexes exhibit average I–V expansion patterns with moderately high indexes of conformity.[2] The inclusive index shows more cases of counter-cyclical movement during reference expansion than the exclusive index, although its index of conformity to reference contractions is perfect. The major exceptions in the exclusive index are the following: the net fall from 1811 to 1815, the decline from 1829 to 1831, and the rise in 1832. The decline from 1811 to 1813 was caused probably by the effects of war on the capital market; and there is, as one might expect if this were the case, a rise in 1814, in the period when peace appeared imminent. The fall from 1829 to 1831 was a consequence of the general lack of confidence and the political unrest of those, only moderately, prosperous years.[3] The slight rise in 1832, a reference trough, probably represents the general relief felt at the final passage of the Reform Bill rather than any strictly economic improvement in the business outlook. It might be noted, as well, however, that the rise in the index in 1842 also precedes by a year the first year of recovery. The evidence, however, is too slight for any generalization.

Like many other prices this series shows greater III–V than I–III rates of expansion. In general the indexes do not represent highly speculative securities. The presence of railway shares, however, which in 1835–6 and 1843–5 were objects of speculative investment, imparts a special character to the average. It will be noted that the exclusive index falls (like Consols and other non-speculative securities) in 1825, when mining shares dominated the attention of the market. The extraordinary rise of mining shares in 1825 makes the difference between the average rate of movement in stages I–III and III–V more sharp in the inclusive than the exclusive index. In one cycle (1837–42), however, the continued decline in mining shares through reference expansion (1837–9) makes for no absolute rise in the index in those years. Reference expansion in the inclusive index at that point appears merely as a lesser rate of fall than during the previous

[1] For a more complete account of the cyclical behaviour of these indexes, see Vol. I, pp. 376–406.

[2] In the monthly series there is typically a decline in stage IV–V.

[3] See Vol. I, pp. 215–21.

reference contraction (1837). It is to be noted that the large increases in both indexes can be associated with major cycle expansions: 1816–18, 1819–25, 1832–6, 1842–5.

C: 10-11. Indexes of Prices of Shares, including and excluding Mines (Monthly)

Specific-cycle Behaviour. The monthly index exclusive of mines has two cycles fewer than the inclusive index. The two additional specific cycles appear during the period between the peaks of 1824–5 and 1836. Only one mild cyclical movement with a peak in December 1829 can be detected in the index excluding mines during this period. Three distinct cycles, with peaks in December 1827, May 1830, and February 1834, appear in the inclusive index. The other relations between the two series described in the analysis of their annual averages are not substantially affected by the use of monthly data.

The annual inclusive series omits the peaks in 1838 and 1840 which may be marked off in the monthly inclusive series, while the annual exclusive series omits only the latter peak.

Reference-cycle Behaviour. Share prices typically rose during stages I–IV. The average pattern also shows an increase in stage IV–V, but in six out of nine cycles (in both indexes), share prices were falling during this stage, so that the average figure is not representative. Stages I–IV showed rises more consistently in the cycles of the exclusive than the inclusive index.

Both series have lower numerical measures of conformity to reference expansions and to all business cycles than the annual series. Both series, however, show perfect conformity to reference contraction. The inclusive index actually shows more instances of lack of conformity than conformity to reference expansions, i.e. negative conformity, whereas there were as many instances of conformity as of lack of conformity in the annual series. At least two of these contrary movements are to be attributed to the almost uninterrupted deflation to which mining shares were subject for over fifteen years after the end of the 1824–5 speculation. The three cases of decline in reference expansion which appear in the exclusive index occurred, respectively, during the period of heavy government remittances abroad during the war, with consequent depressing effects on the capital market (1811–13), during the period of unrest preceding the passage of the Reform Bill (1830–1), and during the financial crisis in early 1847.

The index excluding mines shows its greatest average rate of expansion in stage II–III, a lower positive rate in stage III–IV, and a negative rate in stage IV–V. This tendency towards a slow recovery in share prices, which gradually gathers momentum, and tails off before the cycle reaches its peak, does not manifest itself so clearly in the average rates of changes in the stages of the index including mines, principally because of the concentration of the price increase in mine shares during stages III–V of the reference cycle from 1819 to 1826.

In each of the four cycles (from 1811 to 1850) which have been designated as major, share prices moved upward during reference expansion in this characteristic fashion: a slow rise in the early stages of expansion succeeded by a more rapid rate of rise between stages II–IV, and a lower rate of rise in stage IV–V. The five minor cycles do not share in this process of rise. The later stages of expansion of minor cycles, however, do exhibit either larger rates of decline, or smaller rates of rise than the early stages. The absence of speculative spirit in minor cycles is attested to by this behaviour.

A: 25-26. Rates of Exchange: Hamburg and Paris on London (Annual)

Specific-cycle Behaviour. Despite the fact that Britain was at war with France these two exchange rates move strikingly together even during the war years. The following are the years of differences in absolute movement.

Peak		*Trough*	
Paris	*Hamburg*	*Paris*	*Hamburg*
1805	1804	no turn	1813
no turn	1812		
1829	1830		
1838	1837		

In net, from 1809 to 1850, the Hamburg exchange contains one more cycle than the Paris exchange. After 1821, when Britain returned to a gold standard, fluctuations are very slight indeed. It is difficult, in fact, to mark off specific cycles in the usual sense.

For the Hamburg exchange the average duration of specific cycles [40·2 (13·9)] is much shorter than for reference cycles, resembling very closely the average duration of specific cycles in the balance of trade. The average duration for the Paris exchange is similar. During the war years the exchanges showed two major periods of weakness: 1798–1801, 1807–11. From 1811 the exchanges recovered fairly steadily towards the pre-war mint par. These movements are closely paralleled by changes in the trade balance. The major break in the rise from 1811 (1816-18) is accompanied by a sharp fall in the trade balance. The accordance of the trade balance with the exchange rates is, in all cases, by no means exact in the annual figures. The principal movements in the balance of trade, however, are reflected in parallel changes in the exchanges, even though year-to-year movements differ.

Reference-cycle Behaviour. The average pattern for the Hamburg exchange exhibits average contraction only in stage III–V. This is a characteristic also of the average behaviour for the balance of trade. The average pattern for the Paris exchange, covering a shorter period, exhibits very slight average decline in stage I–III, no movement in III–V, and absolute rise in the two contraction stages. These inconclusive averages result from

the fact that the exchange series usually fluctuated in the course of reference expansions. Their relatively substantial average increase in reference contraction stages has led to their designation as V–I series, to which they exhibit moderately good conformity indexes. The indexes are lowered by the fact that in ten reference cycle phases (for the Hamburg exchange) and seven (for Paris) there is no net average change per month from peak to trough and from trough to peak: this being in part a statistical expression of frequent fluctuations, within very narrow limits, in the course of reference expansions and contractions, which tended to cancel each other out.

Analytically perhaps the most interesting feature of the cyclical behaviour of the foreign exchanges is the tendency to weaken in the latter stages of expansion and to rise during reference contraction. The apparent effect of severe financial crisis was to strengthen the exchanges: 1819, 1826, 1837, 1845. The crises of 1839 and 1847 are exceptions, and, significantly, the trade balance, in those instances, failed to rise. One may advance, tentatively, the conclusion that foreign exchange equilibrium was maintained rather through changes in the trade balance than through the shifting of short-term funds. The extraordinary character of the short-term credits advanced from Paris and Hamburg in the panic year 1839 would tend to support this contention.[1] At a later date, presumably, a corrective impulse would have arisen from the relative difference in interest rates in the various financial centres. On the other hand, the international trade in bullion, based on exchange-rate discrepancies, constituted a means of fairly rapid adjustment in certain instances.[2]

C: 12. Rate of Exchange: Hamburg on London (Monthly)

Specific-cycle Behaviour. Aside from the fact that the monthly series, as is to be expected, has a larger average amplitude than the annual series, the chief difference between their specific-cycle behaviour is that the monthly series has two cycles *less* than the annual series. Usually the annual series tends to conceal cyclical fluctuations apparent in monthly data, but in this case the monthly specific cycle from July 1808 (H) to April 1811 (L) to October 1816 (H) works out in annual averages as three cycles with highs 1807, 1810, 1812, and 1816 and lows in 1809, 1811, and 1813.

The average duration of the monthly specific cycles is approximately equal to that of reference cycles. A comparison between the monthly exchange data and the monthly balance of trade figure is not possible since the latter series is not available.

Reference-cycle Behaviour. The average pattern shows the exchange rising during stages V–II, but the more typical movement of the Hamburg exchange was an increase starting in stage IV and ending at the reference low. There are many instances of zero change in the various stages of individual cycles, and the balance in favour of the description of a stage as

[1] See Vol. I, pp. 296–7.

[2] See especially the crisis of 1825, ibid., pp. 202–5.

typically rising or typically falling is not always decisive. The series has, however, been designated as IV–I. The exchange strengthened more regularly during reference contraction than it weakened during reference expansion.

There is only one instance of a contrary movement (from March 1810 to September 1811) during reference contraction, although there are four cases of zero change (all in the post-war period). The former irregularity, which occurred in the bullion and the Consol yield series also, resulted from heavy government remittances abroad during this period. Bullion moved out of the Bank's reserve during stage VII–III of this cycle instead of rising as it normally would, the money market was tight, and the exchanges weakened against England.

In the reference expansion phases, in addition to three cases of zero change, the exchanges improved instead of weakening in two cycles during the war period, and in one during the post-war period. In the spring of 1802 the exchange rose because of the combination of (*a*) the decline in war expenditure consequent on the Peace of Amiens, (*b*) the collapse of the prices of imported goods, and (*c*) the plentiful wheat harvest which reduced the volume and value of imports. From 1811 to 1815, despite large remittances abroad and the decline in the bullion reserve, the trade balance was favourable and the exchanges were therefore rising. Although the exchanges were declining slightly in the latter stages of prosperity from 1823 to 1825, the rise from October 1819 to June 1823 yields a net rise in the reference expansion of this cycle. This contrary movement of 1819 to 1823 resulted from the improvement in the Bank's reserve, and the easy money market situation, as well as the lack of any pressure on the trade balance from large grain imports.

The monthly indexes of conformity are somewhat higher than the corresponding annual measures. The indexes, of course, are negative, since the IV–I pattern indicates that the series moves inversely to reference cycles.

A: 27. Advances by the Bank of England to the Government (Annual)

Specific-cycle Behaviour. The average duration of specific cycles is longer than for reference cycles, there being no close correspondence between the timing of this series and business-cycle movements. The average amplitude of movement is large owing to the extent of the trend rise from 1796 to 1814, and the enormous fall thereafter.[1] Interruptions in those trend movements are relatively slight. The net trend is heavily downward.

Reference-cycle Behaviour. The pattern is best taken as of I–V expansion, although the average pattern shows the largest decline in stage III–V. If

[1] The trend is only slightly upward from 1801 to 1810 when, to a larger extent than in the previous war years, government expenditures were financed out of current taxation. A rapid rise in the net tax yield can be traced in that interval, and a slackened rate of increase in the total government debt (see Vol. I, pp. 103–7).

the last reference cycle is excluded from the analysis (with the tremendous decline in 1845)[1] the average decline in stage III–V becomes less than in the contraction stages from V–IX. Six of twelve reference cycles exhibit net increase in stage III–V. But there is little regularity in the reference-cycle behaviour of the series, even if the cycles during the war period are separated out. The most typical pattern during the war years shows an increase in every stage. The most typical pattern during the post-war years shows a decrease in every stage except I–III. The trend factor, it is evident, has reduced to a minimum any cyclical characteristics inherent in government borrowing from the Bank. The significance of the I–V pattern is thus severely limited.

Theoretically the pattern which government borrowing from the Bank might be expected to yield would more closely approximate one of expansion during stages III–VII. The changing condition of the money market and its influence on Treasury operations encourage such an expectation. The government could finance itself either by obtaining advances from the Bank, or by selling Supply bills to the market. If its offerings were not taken by the public, the Treasury had to request the Bank to buy them or obtained an advance from the Bank for the public services. Wood sums up this triangular relationship as follows: 'It was the unwillingness of the market at times to absorb all the Supply bills offered that was the really important factor causing the Treasury to increase its demands upon the Bank.'[2] It is perhaps significant in this connexion that, after 1818, the major declines in the government's borrowing at the Bank occurred roughly during periods of prosperity (1819–24, 1826–9, 1834–7, 1843–5), while the interruptions in the fall may be associated with crisis or relative depression (1825, 1831–4, 1837–43). The dating, however, is so crude, with respect to reference cycles, that no simple relation may be established statistically.

The rate of increase to 1815 seems to have depended largely on the government's needs, although the decline in 1797 is connected with the financial crisis of that year. There is a secular decline in total expenditure after 1815, and, since the downward trend in tax revenue is much less, one might expect a lessened dependence on the short-term market. This conclusion is reinforced by the decline in unfunded debt, relative to the total, indicating the process of conversion to long-term obligations which proceeded in the decades of peace.

C: 13. Advances by the Bank of England to the Government (Monthly)

Specific-cycle Behaviour. The most striking difference between the specific-cycle behaviour of the annual and monthly series is the fact that the monthly series is analysed on an inverted basis; that is, peaks are treated

[1] This decline is due apparently to a fall in government expenditure at a time when the tax revenue was rising.

[2] *English Theories of Central Banking Control, 1819–1858*, p. 64.

as specific-cycle troughs and troughs as specific-cycle peaks. This treatment was dictated by the typical pattern which emerged from the movements of the series during the nine stages of reference cycles. The presence of more stages of rise in the monthly series during reference contraction than reference expansion resulted in the inversion of the specific-cycle analysis. The summary measure most sensibly affected by this change in the monthly series is the weighted average per month change from cycle to cycle. The numerical value of this measure is almost twice as high in the annual as it is in the monthly series. Since the peak in 1843 marks the close of the last specific cycle in the latter, the tremendous drop in the Bank's advances to the government after that date does not figure in the monthly analysis. The full effect of this fall, is, however, present in the annual series, yielding the higher negative measure of secular change.

Reference-cycle Behaviour. The pattern of the monthly series has been designated VI–II, but as in the case of the annual series, wide reservations hedge this characterization. There is no single cycle with this clear-cut pattern of expansion. Reference cycles during the period of rising trend show increases typically during stages VII–II and III–IV, and, in the remaining stages, show rises as frequently as falls. In the period of declining trend, the series typically rose only in stages VI–VII and VIII–IX. In stages VII–VIII and I–II there were four cycles in which advances were rising, four of decline. Hence the VI–II pattern must not be used to support too detailed a picture of the typical cyclical behaviour of the Bank's advances to the government.

The comments made above with respect to the behaviour of the annual series are equally applicable to the monthly data. The monthly indexes, of course, bear negative signs. The conformity indexes of the monthly are higher than for the annual series except in reference contraction, but they are still low, indicating poor cyclical conformity. In general, only negative conclusions can be drawn from the formal statistical analysis: no consistent relation to business cycles emerges.

A: 28. Net Public Revenue from Taxes

Specific-cycle Behaviour. From 1811 to 1850 there are the same number of specific cycles in net tax revenue as there are reference cycles. The decline in 1823, however, corresponds to no reference-cycle contraction, although this is balanced, in the total, by the long specific cycle from 1827 to 1833. Increased war taxation accounts for the unbroken rise in the revenue from 1801 to 1810. The average amplitude of movement is relatively slight. There is, in net, an upward secular trend, which is compounded of a rise to 1815, a decline to 1831, and a slight rising tendency to the end of the period. For the duration of the eight specific cycles, however, the net trend is downward. There is a notable increase in the level from 1843, due largely to the introduction of the income tax in the budget of the previous year.

Reference-cycle Behaviour. As one would expect, the net tax revenue shows rough positive conformity to business-cycle movements: the average pattern reveals I–V expansion, V–IX contraction. The index of conformity to reference expansions would be perfect but for the sharp decline in 1817,[1] the lack of any net upward movement from 1819 to 1825 (due principally to the decline in 1825), and the net decline (during reference expansion) from 1829 to 1831. Taken from 1811 the contraction index would be perfect but for the counter-cyclical rise in 1832.

A: 29. Total Public Expenditures

Specific-cycle Behaviour. Although this series exhibits no very consistent relation to cyclical fluctuations, the average duration of specific cycles approximates that for reference cycles in the period covered. Specific cycles vary from two to twelve years in length, and the average deviation is consequently large. The average amplitude of movement is moderate, being less than for Bank advances to the government, although greater than for net tax revenue. From 1803 to 1813–15 the trend is steadily upward in public expenditure. The end of the wars saw a sharp decline to 1817. From 1817 to 1842 there is a slight secular decline, which accelerates in the last years of the period.

Reference-cycle Behaviour. The indexes of conformity are low but positive to a I–V expansion pattern. This pattern appears, however, in only one reference cycle (1811–16) and is due simply to the coincidence of the end of the wars with a reference-cycle peak (1815). In short, no particular analytic significance is to be attached to this average pattern.

A: 30-34. Total, Funded, and Unfunded Public Debt

Specific-cycle Behaviour. The funded and total debt series do not exhibit specific cycles in the usual sense. They rise from 1792 to 1814, at varying rates, but without any absolute decrease, and then decline very slightly throughout the remaining years, with almost imperceptible fluctuations. In the period of secular increase, the rate of rise slackens, roughly, from 1800 to 1810. The funded debt constituted by far the major proportion of Britain's debt, so that the contours of the curves of the two series are very similar. The unfunded debt (largely exchequer bills) exhibits clearly marked cycles of fairly large average amplitude. This series shows some similarity in its movements to the series on advances by the Bank to the government, although the resemblance is impaired by the tendency of the movements in the unfunded debt to lag behind government borrowing. A closer correspondence, no doubt, exists between annual changes in the unfunded debt and advances to the government.[2] The unfunded debt series shows longer

[1] The sharp post-war decline reflects the removal of various emergency taxes (especially the income tax), as well as the decline in money incomes that accompanied the fall in prices.

[2] E. B. Schumpeter ('English Prices and Public Finance, 1660-1822', *Review of Economic Statistics*, 1938, pp. 21 ff.) has pointed out the lack of close agreement between increases or decreases in the national

average specific cycles than reference cycles, a rising trend until 1813 (a second, slightly lower, peak occurs in 1816), and a declining trend thereafter. The amount of exchequer bills outstanding in 1850, however, was twice as large as that in 1790. The trend thus reflects the diminution in the government's dependence on short-term borrowing, on the conclusion of the war, and its policy of reducing the number of outstanding exchequer bills.

Reference-cycle Behaviour. The debt series do not exhibit a significant average pattern over the whole period. Funded and total debt have been designated as showing expansion during stages I–V; unfunded debt during stages V–I. Until 1811 funded and total debt increase during both reference expansions and contractions. Thereafter in 9 phases out of 16 for funded debt and 12 phases out of 16 for total debt there is no average per month change. During the war period the unfunded debt increased throughout both phases of reference cycles, except from 1793 to 1797 and 1800–1, when it was declining. The curtailment of the Bank's advances in 1796–7, prior to the decision to abandon the metallic standard, explains the failure of the unfunded debt to show average per month rise during this first reference cycle. Although government borrowing from the Bank shows no decline during 1801, the greater expenditure during that year devoted to the reduction of the amount of exchequer bills outstanding, in net, causes a falling off in the unfunded debt. In the post-war period the unfunded debt tends to increase (or decline at a lesser rate) during reference contraction and to decline during reference expansion. Although the average pattern of the series for the whole period shows an increase in stage I–III, the average of the standings after 1816 is negative for that stage. A V–I pattern thus emerges. The conformity to all business cycles is excellent, revealing only one instance when the rate of decrease during reference contraction (1818–19) exceeded that of the following reference expansion. The characteristic behaviour is probably explained by the government's policy of reducing (or converting) its unfunded debt during upswings of reference cycles, in the period after 1816, and slackening the rate of reduction or increasing its debt during the downswings. As noted above, changes in the amount of government borrowing from the Bank after the war also seem to occur inversely with reference cycles.

debt and the amount of net receipts from loans available each year. She attributes the discrepancies after 1794 to the system of selling Consols at a considerable discount. The debt was thus increased by more than the increase in net receipts from borrowing.

TABLE 94*a*

Measures of Average Cyclical Behaviour: Labour Series

Specific-cycle behaviour	(1) *Kondratieff's index of money wages in the textile industry*	(2) *Bowley's index of agricultural money wages*	(3) *Tucker's index of money wages of London artisans*	(4) *Tucker's index of real wages of London artisans*
PERIOD COVERED	1808–48	1824–45	1820–45	1795–1847
NUMBER OF CYCLES	9	3	5	10
AVERAGE DURATION (in months)				
Expansion	26·7 (8·3)	64·0 (21·3)	31 2 (18 2)	30 0 (9 6)
Contraction	26·7 (16 9)	20 0 (5 3)	28 8 (17·3)	32 4 (11·5)
Full cycle	53·3 (13 9)	84·0 (24·0)	60 0 (19 2)	62·4 (14 4)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	6·8 (4·4)	7·3 (0·4)	1·4 (1 3)	13·9 (4·7)
Fall	9·2 (9 0)	7·3 (3 8)	2 2 (1 0)	12 7 (5·6)
Rise and fall	16 0 (9 3)	14 7 (4·2)	3 6 (1 1)	26·6 (6·5)
Movement per month				
Rise	0 4 (0·4)	0·1 (0 0)	0·1 (0 1)	0 5 (0 2)
Fall	0·3 (0·3)	0 3 (0 1)	0 1 (0 0)	0 4 (0·2)
Rise and fall	0·3 (0·2)	0 2 (0 0)	0 1 (0 0)	0·4 (0·1)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	98·9 (2·8)	95·7 (1·1)	100 2 (1 0)	93·8 (3·8)
„ III	102·1 (3 0)	101 7 (0 9)	100 8 (0 6)	99 3 (3 4)
„ V	105·7 (3 3)	103·0 (1 3)	101 6 (0 5)	107 7 (1·2)
„ VII	100·1 (1 9)	99·3 (1 6)	99 8 (0 6)	102 5 (2 9)
„ IX	96·4 (5·9)	95·7 (3·1)	99·4 (0·9)	95 0 (5·2)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·4 (0·4)	+0·2 (0 0)	+0 1 (0 1)	+0 4 (0 2)
„ III to V	+0·4 (0 4)	+0·1 (0·1)	+0·1 (0 1)	+0·6 (0·3)
„ V to VII	- 0 5 (0 4)	0·3 (0 2)	0 2 (0 0)	- 0 4 (0 2)
„ VII to IX	- 0·3 (0·3)	- 0·3 (0 1)	0 0 (0 0)	- 0 5 (0 3)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	- 2·1 (5·6)	+1 5 (0·5)	- 1 2 (1·0)	+2 8 (6·9)
Weighted average change per month from cycle to cycle	−0 04	+0·02	- 0 03	+ 0 04

[*Continued*

TABLE 94*a* (*cont.*)

Measures of Average Cyclical Behaviour: Labour Series

Specific-cycle behaviour	(5) *Tucker's index of the cost of living of London artisans*	(6) *Tea consumption in the United Kingdom*	(7) *Tobacco consumption in Great Britain*	(8) *Tobacco consumption in the United Kingdom*
PERIOD COVERED	1792–1852	1793–1840	1787–1824	1816–41
NUMBER OF CYCLES	9	10	9	3
AVERAGE DURATION (in months)				
Expansion	42·7 (22·2)	42·0 (36·0)	32 0 (14·2)	68·0 (50·7)
Contraction	37·3 (14·8)	14·4 (3·8)	17·3 (5·9)	32·0 (13·3)
Full cycle	80·0 (22·2)	56·4 (37·4)	49·3 (15·1)	100·0 (53·3)
AVERAGE AMPLITUDE OF RELATIVES				
Total movement				
Rise	17·1 (10·3)	21·2 (12·9)	16·2 (8·2)	16·7 (7·8)
Fall	16·1 (6·3)	15·5 (9·4)	9·1 (6·8)	9·7 (4·9)
Rise and fall	33·2 (14·3)	36·7 (21·7)	25·3 (13·3)	26·3 (4·4)
Movement per month				
Rise	0·4 (0·1)	0·6 (0·2)	0·6 (0·4)	0·3 (0·1)
Fall	0 5 (0·3)	1·2 (0·8)	0·5 (0·3)	0·4 (0·1)
Rise and fall	0·4 (0 1)	0·7 (0·2)	0 5 (0·2)	0 3 (0·1)
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	94·9 (6·6)	91·9 (4·3)	91·4 (5·1)	93·7 (6·9)
„ III	101·7 (3·7)	100 0 (1·8)	99·9 (1·7)	101·0 (4·0)
„ V	112·0 (5·3)	113·1 (9·4)	107·7 (3·9)	110·3 (1·1)
„ VII	102·3 (5·3)	105·9 (5·2)	103·3 (2·6)	105·3 (4·9)
„ IX	95·9 (6·7)	97·6 (2·7)	98·6 (4·8)	100·7 (5·8)
AVERAGE RATES OF CHANGE (per month)				
From I to III	+0·3 (0·1)	+ 0·6 (0·2)	+0·7 (0·4)	+0·3 (0·1)
„ III to V	+0·4 (0·2)	+0·7 (0·2)	+0·6 (0·4)	+0·3 (0·1)
„ V to VII	−0·6 (0·3)	−1·1 (0·8)	−0·5 (0·3)	−0·4 (0·2)
„ VII to IX	−0·5 (0·4)	−1·2 (0·8)	−0·5 (0·4)	−0·3 (0·1)
SECULAR MOVEMENTS (in percentages)				
Average change from cycle to cycle	−0·5 (9·9)	+5·8 (6·2)	+5 9 (5 6)	+1·1 (10·0)
Weighted average change per month from cycle to cycle	−0·01	+0·10	+0·12	+0·12

TABLE 94*a* (*cont.*)

Measures of Average Cyclical Behaviour: Labour Series

(9) *Wine consumption in the United Kingdom*	(10) *Rum consumption in England*	(11) *Rum consumption in the United Kingdom*	(12) *Sugar consumption in the United Kingdom*	(13) *Coffee consumption*
1789–1851	1801–50	1804–48	1795–1849	1792–1850
15	9	8	17	15
28·8 (10·6)	30·7 (21·1)	28·5 (17·6)	20·5 (10·0)	30·4 (18·1)
20·8 (8·2)	34·7 (17·5)	37·5 (22·5)	17·6 (8·6)	16·0 (6·4)
49·6 (7·1)	65·3 (24·6)	66·0 (19·5)	38·1 (12·9)	46·4 (22·1)
24·9 (13·3)	29·8 (21·3)	29·8 (23·4)	24·2 (14·1)	35·8 (27·7)
24·0 (16·0)	25·6 (15·1)	24·0 (11·8)	17·3 (13·9)	19 0 (19·3)
48·9 (21·0)	55·3 (24·7)	53·8 (22·2)	41·5 (25·1)	54·8 (38·1)
0·9 (0 4)	1·3 (1·1)	1·4 (1·2)	1·4 (0·7)	1·7 (1·6)
1·2 (0·7)	1·2 (0·9)	1·0 (0·6)	1·1 (0·8)	1·3 (1·4)
1·0 (0·4)	1·1 (0 7)	1·1 (0·8)	1·1 (0·6)	1·6 (1·4)
91 7 (10·2)	89·8 (13 1)	89·9 (13·6)	89·7 (7·1)	82·7 (16 8)
103 4 (5·0)	103·2 (7·0)	100·2 (6·8)	100 8 (3·6)	101·8 (4 4)
116·6 (9·1)	119·6 (9·5)	119 6 (9 8)	113·9 (9·0)	118·5 (13·0)
103·3 (7·4)	105·3 (6·9)	110·4 (9·2)	105 4 (5 2)	108 0 (9·7)
92·6 (11·6)	94·0 (12·9)	95·6 (13·1)	96·6 (7·3)	99·5 (10·6)
+0·9 (0·6)	+1·3 (1 2)	+1·2 (1·2)	+1·3 (0 6)	+1·8 (1·7)
+0·9 (0·5)	+1·4 (1·0)	+1·6 (1·1)	+1·5 (1·0)	+1·6 (1 5)
−1·3 (0·9)	−1·3 (1·1)	−0·9 (0 6)	−1·1 (0·8)	−1·4 (1 6)
−1·1 (0·6)	−1·0 (0·9)	−1·1 (0 6)	−1 1 (0·9)	−1·2 (1·4)
−0·7 (7·5)	+2·6 (16·4)	−0 4 (17·2)	+6·8 (8·2)	+24·5 (25·5)
−0·01	+0·04	+0·01	+0·18	+0·50

[*Continued*

TABLE 94*a* (*cont.*)

Measures of Average Cyclical Behaviour: Labour Series

Specific-cycle behaviour	(14) *Percentage of iron-founders unemployed*	(15) *Iron-founders' unemployment benefit paid per head*	(16) *Iron-founders' sick benefit paid per head*
PERIOD COVERED	1833–52 (i)	1833–48 (i)	1833–52 (i)
NUMBER OF CYCLES	5	3	5
AVERAGE DURATION (in months)			
Expansion	28·8 (13·4)	36·0 (16·0)	19·2 (8·6)
Contraction	16·8 (7·7)	24·0 (8 0)	26·4 (11 5)
Full cycle	45 6 (8·6)	60·0 (24·0)	45·6 (3·8)
AVERAGE AMPLITUDE OF RELATIVES			
Total movement			
Rise	63·7 (47·9)	75·7 (22·2)	65·6 (40·5)
Fall	85·8 (27·8)	210 0 (112·7)	51·2 (33·8)
Rise and fall	149 4 (56·5)	285·7 (133·8)	116·8 (7·8)
Movement per month			
Rise	1·9 (0·8)	2 5 (0·8)	4·2 (3 0)
Fall	6·5 (2·9)	10·6 (6·7)	2·4 (2·1)
Rise and fall	3·3 (0 8)	4·6 (1·5)	2 6 (0·3)
AVERAGE STANDINGS OF RELATIVES IN			
Stage I	124·2 (34·6)	113·0 (9·3)	133·6 (39·7)
,, III	79 8 (5·4)	73·3 (17 8)	94·4 (16·9)
,, V.	60·6 (13·3)	37·3 (27·1)	68·0 (3 2)
,, VII	101·2 (11·4)	102·7 (30·2)	90 2 (15·4)
,, IX	146·4 (20·9)	247·3 (85·6)	119·2 (35·4)
AVERAGE RATES OF CHANGE (per month)			
From I to III.	−2·5 (1·3)	−2·7 (0·7)	−4·7 (3·2)
,, III to V	−1·3 (0·4)	−2·4 (0·9)	−3·7 (3·2)
,, V to VII	+6·4 (3·0)	+8·2 (8·2)	+2·2 (2·0)
,, VII to IX	+6·6 (2·8)	+13·0 (6·6)	+2·6 (2·2)
SECULAR MOVEMENTS (in percentages)			
Average change from cycle to cycle	+24·0 (40·5)	+38·0 (38 0)	−9·2 (15·8)
Weighted average change per month from cycle to cycle	+0·53	+0·70	−0·21

TABLE 94*a* (*cont.*)

Measures of Average Cyclical Behaviour: Labour Series

(17) *Poor-relief expenditures in England and Wales*	(18) *Poor-relief expenditures in agricultural counties of England and Wales*	(19) *Poor-relief expenditures in non-agricultural counties of England and Wales*	(20) *Marriage rate in England and Wales*	(21) *Passengers to extra-European countries from the United Kingdom*
1817–47 (i)	1817–47 (i)	1817–47 (i)	1795–1847	1821–48
5	5	4	11	7
33·6 (25 9)	33 6 (25 9)	48·0 (18·0)	27 3 (12 3)	30·9 (16 2)
38 4 (17·3)	38·4 (16·3)	42·0 (15·0)	29·5 (16·9)	15·4 (4·9)
72·0 (38·4)	72·0 (38·4)	90·0 (30 0)	56·7 (14 5)	46·3 (12 2)
19 8 (20·2)	21·0 (22 4)	24 2 (19·2)	9·3 (7 3)	77 4 (43 3)
13 6 (7·1)	11·2 (4·2)	19·8 (7·8)	9·1 (5 2)	47·7 (25 8)
33 4 (22·5)	32·2 (22 2)	44 0 (20 5)	18·4 (12·3)	125 1 (49 8)
0 5 (0·2)	0 4 (0·2)	0 4 (0·3)	0·3 (0·2)	2·5 (0 8)
0 4 (0·3)	0·3 (0 1)	0·6 (0·3)	0 4 (0 2)	3 3 (2 1)
0 4 (0·2)	0·4 (0·1)	0 4 (0 2)	0·3 (0·2)	2 7 (0 7)
109 8 (14·2)	111·0 (16·4)	112·0 (13 0)	96·4 (3 8)	68 3 (23 5)
101·6 (6·3)	101·2 (5·8)	101·8 (6 8)	101 8 (1·8)	98 9 (13 9)
90 0 (6·0)	90 0 (6 0)	87·8 (6 2)	105·6 (3·5)	145·7 (20 2)
95 2 (5·4)	95 8 (5 8)	94·8 (6·2)	100·0 (0·9)	125·9 (19·6)
103·6 (5·5)	101·2 (6·2)	107·5 (6·2)	96·5 (2·2)	98·0 (31·1)
−0·4 (0·2)	−0·4 (0 2)	−0·4 (0·2)	+0·4 (0 3)	+2·1 (0 9)
−0·5 (0·3)	−0·4 (0 2)	−0·5 (0·4)	+0 3 (0 1)	+2·8 (1·1)
+0·3 (0·1)	+0 3 (0 1)	+0·4 (0·2)	−0 5 (0 2)	−3 0 (2 3)
+0·5 (0·4)	+0 3 (0·2)	+0·8 (0·5)	−0 4 (0 2)	−3·6 (2 4)
−4·5 (9·2)	−7·8 (11·2)	−4·3 (11·1)	0 0 (0 3)	+34 0 (29 7)
−0·06	−0·11	−0·05	0·00	+0·74

TABLE 94*b*

Measures of Average Cyclical Behaviour: Labour Series

Reference-cycle behaviour	(1) *Kondratieff's index of money wages in the textile industry*	(2) *Bowley's index of agricultural money wages*	(3) *Tucker's index of money wages of London artisans*	(4) *Tucker's index of real wages of London artisans*
PERIOD COVERED	1808–48	1793–1848	1793–1848	1793–1848
NUMBER OF CYCLES	9	13	13	13
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	99·9 (4·1)	99·7 (5·1)	98·9 (1·8)	99·9 (5·0)
„ III	100·3 (1·5)	99·1 (1·8)	99·8 (1·1)	101·1 (3·9)
„ V	100·7 (2 8)	100 2 (2·8)	99·8 (1·1)	98·9 (4·3)
„ VII	98·9 (1·9)	101·0 (2·6)	100·8 (1·9)	98·9 (4·7)
„ IX	97·4 (2·8)	100 9 (3·6)	101·3 (3·0)	100·6 (4·7)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−0·1 (0·3)	0·0 (0·2)	+0·1 (0·1)	+0·1 (0·4)
„ III to V	0·0 (0·1)	+0·1 (0·3)	0 0 (0·1)	−0·1 (0·5)
„ V to VII	−0·3 (0·3)	+0·1 (0·1)	+0·1 (0·2)	0·0 (0·3)
„ VII to IX	−0·2 (0·4)	0 0 (0·1)	+0·1 (0·2)	+0·1 (0·3)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	I–V	III–VII	VII–III	VII–III
Av. change per month of relatives during stages matched with				
Reference expansion	0·0 (0·2)	+0·1 (0·2)	0·0 (0·1)	+0·1 (0·3)
Reference contraction	−0·3 (0 4)	0·0 (0·2)	0·0 (0·1)	0·0 (0·3)
Index of conformity to				
Reference expansion	+11	+15	+31	− 8
Reference contraction	+11	+ 8	+ 8	+23
Business cycles	+12	+12	+12	+12

TABLE 94*b* (*cont.*)

Measures of Average Cyclical Behaviour: Labour Series

(5) *Tucker's index of the cost of living of London artisans*	(6) *Tea consumption in the United Kingdom*	(7) *Tobacco consumption in Great Britain*	(8) *Tobacco consumption in the United Kingdom*	(9) *Wine consumption in the United Kingdom*
1793–1848	1793–1848	1793–1819	1816–48	1793–1848
13	13	7	7	13
99·2 (6·2)	94·0 (5·4)	96·1 (6·2)	96·0 (2·9)	96·2 (13·1)
98·6 (3·6)	98·6 (2 8)	99 6 (2·8)	99·7 (2·8)	100·7 (7 1)
101·2 (4·3)	105·6 (5·5)	102·7 (2·3)	103·6 (2·7)	108·8 (10·5)
101·8 (4·4)	103·2 (2·9)	102 0 (2 9)	103·0 (3 1)	102·8 (8·1)
100·5 (5·6)	101·7 (5·4)	101·3 (4·0)	102 1 (4 1)	95 4 (11·3)
0 0 (0·4)	+0·2 (0·4)	+0·4 (0·5)	+0·3 (0·1)	+0·3 (0·9)
+0·1 (0·4)	+0·4 (0 4)	+0 3 (0 4)	+0·1 (0 2)	+0 4 (0·6)
0·0 (0·2)	−0·5 (0·8)	−0·1 (0·3)	−0 1 (0 3)	−0 9 (0 9)
−0·1 (0·3)	−0·4 (0·7)	−0·2 (0·4)	−0 1 (0 3)	−1·0 (0 9)
III–VII	I-V	I–V	I–V	I-V
+0·1 (0·3)	+0 3 (0·3)	+0·3 (0·3)	+0 2 (0·1)	+0·4 (0 6)
−0·1 (0·3)	−0 4 (0 7)	−0·1 (0·4)	−0·1 (0·3)	0·1 (0 8)
+38	+62	+43	+100	+46
+ 8	+15	+14	− 14	+69
+ 8	+60	+31	+ 62	+68

[*Continued*

TABLE 94*b* (*cont.*)

Measures of Average Cyclical Behaviour: Labour Series

Reference-cycle behaviour	(10) *Rum consumption in England*	(11) *Rum consumption in the United Kingdom*	(12) *Sugar consumption in the United Kingdom*	(13) *Coffee consumption*
PERIOD COVERED	1801–48	1801–48	1793–1848	1793–1848
NUMBER OF CYCLES	11	11	13	13
AVERAGE STANDINGS OF RELATIVES IN				
Stage I	100 8 (13·0)	102·5 (12 6)	96·8 (11·6)	87 1 (12 3)
„ III	95·8 (8·1)	98·4 (9 6)	100 2 (7·2)	105·6 (13·8)
„ V	99·5 (6·0)	98·1 (5 7)	98 3 (8·3)	99·1 (10·7)
„ VII	103·2 (8·2)	101·4 (7·5)	100·5 (6·0)	104·4 (9·1)
„ IX	105·5 (15·1)	103·4 (15·8)	105·5 (11·6)	107 6 (10·2)
AVERAGE RATES OF CHANGE (per month)				
From I to III	−0·2 (0·9)	−0 2 (1·0)	+0·2 (0·8)	+1 4 (1·6)
„ III to V	+0 4 (0·7)	0·0 (0 5)	−0·2 (0·9)	−0 5 (1·5)
„ V to VII	+0·6 (1·4)	+0·4 (1·4)	+0·3 (1·3)	+0·8 (0·8)
„ VII to IX	+0·5 (1 3)	+0·4 (1 4)	+0 6 (1·3)	+0 6 (0 9)
CONFORMITY TO BUSINESS CYCLES				
Expansion stages of series	III–VII	III–VII	VII–III	VII–III
Av. change per month of relatives during stages matched with				
Reference expansion	+0·4 (0·6)	+0·1 (0·5)	+0·3 (0·5)	+1 0 (0·9)
Reference contraction	−0·1 (0·5)	0 0 (0·6)	−0 1 (0 6)	−0·2 (1 0)
Index of conformity to				
Reference expansion	+27	+ 9	+46	+62
Reference contraction	+27	+27	+8	38
Business cycles	+43	+14	+24	+32

TABLE 94*b* (*cont.*)

Measures of Average Cyclical Behaviour: Labour Series

(14) *Percentage of iron-founders unemployed*	(15) *Iron-founders' unemployment benefit paid per head*	(16) *Iron-founders' sick benefit paid per head*	(17) *Poor-relief expenditures in England and Wales*	(18) *Poor-relief expenditures in agricultural counties of England and Wales*
1832–48	1832–48	1832–48	1816–48	1816–48
3	3	3	7	7
90 0 (6 7)	98·3 (16·4)	113·0 (22 0)	103·1 (11 3)	103 3 (10·7)
71·0 (16·7)	61 7 (16 4)	77·7 (7 6)	98·6 (4·1)	100 0 (4·6)
60·0 (21·3)	39·0 (28·7)	75·7 (5·8)	95·0 (6·0)	96·0 (6·0)
124·0 (5·3)	116 0 (24·7)	113·3 (3·8)	98 6 (6 0)	98·0 (6·9)
164·7 (53·8)	244·0 (104 7)	135·7 (44·4)	100 4 (7·2)	97·4 (7·4)
−1 1 (0 6)	− 2·4 (1·2)	−2·6 (2·2)	0 0 (0·5)	0 0 (0·5)
−0·5 (0·6)	− 1·0 (0·8)	0·0 (0·5)	−0 1 (0 3)	−0·2 (0·5)
+ 5·4 (2·0)	+ 9·0 (8 2)	+3·7 (2·3)	+0 3 (0·4)	+0·1 (0 3)
+ 4·1 (4·3)	+11·8 (8 9)	+ 2·9 (3·5)	+0·2 (0·3)	− 0 1 (0 3)
V–I (i)	V–I (i)	V–I (i)	V–I (i)	V–I (i)
−0 8 (0·4)	− 1 7 (0 3)	−1·3 (0·9)	−0 1 (0 4)	−0 1 (0 4)
+4·7 (3 2)	+10 4 (7·3)	+3·3 (2 6)	+0·2 (0·3)	0 0 (0·3)
−100	−100	−100	0	+ 14
− 67	−100	− 33	−43	− 14
−100	−100	−100	−46	−23

[*Continued*

TABLE 94*b* (*cont.*)

Measures of Average Cyclical Behaviour: Labour Series

Reference-cycle behaviour	(19) *Poor-relief expenditures in non-agricultural counties of England and Wales*	(20) *Marriage rate in England and Wales*	(21) *Passengers to extra-European countries from the United Kingdom*
PERIOD COVERED . . .	1816–48	1793–1848	1816–48
NUMBER OF CYCLES . . .	7	13	7
AVERAGE STANDINGS OF RELATIVES IN			
Stage I	103·6 (11 4)	99·5 (4 2)	94 9 (34·7)
,, III	97·6 (4·2)	99·0 (2·2)	77·0 (20·0)
,, V.	94·3 (6·0)	101·8 (3·5)	93·0 (19·1)
,, VII	99·0 (5·7)	100·7 (2·6)	117·9 (16·4)
,, IX	102·6 (7 3)	99·1 (3·3)	134 6 (24·2)
AVERAGE RATES OF CHANGE (per month)			
From I to III. . . .	−0·1 (0·5)	+0·1 (0·4)	−0 4 (2 7)
,, III to V . . .	−0 1 (0·3)	+0·3 (0·4)	+1·3 (1·3)
,, V to VII . . .	+0·4 (0·4)	−0·1 (0·3)	+2·2 (0·9)
,, VII to IX . . .	+0 4 (0·4)	−0·2 (0 2)	+1·7 (0·6)
CONFORMITY TO BUSINESS CYCLES			
Expansion stages of series .	V-I (1)	I–V	III–VII
Av. change per month of relatives during stages matched with			
Reference expansion . .	−0 1 (0·4)	+0·2 (0 4)	+1·6 (1·2)
Reference contraction . .	+0·4 (0 4)	−0·2 (0 3)	+0·5 (2·6)
Index of conformity to			
Reference expansion . .	−14	+23	+71
Reference contraction . .	−43	+15	+14
Business cycles . . .	−54	+32	+38

Chapter XI

CYCLICAL PATTERNS RELATING TO THE CONDITION OF LABOUR

Introduction

Continuous and inclusive statistical data on unemployment and money and real wages are not available. For unemployment there are, from 1830, the interesting statistics of the Friendly Society of Iron-founders, and, from 1812, poor-relief expenditure. Before 1812 no continuous series are available. Aside from this weakness, the iron-founders comprise a sample of doubtful representativeness, while poor-relief expenditure was heavily influenced by changes in the cost of maintenance and the mode of administration. There are three money-wage indexes, purporting to describe wage changes for London artisans (Tucker), textile labour (Kondratieff), and agricultural workers (Bowley). These represent, presumably, an organization of all the continuous statistical evidence available. But they are rather to be relied upon for money-wage trends rather than for short-period fluctuations. In the case of London artisans, short-period movements are so slight that the real-wage index emerges, so far as short-period movements are concerned, as virtually the inverse of the cost-of-living index.

Because of the inadequacy of Tucker's calculated real-wage series, a number of consumption goods' imports have been analysed in this section: rum, tea, wine, tobacco, coffee, and sugar. On the whole these (unlike the calculated real wages) exhibit rather high positive (I–V) conformity to general business fluctuations. But whether such a pattern in fact represents the course of real wages it is difficult to say. These imports were all affected by the general sentiment in the large commodity markets. Expected consumers' demand would, of course, be an important variable influencing the judgement of importers; but it is possible that rather broad judgements, based on the general state of prosperity rather than consumers' purchasing power, affected wholesale imports. If this, in fact, were the case, any divergence between the course of general prosperity and real wages (caused principally by money wages lags and the counter-cyclical movement of the cost of living) would be obscured. It should be noted, further, that, in any case, the consumption series, at best, represent gross real wages, not the unit real wage.

Several conclusions, however, emerge unequivocally even from these inadequate data. Money wages rose during the war years, and, in net, declined thereafter. But this fall is much less than in almost all other prices examined. During the war years real wages (London artisans), in net, declined and rose irregularly thereafter. This broad secular pattern for real wages is supported by the various consumption series, which, with the exception of wine and rum, rise more rapidly after 1815 than before.

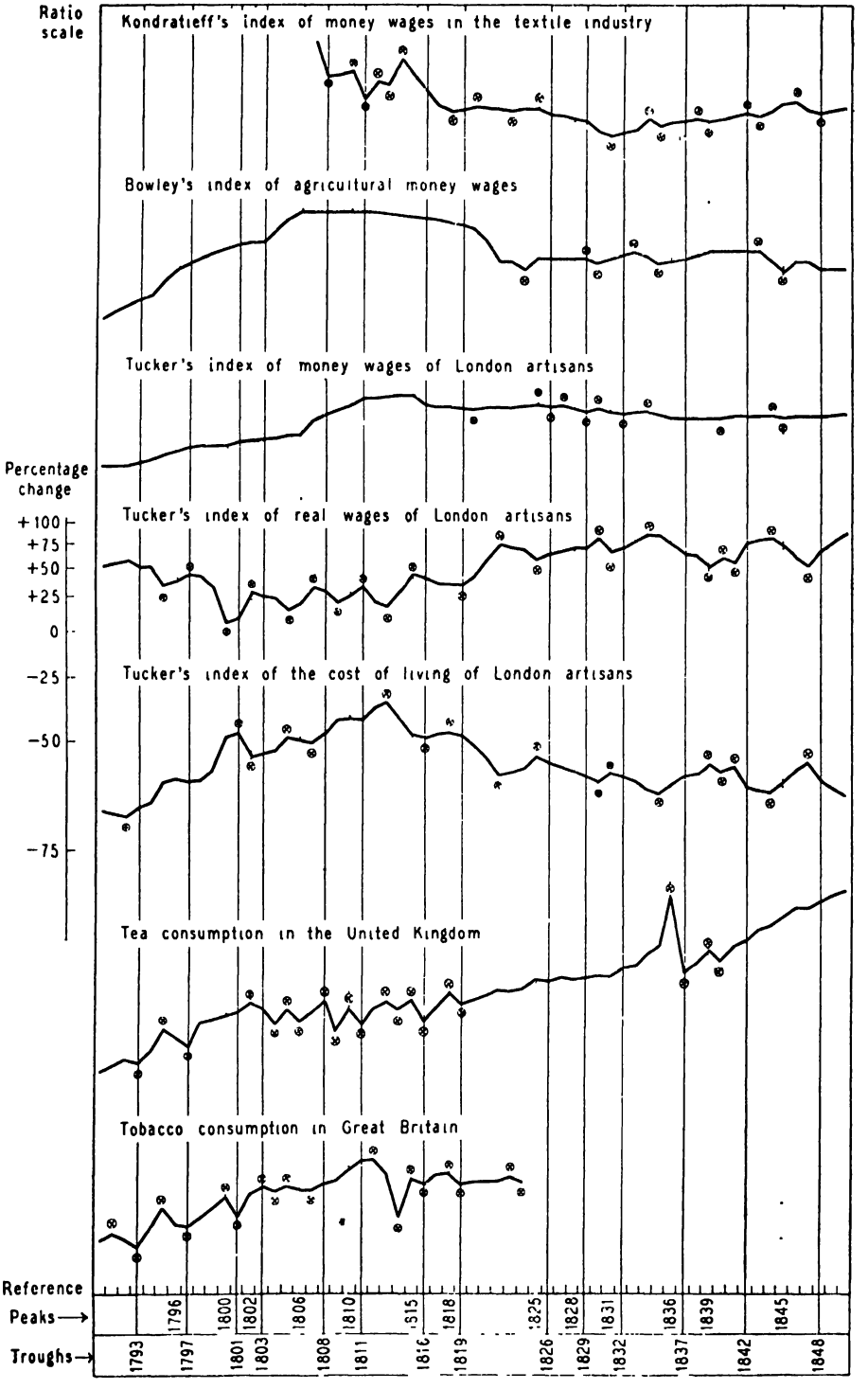


FIG. 146 *a*. Labour Series

The trend movements, however, are irregular, affected by changes in taxation, taste (e.g. wine), or supply and price conditions (e.g. sugar and rum in the thirties).

The textile-wage index exhibits low positive conformity to a I–V pattern, while the money-wage index for London artisans displays that pattern after 1818. In neither case is the coincidence of movement with reference cycles very exact, although the sequence of prosperity and depression can be broadly traced in both cases. Agricultural wages show little if any short-period relation to the industrial wage series or to business-cycle movements. A III–VII expansion pattern yields meaninglessly low indexes of conformity. The various consumption (i.e. net import) series, as noted, show moderately high positive indexes of conformity to a I–V pattern.

Iron-founders' unemployment, during the short period for which it is available, shows all but perfect indexes of conformity to a V–I expansion pattern. Poor-relief expenditure in predominantly non-agricultural counties also exhibits an average pattern inverse to business-cycle movements, although its behaviour is much less consistent than iron-founders' unemployment. Poor relief in predominantly agricultural counties conforms even less closely to business-cycle movements. The change in the Poor Law administration in 1834 weakens the consistency of both series, although agricultural relief appears to have been more drastically affected.

This section concludes with an analysis of two series calculated to reveal certain social repercussions of business-cycle movements: the marriage rate and emigration (passengers to extra-European countries). The former emerges as only moderately sensitive to general cyclical fluctuations, but with surprisingly high indexes of conformity to a I–V pattern after 1820 and perfect inverse conformity to the price of wheat before that date. The latter is dominated by a powerful upward secular trend; but, significantly, that trend is interrupted (with two slight exceptions) only during reference expansions, indicating that cyclical depression in Britain was almost certainly a factor making for migration during these years.

On the whole, then, these series yielded the expected conclusions: industrial money wages, the marriage rate, and total food consumption (but not the calculated real wage) conformed positively with business cycles; unemployment and migration conformed negatively. But the data are so inadequate, and the consistency of behaviour so irregular, that only the most cautious analytic generalizations about the short-period behaviour of these variables are justified.

1. Kondratieff's Index of Money Wages in the Textile Industry

Specific-cycle Behaviour. This money-wage series shows more frequent and greater short-period fluctuation than the Tucker wage index for London artisans. Output in the textile industries, heavily dependent on export markets, fluctuated considerably, and the demand for labour with it. Over the period covered the textile wage rate exhibits the same number of

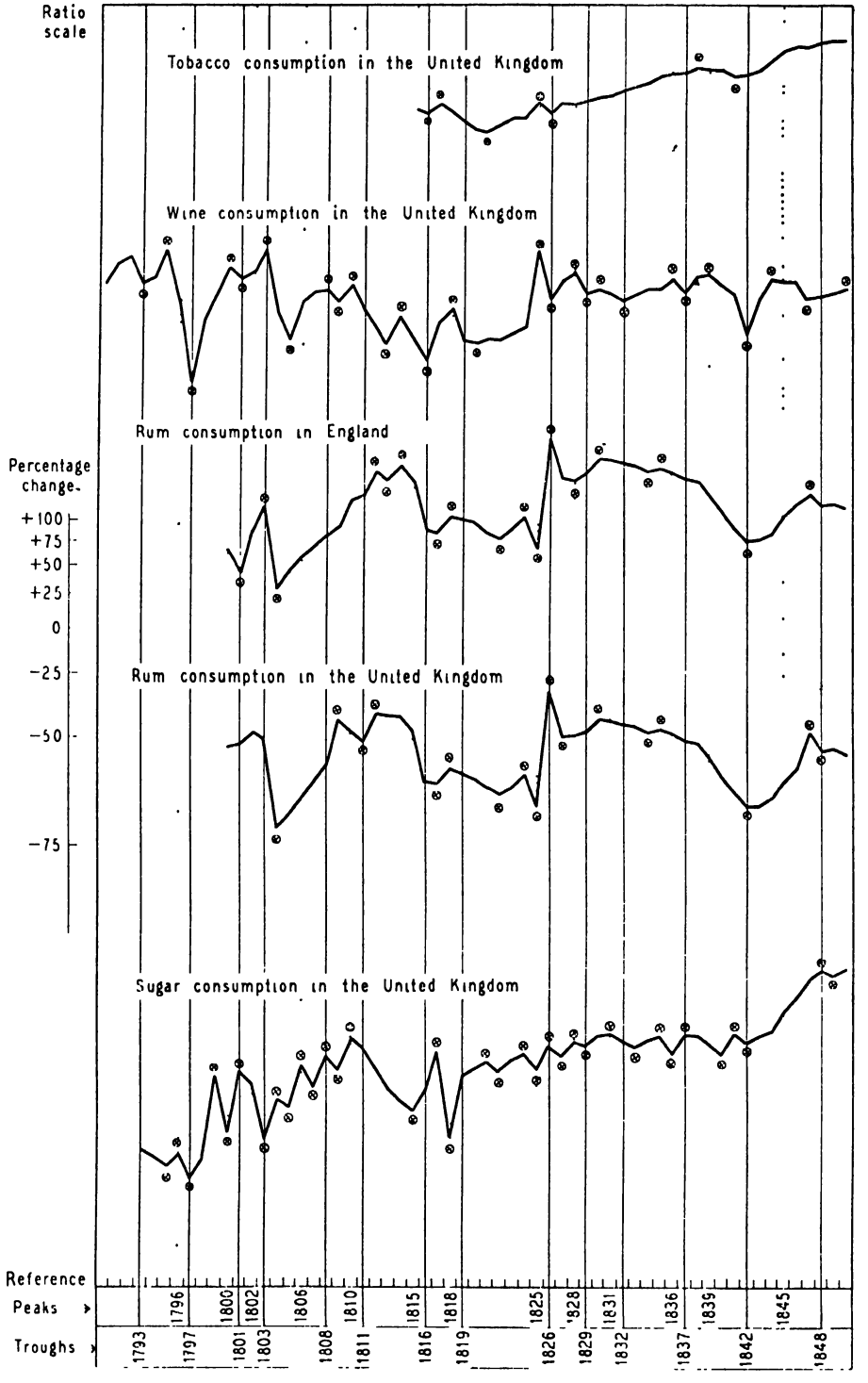

Ratio scale
Tobacco consumption in the United Kingdom
Wine consumption in the United Kingdom
Rum consumption in England
Percentage change.
+100
+75
+50
+25
0
−25
−50
−75
Rum consumption in the United Kingdom
Sugar consumption in the United Kingdom
Reference
Peaks
Troughs
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 146 *b*

specific as reference cycles, although there is not exact coincidence in dating. The trend movement is slightly downward from 1807 to 1814, followed by a considerable decline to 1818. From 1818 to 1831 the downward trend continues, at a very low rate. From that point to the end of the period the trend is clearly upward.

Reference-cycle Behaviour. A I–V average pattern yields low positive indexes of conformity. Four of the nine reference cycles covered by the series exhibit I–V expansion and V–IX contraction. The three minor cycles (1826–9, 1829–32, and 1837–42) show irregular movement, and the post-war wage decline makes for net contraction during the reference expansion 1816–18. The rate of decline in 1818 is, however, perceptibly less than in the two previous years. The rise in the textile-wage index in 1837 accounts for the failure of the reference cycle 1832–7 to conform. The most consistent deviation from the I–V pattern is the tendency of this series to lag at reference peaks. This occurs in four cases; i.e. there were increases in 1819, 1837, 1840–2, and 1846. The third of these instances (1840–2) cannot properly be considered a lag in a cyclical movement, but is probably to be explained as a wage increase designed to compensate for the high range of retail prices in those years.

2. Bowley's Index of Agricultural Money Wages

Specific-cycle Behaviour. Like the money-wage index for London artisans, Bowley's agricultural-wage series shows no specific cycle trough until the early twenties. From 1824, when the trough occurs in agricultural wages, to the end of the period there are but three specific cycles, yielding a long average duration of 84·0 (24·0) months. In the years 1824–45 the duration of expansion is about three times longer than for contraction. The average amplitude of movement is greater than for the Tucker series, being only slightly less than for the textile-wage rate. The trend movement from 1824 to 1843 is slightly upward, but the fall thereafter brings the index, in 1850, close to its level of the early twenties. The rise during the early years takes place between 1790 and 1806. The series remains at a constant level until 1812, thus beginning its decline (to 1824) with the secular turn of the wheat price. The war-time rise in agricultural wages is greater than for the money wages of London artisans; but the net upward trend over the whole period is strikingly similar in the two cases.

Reference-cycle Behaviour. This series exhibits low positive conformity to a III–VII reference pattern, but no single reference cycle follows that pattern. There is, in short, no very consistent relation between this agricultural-wage index and general business-cycle movements. Both the average pattern and the short-period movements of this series suggest, however, some connexion with the wheat price: the III–VII expansion, the secular turning-point in 1812, the decline to 1824, the net rise from 1824 to 1833, the decline from 1833 to 1835, the continued increase from 1835 to 1843,

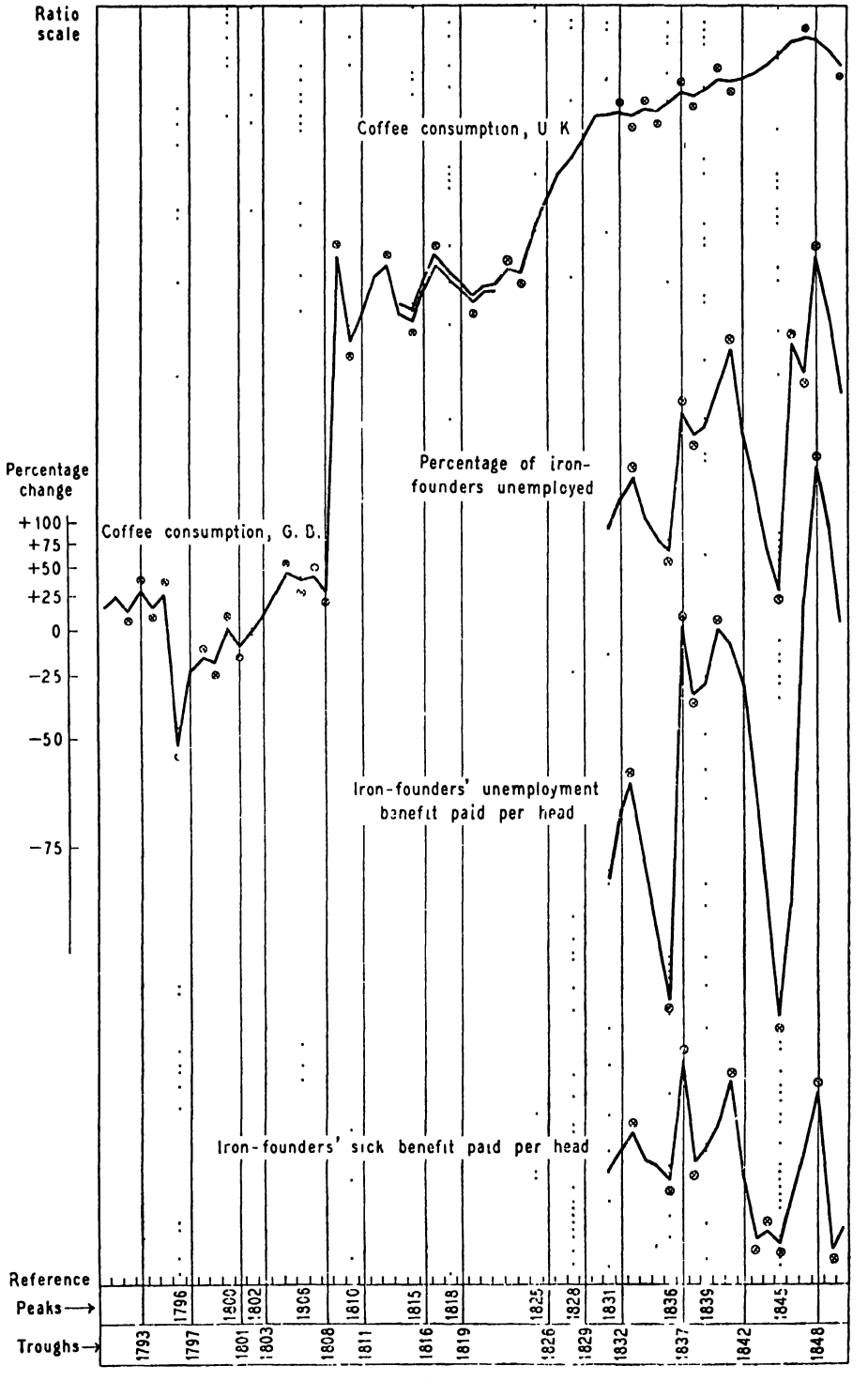

Ratio scale
Coffee consumption, U K
Percentage change
Percentage of iron-founders unemployed
Coffee consumption, G. B.
+100
+75
+50
+25
0
−25
−50
−75
Iron-founders' unemployment benefit paid per head
Iron-founders' sick benefit paid per head
Reference
Peaks →
Troughs →
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 146 *c*

the decline to 1845, the rise to 1847. These movements are not, in amplitude, comparable to those of the wheat price, nor, in all cases do the turning-points coincide. It is, further, institutionally evident that to some extent the market for agricultural labour was not discrete, and must have been partially influenced by changes in the demand for industrial labour. The broad similarity in the character of the trends is perhaps indicative of this relationship. The controlling element in short-period movements, nevertheless, seems to have been changes in the price of British wheat, although further investigation into the wage-setting process in agriculture is required before this connexion can be fully established.

3-5. Tucker's Indexes of Money Wages, Real Wages, and Cost of Living of London Artisans

Specific-cycle Behaviour. The money-wage series compiled by Tucker exhibits slight and infrequent fluctuations: the average duration of specific cycles is long, the average amplitude of movement exceedingly small. It is better used as a measure of wage trends than as an index of short-period movements, although the stickiness it reflects was probably a true characteristic of money wages in certain trades. From 1790 to 1815 there is no absolute decline in the index. The major portion of the rise, however, is concentrated in the two periods 1792–7 and 1806–11. After the war money wages decline to 1820, the first specific-cycle trough in the series. The index remains relatively stable to 1834, declines slightly to 1840, and rises in the course of the last decade. The net movement from 1815 to 1850 is slightly downward, for the whole period 1790-1850, quite strongly upward.

The lack of any decisive short-period movement in the money-wage index makes fluctuations in the real-wage index virtually a function of the cost-of-living index, which exhibits clearly marked specific cycles, almost ten times the average amplitude of cycles in money wages.[1] The trend in the cost of living is upward from 1792 to 1813, rapidly downward to 1822, and, in net, slightly downward to 1850. This series, in its principal fluctuations and trends, seems to be dominated by the wheat price, although its amplitude of movement is considerably less. The trend in the calculated real-wage series is downward from 1792 to 1800, slightly upward to 1813, sharply upward to 1822, and gradually upward thereafter. The net trend from 1790 to 1850 is, of course, positive.

Reference-cycle Behaviour. For the whole period a VII–III expansion pattern best describes the money-wage index. After 1816, however, the series exhibits rather high conformity to a I–V average pattern. The VII–III movement describes no significant relation of money wages to business cycles, being merely the best mathematical average of diverse behaviour. The unbroken rise during the war years distorts the reference pattern if

[1] The cost-of-living index was constructed by adding to the consumers' price index money wages, whose fluctuations, Tucker assumes, conformed to changes in rents.

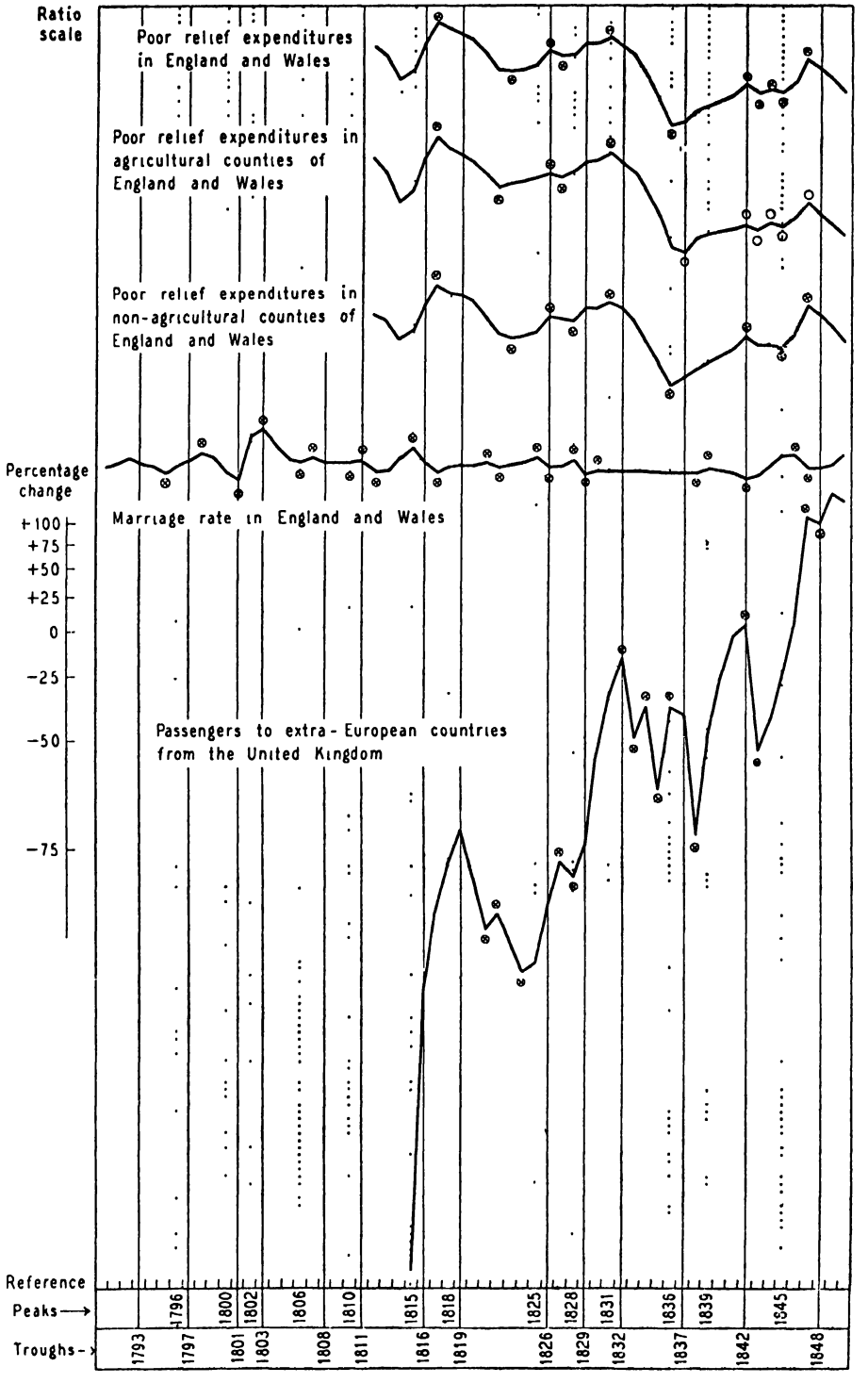

Ratio scale
Poor relief expenditures in England and Wales
Poor relief expenditures in agricultural counties of England and Wales
Poor relief expenditures in non-agricultural counties of England and Wales
Percentage change
+100
+75
+50
+25
0
−25
−50
−75
Marriage rate in England and Wales
Passengers to extra-European countries from the United Kingdom
Reference
Peaks →
Troughs →
1793
1796
1797
1800
1801
1802
1803
1806
1808
1810
1811
1815
1816
1818
1819
1825
1826
1828
1829
1831
1832
1836
1837
1839
1842
1845
1848

FIG. 146 *d*

taken for the whole period, yielding negative conformity indexes to I–V expansion. The most serious irregularity in the post-war decades is the decline from 1834 to 1836, during the latter stages of reference expansion.[1] The major expansions of the twenties and the forties are reflected by slight rises in money wages. The wheat price controls indirectly and broadly the average cyclical pattern for the cost-of-living and real-wage indexes, yielding III–VII and VII–III expansion, respectively.[2] In both cases the indexes of conformity are relatively low. Because the money-wage data represent too limited a sampling of total wage rates, the average cyclical behaviour of these indexes justifies no generalizations about the relation of the real wage to business fluctuations. The cost-of-living index, which virtually determines the cyclical pattern of real wages, is, perhaps, a more representative series. But its III–VII expansion pattern, derived essentially from the wheat price, does not emerge with sufficient frequency in individual cycles to bear much analytic weight.

6. Tea Consumption in the United Kindom

Specific-cycle Behaviour. The average duration of specific cycles for tea consumption is somewhat greater than for reference cycles; but the average summarizes highly divergent behaviour. Specific cycles vary from two to eighteen years in length. As in the case of tobacco consumption the war years are marked by irregularity of movement and a specific cycle of relatively short average duration. Frequent changes in the rate of movement during the post-war years seem to indicate some sort of an inventory fluctuation in tea imports. The average amplitude of movement is greater than for tobacco consumption; but this results from the abnormal speculative imports of tea in 1836 and the consequent decline in 1837.[3] The secular trend rises from 1790 to 1802, but there is virtually no upward trend from that year until the end of the war. From about 1815 there is a secular rise, notably accelerated in the last decade of the period.

Reference-cycle Behaviour. A I–V reference pattern yields fairly high conformity indexes. The persistent upward trend (as in tobacco consumption) causes a lower conformity index for contractions than for expansions. From 1811 to 1850 (but for the case of no net movement in the reference-cycle 1826–9) the index of conformity to expansion and to all business cycles would be perfect: in other words, even when net increase occurred during reference contraction, it was at a lesser rate than during the previous and following expansion.

[1] For the possible forces producing this counter-cyclical movement, see Vol 1, pp. 273–6.

[2] A I–V expansion pattern yields, on the whole, higher indexes of conformity for the cost-of-living index than III-VII. This is due to the movement of the series during the war period when, in all but one I–III stage, the cost of living rose. After 1819 stage I III shows contraction in five of the six reference cycles, indicating probably that III–VII expansion is the more normal sequence.

[3] See Vol. I, pp. 280–1.

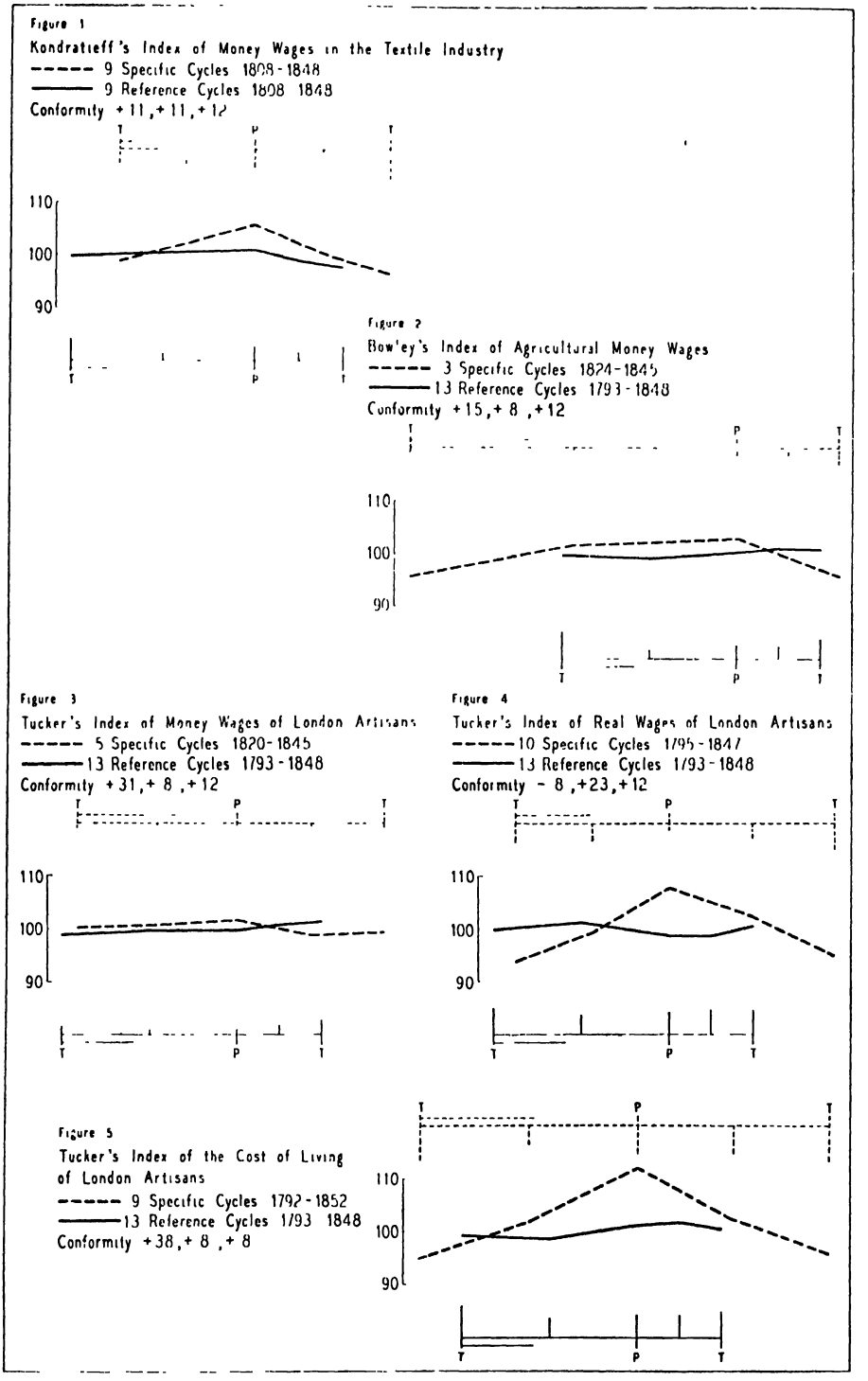


FIG. 147 *a*. Cyclical Patterns of Labour Series

7–8. Tobacco Consumption in Great Britain and the United Kingdom

Specific-cycle Behaviour. There are, unfortunately, no continuous data on tobacco consumption for either Great Britain or the United Kingdom from 1790 to 1850. Over the period for which they overlap (1815-25) the two series presented here move broadly together, although the coincidence is insufficient to justify linking them. There are many more cycles during the war than in the post-war years, owing to the irregularity of supply conditions rather than to any change in the typical short-period movement of the domestic demand. From 1821 there are only two significant breaks in the upward movement: in 1826 and 1838–41, both periods of relative depression. The rate of growth is roughly similar in both periods, although the inclusion of Ireland in the series covering the latter three decades probably damps the trend as compared to that for Great Britain alone.

Reference-cycle Behaviour. Both series exhibit I–V average patterns with, on the whole, fairly high indexes of conformity. Tobacco consumption in the United Kingdom shows perfect conformity to reference expansions, but negative conformity to reference contractions, due to net increases in 1829, 1832, 1837, and 1845–7. In only one of these instances, however (1832), is the net increase during reference contraction greater than in the previous and following expansions. In both series the index of conformity to reference expansions is greater than that for reference contractions. As in the case of tea consumption, this is to be regarded as a consequence of the persistent upward trend.

9. Wine Consumption in the United Kingdom

Specific-cycle Behaviour. Exhibiting two more specific than reference cycles from 1790 to 1850, the average duration of specific cycles for net wine imports is somewhat shorter than for reference cycles. Its average amplitude of movement is greater than for tea or tobacco consumption. An article of luxury consumption might be expected to be subject to wider fluctuations in demand in the course of general business cycles than staple 'necessities' such as tea or tobacco, and it is probable that the relatively large average amplitude of movement of this net import series, which appears even during the normal post-war years, validly expresses this characteristic. From 1790 to 1804 and from 1824 to 1850 the series seems to fluctuate about a constant or very slightly declining trend line. The last decade of the war, however, saw a trend decline and from 1816 to 1825 there is a sharp trend rise. A considerable reduction in the import duty helped to maintain that level in the following decades.[1] The slight net decline in trend argues a falling *per capita* consumption of imported wine; but this is to be taken as indicating a change in tastes rather than a fall in real wages.

[1] For a complete list of duty charges see Vol. I, p. 479.

Figure 6

Tea Consumption in the United Kingdom

------ 10 Specific Cycles 1793 - 1840

——— 13 Reference Cycles 1793 - 1848

Conformity +62, +15, +60

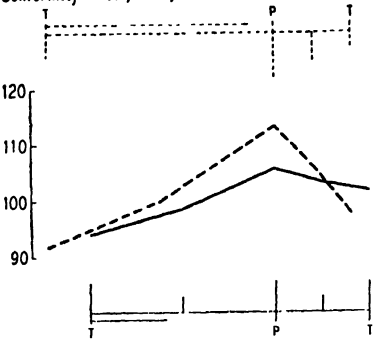


Figure 7

Tobacco Consumption in Great Britain

------ 9 Specific Cycles 1787 - 1824

——— 7 Reference Cycles 1793 - 1819

Conformity +43, +14, +31

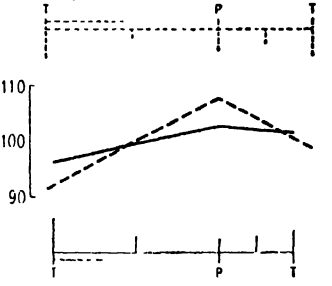


Figure 8

Tobacco Consumption in the United Kingdom

------ 3 Specific Cycles 1816 - 1841

——— 7 Reference Cycles 1816 - 1848

Conformity +100, −14, +62

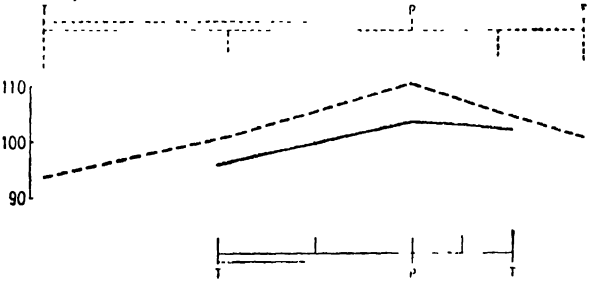


Figure 9

Wine Consumption in the United Kingdom

------ 15 Specific Cycles 1789 - 1851

——— 13 Reference Cycles 1793 - 1848

Conformity +46, +69, +68

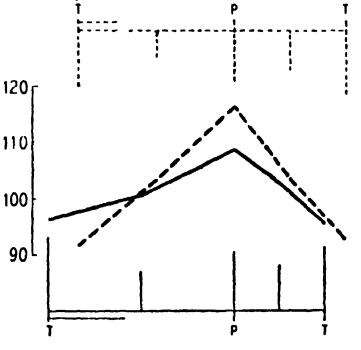


Figure 10

Rum Consumption in England

------ 9 Specific Cycles 1801 - 1850

——— 11 Reference Cycles 1801 - 1849

Conformity +27, +27, +43

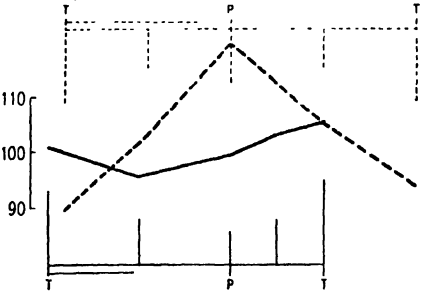


FIG. 147 *b*

Reference-cycle Behaviour. From 1811 to 1848 this series exhibits perfect indexes of conformity to reference contractions and all business cycles when a I–V average pattern is applied. Over the whole period the indexes of conformity are all positive and relatively high.[1] But for the increases in 1803 and 1807–8 the indexes of conformity to reference contractions and for all business cycles would be perfect. The net declines, during (war-time) reference expansions 1793–6, 1803–6, and 1811–15, and the lack of movement in 1829–31 account for the failure of the index of conformity to reference expansions to be perfect.

10-11. Rum Consumption in England and the United Kingdom

Specific-cycle Behaviour. From 1814 to 1850 the movements of these two series are almost exactly similar. The average duration of specific cycles is longer than for reference cycles over the period covered. The average amplitude of movement is the largest among the consumption series analysed. The trend from 1800 to 1850 is slightly upward; but that net movement emerges from, roughly, five divergent shorter trends: a rise from 1804 to 1814, a fall to 1825,[2] a rise to a new level in 1826, an accelerating decline to 1841, a rise in the course of the final decade of the period. It is clear that the series is influenced by a number of factors specific to itself, and cannot be taken as a simple indicator of cyclical movements in general consumption spending. The most important of these were changes in the duties (custom and excise). From 1800 to 1804 the duty was raised from 9*s.* to 13*s.* 4*d.*[3] It was not lowered significantly until 1826, when it fell to 8*s.* 6*d.* The response of the public, in the form of an increased consumption, is clearly evident in the statistics. The duty was slightly raised to 9*s.* in 1830, and again in 1840 to 9*s.* 4*d.* These increases, in part, account for the steady decline in consumption to 1842. The failure of rum consumption to rise during the thirties is probably to be attributed to the high sugar and rum prices, caused largely by the freeing of the West Indian slaves.[4] The sharp increase after 1842 can be associated with a sharp fall in the prices of sugar and rum, as well as the general business recovery from that date.

Reference-cycle Behaviour. A III–VII average pattern yields moderate positive indexes of conformity. The average rise during reference contrac-

[1] The relatively high conformity of this series to business-cycle movements is at variance with Clapham's dictum (i. 247): 'Wine had long ceased to be a drink of the people, and the curves of its consumption record little of interest except changes in the dinner-table habits of the well-to-do.' In so far as this statement refers to the net downward trend movement, however, it is almost certainly correct; but wine consumption exhibits excellent broad conformity to business-cycle movements, and a larger average amplitude of movement than articles of more general consumption.

[2] The rise during the war years and the subsequent decline are possibly to be connected with the movement of the demand for rum for naval consumption.

[3] McCulloch, ii. 422.

[4] See above, pp. 855–7, for analysis of the price of Jamaica sugar and below, pp. 963–5, for the analysis of the consumption of imported sugar.

Figure 11

Rum Consumption in the United Kingdom

------ 8 Specific Cycles 1804-1848

——— 11 Reference Cycles 1801-1848

Conformity + 9, +27, +14

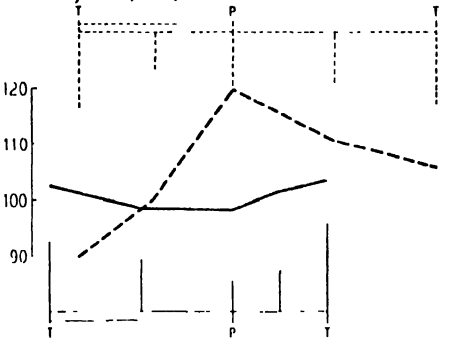


Figure 12

Sugar Consumption in the United Kingdom

------ 17 Specific Cycles 1795-1849

——— 13 Reference Cycles 1793-1848

Conformity +46, +8, +24

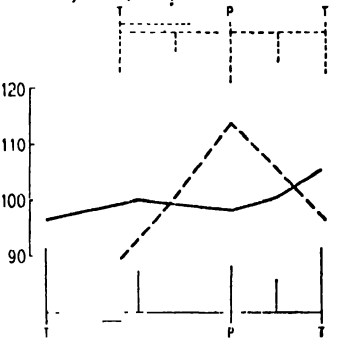


Figure 13

Coffee Consumption

------ 15 Specific Cycles 1792-1850

——— 13 Reference Cycles 1793-1848

Conformity +62, 38, +32

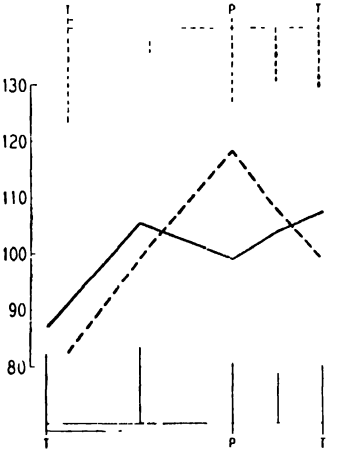


Figure 14

Percentage of Iron-Founders Unemployed

------ 5 Specific Cycles 1833-1852

——— 3 Reference Cycles 1832-1848

Conformity −100, −67, −100

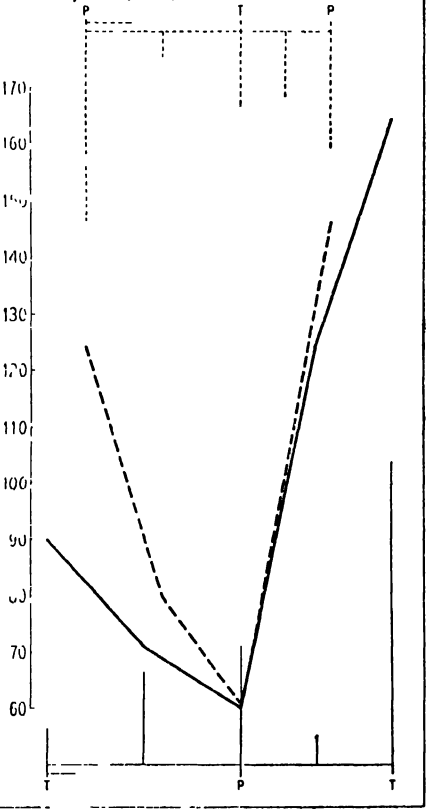


FIG. 147 c

tion, clearly evident in the reference pattern, appears, in fact, during only five of eleven cycles. The striking increase in 1826 largely accounts for the net upward movement during contraction stages. Both series, on the average, decline in stage I–III. In stage III–V consumption in England increases, while there is a slight decline in the series for the United Kingdom. This divergence is indicative of the secular decline in rum consumption in Ireland, where the long-term rise in real income was apparently less, and where high taxes were most severely felt. McCulloch's comment, although strongly tinged with the bias of a *laissez-faire* propagandist, probably affords a just explanation:[1]

> The decrease in the consumption of rum in Ireland is most striking. Unfortunately, however, this is not the only instance the sister kingdom affords of the destructive efforts of oppressive taxes. The excessive additions made to the duties on brandy, wine, sugar, etc. since 1805, have had similar effects; the quantity of these articles consumed in Ireland being decidedly less now (1835) than it was 30 years ago! . . . The poverty of the people has set at nought the calculations of our finance ministers; *every increase of taxation in Ireland having produced a diminution of revenue and an increase of crime!*

Only four of seven reference cycles, for rum consumption in England, show contraction in stage III–V; but the response of this series to general business-cycle movements is weak and irregular. No great analytic significance can be attached to the III–VII average pattern.

12. Sugar Consumption in the United Kingdom

Specific-cycle Behaviour. Until 1814 this series constitutes net imports; after that date the amounts of sugar upon which the excise tax was paid are represented. The relatively short average duration of specific cycles seems to indicate a connexion with import series.[2] The average amplitude of movement is greater than for tea or tobacco, but less than for wine or rum consumption. The trend movement is upward, over the whole period, but most strongly so from 1797 to 1810 and from 1842 to 1850. The principal interruptions occur from 1810 to 1818, and during the thirties, when the difficulties of adjusting the West Indian economy to a non-slave basis produced interruptions in the sugar supply and a high range of prices.

Reference-cycle Behaviour. An average VII–III expansion pattern yields a moderately high positive index to reference expansions, low positive indexes to reference contractions and all business cycles. On the average the series rises in all stages except III–V. But in only seven of thirteen cycles is there net contraction in stage III–V, the substantial decline in 1818 largely accounting for the fall in the average in that stage. There are, as well, counter to the average, five cases of net contraction in stage

[1] Op. cit. ii. 423–4.

[2] The irregular character of the movement, even (after 1814) when the series is calculated on the basis of the excise tax, seems to argue that the excise returns reflect not imports rather more than actual sugar consumption.

Figure 15

Iron-Founders' Unemployment Benefit Paid per Head

------ 3 Specific Cycles 1833-1848

——— 3 Reference Cycles 1832-1848

Conformity -100,-100,-100

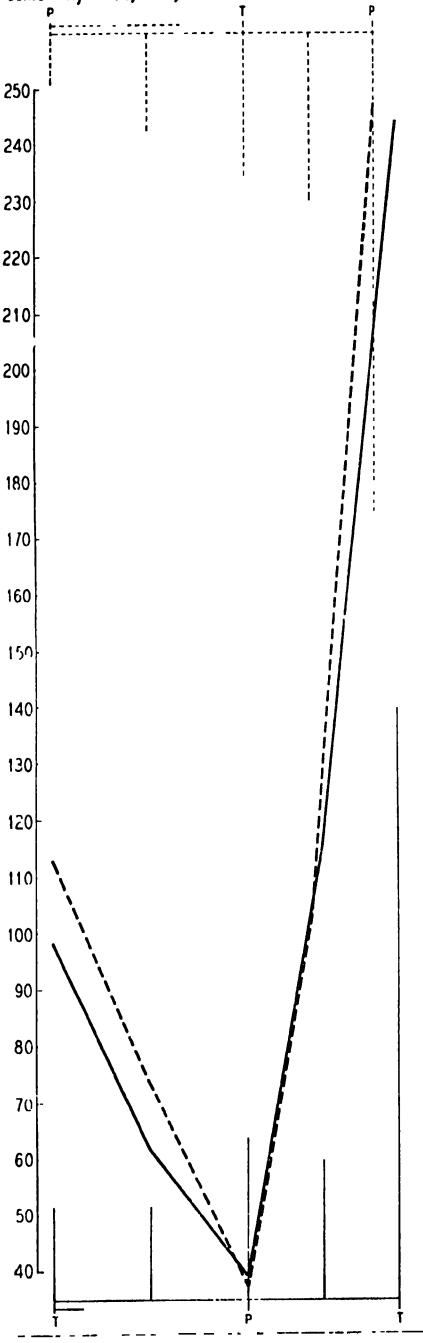


Figure 16

Iron-Founders' Sick Benefit Paid per Head

------ 5 Specific Cycles 1833-1852

——— 3 Reference Cycles 1832-1848

Conformity -100,-33,-100

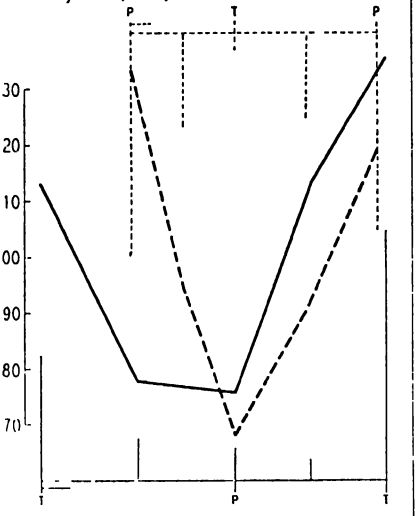


Figure 17

Poor Relief Expenditures in England and Wales

------ 5 Specific Cycles 1817-1847

——— 7 Reference Cycles 1816-1848

Conformity 0 ,-43,-46

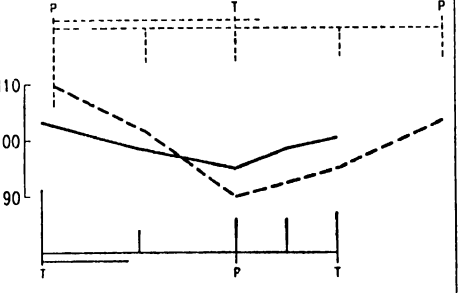


FIG. 147 *d*

VII–IX, and six cases of net contraction in stage I–III. The average pattern, then, does not represent very consistent behaviour, and no very general analytic significance is to be attached to it.

13. Coffee Consumption

Specific-cycle Behaviour. The average duration of specific cycles is somewhat shorter than for reference cycles, as is to be expected in a series subject to import fluctuations. As in the case of other consumption indexes, however, this net import series has been corrected for warehouse stocks, so that it bears some relevance to actual consumption by the British population. There are a number of highly irregular movements, which are clearly the result of shifts in the coffee supply rather than the demand: the sharp rise in 1809 represents one important consequence of the Latin American boom of 1808–10; the upward surge of the trend movement, from 1825, is a reflection of the increased Brazilian supply and a lowering in the import duty, which had previously favoured West Indian coffee.[1] McCulloch accounts for the failure of the series to rise significantly in the early thirties to high prices and diminished production, brought on, in turn, by an end of low prices (and increased consumption) in the late twenties:[2] a typical Marshallian short- and long-run price adjustment.

Since coffee, as an article of general consumption, was virtually introduced in the course of these years, its secular trend is more sharply upward than for the more traditional items in the British food supply.

Reference-cycle Behaviour. A VII–III expansion pattern best describes the typical behaviour of this series. It declined in the III–V stage of only four reference cycles, but these declines were so severe as to yield a substantial net decline, on the average, for that stage. All other stages rise, on the average, the greatest increase coming in stage I–III. The average III–V decrease is not to be regarded as significant since the declines in 1796 and 1810, which largely determine the average, are the results of unique circumstances. War-time difficulties in supply and a sharp rise in duties explain the 1796 decline,[2] while the falling off in 1810 represents simply a reaction from the abnormal rise in the previous year, when the series increases by almost eight times, upon the opening up of the former Spanish and Portuguese colonies.

From 1819 to 1848 the rate of increase during reference contractions is greater than during reference expansions. If one assumes that, like other import prices, the price of coffee responded sharply to cyclical depression; and, if one assumes, as seems to have been the case,[3] that coffee remained largely a middle-class drink, then it is likely that this characteristic represents an increased consumption at lower, depression prices. The amount of

[1] McCulloch, i. 378–9. Not until 1833 was preferential treatment to West Indian coffee completely removed.

[2] Idem.

[3] Clapham, i. 245.

Figure 18

Poor Relief Expenditures in Agricultural Counties of England and Wales

----- 5 Specific Cycles 1817-1847

——— 7 Reference Cycles 1816-1848

Conformity +14, -14, -23

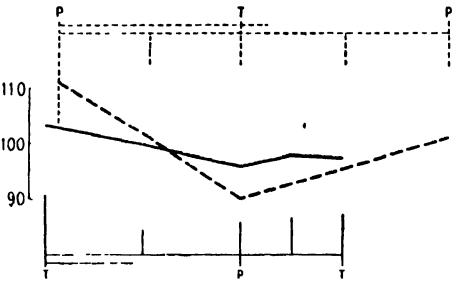


Figure 19

Poor Relief Expenditures in Non-Agricultural Counties of England and Wales

----- 4 Specific Cycles 1817-1847

——— 7 Reference Cycles 1816 1848

Conformity -14, -43, -54

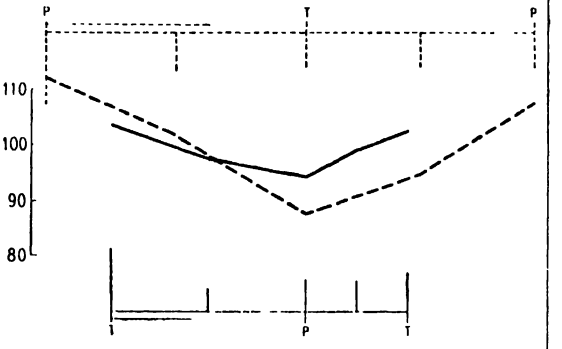


Figure 20

Marriage Rate in England and Wales

----- 11 Specific Cycles 1795-1847

——— 13 Reference Cycles 1793 1848

Conformity +23, +15, +32

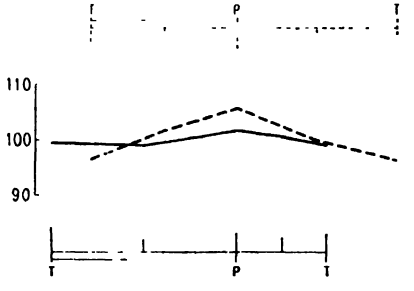


Figure 21

Passengers to Extra-European Countries from the United Kingdom

----- 7 Specific Cycles 1821-1848

——— 7 Reference Cycles 1816-1848

Conformity +71, +14, +38

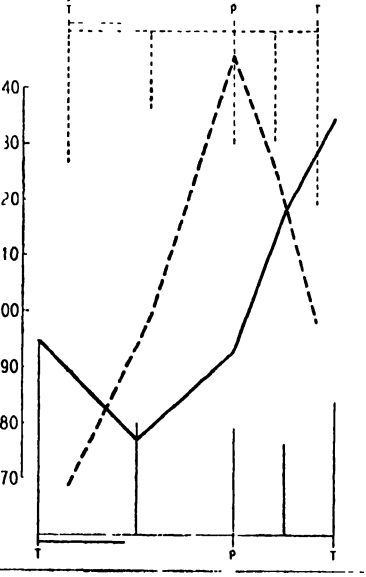


FIG. 147 *e*

money spent on foodstuffs by middle-class groups is notably insensitive to fluctuations.

On the whole, then, it is to be concluded that coffee consumption was affected principally by a powerful upward secular trend; that changes in supply conditions and taxation account for the more important fluctuations; and that no very clear relation to business cycles can be established. The phenomenon of a consistent rise during cyclical depression has been tentatively explained by assuming a coffee-demand curve sensitive to price but insensitive to income changes.

14-16. Percentage of Iron-founders Unemployed, Iron-founders' Unemployment and Sick Benefit Paid per Head

Specific-cycle Behaviour. These series concern the Friendly Society of Iron-founders of England, Ireland, and Wales, comprising several thousand members. The average duration of their specific cycles over so short a period does not offer a useful basis of comparison with other series; nevertheless, both *per capita* unemployment benefits and percentage unemployment conform well to business-cycle movements; and it is probable that the average duration of their specific cycles over the whole period would approximate that for reference cycles. Although the analytic reasons are less clear, the same seems to be true for *per capita* sick benefit. The average amplitude of movement of all three series is relatively large, with *per capita* unemployment benefit exhibiting the greatest movement, and sick benefit the least. The unemployment series exhibit an upward trend from 1831 to 1850, the sick benefit declines. The trend movement of the unemployment statistics, however, is affected by the fact that 1850 falls close to a cyclical trough (1848). At the peak in 1845 the unemployment percentage and benefit was, in fact, lower than at the previous major cycle peak (1836). The apparent upward trend may represent merely an increased amplitude of movement.

Reference-cycle Behaviour. In all cases the indexes of conformity to a V–I expansion pattern are extraordinarily high. Although the period for which these series are available is short, they seem to be among the most sensitive to general business fluctuations of any of those analysed. The deviations from conformity to reference-cycle dating are the following: unemployment was at a peak in 1833, not 1832; unemployment reached a trough in 1838, not in 1839; unemployment reached a trough in 1841, not 1842; the unemployment percentage (unlike the unemployment benefit) falls in 1847, which has been marked off as a reference peak in the monthly but not in the annual reference dates. The *per capita* sick benefit exhibits the same deviations, and, in addition, there is a slight increase in 1844, not shared by the other series. But broadly the business-cycle pattern is clearly imprinted on these data.

Another striking characteristic of the unemployment series is the manner in which they reflect the major and minor reference cycles. The recovery

in 1838–9, from the low level of 1837, is relatively slight, and the decline after 1845 remarkably rapid. If, as it is assumed, the distinguishing feature of the major cycle expansions was the marked concentration of new domestic investment in the latter stages, then the considerable difference between the peak levels of iron-founders' unemployment in 1836 and 1838–9, 1845 and 1847 is quite consistent with that hypothesis.

The rather close agreement between unemployment and sick-benefit payments might, at first sight, seem surprising. It probably indicates a lessened ability among the workers to finance themselves and their families through periods of sickness at times of cyclical depression, rather than an increased amount of sickness at such times; although, of course, it is quite possible that unemployment, and a consequently inadequate diet, brought with it an increase in disease among the working classes.

A: 17-19. Poor-relief Expenditures in England and Wales; and Poor-relief Expenditures in Agricultural and Non-agricultural Counties

Specific-cycle Behaviour. These series contain average specific cycles of greater length than reference cycles over the period covered. The three minor reference cycles, 1826-9, 1829–32, and 1837–42 do not emerge clearly in their fluctuation. The counties have been separated, on the basis of census returns, into predominantly agricultural and non-agricultural groups; but, in the nature of the material, it is impossible to achieve a definitive segregation. Changes in the cost of foodstuffs and changes and irregularities in the method of administration further weaken the accuracy of these series as a measure of changes in unemployment. Finally, the fact that the years are measured from 25 March may, at several points, impart to the series a tendency to lead at the turning-points.

The average amplitude of movement resembles that for the consumption series rather than money wages or iron-founders' unemployment. The net trend movement is downward, reflecting both the decline in foodstuff costs and the reduced scope of relief expenditure under the Poor Law of 1834. The downward trend is more pronounced in the agricultural than in non-agricultural relief. The two component series display a broad resemblance, with non-agricultural poor relief exhibiting somewhat larger average amplitude of movement, especially after 1836. The Poor Law of 1834 seems to have affected the agricultural areas more than the industrial.[1] If it were possible completely to separate the two types of relief this distinction would probably emerge even more clearly than it does. Relief in non-agricultural counties constitutes throughout the greater proportion of the total: 1815, 60 per cent.; 1825, 58 per cent.; 1840, 63 per cent.; 1850, 65 per cent.

Reference-cycle Behaviour. An average V–I pattern yields moderate indexes of conformity. Non-agricultural relief, as one might expect, conforms

[1] See Vol. I, pp. 273–6.

better to the reference dates than the predominantly agricultural series. But for the net increase in one reference expansion (1829–31) and the decline during the following reference contraction (1832) the former series would show perfect conformity to all business cycles. The counter-cyclical decline in 1832 was probably due to a decline in foodstuff prices in that year. A similar influence may account for the counter-cyclical rise in 1817. In general this series reflects the major cyclical movements, but with only rough coincidence in timing.

Poor relief in predominantly agricultural counties exhibits lower conformity to the V–I pattern. It shows, for example, only a very slight net decline during the reference expansion from 1842 to 1845. It would seem, on the whole, to have been more completely governed by movements in foodstuff prices than the non-agricultural series, and, as noted earlier, the Poor Law of 1834 affected it more drastically. It is significant of the possible influence of foodstuff prices that a III–VII expansion pattern yields equal or higher conformity indexes than V–I. It will be recalled that the wheat price and most cost-of-living indexes showed evidences of the former pattern. Total poor-relief expenditure is best taken as of V–I expansion; although the indexes of conformity to stages matched with reference expansion and all business cycles are lower than for non-agricultural relief.

20. Marriage Rate in England and Wales

Specific-cycle Behaviour. The marriage rate (per thousand), failing to reflect two reference cycles (1793–7, 1829–32), exhibits specific cycles somewhat longer in average duration than reference cycles. Its average amplitude of movement is relatively slight, being less than for the calculated real-wage rate (Tucker) or the various consumption series. Only the money-wage series exhibit slighter fluctuations. In net, over the whole period, the series shows no secular change. The trend, however, is strongly upward to 1802; moderately downward, thereafter, to 1817; and rising again until 1824. A period of secular decline, beginning in 1824, ends in 1842. The level of the series appears to be upward again during the remaining years in the period.

Reference-cycle Behaviour. Over the whole period the conformity of the marriage rate to our reference dates is positive and low (+32). Inspection of the individual cycles, however, reveals closer conformity from 1819 on. There are no contrary movements during the last six reference cycles, although there are instances of lack of movement during the two reference cycles, 1829–32, 1832–7.[1] This behaviour suggested to us a distinction in the character of Britain's economy before and after, roughly, 1819. The existence of a relationship between the marriage rate and general economic conditions has been posited by many students of British social and economic life. It is possible, however, that good or bad times were determined for

[1] Since the data on the number of marriages from 1831 to 1837 are estimates only, limited significance attaches to the behaviour of the marriage rate during this period.

the majority of the population by agricultural rather than by industrial conditions at an early stage of the economic development of the country. Hence the failure of the marriage rate to conform closely during the years before 1819 might be a reflection of the predominance of agricultural influences on the well-being of the population. On this assumption we calculated the conformity of the marriage rate to the dates of the turning-points in the price of wheat. Over the whole period the conformity is, as might be expected, negative, but only moderately high (−48). Significantly enough, however, from 1792 to 1822 the conformity is perfect. During the six specific cycles manifested in the price of wheat before 1822, every expansion phase was matched by a fall in the marriage rate, and every contraction phase was matched by a rise in the marriage rate. Good or bad business seemed to play a lesser part in determining changes in the marriage rate, until the third decade of the century, than did low or high prices for agricultural produce. After 1820 or thereabouts the closeness of agreement between the marriage rate and agricultural conditions diminishes, and the state of industrial activity appears to increase in its importance as a factor influencing marriage.

21. Passengers to Extra-European Countries from the United Kingdom

Specific-cycle Behaviour. This approximation for gross emigration includes some Scottish, Irish, and Welsh as well as English persons. The number of specific cycles equals the number of reference cycles over the period covered, but there is not exact coincidence in the turning-points. The average amplitude of movement is extremely large, with a strong upward trend.

Reference-cycle Behaviour. With two minor exceptions (1837 and 1848) every net decline in passenger traffic to extra-European countries occurs during reference expansion. The average pattern exhibits net contraction only in stage I–III, but average expansion in stage III–V is less than in the two reference contraction stages. The indexes of conformity to a III–VII pattern are high for expansion, low, but positive, for contraction. All that may safely be said on the basis of this evidence is that prosperity at home was a necessary but not a sufficient condition for reducing the rate of emigration from Great Britain; and that cyclical depression would appear to be one of the factors tending to encourage emigration.

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[1] See above Vol. I, Pt. II, Chap. III, for abbreviated text.

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	Table No. of Series	
	Unadjusted	*Adjusted*
Canals		
Ellesmere, 1811–50	1	64
Grand Junction, 1811–50	2	65
Leeds and Liverpool, 1811–50	3	66
Coventry, 1811–45	4	67
Monmouthshire, 1811–45	5	68
Trent and Mersey, 1811–45	6	69
Worcester and Birmingham, 1815–50	7	70
Docks		
East India, 1811–38	8	71
West India, 1811–38	9	72
East and West India, 1838–50	10	73

	Table No. of Series	
	Unadjusted	*Adjusted*
London, 1811–50	11	74
Saint Katharine, 1828–50	12	75
Waterworks		
East London, 1811–50	13	76
Grand Junction, 1811–50	14	77
West Middlesex, 1811–50	15	78
Kent, 1811–50	16	79
Manchester and Salford, 1815–42	17	80
Insurance Companies		
Globe, 1811–50	18	81
Imperial Fire, 1811–50	19	82
Eagle, 1811–50	20	83
Rock Life, 1811–50	21	84
Royal Exchange, 1811–50	22	85
Albion, 1811–50	23	86
Imperial Life, 1821–50	24	87
Atlas, 1821–50	25	88
Gas-Light and Coke Companies		
Bristol, 1819–46	26	89
City, 1819–39	27	90
Westminster Chartered, 1819–50	28	91
Phoenix, 1825–50	29	92
United General, 1825–50	30	93
British, 1830–50	31	94
British Provincial, 1831–50	32	95
Mines		
Brazilian Imperial, 1825–50	33	96
Bolanos, 1825–44	34	97
Real del Monte, 1824–40	35	98
United Mexican, 1824–40	36	99
Anglo-Mexican, 1824–38	37	100
Colombian, 1825–35	38	101
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List of Sources Cited or Directly Used

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This list is not intended to be a bibliography of the literature on the subject-matter of this volume. Nor does it mention all works consulted. Details of titles, &c., of those that have been cited or directly used are here given to facilitate reference.

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5 & 6 William and Mary, c. 20. An Act for granting to their Majesties several Rates and Duties upon Tunnage of Ships and Vessels, etc. (Bank of England incorporation).

8 & 9 William III, c. 32. An Act to restrain the Number and ill Practice of Brokers and Stock Jobbers.

11 & 12 William III, c. 13. An Act for continuing several laws therein mentioned, etc. (including 8 & 9 William III, c. 32).

6 Anne, c. 16. An Act . . . for granting an equivalent to the city of London by admitting brokers.

7 Anne, c. 30. An Act for enlarging the capital stock of the bank of England, etc.

6 George I, c. 18. An Act for better securing certain powers and privileges intended to be granted by his Majesty . . . for assurance of ships . . . and for restraining several extravagant and unwarrantable practices therein mentioned. (The Bubble Act.)

7 George II, c. 8. An Act to prevent the infamous practice of stock-jobbing.

10 George II, c. 8. An Act to make perpetual an act made in the seventh year of the reign of his present Majesty, intitled 'An Act to prevent the infamous practice of stock-jobbing'.

14 George III, c. 48. An Act for regulating Insurance upon Lives, and for prohibiting all such Insurances, except in Cases where the Persons insuring shall have an Interest in the Life or Death of the Persons insured.

16 George III, c. 32. An Act to enable the Company of Proprietors of the Navigation from the Trent to the Mersey, to make . . . a Railway to or near Caldon . . . and to make other railways.

22 George III, c. 48. An Act for charging a duty on persons whose property shall be insured against loss by fire.

26 George III, c. 82. An Act . . . for repealing certain stamp duties on policies for insuring property in any foreign kingdom or state from loss by fire.

35 George III, c. 63. An Act for granting to his Majesty certain stamp duties on sea insurance.

37 George III, c. 90. An Act for granting to his Majesty certain stamp duties on the several matters therein mentioned, etc. (Including fire insurance policies.)

38 George III, c. 33*. An Act for confirming and carrying into execution certain articles of agreement made and entered into between . . . and the company of proprietors of the Grand Junction Canal, etc.

39 George III, c. 69*. An Act for rendering more commodious, and for better regulating, the port of London. (West India Dock Act.)

39 & 40 George III, c. 47*. An Act for making wet docks . . . and other works, for the greater accommodation and security of shipping, commerce, and revenue, within the port of London. (London Dock Company Act.)

41 George III, c. 33*. An Act for making and maintaining a railway from the town of Wandsworth to the town of Croydon, etc. (Surrey Iron Company.)

41 George III, c. 57*. An Act to enable the corporation of the Royal Exchange Assurance to assure vessels, barges, etc.

41 George III, c. 58*. An Act to enable the corporation of the London Assurance to assure vessels, barges, etc.

43 George III, c. 126*. An Act for the further improvement of the port of London, by making docks and other works at Blackwall, for the accommodation of the *East India* shipping in the said port.

43 George III, c. 132. An Act for permitting certain goods imported into Great Britain, to be secured in warehouses without payment of duty.

44 George III, c. 98. An Act to repeal the several duties under the Commissioners for managing the duties . . . in Great Britain, etc. (Including duty on fire insurances.)

46 George III, c. 119*. An Act for supplying with water the inhabitants of . . . the counties of Middlesex and Surrey. (West Middlesex Waterworks.)

47 George III, sess. 2, c. 5*. An Act to enable the London Dock Company to purchase certain Water Works in the parishes of Stratford, Westham, etc.

47 George III, sess. 2, c. 86*. An Act for enabling the Albion Fire and Life Insurance Company to sue in the name of their Secretary, etc.

47 George III, sess. 2, c. 111*. An Act for paving, cleaning, lighting and watching the Town and Parish of Woolwich, in the County of Kent, etc.

48 George III, c. 8*. An Act to enable the Company of Proprietors of the East London Water Works to purchase certain other Water Works, etc.

49 George III, c. 192*. An Act for more effectually supplying with Water the Inhabitants of the Towns of Manchester and Salford, etc.

50 George III, c. 132*. An Act to enable the Company of Proprietors of the West Middlesex Waterworks to raise a further sum of money, etc.

50 George III, c. 163*. An Act for granting certain Powers and Authorities to a Company . . . to be called 'The Gas Light and Coke Company' for making Inflammable Air for the lighting of the Streets of the Metropolis, etc.

51 George III, c. 169*. An Act for confirming certain Articles of Agreement entered into between the Company of Proprietors of the Grand Junction Canal and certain Persons, for supplying with Water the Inhabitants . . . of Middlesex.

53 George III, c. 207*. An Act to enable the Eagle Insurance Company to sue and be sued in the Name of their Secretary or any Member thereof.

54 George III, c. 79*. An Act to enable the Atlas Assurance Company to sue and be sued in the Name of their Chairman, or Secretary, etc.

54 George III, c. 116*. An Act . . . for granting certain Powers and Authorities to the Gas Light and Coke Company.

55 George III, c. 184. An Act for repealing . . . the Duties on Fire Insurance . . . and for granting other Duties in lieu thereof.

56 George III, c. 87*. An Act . . . for granting certain Powers to the Gas Light and Coke Company.

57 George III, c. 60*. An Act . . . for increasing the Payments to be made by Brokers.

57 George III, c. 99. An Act to consolidate and amend the Laws relating to Spiritual Persons holding of Farms, etc.

59 George III, c. 20*. An Act to alter and enlarge the Powers of the Gas Light and Coke Company, etc.

1 & 2 George IV, c. 44*. An Act for making and maintaining a Railway or Tramroad from . . . Stockton, to Witton Park Colliery, etc.

4 George IV, c. 33*. An Act to enable the Stockton and Darlington Railway Company to vary and alter the Line of their Railway, etc.

4 George IV, c. 119*. An Act to enlarge the Powers of the Gas Light and Coke Company, etc.

5 George IV, c. 114. An Act to repeal so much of an Act of the Sixth Year of King George the First, as restrains any other Corporations than those in the Act named . . . from effecting Marine Assurances, etc.

6 George IV, c. 91. An Act to repeal so much of an Act passed in the Sixth year of . . . King George the First, as relates to the restraining several extravagant and unwarrantable Practices in the said Act mentioned, etc. (Repeal of Bubble Act.)

6 George IV, c. 105*. An Act for making and constructing certain Wet Docks, Warehouses and other Works . . . in the Parish or Precinct of Saint Katharine, etc.

7 George IV, c. 6. An Act to limit, and after a certain Period to prohibit, the issuing of Promissory Notes under a limited Sum in England.

7 George IV, c. 46. An Act for the better regulating Copartnerships of certain Bankers in England, etc.

7 George IV, c. 49*. An Act for making and maintaining a Railway or Tramroad from the Town of Liverpool to the Town of Manchester, etc.

9 George IV, c. 117*. An Act to amend several Acts for cleansing, lighting, watching . . . the Towns of Manchester and Salford, etc.

10 George IV, c. 35*. An Act for enabling the Liverpool and Manchester Railway Company to make an Alteration in the Line of the said Railway, etc.

1 William IV, c. 51*. An Act for amending and enlarging the Powers and Provisions . . . relating to the Liverpool and Manchester Railway.

3 & 4 William IV, c. 23. An Act to reduce the Stamp Duties . . . on certain Sea Insurances . . . and to exempt Insurances on Farming Stock from Stamp Duties.

3 & 4 William IV, c. 36*. An Act for making a Railway from London to Birmingham.

3 & 4 William IV, c. 57. An Act for the warehousing of Goods.

3 & 4 William IV, c. 98. An Act for giving to the Corporation of the Governor and Company of the Bank of England certain Privileges, etc. (Bank Charter Act.)

4 & 5 William IV, c. 94. An Act to enable His Majesty to invest trading and other Companies with the Powers necessary for the due Conduct of their Affairs, etc.

1 Victoria, c. 73. An Act for better enabling Her Majesty to confer certain Powers and Immunities on trading and other Companies.

1 & 2 Victoria, c. 9*. An Act . . . relating to the West India Dock Company and East India Dock Company; and to consolidate the said Companies.

7 & 8 Victoria, c. 32. An Act to regulate the Issue of Bank Notes, and for giving to the Governor and Company of the Bank of England certain Privileges for a limited Period. (Bank Charter Act.)

7 & 8 Victoria, c. 85. An Act to attach certain conditions to the Construction of future Railways authorized . . . by . . . Parliament, etc.

7 & 8 Victoria, c. 110. An Act for the Registration, Incorporation, and Regulation of Joint Stock Companies.

7 & 8 Victoria, c. 113. An Act to regulate Joint Stock Banks in England.

8 & 9 Victoria, c. 16. An Act for consolidating . . . certain Provisions . . . with respect to the Constitution of Companies incorporated for carrying on Undertakings of a public Nature.

8 & 9 Victoria, c. 18. An Act for consolidating . . . certain Provisons . . . authorizing the taking of Lands for Undertakings of a public Nature.

8 & 9 Victoria, c. 20. An Act for consolidating . . . certain Provisions . . . authorizing the making of Railways.

8 & 9 Victoria, c. 28. An Act to empower Canal Companies . . . to vary their Tolls, Rates, and Charges on different Parts of their Navigations.

8 & 9 Victoria, c. 37. An Act to regulate the Issue of Bank Notes in Ireland. (Joint Stock Banking in Ireland.)

8 & 9 Victoria, c. 42. An Act to enable Canal Companies to become Carriers of Goods upon their Canals.

10 & 11 Victoria, c. 15. An Act for consolidating . . . certain Provisions authorizing the making of Gasworks for supplying Towns with Gas. (Gasworks Clauses Act.)

10 & 11 Victoria, c. 17. An Act for consolidating . . . certain Provisions . . . authorizing the making of Waterworks for supplying Towns with Water. (Waterworks Clauses Act.)

10 & 11 Victoria, c. 203*. An Act to enable the Mayor . . . of Manchester . . . to construct Waterworks for supplying the said Borough and several places on the Line of the said intended Works with Water.

13 & 14 Victoria, c. 83. An Act to facilitate the Abandonment of Railways, and the Dissolution of Railway Companies, in certain Cases.

15 & 16 Victoria, c. 84. An Act to make better Provision respecting the Supply of Water to the Metropolis.

30 & 31 Victoria, c. 59. An Act for further promoting the Revision of the Statute Law by repealing certain Enactments which have ceased to be in force, etc.

32 & 33 Victoria, c. 14. An Act . . . to repeal . . . other Duties of Customs and Inland Revenue. (Repeal of Fire Insurance Duties.)

7 Edward VII, c. 24. An Act to establish Limited Partnerships.

Note: The Statutes at Large, for each regnal year, are divided into three sections: 'Public', 'Local and Personal', and 'Private'. A 'Local and Personal' Act is indicated in our list by an asterisk following the chapter number. All other statutes referred to here are 'Public'. ('Private' statutes were not used.)

Volume I, Part III

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Statistical Sources

Volume II, Part II

Below are listed sources of the individual time series analysed for which measures of average cyclical behaviour have been presented. More detailed information on sources and the character of the data are contained in the microfilmed basic statistical compilation. To economize space titles of series are not listed below, but each source entry bears the number of the corresponding series in the table to which it refers. The figure on which the original data are plotted is also identified.

Table 86 and Figure 132

Series No.	*Source*
1, 2, 3	W. Hoffmann, 'An Index of Industrial Production for Great Britain from the 18th Century', *Weltwirtschaftliches Archiv*, Sept. 1934, pp. 383–98.
4	N. D. Kondratieff, 'Die Preisdynamik der industriellen und landwirtschaftlichen Waren', *Archiv fur Sozialwissenschaft und Sozialpolitik*, lx, 1928, p. 81.
5	J. A. Mann, *The Cotton Trade of Great Britain*, London, 1860, p. 134. The series was compiled by Messrs. G. Holt and Co., Liverpool cotton brokers. Stocks are stated to be 'the quantity held in merchants', dealers', and spinners' hands in the United Kingdom as far as can be ascertained'.
6	J. Marshall, *A Digest of all the Accounts*, London, 1833, p. 121 for 1790–1820; J. R. McCulloch, *Account of the British Empire*, i. 681 (London, 1854 ed.) for 1821–44; Messrs. G. Holt and Co., 'Annual Circular' for 1845–50. Until 1845 a duty was levied on raw cotton imported for domestic use. The Holt figures thereafter were apparently adopted by the trade.
7, 8	*P.P.* 1820, xii (88).
9	H. A. Shannon, 'Bricks—A Trade Index, 1785–1849', *Economica*, Aug. 1934, pp. 30 ff.
10	J. Carne, 'Statistics of the Tin Mines in Cornwall, and of the Consumption of Tin in Great Britain', *Journal of the Statistical Society of London*, ii, 1839, p. 261.
11	R. Hunt, *British Mining*, London, 1884, p. 892.
12	*P.P.* 1835, xlix, No. 211 for 1820–32; Porter, p. 586 thereafter.
13	*P.P.* Annual Finance Accounts. Only tonnage built that came under British registry is covered by this series.
14, 15, 16, 17	W. Beveridge, 'The Trade Cycle in Britain before 1850', *Oxford Economic Papers*, Feb. 1940.

Table 87

1–10	S. Fine, 'Production and Excise Tax in England, 1643–1825', 1937, an unpublished dissertation in the Radcliffe College Library.

TABLE 88 and FIGURE 134

Series No.	*Source*
1	Schlote, Table 7, p. 133.
2	Schlote, Table 3, pp. 124–5.
3	Schlote, Table 7, p. 133; Table 7*a*, p. 134; Table 10, p. 140. Before 1801 the source shows only total exports including re-exports. Ratios of re-exports to total exports, in official values, for Great Britain (including exports to Ireland) were calculated, 1792–1801, from data in *P.P.* 1817, xiv (113), and applied to Schlote's data to derive re-exports before 1801.
4	Schlote, Table 3, pp. 124–5.
5	Schlote, Table 7*a*, p. 134; Table 9, pp. 137–8. Domestic exports before 1801 were derived as described above, under 3.
6	*P.P.* 1831–2, xxxiv (315); 1898, lxxxv. 51. Before 1804 figures for U.K. were obtained by multiplying exports from G.B. by 102·6.
7	Schlote, Table 9, pp. 137–8.
8	Schlote, Table 5, p. 128.
9	Same as above, under 7.
10	Same as above, under 8.
11	Same as above, under 7.
12	Same as above, under 8.
13	J. A. Mann, p. 97. Before 1800 figures apply to G.B. only, thereafter to U.K. Cotton manufactures exported from Ireland before 1800, however, were negligible. Series is a sum of cotton yarn and goods exports.
14	*P.P.* Annual Finance Accounts; 1847–8, lviii (383); 1851, liii (649).
15	E. B. Firuski (Schumpeter), 'Trade Statistics and Cycles in England, 1697–1825', unpublished dissertation in the Radcliffe College Library, for 1790–1813; *P.P.* Annual Finance Accounts, for 1814–51. Figures before 1813 have been adjusted to correct for the inclusion of exports of British woollens to Ireland.
16	*P.P.* 1828, viii (515); 1835, xlix. 173 ff.; 1842, xxxix. 177; 1870, lxviii. 48.
17	*P.P.* 1828, viii (515), App. 3, p. 352; 1835, xlix. 172–86; Annual Trade and Navigation Accounts, for 1834–52.
18	*P.P.* 1828, viii (515), App. 3, p. 352; 1835, xlix. 172–86; 1835, xlviii (191); 1836, xlv (256); 1837, l (314); 1837–8, xlv (340); 1839, xlvi (228); 1840, xliv (269); 1841, xxvi (255); 1842, xxxix (237); 1843, lii (210); Porter, p. 168, for 1843; *P.P.* 1845, xlvi (297); 1846, xliv (341); 1847, lix (521); 1849, liv, Tables, Part xvii, p. 120; 1849, l (329); 1850, lii (500); 1852, li (443).
19	*P.P.* 1828, viii (515), App. 3, p. 352; 1835, xlix. 172–86; Tables of Revenue, Population, Commerce, &c., of the U.K. and its dependencies, for 1834–51.
20	*Great Britain, 1792–1825*: E. B. Firuski (Schumpeter), for 1792–6; *P.P.* 1816, xiv (309), for 1797–1807; 1823, xiii (367), for 1808–22 (figure for 1813 interpolated along a straight line); *Journals of the House of*

Series No.	*Source*
	Commons (*JHC* hereafter), lxxv, for 1823–5. This series covers British and Irish linen exports from G.B. Figures prior to 1797 were multiplied by a constant (1·35) based on the average relation of British linen exports to total British and Irish linen exports in the decade following. *U.K., 1815–52*: *P.P.* Annual Finance Accounts. Excludes shipments to G.B. from Ireland and from Ireland to G.B.
21	*P.P.* Annual Finance Accounts, for 1814–31; 1842, xxxix. 152–6, for 1831–40; 1870, lxviii. 44–5, for 1840–54.
22	*P.P.* 1806, xii (119), (146), for 1796–1805; *JHC*, lxx, App. pp. 870–3, for 1806–14 (figures for 1809–11 interpolated on the basis of official value data, 1813 along a straight line); lxxiv, App. pp. 970–5 and *P.P.* 1825, xxi (191) for 1815–24; 1835, xlix. 195, for 1825–30; 1842, xxxix. 146, for 1831–40; 1870, lxviii. 40, for 1840–50. Exports to Ireland excluded throughout.
23	E. B. Firuski (Schumpeter), for 1790–5 and 1806–12; *P.P.* 1806, xii (119), (146), for 1796–1805; Annual Finance Accounts for 1814–52 (1813 interpolated along a straight line). Exports to Ireland excluded throughout.
24	*P.P.* 1806, xii (119), (146), for 1796–1805; Annual Finance Accounts, for 1814–50. No data 1806–13. Excludes exports to Ireland.
25, 26	*P.P.* Annual Finance Accounts.
27–31	Porter, pp. 361–2, for 1805–44; MacGregor, p. 104, for 1845; *P.P.* 1853–4, lii. 126, for 1846–50; 1854–5, li. 353–4, 1851. There are almost certainly inaccuracies in Porter's figures for years before 1825. The sum of the exports by continents during this period often falls short of the total value of domestic goods exports.
32	Schlote, Table 7, p. 133.
33	Schlote, Table 3, pp. 124–5.
34	*Great Britain, 1790–1819*: J. A. Mann, p. 93, for 1790–1; *P.P.* 1812, x (278), for 1792–1810; 1818, xiv (102), for 1811–16; *JHC*, lxxiv, App. pp. 931, 954, for 1817–18; Tooke, ii. 391, for 1819; figure for 1815 interpolated along a straight line. *U.K., 1815–50*: *P.P.* 1847–8, lviii (383), for 1815–47; 1851, liii (649), for 1848–50.
35	*P.P.* 1807, iv (45), for 1789–99; 1828, viii (515), App. pp. 330–5, for 1800–14 (1813 interpolated on basis of *P.P.* 1813–14, xii (310)); 1850, lii (460), p. 30, for 1815–39; 1870, lxviii (144), p. 33, for 1840–53.
36	A. J. Warden, *The Linen Trade*, London, 1864, p. 111, for 1801–19; *P.P.* 1835, xlix. 129, for 1820–33; 1842, xxxix. 26, for 1833–40; 1870, lxviii. 14, for 1840–54.
37	A. J. Warden, p. 111, for 1801–19; *P.P.* 1835, xlix. 136, for 1820–33; 1842, xxxix. 35, for 1833–40; 1870, lxviii. 14–15, for 1840–50.
38	*P.P.* 1835, xix, App. 5, for 1788–1834; Annual Finance Accounts, for 1835–41. A change in 1842 in the duty levied on wood eliminated the category of fir timber; hence the termination of this series in 1841.
39	*P.P.* 1812, x (371), for 1792–1811; 1813–14, xii (159); 1816, xiv (270); 1818, xiv (424), for 1812–19; 1878–9, lxv. 423, 430, for 1820–54. Series

Series No.	Source
	in units of cwt. A quarter of wheat was reckoned as 4½ cwt., of wheat flour as 3½ cwt. Before 1792 and in 1814, 1818–19 wheat and wheat flour imports were not separately shown. A breakdown was made on the basis of the distribution in the preceding and following years and units of quarters converted to cwt. Excludes imports from Ireland.
40	*P.P.* 1847–8, lviii (400), for 1793–1847; 1851, liii (264), for 1848–50.
41	Schlote, Table 3, p. 124.
42	Series 1 above divided by series 32 above.
43	Series 3 of Table 89 below divided by series 12 of Table 89 below.
44	*P.P.* Annual Finance Accounts.
45	*P.P.* 1852, xlix (376).
46	*JHC*, lvii. 955, for 1789 1809; *P.P.* Annual Finance Accounts, for 1809–52.

TABLE 89 and FIGURE 136

1–3	Constructed by us; see above, Vol. I, Part III.
4	N. J. Silberling, 'British Prices and Business Cycles, 1779 1850', *Review of Economic Statistics*, 1923, pp. 232 ff.
5, 6	E. B. Schumpeter, 'English Prices and Public Finance, 1660 1822', *Review of Economic Statistics*, 1938, pp. 21 ff.
7–11	R. S. Tucker, 'Real Wages of Artisans in London, 1729 1935', *Journal of the American Statistical Society*, Mar. 1936, pp. 73 84.
12	Series 6 of Table 88 above divided by series 5 of Table 88 above.
13	*P.P.* 1903, lxviii, Pt. 2, p. 46. Figures for 1814 39 are based on *P.P.* 1846, xliv (206); for 1840–53, on 1888, xci (c. 5386).
14	*P.P.* 1903, lxviii, Pt. 2, p. 48. Figures for 1820 39 are based on Porter; for 1840–50, on *P.P.* 1888, xci (c. 5386). The series is for plain cotton piece goods.
15–25	From the collection of individual monthly series originally transcribed under the direction of N. J. Silberling, and made available to us by the Harvard University Committee on Economic Research. Duty added by us. See Vol. I above, pp. 473 and 478 9.

TABLE 90 and FIGURE 138

1–3	Same as 1–3, Table 89.
4–6	Same as 15–25, Table 89.

TABLE 91 and FIGURE 140

1	Annual summations of notices of commissions of bankruptcies in London *Gazette*, 1790–1829; *A.R.*, 1830–50.
2	Annual averages of unpublished figures of bullion held by the Bank on the second and fourth Saturdays of each month, until Feb. 1814; Wednesdays, through Mar. 1832. Thereafter annual averages of weekly Tuesday figures, through Mar. 1842; Saturday figures through 1847 (*P.P.* 1840, iv, App. 16; 1841, v, App. 6; 1847–8, viii, Pt. 2, App. 8). Thereafter annual averages of weekly sums of gold and silver coin and bullion in Banking and Issue Departments (*P.P.* 1847 8, viii, Pt 2,

Series No.	*Source*
	App. 5; 1857, Sess. 2, x, Pt. 2, App. 12). Branch balances, 1826-Feb 1832, are not included.
3	Sum of private advances, described in 4 below, and public advances, described in 27 below.
4	Only bills and notes discounted, described in 5 below, of total private advances, are known before 1832. Thereafter the series is an annual average of the sum of weekly figures of bills and notes discounted and of advances on bills of exchange, exchequer bills and stock (*P.P.* 1840, iv, App. 16; 1841, iv, App. 6; 1847–8, viii, Pt. 2, App. 8). Advances were of two kinds: quarterly (temporary) and special; only figures for temporary advances, which were somewhat more than half of total advances, 1844-7, are available from 1848; hence, the termination of the series in 1847. Regular quarterly advances were not made until 1829. Before that time the Bank made loans of small, miscellaneous sums to private individuals and the East India Company, in addition to its discounts, but the latter were practically identical with its total private lending.
5	Annual averages of unpublished figures of bills and notes discounted, similar to bullion figures described in 2 above. Thereafter annual averages of weekly figures in *P.P.*, similar to bullion figures. Figures for 1848–50 from *P.P.* 1847-8, viii, Pt. 2, App. 6; 1857, Sess. 2, x, Pt. 2, App. 13.
6	Annual averages of quarterly data of notes outstanding, excluding post bills, through 1824 (*P.P.* 1831–2, vi, App. 82); weekly data, Saturday figures, excluding post bills, through Feb. 1832 (ibid., App. 83; 1833, xxiii (733)); Tuesday figures, including post bills, through Mar. 1842; thereafter Saturday figures (1840, iv, App. 16; 1841, v, App. 6; 1847–8, viii, Pt. 2, App. 8; also App. 5 and 1857, Sess. 2, x, Pt. 2, App. 12). Figures for 1849–50 are the difference between notes issued shown for Issue Department and notes held in reserve by Banking Department plus post bills.
7–10	An inland bill of exchange was a bill drawn within the limits of G.B., entitled to circulate as a legal instrument if the requisite stamp duty had been paid on it. Returns of the stamp duty imposed have been used to estimate the actual value of bills created. Figures for the number of stamps issued on bills of exchange were published annually until 1826, thereafter quarterly. The tax varied from 1*s.* to 30*s.*, depending on the value and maturity of the bill; returns showed either the amount of duty collected under each value of stamp or the number of stamps issued under each duty (*P.P.* 1828, xvi (94) (558); 1830, xxv (160); 1854, xxxix (474)). Newmarch computed quarterly series for total bills and three sub-classes, 1830–53 (*P.P.* 1857, Sess. 2, x, Pt. 2, p. 324; subsequently corrected for inaccuracies by Silberling). From a random sample, Newmarch estimated that large bills averaged about £1,000 and 4 months' usance; medium bills £125 and 3½ months' usance; small bills, £22½ and 3 months' usance. These data yielded conversion factors that we have applied to the quarterly stamp returns,

Series No.	*Source*
	1826–9, and the annual returns, 1816–25 (stamp returns are available for earlier years, but the conversion factors apply only to period after 1815, when a new scale of duties was put into effect). Annual data, 1826–53, are averages of quarterly figures.
11	*P.P.* 1831–2, vi, App. 24, for 1807–31 (number of items in annual average not stated); *P.P.* 1840, iv, App. 16; 1841, v, App. 6; 1847–8, viii, Pt. 2, App. 8; also App. 5 and 1857, Sess. 2, x, Pt. 2, App. 12, for 1832–50 (annual averages of weekly figures).
12	Annual averages of weekly figures; sources as in 11 above, for 1832–50.
13	Annual averages of monthly highs and lows (*P.P.* 1847–8, viii, Pt. 2, App. 13; 1857, Sess. 2, x, Pt. 2, App. 28).
14	Annual averages of monthly rates charged by London discount houses for discounting prime 3 months' bills, according to Chapman, a member of the firm of Overend, Gurney and Co., bill brokers (*P.P.* 1857, Sess. 2, x, Pt. 1, p. 464).
15	Annual averages of quarterly highs and lows (Tooke, vi. 589–92).
16	Annual averages of monthly yields. Monthly highs and lows from *A.R.* were averaged and nominal interest of 3 per cent. divided by the average price.
17	Computed from annual figures of capital value and interest charges for each year (*P.P.* 1857–8, xxxiii (443), pp. 35–59).
18	R. Giffen, *Stock Exchange Securities*, London, 1877, pp. 134–6; interest received by the Widows' Fund of the Writers to the Signet for money lent on first-class landed security. Rates were fixed semi-annually, at Martinmas and Whitsuntide, once at Lammas. Time units of data were converted into calendar years (end of Nov., beginning of June and Aug. used for festival dating) and average of monthly rates computed.
19	Average rent per acre of approximately 70,000 acres of land on estates in Lincoln, Essex, Hereford, and North Wales (R. J. Thompson, 'An Inquiry into the Rent of Agricultural Land in England and Wales during the Nineteenth Century', *Journal of the Royal Statistical Society*, lxx, 1907, App. A, p. 612).
20	Rent per acre of land sold annually from 1788 until 1852, compiled by Norton, Trist, and Gilbert, a real estate firm (*The Times*, 20 Apr. 1889). Annual sales ranged from 1,000 to 71,000 acres of agricultural land.
21	Average rent per acre of sample of approximately 120,000 acres in Lincoln, Hereford, Bucks., Beds., Cambridge, Essex, and North Wales (R. J. Thompson, App. B, p. 613).
22	Price per acre of land sold, as described under 20 above.
23, 24	Constructed by us; see above, Vol. I, Part II.
25	Annual averages of weekly figures (*P.P.* 1819, iii, App. 14 to the Second Report by the Committee of the House, App. C to the Second Report by the Lords' Committee; 1831–2, vi, App. 96; 1840, iv, App. 13; 1841, v, App. 29; 1847–8, viii, Pt. 2, App. 32; 1857, Sess. 2, x, Pt. 2, App. 13). Until 15 Jan. 1828 Hamburg exchange was expressed in the number of Flemish *schillings* and grotes (12 grotes equalled

Series No.	*Source*
	1 *schilling*) given for a pound sterling; thereafter in Lubec (or Lubisch) *marks* and *schillings* (16 *schillings* equalled 1 *mark*). Lubec were converted into Flemish quotations ($2\frac{2}{3}$ Fl. *schillings* equalled 1 *mark*).
26	Annual averages of weekly figures (sources as above, under 25). War interrupted quotations, Oct. 1793-Apr. 1802. Before July 1812, *livres* were converted into *francs* (80 *francs* equalled 81 *livres*).
27	Annual averages of unpublished figures on exchequer bills purchased and issued, the largest portion of the Bank's advances to the Government, through Mar. 1832, as described under 2 above; thereafter annual averages of weekly figures from *P.P.*, noted under 2 above. For 1848–50 the data are unpublished figures obtained by us from the Bank.
28	*P.P.* 1868–9, xxxv. Gross revenue less total of civil and military payments for collection and management.
29	Ibid. Sum of interest and capital charges, civil and war service expenditures.
30–4	*P.P.* 1857–8, xxxiii. Exchequer bills constituted almost the whole of the unfunded debt. Series 31 and 33 omit war years.
	TABLE 92 and FIGURE 142
1–3	See Table 91, series 7–10 above. Data have been seasonally adjusted by us.
	TABLE 93 and FIGURE 144
1	See Table 91, series 1. Data have been seasonally adjusted by us.
2	Monthly averages of weekly figures described above, Table 91, series 2.
3	Monthly averages of weekly figures described above, Table 91, series 3, 4, 27. Data have been seasonally adjusted by us.
4	Monthly averages of weekly figures described above, Table 91, series 5. Data have been seasonally adjusted by us.
5	Monthly averages of weekly figures (*P.P.* 1840, iv, App. 16; 1841, iv, App. 6; 1847–8, viii, Pt. 2, App. 8). Data have been seasonally adjusted by us.
6	Monthly averages of weekly figures described above, Table 91, series 6. Data have been seasonally adjusted by us.
7	Monthly averages of weekly figures described above, Table 91, series 11–12. Data have been seasonally adjusted by us.
8	Monthly data described above, Table 91, series 14.
9	Monthly data described above, Table 91, series 16.
10–11	Same as Table 91, series 23–4.
12	Monthly averages of weekly data described above, Table 91, series 25.
13	Monthly averages of weekly data described above, Table 91, series 27.
	TABLE 94 and FIGURE 146
1	N. D. Kondratieff, 'Die langen Wellen der Konjunktur', *Archiv für Sozialwissenschaft und Sozialpolitik*, lvi. 603 ff. Weekly wages in the textile industry, as shown in G. H. Wood, *The History of Wages in the Cotton Industry*, London, 1910, p. 127, have been converted into index

Series No.	*Source*
	numbers with 1892 as base. A gold conversion factor was applied to Wood's data for the period of the restriction.
2	A. L. Bowley, 'Agricultural Wages: Earnings and General Averages', *Journal of the Royal Statistical Society*, 1899, lxii, pp. 562–9, where index numbers for U.K. based on 1892 are presented. This series, reduced to the base 1790 (N. J. Silberling, 'British Prices and Business Cycles, 1779–1850', *Review of Economic Statistics*, 1923, p. 250), has been used in our analysis. Weekly wages have been adjusted to include extra payments and other earnings.
3–5	R. S. Tucker, 'Real Wages of Artisans in London, 1729–1935', *Journal of the American Statistical Association*, xxxi, 1936, pp. 78–9. Index of money wages divided by index of cost of living yielded index of real wages.
6	Quantity charged with duty and 'retained for home consumption'. *P.P.* 1898, lxxxv. 203–4.
7, 8	A. Rive, 'The Consumption of Tobacco since 1600', *Economic History*, i, 1926, pp. 68–9.
9	*P.P.* 1898, lxxxv. 150–1. Includes all kinds of wine.
10, 11	Ibid. 176–7. Does not include rum allowed the navy.
12	*P.P.* 1847–8, lviii (400), for 1793–1814; 1898, lxxxv thereafter. Difference between imports and re-exports, 1793–1813, taken as quantity consumed, for lack of data on quantities actually charged with duty.
13	*Great Britain, 1789–1820*: *P.P.* 1829, xv (340), p. 12. *U.K., 1820–51*: *P.P.* 1831–2, xx (381), App. 4, p. 290, for 1814–17, 1819–25; 1865, l (14), for 1818; 1843, lii (439), for 1826–42; 1870, lxviii, for 1843–54.
14	*P.P.* 1890–1, xcii (c. 6475), pp. 522–3. Includes a relatively small number of workers on sick benefit, superannuation benefit, and strike benefit, in addition to number actually unemployed.
15	Ibid., p. 65.
16	Ibid., p. 79.
17	*P.P.* 1854, xxix, p. 142. Year begins 25 Mar.
18, 19	*P.P.* 1830–1, xi (52); 1839, xliv (562); 1847–8, liii (735), pp. 168–9; 1850, xxvii, Pt. 1, p. 168; 1852, xxiii, p. 88. Twenty-six counties and the West Riding of Yorkshire were designated non-agricultural counties, the remainder, including the East and North Riding, agricultural counties, on the basis of census figures on occupations, by counties.
20	J. R. McCulloch, i. 407, for number of marriages in England, 1790–1800; *P.P.* 1873, lxxi, Pt. 2, App. A, Table 82, p. 69, for 1801–37; 1871, xv. x, thereafter. Data on marriages divided by population estimates for each year, 1790–1850: *P.P.* 1871, xv. lxviii, from 1801 on; previous decade extrapolated on basis of 1790 estimate by R. P. Williams, 'On the Increase of Population in England and Wales', *Journal of the Statistical Society of London*, xliii, 1880, p. 462. Series states rate per 1,000 persons.
21	*P.P.* 1857, Sess. 2, xvi; 1852–3, lxxxv; and Statistical Abstract of the United Kingdom.

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