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# INVESTIGATIONS

IN

# CURRENCY AND FINANCE

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# INVESTIGATIONS

IN

# CURRENCY & FINANCE

BY

W. STANLEY JEVONS

LL.D. (EDIN.), M.A. (LOND.), F.R.S.

*ILLUSTRATED BY EIGHTEEN DIAGRAMS*

EDITED, WITH AN INTRODUCTION, BY

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*NEW EDITION, ABRIDGED, WITH PREFACE BY*

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# PREFACE

TOWARDS the end of 1881 my husband collected the following papers, with the intention of publishing the volume in the spring of 1882; but the state of his health, combined with the pressure of other work, obliged him to proceed more slowly than he had hoped to do, and he therefore postponed the publication until the autumn. When he laid the book aside, hoping to resume work upon it in the autumn, he had seen all but the last two papers through the press; but the manuscript of the concluding one was still unfinished, and the Introduction, which was to have been a long and full one, bringing up the results of the papers to the present time, was hardly commenced. With regard to the Bibliography, though the greater number of the entries had been written out, there was still a good deal of arranging and of verifying references to be done; and only about one-third of the Index was made.

Several of the diagrams had been originally published with the papers, and most of the others had merely to be reduced from the large diagrams prepared at the time the papers were read. The diagrams relating to the Bank Accounts, however, having been prepared in 1862, at the time the first paper was read at the British Association, did not contain the results of the Tables relating to the later years; they have therefore been entirely re-cast by MR. MABSON, of "The Statist." I may add that MR. JEVONS had begun to prepare a diagram on the price of wheat at Delhi from 1763 to 1836, but only outlines, insufficient to indicate the plan of it, were left, and therefore it could not be carried out and inserted.

It would have been quite impossible for me to have completed the book myself; but when I accepted MR. FOXWELL'S most kind offer of help, feeling sure that to no one else would my husband have so gladly entrusted the completion of his book, I had no idea of the labour which I was imposing upon him. I did not then realise the difficulties which must be met with in taking up another's unfinished work, nor how much time and patience would be needed to overcome them. Though it is impossible that the book should be quite all that it would have been if my husband had lived to finish it himself, I cannot sufficiently express my thanks to MR. FOXWELL for having spared no pains to bring the work to completion in the way which the Author would himself have wished.

HARRIET A. JEVONS

2 THE CHESTNUTS,
HAMPSTEAD

# PREFACE
# TO THE SECOND EDITION

THE original edition of this book, published in 1884, was not exhausted until more than twenty years had passed. Believing that its limited sale was due to its high price, caused by the bibliography and the many diagrams and tables it contained, I suggested to the publishers that a new edition at a considerable reduction of price should be tried, and to my request they have kindly acceded. I trust that readers may not be wanting, for much of the book is of value still. The essay on "A Serious Fall in the Value of Gold Ascertained" has a permanent interest as one of the earliest systematic attempts to gauge general fluctuations of prices; the subsequent paper on the "Variation of Prices" is one often needed for reference; and that "On the Frequent Autumnal Pressure in the Money Market" is in some sense a classic. I venture to predict that the succeeding articles on the Periodicity of Commercial Crises and their relation to Solar Phenomena will be read with renewed interest in a few years' time. Recent work in Astronomy and Meteorology has gone far towards establishing the connection between commercial and cosmic phenomena which my father foresaw, though probably the latter are somewhat more complicated than he supposed. Finally, the paper on the Gold Coinage may again claim attention in connection with the enumeration of British Gold Coin recently undertaken by a Committee of the British Association; and the essays on Bimetallism are always instructive and entertaining.

In order to reduce the cost of producing the book some sacrifices were inevitable. The diagram of the Bank of

England accounts, and the large historic diagram, have been omitted, as I hope it may be possible at some future time to bring them up to date and issue them as a separate publication. The elaborate tables of Bank accounts following the paper on "The Frequent Autumnal Pressure in the Money Market" have been omitted as unnecessary, because almost all the figures contained in them are illustrated in the accompanying diagrams (Plates VIII. to XII.). The bibliography of works on currency is also omitted. Copies of the original edition of the book, in which students so desiring may consult the portions not to be found in this reprint, are available in many public libraries.

Some trifling corrections of obvious misprints or slips have been made in the text, but it is otherwise unaltered. The diagrams were unfortunately not well reproduced in the original edition, and in this issue I have taken pains to correct inaccuracies (usually small) wherever found. Most of the curves have been checked with the original figures. In the case of the diagram of the "Exports from Maryland and Virginia" (facing p. 221), I recalculated the three-yearly averages from the original numbers in Sir Charles Whitworth's tables in his "State of the Trade of Great Britain" (London, 1776), and have replotted these, and the annual figures, entirely anew, though on the same scale as the original.

H. STANLEY JEVONS

CARDIFF,
*5th December*, 1908

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# INTRODUCTION

THE circumstances in which the present volume of papers by the late Mr. Stanley Jevons is offered to the public have been partly explained by Mrs. Jevons in her Preface to it. In this short Introduction, which, at her request, I have gladly undertaken to write, I shall have little to add to what she has there said, in regard to the history of the volume; but I shall attempt to give some account of the general nature of the papers it contains, and to point out some considerations which go to show their unique value to the economic and statistical world, and the opportuneness of their present collection and publication.

Those who had interested themselves in the recent development of economic science, whether on its theoretic, statistic, or administrative sides, must have been well aware that it received a severe check by the lamented death of Mr. Jevons in August 1882. But probably only a few of his more intimate friends were conscious of the full extent of their loss. For some years, Mr. Jevons had been concentrating himself with ever-increasing interest and intensity upon his economic studies. His book on the *State in Relation to Labour* was one indication of the new lines of inquiry on which he was entering, and was full of promise of the important service his eminently wise and healthy judgment might have rendered in the treatment of the difficult social problems which now press for solution. Another direction taken by his many-sided activity was historical research and bibliography. In his brilliant article on Cantillon,* and in the last paper of

* *Richard Cantillon and the Nationality of Political Economy.* Cont. Rev., Jan., 1881.

this volume, he has left us sufficient evidence of what he could have done as an historian. To Bibliography he attached great value, regarding it as the instrument of historical study, the economiser of scientific labour, and an important help to the formation of a solid and instructed judgment. In the List of Works on Money appended to this volume we have the first-fruits of his labours in this department. He had hoped, at no distant date, to give a similar list of works on other branches of economic science.

These various studies, however, were but subordinate to one principal enterprise, towards which his later work and thoughts had been steadily converging, and for which both the time and the man certainly seemed ripe. He had planned and partly written a great Treatise on Economics, which was, as he hoped, to be *the* achievement of his life, and in which he would have worked up the immense store of classified materials which he had been accumulating for more than twenty years. He had unrivalled qualifications for the task he had set himself; his death, when he had just fairly set out upon it, falls on many of us with all the weight of a personal and irreparable loss.

It would seem as though before making this fresh start Mr. Jevons had been desirous to collect and review his already accomplished work. For he had begun to arrange for the reprinting of two collections of his papers; those on social subjects, which were published by Mrs. Jevons last year,* and those on Currency and Finance, which are contained in the present volume.

The delay which has intervened in the publication of this second volume is due to several causes. Besides the difficulties inseparable from an attempt to gather up the scattered threads of another's work, suddenly suspended, unexpected obstacles were met with in the preparation of the diagrams, some of which are very elaborate, and all of such a character as to require great precision of execution. Constant and unforeseen engagements have also prevented my devoting to the work as much time as I could have wished, and this has further retarded its appearance.

* *Methods of Social Reform.* Macmillan and Co. 1883.

But if the time of publication had been deliberately arranged, instead of being the result of adverse circumstances, it could hardly have been more opportune. Never, as we shall see when we come to consider the several papers in detail, has more general attention been directed to the subjects of which they treat. And while few of the papers have lost any of their significance by the lapse of time, they have all gained immensely by unity of presentation. It may thus safely be said that though some of them are now twenty years old, they will be read with wider and keener interest to-day than they were when they first appeared.

It is obvious, however, that in a republication of this kind, an Introduction is required, and Mr. Jevons had begun to write one. As he observes at the outset, "in reprinting in a collected form a series of papers, tracts, and letters previously published during the last twenty years, it was desirable to prefix some sort of Introduction tending to show the bearing of these papers upon each other, and to bring up their contents to the present day." Only a few fragments were written of these projected "introductory discussions." It would appear from them that Mr. Jevons had intended to give an account, first of the general contents of the volume, and then of each of the separate papers, with comments and completions to date. In attempting to furnish such substitute as I can for the Introduction thus planned, I shall devote myself chiefly to explaining the nature of the inquiries undertaken, and their relation to one another. As to comments, any that I shall offer will be very brief, and will be directed principally to pointing out the value and significance of the papers to which they relate; and I shall, as far as possible, incorporate with them what has been left by Mr. Jevons. The papers themselves, as printed in the text, are fortunately for the most part brought up to date, so that little remains to be done under this head. How far this is the case will more fully appear after the description of the contents of the volume, to which I now proceed.

To a great extent, as Mr. Jevons says, the volume consists of reprints of already published papers. Most of these

originally appeared in the journals of societies, and were not very accessible to the general student, and those which had been separately published were out of print. Their republication therefore in a collected series is a great convenience to the economist. It cannot fail, too, by the view it affords of the singular consistency and steady development of his opinions, greatly to enhance the already first-rate reputation of Mr. Jevons. The general reader, who is not given to hunting up Transactions, will be impressed by the continuous series of inquiries, pursued through so many years of distracting occupations; and even the special inquirer will scarcely be prepared to find that the papers he has studied as isolated writings arrange themselves in such a perfect and fascinating organic whole. There is, so far as I have observed, only one important case in the whole series of papers, in which Mr. Jevons allowed himself to make a prediction which has not been verified by the subsequent course of events,* while cases of confirmation and unexpected consilience are numerous.

But the volume is by no means simply a collection of reprints. The unfinished Paper XIV., which, with its Appendix, contains the Author's latest views on Bimetallism, together with Paper X., on an Ideal Currency, are now printed for the first time; and of the letter which forms Paper XI. only a part has been previously published, and that in a French translation. A new Note on Gold Production is appended to Paper II.; to Paper V. elaborate Tables have been added, bringing the analysis of the Bank Accounts up to date; and a Postscript has been added to Paper VII. Of the eighteen smaller diagrams, all except those which illustrate Papers II. and III. are now published for the first time, though some of them, drawn upon a large scale, had been used by the Author to illustrate the papers when originally read. Of the two large diagrams, one has been brought up to date, and the other has been so far completed that it now gives two

*See* p. 50. It is worthy of notice that in this case he was misled by the mechanical teaching of English economists on the subject of money, teaching which led him to ignore the stimulating effect on trade of an increase in its quantity.

complete decennial cycles of the figures. The valuable Bibliography, extending over 50 pp. of double columns, was also compiled expressly for this volume. And a very full Index has been added, which, under certain headings, has been made analytical,* in the hope that the absence of the Author's analysis of the various papers in his proposed Introduction might thus be partly compensated.

The general contents of the volume are thus described by Mr. Jevons: "The papers fall into two groups, the first comprising Papers I. to VIII., treating of prices, commercial fluctuations, crises, etc.; while the second, comprising Papers IX. to XIV., treat more strictly of Currency, including the lapsed subject of International Currency, the burning question of Bimetallism, and technical questions relating to the age, weight, and cost of the gold metallic currency." (The course of events, bringing with it the prospect, at an early date, of a great re-coinage, has raised the "technical questions" here referred to, to a degree of immediate interest and controversial heat, which makes the question of bimetallism for the time seem cool and speculative by comparison).

The two groups of papers thus characterised, though the distinction between them is real and well-marked, have some equally real points of contact. Beginning with commercial fluctuations, which are indicated by prices, we pass naturally to the condition of the currency, the instrument of price, and so to the consideration of the ideal currency, and the question of bimetallism. And the various subjects thus related through the notion of Price, are further connected by the fact that they all (bimetallism not wholly excepted) admit of treatment by exact and statistical methods. The introduction of exact treatment into economic investigations was a matter to which Mr. Jevons attached great importance, and in regard to which the publication of this volume may be expected to have considerable influence. It may, therefore, be of interest to quote what he has written in reference to this point, unfinished though the sentences are.

"These papers," he says, in language which recalls the

* *See e.g.* under Bimetallism, Crisis, Gold Currency.

memorable words of Sir William Petty, two centuries before,* "are, throughout, an attempt to substitute exact inquiries, exact numerical calculations, for guess-work and groundless argument . . to investigate inductively the intricate phenomena of trade and industry. . . . Perhaps, one might say that theory is all-important; and yet fact is all-important also. . . Facts alone without theory are mere disconnected records. . . Again, anything, it has been said, may be proved by figures. What we want are facts carefully marshalled. . . . It is natural, moreover, in approaching the difficulties of the moral sciences to look for aid and example to the most nearly proximate sciences. The natural method is to proceed from the known to the unknown." In short, Mr. Jevons, while by no means disposed, as his Treatise of 1871 shows, to underrate the advantage of the deductive method when scientifically used, or to attach much value to the mere empirical adduction of facts, desires to see more fully introduced into economic inquiry those powerful and precise methods of inductive investigation which have done so much for physical inquiry, and which he has so well described in his *Principles of Science*.† It is to be regretted that he has left us no more distinct indication of the particular inductive methods he regarded as most appropriate for the purposes of the economist, nor of his general views on the relation of the historical to the theoretical treatment of economics. The question of the relative importance to be attached to these two modes of treatment is so warmly disputed, and has had so important a bearing on the progress of ecomonic thought, that I will not take upon myself to define Mr. Jevons' position

* "The Method I take to do this is not yet very usual, for instead of using only Comparative and Superlative words, and Intellectual Arguments, I have taken the course (as a Specimen of the Political Arithmetick I have long aimed at) to express myself in Number, Weight, and Measure."

*See* Preface to *A Discourse of Trade* appended to *England's Guide to Industry*, 1683. The *Discourse* was published by Lord Shelborne in 1690, after his father's death, under the title of *Political Arithmetick* by which it is usually known; and the Preface was then enlarged.

† *The Principles of Science*, etc. 2 vols. 8vo. Macmillan and Co. 1874. *See* especially Books III. and IV.

in regard to it. The best evidence now available of his views on this matter is that afforded by his Introductory Lecture at University College on *The Future of Political Economy*,* and by his own practice, to the study of which the publication of the present volume will prove a valuable aid.

Leaving these questions of method, and turning to the papers themselves, we find that the first eight, taken in connection with the two large statistical diagrams, form a continuous study of periodic commercial fluctuations. It would seem from the remarks on pp. 14 and 204, that a certain historic importance attaches to the two large diagrams. Not only were they the first pieces of purely economic work undertaken by Mr. Jevons, but it seems to have been the study of them which suggested the whole series of his subsequent investigations into commercial periodicity. Having before him in these diagrams, conveniently presented for comparison, an account of the actual series of commercial fluctuations extending over long terms of years, certain periodicities soon forced themselves on his notice. Taking averages over these long terms for every week, month, and quarter in the year, Mr. Jevons detected an unmistakable monthly, quarterly, and annual variation, which he first described in 1862, in Paper I. of this volume. In Paper V., published in 1865, he afterwards went more fully into the proof and explanation of these regular variations, calling particular attention to the annual variation, better known as the Autumnal Pressure in the Money Market, of which a remarkable instance had occurred in that year.

In the course of these investigations, Mr. Jevons had from the first observed the decennial variation, so well known from the crisis in which it usually culminates, and had described it in Papers I. and II., giving some account of its immediate causes. Meanwhile, however, the effects of the gold discoveries, which were exciting very general interest, and giving rise to the wildest speculation, forced upon his notice a variation of a very different order, the progressive change in the value of money: a variation,

* Published in *Fort. Rev.*, Nov., 1876. Reprinted, *Principles of Economics*, 1905.

which though no doubt it could not well be estimated unless the decennial periodicity was assumed, and allowance made for it, nevertheless required to be taken into account before the amount of the decennial variation could be precisely measured.

Accordingly, in Papers II., III., and IV., Mr. Jevons proceeds to deal with this, the greatest variation of which economic science takes cognisance, unless we except the variation from age to age in the return to labour. In Paper II., he estimates the fall in the value of gold from the base line formed by the average of 1844-50, down to the date of the paper (1863). In Paper III., written in 1865, this period of investigation having been found too limited to give a quite trustworthy result, the inquiry is extended back to the year 1782; and in Paper IV., the same inquiry is carried onwards to the year 1869: the results in both cases substantially confirming the original conclusion arrived at in Paper II.

In the remaining Papers VI., VII., VIII. (1875-79), the famous papers on Commercial Crises, Mr. Jevons returns to the investigation of the decennial variation. He seeks to furnish further evidence of its existence, to ascertain its precise average length, and to assign its ultimate or remote cause. This ultimate cause, as every reader will remember, he attempted, by a brilliant stretch of scientific imagination, to trace in the variation of the sun-spots, or rather (as he more carefully states the theory on pp. 214-5), in meteorological variations depending upon cosmical variations of which the sun-spot variation is only one index.

These investigations then present us with a complete example of the three great classes of economic fluctuations, so well characterised by Cournot, in his comparison of them to astronomical motions.* The large diagrams give

* "Dans le système des valeurs, comme dans les mouvements des corps célestes, "il faut bien distinguer les perturbations passagères, accidentelles (comme celles "des comètes), ou les inégalités à courtes périodes, dont les effets se compensent "par le seul laps du temps, d'avec les variations *séculaires* qui procèdent avec une "grande lenteur, toujours dans le même sens, ou qui ne changent de sens que dans "des périodes de temps trop longs pour que nous ayons la prétention de les em- "brasser dans nos calculs."—*Principes de la Théorie des Richesses.* Paris, 1863, p. 149.

us the actual changes of trade, complicated by every passing industrial disturbance, and accidental miscalculation of the markets. In Papers I. and V., these minor irregularities having been averaged away, certain regular variations with monthly, quarterly, and annual periods are detected and explained; and the larger decennial variation is analysed in Papers VI., VII., VIII. Finally, in Papers II., III., IV., we can examine the great secular variation, the change in the value of money. It is a beautiful series of studies; invaluable to the student, whom it furnishes with a type of all exact economic investigation; and of high interest to the historian of economic theory, in which, from its systematic completeness, it practically constitutes a new departure.

Some of the papers constituting this first group call for special notice here; and especially the remarkable Paper II., entitled, *A Serious Fall in the Value of Gold Ascertained, and its Social Effects set forth.* In common with everything else Mr. Jevons wrote, it has the magic power of arresting and compelling the attention; and by its singular success, a success better deserved than such successes always are, it placed its author at once in the first rank of living economists. Like Ricardo's famous tract on the *High Price of Bullion,* the only achievement of the sort which deserves to be compared with it, it boldly grappled with the great question that was exercising contemporary economic thought, it attacked it by methods which, so far as they went, were sound and conclusive, and the solution it arrived at met with general acceptance. Like Ricardo's tract, too, it has made a permanently valuable contribution to economic theory. It is true that the present movement of the value of gold is not in the direction of a fall, but towards a rise. But this does not diminish the importance of the investigation, which attaches not to its results, but to its methods; methods that are equally applicable whatever direction the movement of prices takes. Mr. Jevons was well aware (see pp. 15-21, 53-54, 113-115), that the method he used was open to objections, and that his result could only be regarded as an approximation. But he could scarcely have foreseen

the interest which has recently been taken in the whole inquiry, or he would probably have returned to the subject and pursued it further. A most lively controversy has sprung up, not only on the question of fact as to the actual movement of prices, but on the question of the method by which such a movement can be ascertained, and especially on the meaning and application of an average. Among the writers who have particularly considered the first of these points I may refer to Mr. Giffen,[1] Mr. Ellis,[2] Mr. Patterson,[3] Mr. Goschen,[4] Mr. Gibbs,[5] Mr. J. B. Martin,[6] and Mr. Cork.[7] The question of method has been raised, and Mr. Jevons' procedure in this paper discussed by most of these writers, particularly by the two latter; and also by Professor Sidgwick,[8] M. Henri Chevassus,[9] and Mr. Edgeworth.[10]

On another portion of this first group of investigations, contained in Papers I. and V., Mr. Jevons had himself left some notes, indicating its object and practical bearing. The notes are very fragmentary, but I will try to connect them so as to convey Mr. Jevons' meaning. They are written under the heading, "The Key to the Variation of

[1] *The Depreciation of Gold since 1848.* 1872. *On the Fall of the Prices of Commodities in Recent Years.* 1879. *See* "Essays in Finance," 1880. II. and XIV.

[2] Article in *The Statist*, June 9, 1878.

[3] *Is the Value of Money Rising, etc.?* Jour. Stat. Soc., March, 1880. Vol. XLIII., pp. 1-26.

[4] Speech in Commons Debate, Tues., Feb. 20, 1883. *See* Extract in Jour. Inst. Bankers, IV., pp. 162, 163. *On the Probable Results of an Increase in the Purchasing Power of Gold.* Read April 18, 1883. With Discussion, and a Letter to *The Times*, May 7. *See* Jour. Inst. Bankers, IV., pp. 275-308.

[5] *The Gold Question and the Fall of Prices.* Originally published in the Nat. Rev., July, 1883.

[6] *Gold* v. *Goods.* Read before the Brit. Assoc., Sept., 1883.

[7] *What is the True Measure of the alleged Appreciation of Gold?* Read before the Soc. Sci. Assoc., Oct., 1883.

[8] *Principles of Political Economy.* 1883. pp. 65-69.

[9] *L'Étalon Monétaire.* Lond. 1883. pp. 45-52.

[10] *On the Method of Ascertaining the Change in the Value of Gold.* Jour. Stat. Soc., Dec., 1883. XLVI., pp. 714-718. Also three papers in the Phil. Mag. *On the Law of Error.* Oct., 1883. *On the Method of Least Squares.* Nov., 1883. *On the Reduction of Observations.* Feb., 1884.

the Bank of England Accounts." "Once a week," Mr. Jevons observes, "it becomes requisite to analyse, and if possible explain, the changes of the chief items in the Bank of England accounts. As bringing to a focus the financial transactions of the whole kingdom, and of no small part of the world, these accounts are beyond doubt the most important of all. . . . It seems somewhat extraordinary, however, that while thus furnishing all kinds of explanations of these changes, financial writers have not taken the simple step of estimating their amount by reference" [to the average changes for the particular week in previous years] ". . . In such matters the great point is reference to fact and experience when it is possible to refer. . . . Now the Bank Accounts have been published regularly since" [the passing of the Bank Charter Act of 1844] . . . [Materials therefore have existed since that time for the formation of the required reference-averages] ". . . This was done by me in the year 1861, when I formed average tables of the Bank of England accounts for the years 1845-61, and communicated them to the British Association in 1862. The tables, however, were not printed until the year 1866 in the Jour. Stat. Soc." [XXIX., p. 251.] "Although they have been referred to by Mr. Inglis Palgrave in his *Notes on Banking*" [1873, p. 66], "they have remained buried in the volumes of a periodical not very easy of reference, and have by the lapse of time become inapplicable" [*i.e.* for purposes of comparison with current returns].

Mr. Jevons accordingly, with the assistance of Mr. William Thornely, repeated the calculations for the two decades 1862-71, and 1872-81, taking each separately.* The principal figures in both old and new tables have been graphically represented by Mr. Mabson, of *The Statist*, in five diagrams, arranged so as to facilitate the comparison of the three periods treated. (In fairness to Mr. Mabson, I must remark that these diagrams, which were carefully drawn by him, have suffered considerably, so far as their appearance and clearness is concerned, at the hands of the lithographer. The same remark applies to the reprinting

* See the Postcript to Paper V., pp. 173-4.

and continuation of the larger diagrams, which was also done under Mr. Mabson's experienced direction. In both cases, every pains has been taken to ensure that the accuracy of the diagrams has not been impaired.)

Mr. Jevons goes on to explain the use which should be made of these tables and diagrams. He takes as an illustration the weekly account of the Bank of England for 1st March, 1882, which was as follows:—

BANK OF ENGLAND.

AN ACCOUNT pursuant to the Act 7th and 8th Victoria, cap. 32, for the week ending on Wednesday, the 1st March, 1882.

ISSUE DEPARTMENT.

| | £ | | £ |
|---|---|---|---|
| Notes issued - - | 36,524,135 | Government Debt - | 11,015,100 |
| | | Other securities - - | 4,734,900 |
| | | Gold coin and bullion - | 20,774,135 |
| | | Silver bullion - - | — |
| | 36,524,135 | | 36,524,135 |

BANKING DEPARTMENT.

| | £ | | £ |
|---|---|---|---|
| Proprietors' capital - | 14,553,000 | Government securities | 13,133,684 |
| Rest - - - - | 3,782,779 | Other securities - - | 25,883,187 |
| Public deposits, including Exchequer, Savings' Banks, Commissioners of National Debt, and dividend accounts - | 9,136,618 | Notes - - - | 11,507,680 |
| | | Gold and silver coin - | 1,006,854 |
| Other deposits - - | 23,853,766 | | |
| Seven-day and other bills - - - | 205,242 | | |
| | 51,531,405 | | 51,531,405 |

Dated March 2, 1882 FRANK MAY, Chief Cashier.

The preceding accounts compared with those of last week exhibit:—

| | Increase. | Decrease. |
|---|---|---|
| | £ | £ |
| Circulation (excluding bank post bills) | 483,795 | — |
| Public deposits | 471,783 | — |
| Other deposits | 538,328 | — |
| Government securities | 3,341 | — |
| Other securities | 1,231,629 | — |
| Bullion | 580,769 | — |
| Rest | 332,262 | — |
| Reserve | 96,974 | — |

On this he remarks, "Now the average accounts of 1st March, 1872-81, compared with those of the preceding week, show the following changes:—

| | Increase. |
|---|---|
| | £ |
| Circulation (excluding bank post bills) | 140,000 |
| Public deposits | 570,000 |
| Other deposits | 390,000 |

[and so on, the results being obtained by subtraction from the data in Table IX., p. 109.] . . . "It seems probable that the best way of making the comparison would be to give the increase or decrease for the actual week, and then the excess of that above or below the average*: thus—

| | [1st *March*, 1882. Increase. | *Average of* 1872-81. Increase. | *Difference.* |
|---|---|---|---|
| | £ | £ | £ |
| Circulation, etc. | 483,795 | 140,000 | +343,795 |
| Public deposits | 471,783 | 570,000 | − 98,217 |
| Other deposits | 538,328 | 390,000 | +148,328 |

That is to say, that the increase in the circulation for 1st March, 1882, was £343,795 in excess of the average increase for that week taken over the period 1872-81; the increase in the public deposits £98,217 less than the average increase, and so on.] "Especially is this com-

* This method has been independently advocated in an article on *Natural Bank Returns* in the last number of *The Economist*, April 26th, 1884.

parison important in the months of October and November, when the drain upon the resources of the Bank is apt to continue longer than is usually expected, thus creating alarm" [alarm which a reference to Mr. Jevons' average results would show at once to be unfounded.] This particular matter of the Autumn Drain, thanks especially to Mr. Jevons' important paper on the subject here reprinted on pp. 151-174, is probably pretty well understood at the present time. But less attention has been paid to the other regular variations brought out by his tables; and it is impossible that a close scrutiny of his averages by financial experts might reveal some hitherto unnoticed periodic disturbances, less important, no doubt, but still sufficient to produce, in certain conditions, an appreciable effect on the market.

The three brilliant papers on Commercial Crises require no comment for readers who, setting aside any preconceptions, will observe what it is precisely that the Author maintains in them. There is no doubt this has been much misunderstood. The theory propounded by Mr. Jevons does not presuppose any accurate correspondence between the particular crisis intervals and the solar or sun-spot period. He only claims that the periodic variation of tropical harvests is connected with the solar period, and that this harvest variation operates so as to stimulate and determine the naturally rhythmic fluctuation of European trade. If this is not so, what other reason, he asks, can be assigned why this latter fluctuation, depending immediately on such very various causes, should nevertheless show such a curious regularity of recurrence, and recur in a period whose average length, within the limits of error, is identical with that of the solar spots? Is it more rational to suppose that the commercial mind is constructed so as to vary, in its moods of enterprise and depression, in just this period of 10.44 years?

The question has been asked again quite recently by Professor Poynting,* in an able and suggestive paper,

* *A Comparison of the Fluctuations of the Price of Wheat and in the Cotton and Silk Imports into Great Britain.* Read before the Stat. Soc., Jan. 15, 1884; and published in the Journal for March, 1884. Vol. XLVII., pp. 34-64.

to which I am very glad to have this opportunity of drawing attention. Professor Poynting, while conclusively proving that the remarkable coincidences established by his tables cannot be merely accidental, refrains from indicating any particular explanation of them, contenting himself with the remark that they "point probably to a common meteorological cause." His paper concludes with a very interesting note on the process of averaging, as applied to the detection of periodic fluctuations. In the discussion which followed the reading of the paper, constant reference was made to the papers of Mr. Jevons, especially in the valuable remarks of Mr. Hyde Clarke; but it will not fail to be observed that much misunderstanding prevailed as to the nature and object of both inquiries. Practical men are very apt to think that those who attempt to discover periodic fluctuations overlook the number and importance of the fluctuations due to what are sometimes called accidental, *i.e.*, less regular and less predictable causes. It is scarcely necessary for me to say, for every page of his works shows it, that this was at any rate not the case with Mr. Jevons. Probably no single individual ever accumulated such a mass of material relating to irregular fluctuations, or was so capable of dealing with it. But he was far too clear a reasoner to suppose that such evidence of periodicity as is afforded by these papers, such, for instance, as may be seen by a glance at Diagram I., can possibly be set aside by the process of instancing exceptions, or setting forth proximate causes. The truth is that these "practical" objections, pushed to their logical conclusion, amount to a denial of the value of averaging altogether, and would confine us strictly to the observation of isolated and, therefore, unintelligible facts. Nay, we should soon want even facts. Commercial facts depend on market price, and are expressed in general terms. Both market price and general terms are averages.

In the same discussion, reference was made by Mr. Hyde Clarke to the probability that some longer periodicity (*e.g.* a period of 26½ years) might overlie and interfere with the recurrence of the decennial period principally considered by Mr. Jevons. It will be seen that Mr. Jevons

adison in p. 204 that the period of 54 years "is perhaps deserving of further investigation." The difficulty is that materials of a trustworthy kind scarcely exist for an adequate inquiry into these longer periods. I may perhaps mention here that I have recently met with a scrap of evidence, which, by carrying Mr. Jevons' series of crises twenty years back, helps to extend the basis of inquiry. It is from the first series of the *Collection of Letters for the Improvement of Husbandry and Trade,* published in 1681-83 by that very industrious and ingenious writer, John Houghton, F.R.S. Under date of Feb. 13, 168$\frac{2}{3}$, he refers* to a "late storm" in the financial world, preceded by a rise of interest from 3 to 6 per cent.; and it is especially deserving of notice that the causes of this disturbance were entirely connected with the East Indian trade. It seems to have arisen out of a contest between the Company and the Interlopers, the result no doubt of an old rivalry, but probably brought to a head at this particular time by the exceptional profitableness of the trade. The incident, therefore, goes to justify Mr. Jevons' opinion (p. 219) of the important influence of the East Indian trade on the European Market, an opinion which my own acquaintance with 17th and 18th century literature would lead me entirely to confirm.

Just observing that the comments on the large diagrams are given exactly as they were written in 1862—though twenty years' study of the facts they represent would no doubt have led Mr. Jevons to amplify and otherwise improve them, had he been permitted to republish them himself—we may now leave the group of papers relating to Fluctuations, and pass on to the second group, relating to the Currency.

On the first paper of this group, which deals with *The Condition of the Gold Coinage,* we have fortunately a few notes by Mr. Jevons. "The ninth paper," he says, "treats of a practical, if not technical, subject, just now coming into special notice—the gold coinage. The purpose of that paper was partly to advocate a system of international money, originally suggested by Mr. Hendriks

* *See* pp. 141-145 of the original quarto edition.

and the late Col. J. T. Smith. An attempt was made to throw light upon the subject of the collection of new information. A partial census of the coinage was carried out by " [Mr. Jevons in 1868, with the cordial co-operation of many bankers and other gentlemen (see p. 239), and the results were worked out and communicated to the Statistical Societies of Manchester (May 13) and London (Nov. 17).] " The project of international money having fallen through, and no attention having been paid to the subject, the condition of the gold coinage has, as predicted, gone on from bad to worse, until it has become almost impossible to ignore it any longer. The attention of Mr. J. B. Martin, one of the Hon. Secretaries of the Statistical Society, having been drawn to the matter, he very recently undertook to repeat upon a more extensive scale the census which I carried out " [14 years before].* " His basis of facts indeed is not very much more extensive than mine, the sovereigns examined being [105,364] against [90,474], and half-sovereigns [145,743] against [75,036]. But as the half-sovereigns form a minor part of the circulation, and are now for the most part reduced to the rank of token money, they are of far less interest.

" Although I could never have any doubts as to the substantial accuracy of my figures, it is evidently desirable that an inquiry of the kind should [receive independent verification]. . . . It may indeed seem somewhat strange that inquiries of this sort, touching matters of direct practical interest to the population, should be left to be carried out by private inquirers like Mr. Martin and myself. . . . It must, of course, be highly satisfactory to find that Mr. Martin confirms, with almost absolute coincidence, the accuracy of my determination of the average wear of the sovereign, obtaining the result [by a different method, of .04325 gr. as the mean annual rate of wear of the sovereign, against Mr. Jevons' result of .043 gr.†]

* The result was communicated by Mr. Martin to the Institute of Bankers on April 19, 1882, in a valuable paper entitled *Our Gold Coinage: An Inquiry into its present Defective Condition, with a view to its Reform.* The paper and a report of the discussion which followed will be found in the Journal for June, 1882. Vol. III., pp. 297-358.

† *See* p. 259 of this volume; and Jour. Inst. Bankers, III., 310.

But this is subject [in both cases] to the remarks of Dr. Farr." *

Here Mr. Jevons' notes end. The reader will find further information on the present state of the gold coinage question in a paper by Mr. Inglis Palgrave,† and in the Annual Reports of the Deputy Master of the Mint for 1882 and 1883. It would appear from the Deputy Master's Reports that the Mint, after the recent alterations and renewals, is in a position "to undertake a long and continuous gold coinage," and "to meet all demands likely to be made upon it." As to the urgency of the matter, there is now general agreement. The Report of 1883 speaks of "the unsatisfactory condition of the gold coinage, and the necessity of taking steps for the withdrawal and recoinage of the large amount of light gold in circulation." Meanwhile, the Institute of Bankers had taken up the question; and at a meeting on February 21, 1883, it was resolved that the Council should appoint a Committee to report upon it. In pursuance of the recommendation of this Committee, the President of the Institute, on June 19, 1883, made a formal representation to the Lords of the Treasury, calling their attention "to the condition of the gold coinage of the Realm, the deterioration of which has of late years increased in a marked degree, to the great inconvenience of the public in general, and to the serious anxiety of the Bankers as a body." ‡ As these sheets are passing through the press the announcement is made that the Government propose to take the matter up without further delay. In his recent Financial Statement, the Chancellor of the Exchequer explained the plan on which it is intended to proceed; and is reported § to have said in the remarks by which he introduced it that "the question is one of great importance. Since the late Mr. Jevons'

* In his Report to the Inter. Stat. Congress of 1869. *See* note p. 260 of this volume.

† *The Deficiency of Weight in our Gold Coinage, with a Proposal for its Reform.* Read before the Inst. of Bankers, Feb. 21, 1883. Published with a report of the discussion in the Journal for March (No. 2), 1883. Vol. IV., pp. 177-210.

‡ Jour. Inst. Bankers, IV., 361.

§ *The Times*, Friday, April 25th, 1884.

paper on the subject in 1868, the condition of the gold coinage has more and more occupied the attention of bankers, the Press, and indeed of the general public. . . More than half of our existing gold coins are not even a legal tender. . . . To leave matters alone . . . is evidently impossible, as the evil would only get worse, and the result would be to bring serious discredit on our gold coinage as our instrument of exchange." Accordingly the Government propose to gradually withdraw from circulation the light gold, substituting in the case of sovereigns coins of full weight, and defraying the expense by a seignorage of ten per cent. upon the half-sovereign, which would thus be made actually, what Mr. Jevons has declared it to be virtually, a token coin. The withdrawal would be conducted through the banks; careful provision is made against fraud; and, as the arrangement would be permanent, the future deterioration of the sovereign currency would be effectively prevented. Space does not permit us to give the details of this well-conceived scheme. In considering it and comparing it with the alternative proposals rejected by the Chancellor of the Exchequer, the reader will find it instructive to refer to the discussion on the amount and proper incidence of the charges of a re-coinage in the already-mentioned papers by Mr. Martin and Mr. Inglis Palgrave; as well as to an ingenious argument on the effects of a seignorage on standard coin, contained in a later paper by Mr. Martin.*

The tenth paper, on *An Ideally Perfect System of Currency,* calls for no special remark. It is characterised by Mr. Jevons' usual independence and breadth of view. It will be observed that it agrees with the essay on the same subject by Ricardo in regarding paper as the natural medium for the main body of the currency, and consequently in contemplating the issue of small notes. On this latter point, besides the publications referred to in the Bibliography, the reader will find it worth while to consult the Summary of the Commons Debate on Mr. W.

* *Seigneuriage and Mint Charges.* Read before the Inst. of Bankers, March 19, 1884. Published with a report of the discussion in the Journal for April, 1884. Vol. V., pp. 171-205.

Fowler's resolution of May 28, 1882,* and a paper by Mr. Fowler,† read on December 20 of the same year.

The four concluding papers deal with Bimetallism. There are none in this volume raising more points which one might be tempted to discuss. But the "burning question" is scarcely one which could be fitly or conveniently treated within the limits of an Introduction; and bearing in mind Mr. Jevons' humorous description on p. 303 of the usual results of bi-metallic controversy, I think it best to be silent on the matter here. But I may refer the reader to two Reports on the International Monetary Conference of 1881, the first by the delegate of the English Government, the Hon. C. W. Fremantle, the second by Lord Reay and Sir Louis Mallet, the delegates of the Indian Government,‡ in which he will find some interesting historical matter, and a clear statement of the principal arguments on both sides: and also to the very valuable report and collection of documents by Mr. Dana Horton, referred to in Paper XIII., p. 303, and in the Bibliography, p. 409. And I will ask him not to forget, in judging of the position taken up by Mr. Jevons, to take into account his views as to the constitution of the ideal currency of the future. Whatever opinion may be held as to Mr. Jevons' conclusions, no one can fail to admire his sagacity and practical caution. And it will be generally felt that in the author of Paper XIV. we have lost an economist of unrivalled historical gifts, under whose touch the driest episodes of monetary policy or the knottiest points of theory are equally invested with the interest of romance.

The Bibliography which concludes the volume illustrates another side of Mr. Jevons' character—his patient industry, and his consideration for other workers in the same field. Of course he did not attempt to make the list absolutely complete; but with the entries added by Mrs. Jevons, on whom the principal labour of editing it fell, it is very far

* Jour. Inst. Bankers, June, 1882. Vol. III., pp. 358-362.

† Jour. Inst. Bankers, Feb., 1883. Vol. IV., pp. 75-103.

‡ *See* Jour. Inst. Bankers, July, 1882. Vol. III., pp. 424-436. The first eport is printed in full, and important extracts are made from the second.

the best yet published; and he thought it might be of service until the completion of the British Museum Printed Catalogue should afford facilities for improving it.

A few words in conclusion as to the general bearing of the volume whose contents we have now glanced at. I have pointed out that its appearance is most opportune, so far as concerns that portion of the public which has a special interest in the subjects of which it treats. It might be supposed, however, that so far as general readers are concerned, the book would be more suitable to the times of the Bullion Controversy or the Bank Charter Debates, than to an age which is principally occupied with social questions. But I venture to think that, on closer consideration, it will be perceived that the study of fluctuations, abstract and theoretical as it may appear, is most intimately related to the great practical questions, to which, fortunately, public attention is now at length seriously directed. One of the gravest social evils of our economical system is the uncertainty and precariousness in so many respects connected with it, and largely due to the fluctuations of trade. Let me quote on this point the views of Mr. George Howell, one of the ablest representatives of working-class opinion. "If the science of political economy," he says, "is to be of any practical value, its expounders ought to try and find some means whereby these frequent fluctuations can be avoided, instead of which they only teach men to increase them, by declaring that wages must be dependent on the variations of 'the market,' which may change fifty times a day, in so far as the price of the commodities offered for sale is concerned. Stocks and securities go up and down like the notes on a gamut, and in the hands of skilful operators they play strange music, which should make good men feel sad indeed." * A knowledge of these fluctuations and their causes is the necessary preliminary to the mitigation of their disastrous effects; and Mr. Jevons' unerring instinct for the practical bearing of theory was never more conspicuously shown than in the labour and importance he assigned to this study. His most characteristic theor-

* *The Conflicts of Capital and Labour*, p. 228. Chatto and Windus. 1878.

etical work, in fact, divides almost equally into two parts: the mathematical analysis of economic conceptions, such as those of Utility, Value, and Exchange; and this statistical investigation of periodic fluctuations, such as the Autumn Pressure and the Commercial Crisis; and the part occupied with fluctuations is neither the less valuable nor the less original of the two.

Space will not allow me to attempt an adequate estimate of the general value of Mr. Jevons' work, nor of the position which it will occupy in the history of Political Economy. But I do not think it too much to say that the future historian of the science, in reviewing the development of its theory up to the present time, will trace the main sources of its advance in the writings of four men, each of marked genius—Petty, Cantillon, Ricardo,* and Jevons; and of these four, the name of Jevons, though last in order of time, will not, I think, rank last in order of fame.

If it is with the advance of theory we associate Mr. Jevons, rather than with its social applications, this is not so much because he has not given abundant proof of his power in this latter department, as because until lately his attention had been less directed to it. In his union of high speculative ability with the greatest reserve and sagacity in the treatment of practical problems, Mr. Jevons is a conspicuous example of the truth of Cournot's defence of theoretical study in his great work of 1838.† Cournot urges that those who are most concerned for the precision of their principles will be most sensible of the limits of their application, and therefore the least unpractical in their treatment of real questions. The reader who compares the exact researches in the earlier papers of this volume, or in the *Theory of Political Economy*, with the cautious and balanced papers on Bimetallism at its close, and with the admirably wise essays in the *Methods of*

* Notwithstanding his instinctive antagonism to Ricardo's unsystematic and inexact manner of exposition, there can be no doubt that Mr. Jevons is in the direct line of descent from Petty through Cantillon and Ricardo.

† *Recherches sur les Principes Mathématiques de la Théorie des Richesses*, par Augustin Cournot. Paris: Hachette, 1838. Pref. xi., and p. 13.

*Social Reform,* will have the best possible illustration of the justice of Cournot's contention. Nor will he be likely to think that the high opinion I have above expressed of the singular and varied ability of Mr. Jevons is merely due to the partiality of acquaintance, or to the special opportunities I have had of observing the thoroughness of his work, and the masses of material he had collected for it. I am glad, nevertheless, to be able to support what I have said by the opinion of Mr. Alfred Marshall, beyond doubt the most competent of living writers to judge of the value of Mr. Jevons' work on all its sides. He holds that the great body of it "will probably be found to have more constructive force than any, save that of Ricardo, that has been done during the last hundred years"; and of the contributions to statistics now collected he says that "the pure honesty of Mr. Jevons' mind, combined with his special intellectual fitness for the work, have made them models for all time."

With these conclusions of Mr. Marshall I entirely agree, but I do not attempt to justify them here. The Editors of this volume have rather felt it their business to furnish others with materials for criticism than to form a critical estimate themselves. No one can be more conscious than they are of what the book has lost by the absence of the finishing touches which the Author himself, had he been spared, would certainly have given it. But though they have felt this keenly, it has been a labour of love with them to make the loss as small as circumstances would permit. They have adhered with scrupulous fidelity to the intentions of the Author, and in their desire to throw the utmost light upon his opinions and results, they have not hesitated to publish fragments, however detached, which seemed to possess any value. Much, no doubt, has been lost in the Introduction and in Paper XIV., which they were not able thus to supply; but, otherwise, they are satisfied that the volume appears substantially as the Author would have desired; and they believe it will remain a lasting monument to his genius, and a landmark in the history of economic science.

Mrs. Jevons having too kindly referred, in her Preface,

to the share which I have had in the preparation of this book for the press, I wish to say that I have been most ably assisted by her; and that her part in the work has been much more considerable and important than her language in regard to it might lead the reader to infer.

H. S. FOXWELL

ST. JOHN'S COLLEGE,
CAMBRIDGE, *April* 28, 1884

# I

# ON THE STUDY OF PERIODIC COMMERCIAL FLUCTUATIONS

# INVESTIGATIONS IN CURRENCY AND FINANCE

## I

## ON THE STUDY OF PERIODIC COMMERCIAL FLUCTUATIONS*

1. In the daily market reports, and other statistical publications, we continually find comparisons between numbers referring to the week, month, or other parts of the year, and those for the corresponding parts of a previous year. The comparison is given in this way in order to avoid any variation due to the time of year. And it is obvious to everyone that this precaution is necessary. Every branch of industry and commerce must be affected more or less by the revolution of the seasons, and we must allow for what is due to this cause before we can learn what is due to other causes.

2. Merchants and manufacturers are of necessity intimately acquainted, by experience or by tradition, with such periodic fluctuations as occur in their own branches of industry. By the skill and rule-of-thumb knowledge

* This paper was forwarded, together with one upon the "Mathematical Theory of Political Economy," to the Meeting of the British Association at Cambridge, in 1862. It was read in Section F, by Mr. Edmund Macrory, M.A., the Honorary Secretary, and a brief abstract of its contents was printed in the Report. See Transactions of Sections, p. 157. (See also *Times*, Wednesday, 8th October, 1862, p. 5, b.) The paper itself is now printed completely for the first time, with some trifling verbal corrections.

which each one acquires in his own pursuits, they make allowance for such variations, and thus very rude comparisons of prices, stocks, and sales enable them to detect irregular changes in their own market, which is all that they require.

3. But this unwritten knowledge of commercial fluctuations is not available for scientific purposes, and it is always of very limited extent; so that, if we come to inquire into the causes of more obscure fluctuations, such as those of credit, bankruptcy, bullion, currency, rate of interest, etc. theorists and practical men alike disagree.

4. It seems necessary, then, that all commercial fluctuations should be investigated according to the same scientific methods with which we are familiar in other complicated sciences, such especially as meteorology and terrestrial magnetism. Every kind of periodic fluctuation, whether daily, weekly, monthly, quarterly, or yearly, must be detected and exhibited, not only as a subject of study in itself, but because we must ascertain and eliminate such periodic variations before we can correctly exhibit those which are irregular or non-periodic, and probably of more interest and importance.

5. It is surprising what little work has already been done in this way. Two papers on the variations of the bank-note circulation, by Gilbart ("Statistical Journal," vol. xvii. pp. 289-321; and vol. xix. pp. 144-168, partly reprinted in others of his works),* and Babbage's "Analysis of the Statistics of the Clearing House during the Year 1839" ("Statistical Journal," March, 1856, vol. xix. p. 28),† contain almost the only express inquiries into such fluctuations which I have met with. In other cases any reference to them is usually incidental. Babbage, indeed, strongly recommends the kind of inquiry to which I am referring, but he has not carried it into effect, so far as I am aware, in more than the single instance of the Clearing House.

* See "A Practical Treatise on Banking," 1865, vol. ii. pp. 466-68, 519-24, 582-92. Tooke and Newmarch's "History of Prices," vol. vi. pp. 566-583.

† Reprinted as a Pamphlet. London: Murray. 1856.

6. In attempting to show that something may be done in this subject, I have begun upon the Bank of England accounts, of which we have a perfect series from the 1st September, 1844, in accordance with the provisions of the Bank Charter Act of that year. Taking the weekly accounts of the seventeen complete years, 1845 to 1861 inclusive, I have simply ranged them under each other in their numerical order within the year, and drawn the averages with all suitable precautions against error. All non-periodic variations seem to be nearly eliminated, and the seasonal variations remain as shown in the following tables,* and more plainly in the largest of the diagrams, which sufficiently explain themselves. Only the most important and interesting items, however, are shown in these diagrams.

7. It is quite obvious that in the large diagram we have several sets of fluctuations imposed upon each other. It is scarcely necessary to say that the very conspicuous quarterly variation is chiefly due to the payments of the dividends on the National Debt, the immediate effect of which is seen in the Government deposits. But some further quarterly variation may be due to the general custom of settling rents and other accounts at the quarter-days.

Ranging the corresponding weeks of the quarters under each other, and drawing the averages, we determine the quarterly variation, nearly free from any difference which distinguishes one quarter from another. This is shown in the following table (II.), or in the diagram.

8. An examination of these quarterly curves will show certain minor fluctuations, which are obviously not fortuitous. They are doubtless due to the custom of settling accounts and making bills payable at the end of the month, so that (in consequence of the days of grace) the fourth day of the following month becomes the principal settling-day. Taking the original series of fifty-two weekly

* These tables were subsequently printed as an appendix to the paper on "The Frequent Autumnal Pressure in the Money Market," etc., No. V. in this volume, and will be found below. The diagrams also are represented in the plates to be found in another part of the volume.

averages, I have arranged them according as the week, *on an average*, fell, 1st, 2nd, 3rd, or 4th in the month, and the averages being drawn indicate a distinct monthly variation, of much less amount however than the quarterly variation. The diagram showing the monthly average is therefore made, as regards upright distances, on ten times the scale of the others. An average for a fifth week is added, because this occurs four times during the year, and this is only one of many inconveniences which arise from the week not being an aliquot part of the year.

9. It is interesting to observe that the monthly and quarterly variations are of precisely the same character. The payments which occur at the beginning of each period, whether on government or private account, cause a sudden increase of the note circulation, and of private deposits, a considerable decrease of private securities, or bills, a slight decrease of the bullion, accompanied by a larger, but otherwise similar, variation of the loanable capital.

10. The chief use of the table of quarterly variations, however, is that we may by its use eliminate these variations from the whole variations of the year, by simple subtraction. We thus ascertain the nature of the yearly variation which is due to natural causes, as distinguished from the artificial distinctions of months and quarters. The elimination, indeed, is by no means perfect, because the dividend and other payments in January and July are considerably greater than those in April and October. But the results are sufficiently accurate for a first approximation, and afford, I think, an interesting subject of study. They are shown in the following table (IV.), or in the diagram, in which only the divergence from the average of the whole year is shown.

11. We here see that the bank-notes in circulation fall to a minimum in January and February; that they gradually rise to a maximum in the third quarter, and then very rapidly decrease during November and December. As was observed, however, by Mr. Newmarch,* in his address to this section last year, the amount of the circu-

* British Association, 1861. "Journal of the Statistical Society," December, 1861; vol. xxiv. p. 464.

lation of notes is not of the importance that the *currency theory* attributed to it. It is merely a very inaccurate indication of the amount of payments taking place, which are thus shown to be greatest, as we should expect, in the fall of the year. The utter want of any connection between the annual variation in the notes and in the bullion, is a fresh argument against the currency theory in its extreme form.

12. The private securities and deposits exhibit great and opposite changes during the third and fourth quarters of the year, principally due to the gathering and buying up of the harvest, and the general proceeds of the year's industry, which have then to be held in stock for consumption during the succeeding twelve months, causing an absorption of capital. From the same general cause, no doubt, arises the marked decrease of bullion and loanable capital during the second half of the year.

13. But the bullion and capital exhibit a double variation during the year, unlike the other curves, unless we may say, indeed, that the private deposits show some traces of the same. Thus there is a secondary maximum in these curves in February, and a subsequent decrease until May. As a mere conjecture, I should suggest that this variation in the first half of the year is due to the balance of foreign trade, which would certainly affect the stock of gold, the medium of international payments. The greater variations in the second half of the year may be due both to inland and foreign causes, but especially the former.

14. A full explanation of these variations can only be expected from an intimate practical acquaintance with trade; or by an extension of the inquiry into all other parts of commercial statistics. I have not the advantage of possessing the former, and the long and laborious nature of the calculations necessary has hitherto prevented me from getting much beyond the Bank of England accounts. But I shall hope to be able to treat similarly the values of the various funds and stocks, amounts of traffic, shipping, export and import trade, the prices of commodities, and especially the stocks of commodities, as far as they are ascertainable.

15. In a supplementary diagram are shown the general nature of the variations from month to month, of the average rate of discount, the number of bankruptcies, the price of consols, and the price of wheat. As the calculations are not quite completed, I do not give the scale of the curves, nor the corresponding table of numbers.* As in the bank accounts, we here see that the most striking fluctuations are due to the gathering of the harvest, and the general termination of the year's operations. The consequences are a rapid rise in the rate of discount, a sudden flood of bankruptcy, and a fall of consols, followed by a rise. The double minimum in the price of wheat and consols is curious. The curve of wheat, perhaps, requires more consideration, and a larger average, but the possible effect of alterations in the corn laws must be borne in mind.

16. Some, perhaps, would attribute the sudden changes in the rate of discount, bankruptcies, and consols, to the occurrence of panics during the months of October and November. It would be more correct to say that there is a periodic tendency to commercial distress and difficulty during these months, of which all concerned should be aware. It is when great irregular fluctuations aggravate this distress, as in the years 1836, 1839, 1847, and 1857, that disastrous breaches in commercial credit occur.†

17. I will only further mention the curious fact, which is apparent in the curve of bankruptcies, that considerably more bankruptcies occur in the middle month of the quarter than in the third month, which immediately precedes the quarterly payment of dividends and the settlement of accounts. Fewest of all occur in the first month. Thus, out of 79,794 bankruptcies which were gazetted from the beginning of 1806 to the end of 1860, 28,391 occurred in the second month of the quarter, 26,427 in the third month, and only 24,976 in the first month.

* These tables are now printed in the Appendix to this paper, pp. 9 and 10, together with curves exhibiting the variations.

† This relation of periodic panics to the autumnal months was further investigated in the Paper No. V. "On the Frequent Autumnal Pressure," etc., printed in this volume.

# APPENDIX

**TABLE showing the Average Variations, from month to month during the year, of the Rate of Discount, the Number of Bankruptcies, the Price of Consols, and the Price of Wheat.**

| Months of the Year - - - - - - | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Rate of Discount, 1845-61 | 3·9 | 4·0 | 4·0 | 3·8 | 4·0 | 3·8 | 3·6 | 3·6 | 3·6 | 4·0 | 4·4 | 4·1 |
| Average Rate of Discount, 1824-61 | 3·9 | 3·8 | 3·7 | 3·7 | 3·6 | 3·7 | 3·6 | 3·5 | 3·6 | 3·8 | 4·1 | 4·0 |
| Bankruptcies—Total No., 1806-60 | 6970 | 7615 | 7186 | 6796 | 7403 | 6826 | 6001 | 5756 | 4954 | 5209 | 7617 | 7461 |
| Price of Consols—Average, 1845-60 | 94·7 | 94·2 | 93·9 | 93·4 | 93·5 | 94·3 | 94·1 | 94·1 | 93·9 | 93·0 | 93·2 | 93·6 |
| Price of Wheat—*Gazette* Average, 1846-61. Shillings per quarter | 53·1 | 53·3 | 52 9 | 52·1 | 55·2 | 55·9 | 55·7 | 53·7 | 52·9 | 52·1 | 54·1 | 53·2 |

**TABLE showing the Quarterly Averages of the Rate of Discount, etc.**

| | January to March | April to June | July to September | October to December |
|---|---|---|---|---|
| Rate of Discount, 1845-61 - | 3.97 | 3.87 | 3.60 | 4.17 |
| Ditto, 1824-61 - - - | 3.80 | 3.67 | 3.57 | 3.97 |
| Bankruptcies—Aggregate number, 1806-60 - - | 21,771 | 21,025 | 16,711 | 20,287 |
| Price of Consols— Average, 1845-60 - - | 94.27 | 93.73 | 94.03 | 93.27 |
| Price of Wheat—*Gazette* Average, 1846-66 - - | 53.1 | 54.4 | 54.1 | 53.1 |

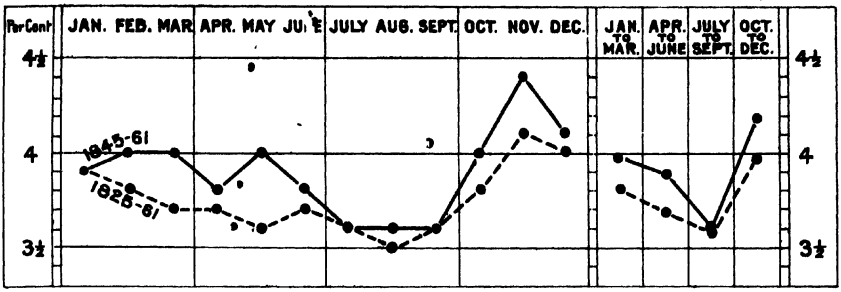
It will be seen that the greatest number of bankruptcies occurs in the first quarter of the year, succeeding the period of highest rates of discount. The number is much reduced in the third quarter, in which, as well as in the second quarter, the rate of discount is distinctly below the average.

The seasonal variation of the price of wheat is best seen in the following averages:

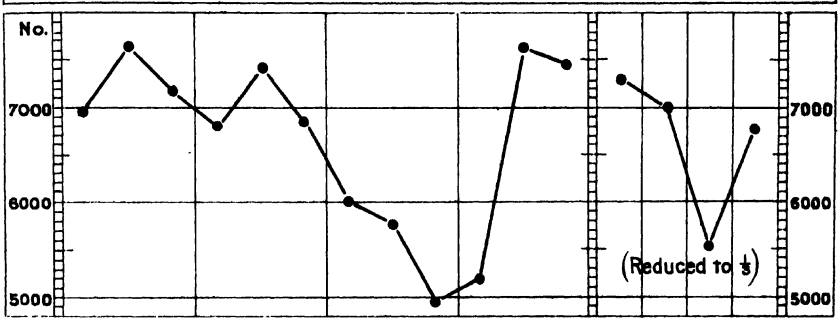
| February to April | May to July | August to October | November to January |
|---|---|---|---|
| 52.8 | 55.6 | 52.9 | 53.5 |

There is a palpable double maximum, the greatest occurring in the months immediately preceding the harvest, and easy to understand. The maximum of November to January is less easy to comprehend, unless it be due merely to reaction from the previous low prices, assisted by the greater difficulties of conveyance during the winter.

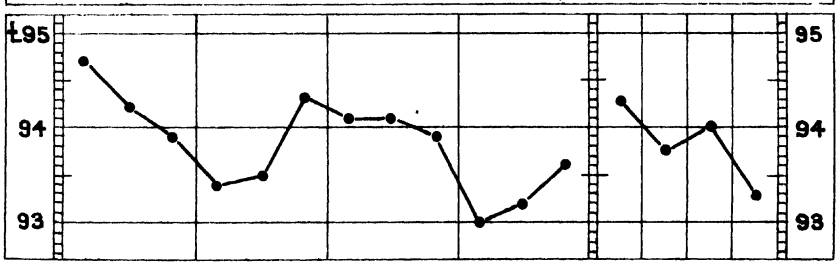
## AVERAGE RATE OF DISCOUNT, 1845-61 & 1825-61.



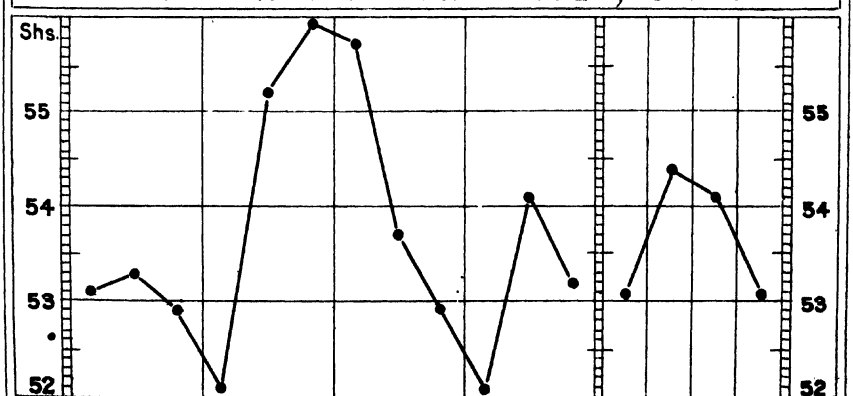

## TOTAL NUMBER OF BANKRUPTCIES, 1806-60.




## AVERAGE PRICE OF CONSOLS, 1845-60.




## GAZETTE AVERAGE PRICE OF WHEAT, 1846-61.




To face p. 10

Stanford's Geog.l Estab.t

# II

# A SERIOUS FALL IN THE VALUE OF GOLD ASCERTAINED

## AND ITS SOCIAL EFFECTS SET FORTH

*WITH TWO DIAGRAMS*

"Nowe that the pryces of thinges are so rysen of al handes, you may better lyve after your degree than wee, for you may and do rayse the pryce of your wares as the prices of vittayles and other your necessaries doe ryse; and so cannot we so much."

"A compendious or briefe examination of certayne ordinary complaints, of divers of our countrymen in these our dayes." By W. S., Gentleman. London: 1581. Fol. 5.

(See Appendix, note A.)

# PREFACE

THAT an article tends to fall in value as it is supplied more abundantly and easily than before, is a most familiar fact. When the discoveries of gold in California were followed in a few years by equally extraordinary discoveries in Australia, and minor discoveries elsewhere, there was no lack of predictions as to the inevitable effect upon the value of gold. But with few exceptions there have been only surmises and conjectures on this highly important subject. Even after the lapse of ten or twelve years, men who give their whole attention to public and monetary matters, or to questions of statistics and economy, remain in a state of doubt as to whether any depreciation of gold is really taking place.

Chevalier, in his well-known work "On the Probable Fall in the Value of Gold," presented to English readers in 1859 by Cobden, confidently predicted a great fall. He suggested, however, that it would be deferred some years by the change of the French currency, which is proceeding. On the other hand, Mr. Newmarch, in the last volume of Tooke's "History of Prices," published in 1857, and MacCulloch, writing in December, 1858,† both doubted the existence of any depreciation. They seemed to hold also that the rapid extension of trade and the increase of wealth, might cause the absorption of the new supplies of gold, without the occurrence of any considerable depreciation. In brief re-discussions of the subject, in the "Journal of the Statistical Society" (for March 1859, 1860, and 1861), Mr. Newmarch, using a method of comparison in which I have had no choice but

*This tract was originally published in April, 1863 (London: Edward Stanford, Charing Cross), 8vo, iv. 73 pp.

†"Encyclopædia Britannica," Eighth Edit., art. "Precious Metals."

to follow him, has seemed to suspend any definite judgment. The question thus continues an open one.

I was only led to form an opinion upon this subject when engaged in compiling tables of the monthly prices of many articles since 1844. I was so much struck with the enormous and almost general rise of prices about the year 1853, that I was led to suspect an alteration of the standard of value. At the same time, the late *comparative* depression of trade in reducing prices as low as they are likely to go (as it were to low tide), has seemed to me to render the subject more and more mature for decision. It shows that the great rise of prices in 1853 has not been, and thus probably will not be, compensated by any equal fall; that there is consequently a permanent rise of prices certainly constituting a fall in the value of gold, and probably arising from the gold discoveries.

In the following tract I commence by endeavouring to unfold the fundamental difficulties of the inquiry, afterwards discriminating the various causes of temporary fluctuations in prices, in order that we may the more surely recognise the effect of the permanent cause in question. I then introduce tables formed and reduced in accordance with the principles of the subject, so as to exhibit a depreciation of gold if any exists. The large depreciation rendered apparent is confirmed by an extended inquiry as regards the prices of 1860-62. The future probable depreciation of gold is considered on somewhat *à priori* grounds; and lastly, the social effects are deduced and commented on.

While I must assert the fact of a depreciation of gold with the utmost confidence, I assign the numerical amount of it with equal diffidence. The lowest estimate of the fall that I arrive at is 9 PER CENT, and I shall be satisfied if my readers accept this. At the same time, in my own opinion the fall is nearer 15 PER CENT. It may even be more than this. Many years, however, must pass before numerical estimates can be properly stated to possess more than a slight degree of probability.*

* On this point, however, see No. IV. "The Depreciation of Gold."

# CHAPTER I

## On the Nature and Difficulties of the Inquiry

### I.—*Of the Meaning of a Fall in the Value of Gold.*

All that is meant by a fall in the value of gold, is the fact that more gold is now usually required to purchase an article than in former years. The comparative values of two articles are said to be altered when the proportion of the quantities usually exchanged in the open market is altered. This alteration may arise from circumstances affecting the supply or demand of either article, just as a balance may be disturbed by an upward or a downward force, applied to either arm. There is nothing in the simple motion to indicate from which side the change comes. Thus during the years 1845-50 a ton weight of copper was, on an average, exchanged for about 88 gold sovereigns. During the years 1860-62, the rate was that of a ton of copper to about 101 sovereigns. There is nothing in this fact to show whether gold is become more abundant and easily obtained, or copper more scarce and troublesome to procure. It may be, and probably is the case, that the circumstances of demand and supply are altered on both sides. The observed effect is then the sum or difference of several effects, concerning which we learn nothing from the simple alteration of values in question.

When a number of articles are exchanged each for the other we are still unable to say with certainty on which side arises any change in the proportion of the exchanges. Thus, if the value of an article, A (gold, for instance), falls in comparison with several other articles, B, C, D, E

(copper, lead, tin, silver, for instance), so that the same quantity of A purchases less of each of B, C, D, E than it used to do, this may arise either from causes affecting A only, or from causes affecting each of B, C, D, E. The value of A may fall from a lessened demand or an increased supply. The value of each of B, C, D, E may likewise rise from increased demand or lessened supply. The mere alteration of values is the *same fact*, whether arising on one side or the other.

There is something, however, which we may say in the case of five articles, but cannot say in the former case of two articles. *It is more likely that the alteration should have arisen on the side of A than on the side of B, C, D, E,* because one cause affecting A will suffice to explain the change, whereas four separate but concurring causes respectively affecting B, C, D, E will be needed on the other side. The odds, then, are four to one in favour of the cause of alteration being in A, and not in B, C, D, E.

If, again, we compare A with a still larger number of other articles, B, C, D, E, F, G, H, etc. and find that all of these have risen or fallen with regard to A, the odds are still more in favour of some circumstance connected with A having caused the alteration. It is obvious, in short, that an alteration in any one article is shown in its rate of exchange * with all other articles, so that the fact of an alteration may be ascertained with a continual approach to certainty, by examining its value in terms of more and more articles. But there always remains the alternative of a concurrence of causes affecting the other articles.

The chief difficulty of such an investigation arises from the independent variations of value, which each of B, C, D, E, etc. will doubtless undergo. Besides rising from an alteration in A, B may rise still further, from an alteration peculiar to itself. On the other hand, C

* It is obvious that *rate of exchange* is used in this tract in a sense equivalent to that of *ratio of exchange*, an expression which I subsequently proposed to substitute for the name *value*.—See "Theory of Political Economy," p. 91; Second Edit. p. 84.

may not rise at all or may fall in value, because its rise, due to A, may be neutralised, or more than neutralised, by a fall due to itself. Similarly, in the cases of D, E, F, etc. all will suffer the effect due to A; but this will be disguised by the various distinct accidents which affect B, C, D, etc.

We must again fall back upon mere probabilities. If the majority of B, C, D, etc. have risen in value, and only a minority fallen, it is more likely that a single cause acting on A should have led to a general rise than that the majority of B, C, D, etc. should have been affected by separate but concurring causes. And in determining the average variation of value with respect to A, of a sufficient number of articles B, C, D, E, etc. we may always ascertain the common alteration probably due to A. For the distinct and contrary variations peculiar to B, C, D, etc. will destroy each other more or less completely in drawing the average, and only that common variation which all equally suffer in being measured against A will remain undiminished.

To apply this analysis to our present inquiry, we have only to consider the substance A as being gold, and the rates of exchange of B, C, D, etc. the prices of commodities in pounds sterling and their fractions as usually quoted. If prices on the average have risen ever so little, *this constitutes a fall in the value of gold.* If only one thing had risen in price while the others remained as before, gold must be said to have fallen in some degree. Value is a vague expression for potency in purchasing other commodities, and if gold has become less potent with respect to some and not more potent with respect to others, it has fallen in value. The same may be said, however various and contrary the alterations of prices, provided the rising preponderate in a certain way over the falling ones. *It must be confessed, however, that the exact mode in which preponderance of rising or falling prices ought to be determined is involved in doubt.* Ought we to take all commodities on an equal footing in the determination? Ought we to give most weight to those which are least intrinsically variable in value? Ought we

to give additional weight to articles according to their importance, and the total quantities bought and sold? The question, when fully opened, seems to be one that no writer has attempted to decide—nor can I attempt to decide it.* Fortunately, the conclusions I shall have to adopt may, I believe, be sustained under any and all modes of estimation which are likely to be proposed. I regard the fall of value as conclusively proved, although the exact nature of the problem is left amid the obscurities of economic science in general.

All that I can pretend to *prove* in this inquiry is that, subject to the vagueness just referred to, the prices of commodities have risen, or that the rise of prices of those which have risen preponderates over the fall of those which have fallen. This *is and constitutes* the alteration of value of gold asserted to exist.

It is quite another question how this fall of value is caused. It may be due to an increased supply of gold, or to a diminished demand for it. It may also arise from an increased demand for one or more commodities not accompanied by a corresponding demand for gold, or a diminished supply not accompanied by a corresponding change of supply of gold. Anything affecting the value of gold, in short, must affect either gold apart from other articles, or other articles apart from gold; or at least it must affect one side more than the other. It is with a less degree of confidence and certainty that it can be inferred on which side of the balance the disturbance arises. If, as is no doubt the case, disturbances on both sides contribute towards the aggregate effect, it will be still more difficult to discriminate between the portions of the total effect due to one cause or another. By what has gone before, however, it is seen to be more likely that any considerable and general change of prices should arise from a single circumstance affecting the demand or supply of gold only, than from a variety of circumstances separately affecting all or most other commodities. Joined to the fact that circumstances have occurred in the production

* Some further brief discussion of this subject will be found in the succeeding paper, No. III. "On the Variation of Prices," etc.

of gold which would probably cause a considerable rise of prices, it is hardly to be doubted that any general elevation of prices which we may discover is for the most part due to such circumstances. But I am far from denying that there may have been such alterations in the comparative demand for gold, and for certain other chief materials of manufacture, or other articles of commerce, as might contribute in an appreciable degree to the change of prices in question.

In the minds of some few there may be confusion between the *exchange value of gold, the value of money in the money market, and the Mint price of gold.* These things have not the slightest connection with each other. The *value of money* in the money market, means the interest or profit yielded by money or capital which is lent and borrowed. But as the loan consists of gold, or at least of something estimated in gold, and the interest is also paid by a certain percentage of gold, this percentage or ratio is quite independent of the value of the gold which forms both capital and interest.

The *Mint price of gold* again merely defines the weight of a sovereign, or the number of sovereigns and parts of a sovereign into which the Mint converts an ounce Troy of gold. The delusion of those who want free trade in gold as well as everything else, merely amounts to doing away with coins of any fixed weight. They might as well, at the same time, do away with all standard weights and measures. In that case fixed promises would become impossible, so that he should get who can, and give who cannot help.

## II.—*Of the Meaning of an Average Rise of Prices.*

There is no such thing as an average of prices at any one time. If a ton of bar-iron costs £6, and a quarter of corn £3, there is no such relation or similarity between a ton of iron and a quarter of corn as can warrant us in drawing an average between £6 and £3; and similarly of other commodities. If at a subsequent time a ton of iron costs £9, and a quarter of corn £3 12s. there is again

no average between these quantities. We may, however, say that iron has risen in price 50 per cent. or by $\frac{1}{2}$; what was previously 100 has become 150; corn has risen 20 per cent. or by $\frac{1}{5}$ : what was 100 has become 120. Now the ratios 100 : 150 and 100 : 120 are things of the same kind, but of different amounts, between which we can take an average.

This average percentage or ratio must not be the arithmetic but the geometric average; not 100 : $\frac{1}{2}(120+150)$ or 100 : 135, but 100 : $\sqrt{120\times150}$, or the ratio of 100 to rather more than 134.16. The mean ratio 100 : 134.16 indeed differs so little from 100 : 135 that in common business matters it would be sufficient to take the simpler arithmetic mean in place of the other, and neglect the error. But this cannot be done in the present inquiry, where our alterations of prices have a large range, varying from more than 50 per cent. of decrease to more than 100 per cent. of increase. Thus the price of cocoa has nearly doubled since 1845-50. It has increased by 100 per cent. so that its variation is now expressed by the number 200. Cloves, on the contrary, have fallen 50 per cent., and are now at 50. The arithmetic mean of these ratios would be $\frac{1}{2}(200+50)$ or 125. The average rise of cocoa and cloves would then appear to be 25 per cent. But this is totally erroneous. The geometric mean of the ratios expressed by the numbers 200 and 50 is 100. On the average of cocoa and cloves there has been no alteration of price whatever. In other words, the price of one is doubled, of the other halved—one is multiplied by two, one divided by two—on the average, then, the prices of these articles remain as they were, instead of rising 25 per cent.

A corresponding error of more or less amount would be committed in every case did we take the simple arithmetic mean of percentages. The general result would be to exaggerate the prices which have risen at the expense of those which have fallen. The average rise of prices would come out considerably greater than it really is, and our results would be to that extent erroneous.

To take the geometric mean of two ratios we must multiply them together and extract the square root of the

product. This is easily accomplished by turning the numbers into their common logarithms, the arithmetic mean of which is the logarithm of the geometric mean required. All the percentages required have accordingly been calculated in logarithms, and the averages drawn in that form, but afterwards turned back into ordinary numbers. Without guaranteeing the absolute accuracy of every figure, deduced from tedious calculations, it may be said that more than reasonable trouble has been taken to insure accuracy, and that the final conclusions cannot be erroneous in any degree worthy of consideration.

### III.—*That we must discriminate Permanent from Temporary Fluctuations of Prices.*

So far we have considered only the general method by which we may ascertain alterations of prices in general, between any two periods, without reference to the character of the alterations. There may, however, be variations of prices which are temporary, and it is a more difficult matter to prove that any variation observed is a permanent one. For this purpose we must briefly analyse the whole series of possible causes of fluctuation in price. Such causes may be divided into two principal classes: (1) those which affect the supply, and (2) those which affect the demand for commodities.

### IV.—*Of Fluctuations of Supply.*

All articles of commerce might be arranged in a list according to the degree in which their supply is subject to natural fluctuations unconnected with the demand. The more variable commodities, of course, are those agricultural products which depend entirely on the seasons. Hops perhaps stand at the head of the list, soon followed by potatoes, and then by the several kinds of grain. All vegetable commodities are more or less variable. Animal products, such as butchers' meat, dairy produce, hides, or sperm oil, undergo much slower *temporary* fluctuations. Finally, we reach mineral substances, especially the chief metals, iron, copper, lead, silver, and gold, of which the

natural conditions of supply experience no temporary fluctuations of importance. The gradual exhaustion of mines is compensated by occasional new discoveries, but except in very rare instances the changes are slow and small. Social causes, such as wars, civil disturbances, disputes among workmen, are also incapable of causing fluctuations of supply of any importance. Hence many of the metals may be regarded as comparatively stationary in value, except so far as their prices may depend on variations of demand.

Our duty as regards fluctuations due to changes of supply is to have nothing to do with them, but to eliminate the effects from our inquiry as soon and as completely as possible. That a commodity is naturally very variable in price is no reason, indeed, for excluding it wholly from our tables. It is only necessary to select such a number and variety of articles independent in their fluctuations, that the variations of some will probably compensate the others. Were we to begin by excluding commodities because they are variable in price, we should not have more than two or three articles left. Wheat, for instance, because it varies in a few years from 40 to 60 and 80 shillings per quarter, does not the less suffer an additional alteration from any change in gold. Alone, it would afford no sure indication of such alteration in the value of gold, but we take it in company with hay, clover, and straw, with meat and butter, with cotton from several parts of the world, with sugar from the East and West Indies, with spices, dyewoods, and various other important products, each subject to its own independent natural fluctuations, but all subject to vary in price with the variations of value in gold of which we are in search. In drawing our averages the independent fluctuations will more or less destroy each other; the one required variation of gold will remain undiminished. Again, were we to exclude some commodities from our tables because variable in price from natural causes, we should have to exclude nearly all the rest from variations depending on demand. *The only mode of eliminating these fluctuations, is to render our inquiry, not more exclusive, but more inclusive.*

### V.—*Of Political Causes of Fluctuations.*

During the Russian war, the prices of hemp, flax, and tallow rose much above their ordinary or natural level. During the present blockade of the ports of the Southern United States, cotton has risen to three or more times its ordinary value. It will be more generally satisfactory, no doubt, to exclude such extreme fluctuations from our inquiry altogether. This accordingly has been done. In the case of hemp and flax, the prices of 1853, 1854, and 1855 were struck out and numbers interpolated, in a geometric series, between the prices of 1852 and 1856. In the case of cotton, the prices of 1861 and 1862 were struck out, and that of 1860 adopted for those years, as being unaffected by the present cotton famine. In the case of tallow, a correction which ought to have been made was accidentally omitted.

It is, however, an open question, whether such extraordinary elevations of price are not compensated by corresponding depressions in the prices of other commodities, due to the stagnation of trade which a war or the stoppage of a great branch of industry occasions. For the sake of clearing the inquiry of difficulties, I do not insist on this view.

### VI.—*Of Variations of Demand.*

Important variations of demand arise only from changes of fashion, taste, or habit; from a few exceptional causes, such as wars, national works, or fêtes; and from certain great fluctuations in industry, which alone need be further analysed here. The demand for bread, meat, spirits, spices, and articles of food and personal use generally, may be regarded as constant, or only affected slightly and indirectly by the floods of prosperity and depression depending on the commercial fluctuations to be further considered. Thus, *articles of immediate and personal use, speaking generally, are constant in demand, variable in supply.* Metals, timber, and other *articles of more per-*

*manent and remote use,* are comparatively *constant in supply*; but I have to show that *they undergo great variations in demand.*

## VII.—*Of Variations of Permanent Investment.*

That great commercial fluctuations, completing their course in some ten years, diversify the progress of trade, is familiar to all who attend to mercantile matters. The remote cause of these commercial tides has not been so well ascertained.* It seems to lie in the *varying proportion which the capital devoted to permanent and remote investment bears to that which is but temporarily invested soon to reproduce itself.*

A large part of the industry of the country must be applied in agriculture and manufactures to produce the supplies of food, clothing, and other articles required for immediate use, the demand for which, as I have said, cannot much vary. It is by the sale of these finished articles that capital invested in materials, and the payment of wages, is returned as ready money, available for fresh investment. While uninvested, it contributes to form the reserve of loanable capital in the Bank of England, and in other banks, or private hands.

It is quite otherwise with those permanent investments in houses, ships, improvements of land, manufactories, mines, railways, foreign loans or undertakings, of which the result is durable, and not expected to make a ready-money return for what was invested, except after the course of many years, or in the form of annual interest. These undertakings are the great means by which the wealth of the country is increased. Temporarily, however, they absorb the means of subsistence of the community—they are wealth *in posse,* rather than *in esse.* Were a certain definite proportion of the capital of the country set apart every year for such long-dated investments, the returns of capital which they would make would be as regular as the absorption of capital. But this is not the case.

*The inquiry into this *remote cause* was resumed in subsequent papers reprinted in this volume. See Nos. VI. to VIII.

It is the peculiarity of these great and permanent works to be multiplied at particular periods. When capital is abundant its owners look out anxiously for some mode of profitable employment. Any new discovery or fresh employment for money is eagerly taken up. Hope of gain is a most contagious emotion among business men, and presently hundreds set themselves to carry out this new discovery upon a most extended scale.

While one scheme is prospering so well, the circumstances of the market and the feelings of men are not less propitious for any other schemes which have at all a good appearance. Further description is needless; it is well known that nothing is so difficult to restrain within prudent bounds as these manias for speculative investment. It is needless also to add, that the most extraordinary of these manias was that for railway construction in 1843-46, when hundreds of millions were rashly subscribed among the various classes of the community.

During such a mania, industry is thrown into extraordinary activity, and also into unusual channels. The customary consumption of food, clothes, etc. goes on of course as usual, or even increases somewhat.* On the other hand the demand for timber, iron, bricks, and countless other commodities of more permanent nature is greatly increased. Their production being incapable of any but slow extension, their prices rise. Part of the available labouring power of the country is transferred to their production. Prices are thus started upwards, and unwonted prosperity and hopes of gain fall upon nearly every one in the country.

The wealth created during such a period of unwonted activity probably far overbalances any loss which follows. Hitherto, however, great losses have usually followed. To explain exactly how the revulsion comes is perhaps a feat of statistical analysis not yet accomplished. The salient fact is a great dearth of capital, or loanable money (gold), due no doubt to the previous great permanent investment.

*Insufficient account is taken here of the increased demand for articles of luxury during a time of prosperity; but this error does not affect the truth of what follows.

The arrival of this dearth is generally accelerated by the failure of the harvest, or some event which cuts off a large part of the anticipated gains of the country. The result is that the stocks of commodities cannot be sold against the stock of available ready money at the point to which prices have advanced. Merchants would gain if they could hold on, but they cannot hold on, because there is no one to continue the advances of capital with which they have bought their goods. To sell at lower prices is loss or even ruin. Then comes the panic and the collapse of credit.

That these great commercial fluctuations arise in the periods of great permanent investment is perhaps sufficiently shown for our present purposes in the following table:

| Years. | Bricks made in U.K. | Loads of unsawn Timber imported. | Price of Welsh Bar Iron in Liverpool.‡ | | | Years. | Bricks made in U.K. | Loads of unsawn Timber imported. | Price of Welsh Bar Iron in Liverpool.‡ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Millions. | Thsnds. | £ | s. | d. | | Millions. | Thsnds. | £ | s. | d. |
| 1821 | 979 | 417 | 8 | 17 | 6 | 1841 | 1426 | 756 | 7 | 5 | 0 |
| †1822 | 993 | 583 | 8 | 7 | 6 | 1842 | 1274 | 527 | 6 | 0 | 0 |
| 1823 | 1265 | 545 | 8 | 7 | 6 | †1843 | 1161 | 708 | 5 | 0 | 0 |
| 1824 | 1493 | 611 | 10 | 0 | 0 | 1844 | 1420 | 758 | 5 | 15 | 0 |
| *1825 | 1991 | 755 | 14 | 0 | 0 | 1845 | 1821 | 1077 | 8 | 7 | 6 |
| 1826 | 1381 | 612 | 10 | 7 | 6 | 1846 | 2040 | 1249 | 9 | 0 | 0 |
| 1827 | 1124 | 533 | 9 | 10 | 0 | *1847 | 2042 | 1031 | 9 | 2 | 6 |
| 1828 | 1104 | 530 | 8 | 7 | 6 | 1848 | 2194 | 929 | 7 | 0 | 0 |
| 1829 | 1135 | 557 | 7 | 7 | 6 | 1849 | 1461 | 818 | 5 | 12 | 6 |
| 1830 | 1112 | 505 | 6 | 10 | 0 | 1850 | 1463 | 868 | 5 | 0 | 0 |
| 1831 | — | 569 | 6 | 2 | 6 | †1851 | Duty repealed (1850). | 1102 | 4 | 17 | 6 |
| †1832 | 998 | 557 | 5 | 17 | 6 | 1852 | | 924 | 5 | 17 | 6 |
| 1833 | 1036 | 527 | 6 | 15 | 0 | 1853 | | 1180 | 8 | 10 | 0 |
| 1834 | 1152 | 558 | 7 | 0 | 0 | 1854 | | 1216 | 9 | 7 | 6 |
| 1835 | 1349 | 694 | 6 | 15 | 0 | 1855 | | 909 | 7 | 17 | 6 |
| 1836 | 1606 | 688 | 10 | 15 | 0 | 1856 | | 1081 | 8 | 0 | 0 |
| *1837 | 1491 | 660 | 9 | 5 | 0 | *1857 | | 1179 | 7 | 10 | 0 |
| 1838 | — | 725 | 9 | 10 | 0 | — | — | — | | — | |
| *1839 | 1576 | 726 | 9 | 15 | 0 | — | — | — | | — | |
| 1840 | 1748 | 817 | 8 | 7 | 6 | — | — | — | | — | |

* Years marked * are those of commercial difficulty and revulsion.

† Years marked † seem to be those with which the great commercial fluctuations begin and end.

‡ From a circular of an old Liverpool iron-exporting firm (Jevons and Sons).

The high prices of iron, and the increased production of bricks, show periods of great investment, and these correspond exactly with the well-known epochs of commercial difficulty, in 1825, 1836-39, and in 1847; indeed, if the above numbers were drawn out in a curve, its form would be found to correspond closely with the curve representing the numbers of bankruptcies during the same years.



## VIII.—*Of Prices as dependent on Credit.*

What greatly assists a rise of prices, started in a period of free investment, is the system of credit on which trade is necessarily conducted. By this system a trader is not obliged to be the real owner of the goods in which he trades, but may buy freely by giving the promise of payment in, perhaps, three months' time. Thus the goods really belong to the holder of his promissory note, or bill; only the margin of profit or loss falls to the share of the trader. The result of this system of purchase on credit must be that prices are not restrained at every moment by the quantity of gold in the country to make payments. Prospective payments take the place of present payments, and in the meantime the bills created may circulate from one hand to another as if they were an embodiment of so much gold.

So long as prices rise every trader is enabled to discharge his liabilities at any required moment; they may be bought by others with a still more free recourse to credit. Thus, prices and credit mutually inflate each other. But there is a check to this process. Though the merchant does not own the goods there must be some one to own them, to advance capital, or, as it is said, to discount the bills arising out of the transaction. Now this capital is limited, and the available amount is reduced during the period of permanent investment, from which a rise of prices proceeds. It is the exhaustion of this capital which limits credit; it is the limitation of credit

which must sooner or later bring prices to a stand, or even cause them to recede to a rate much lower than they had reached. In this revulsion and recession of prices some class must bear the loss; those who are too much dependent on credit will suffer bankruptcy, and inflict part of the loss on others.

While the elasticity of credit, then, may certainly give prices a more free flight, the inflation of credit must be checked by the well-defined boundary of available capital, which consists in the last resort of the reserve of notes, equivalent to gold, in the banking department of the Bank of England. *Prices temporarily may rise or fall independently of the quantity of gold in the country; ultimately they must be governed by this quantity.* Credit gives a certain latitude without rendering prices ultimately independent of gold.

## Causes of Fluctuation

### IX.—*Of Prices after a Revulsion.*

A revulsion occasioned by a failure of the national capital must cause, not only a collapse of credit, and of any inflation of prices due to credit; it must put an end to the formation of new schemes of permanent investment. Schemes already on foot will, as far as possible, be continued, and must for a time keep up the price of permanent materials. As by degrees these undertakings are completed, the demand for materials will decrease as rapidly as it formerly increased. The prices of such materials, therefore, will fall and remain low until the fresh accumulation of free capital causes speculation again to germinate.

### X.—*Of other supposed Causes of Fluctuation.*

Even if there be nothing erroneous in the preceding analysis of a great commercial fluctuation, I am far from supposing that the exact relations in regard to prices, commodities, gold, and capital have been hit upon. I do not believe that any of our economists have yet untied

this Gordian knot of economic science, although some cut it in a very unhesitating manner. One of these summary kinds of procedure is the currency theory, which attributes every fluctuation of prices to an extension of the bank-note circulation. Now by the Bank Charter Act of 1844, it is provided in the most satisfactory manner that every note in the country that is likely to be presented at the Bank for payment, shall be met there by its equivalent amount. Thus, any influence which the note can have is that of its equivalent gold. Under the old state of things it was almost the same, because the prudence of the Bank management might be said to maintain the notes really convertible.*

Another favourite theory of some writers is the dependence of our commercial position on the foreign exchanges. This is another twist in the Gordian knot which it is not easy to untie in detail, and is not right to cut. But taking a general view of the matter, it will appear that the foreign exchanges merely link trade in one country to trade in another. The natures of gold, of capital, and of commodities are not changed by conveyance over the sea, and with certain minor exceptions, trade between England and Germany, or England and America, is subject to the same great laws as trade between England north and south of the Trent, or between the manufacturers and the agriculturists within the nation. The fluctuations of investment of capital, prices, stocks of commodities, and of the standard of value, whether gold or not, would not be altered in nature if we had no foreign exchanges at all.

* On the relation of the note circulation to prices, see Appendix, Note B.

## CHAPTER II

### INQUIRY INTO PRICES BEFORE AND AFTER THE GOLD DISCOVERIES

#### XI.—*Of the Elimination of temporary Fluctuations.*

WHAT little has been correctly stated in the previous chapter as to the procedure of commerce, may serve to explain the real fluctuations of prices which my tables disclose. At the same time, we shall be put on our guard against mistaking any temporary fluctuation due to excessive investment or credit, for the effect of gold depreciation. The twelve years which have elapsed since the epoch of the Australian discoveries have covered scarcely more than a single great fluctuation of commerce, in the effects of which those of gold depreciation must necessarily be disguised. To eliminate such disturbances in our comparison of prices before and after the gold discoveries, we might compare the prices at corresponding points of the commercial tide. This method, proposed by Cobden,* in the preface to his translation of Chevalier's

* That Cobden had observed the periodic character of commercial fluctuations is evident from the passage cited above, which is as follows (p. xii.): "The only useful comparison that could be drawn is by comparing the range of prices, a few months after the panic of 1857, with the prices of a corresponding period after the panics of 1825, 1836, and 1847. From the cursory reference which I have been able to make to the valuable tables in Mr. Tooke's work on prices, I am inclined to the opinion that the comparison would be found to confirm the views of M. Chevalier." The latter inference is conclusively confirmed in my reduction of Tooke's tables (see Paper III.). That Cobden, however, did not entirely appreciate the nature of the decennial cycle, will be apparent from the following passage of his interesting preface (p. x.): "The tendency to a general rise of prices would lead to an expansion of credit and an increase of speculation, which

Essay, is theoretically correct, but practically useless. Commercial fluctuations are never so similar and well marked that we can discover exactly corresponding points in each. Since 1851, too, they have been much interrupted by wars, so that we find no definite undulation of prices sufficiently comparable with that of the years 1844-50.

In these circumstances I adopted the method—partly the same as that previously used by Mr. Newmarch—of comparing the prices of every part of the commercial fluctuations since 1851, not with the similar movements of a previous fluctuation, but with *a certain average price fairly drawn from all parts of the previous fluctuation of* 1844-50. We must then form the best judgment we can as to the part of the commercial tide in which any year since 1851 is situated, and allowing for the height of the tide, judge how far the level of prices has been permanently altered by the gold discoveries. We thus eliminate, I conceive, so far as it can now be done, the fluctuations of prices due to varying demand, and dependent on the manias for permanent investment, and the inflations of credit. The natural variations of supply, which chiefly affect the articles of more immediate use, are at the same time destroyed, as far as may be, in the drawing of our averages.

## XII.—*Of the Method adopted.*

To carry out the inquiry on these principles, I propose to define the commercial tide which culminated in 1847, as commencing with 1844 and ending with 1850. For these tides begin and end with abundant capital, and with low water, as it were, in the rate of interest. Thus the *turn of the tide* will be at the moment of minimum rate of interest, or perhaps more truly about the *middle of the period when interest is at or near its lowest point.*

would be followed by panics and convulsions of greater violence and more frequent recurrence than have been hitherto experienced. Instead of a crisis visiting the commercial world once in each decade, its return might be expected every five years."

Now the rate of discount or interest was at its minimum in the years 1843 and 1844, when it sank as low as 1¾ per cent, and scarcely rose at all above 2½ per cent. It gradually rose during 1845, reached 5 per cent early in 1846, and, after a temporary relapse, advanced to 10 per cent, its culminating point, in November, 1847. Before the commencement of 1848 it had already dropped to some 4 per cent, and then continuously fell, reaching the level of 2 per cent in 1850. A temporary rise in 1851 was succeeded by the extraordinary depression to 1¾ during the last eight months of 1852. It was now that the speculative period of 1853 commenced, only to terminate completely in the stagnation of last year (1862). I think accordingly that there are two pretty well defined periods of low interest, 1843-44 and 1849-52 neglecting in the latter the very minor rise of interest in 1851. It is accordingly in the middle points of these periods, *the beginning of* 1844, and *the end of* 1850, that I place the limits of the fluctuation of 1847. The average prices of this interval I regard as free from the influences of speculation or inflated credit. At the same time this interval affords a good average price of grain and other agricultural produce, because these articles suffered a well-marked fluctuation of prices, culminating in the famine of 1847, just about the middle of the period.

By a further happy coincidence, these years, 1844-50, selected with reference only to the rate of interest, are also nearly the best we could have chosen with reference to the date of the gold discoveries. The year 1851 is that of the Australian discoveries, and that also about which the supplies of Californian gold began to be of importance.

In place, however, of the seven years' average, 1844-50, I was obliged to adopt the six years' average, 1845-50, because the price lists of *The Economist* newspaper, which I used, do not commence at all until July, 1844, and did not assume the full form which they have ever since retained until the beginning of 1845. To have used data for 1844 drawn from other price lists would have introduced doubt and error in place of additional certainty, because articles are not necessarily quoted in an exactly

similar manner in different lists. There is also no reason to suppose that the inclusion of the year 1844 would have sensibly altered the average. To include 1851 in my average in place of 1844 would only increase my estimation of the subsequent rise of prices.*

It may perhaps be objected that six years are not sufficient for furnishing a correct average of prices. But if the period were extended at all, it would have to be extended to the commencement of the previous commercial tide, some ten years earlier, about 1833 or 1834. This would have added greatly to the labour of the inquiry; it would also have rendered it less worthy of reliance. Recourse must have been had to various different lists of prices, and numerous discrepancies in the qualities of the articles quoted or the conditions of their production must have crept in. The shorter the space of time over which our comparison extends, the less will it be affected by long-continued and radical alterations of demand or supply, which there is perhaps no mode of eliminating. In the balance of advantages and disadvantages, I think that the period 1844-50, or 1845-50, will give the most reliable *datum line*, as surveyors would say.

## XIII.—*Compilation of the Tables of Prices.*

Tables of the monthly prices of thirty-nine articles of commerce were compiled from the price lists of *The Economist*, and from other sources, as described in the following statement. The quotations were usually taken, as near as may be, to the middle of each month, from the number of *The Economist*, dated between the 14th and 20th of the month. Though it is a matter of indifference as regards the present subject, it seems obvious that single monthly quotations should be taken at the middle of the month rather than at the beginning, as is commonly done. They thus belong more properly to the month, correspond more truly with the monthly tables of the Board of Trade, and are less liable to disturbance from the monthly settlements.

* See Appendix, Note C.

It is usual in all commercial quotations to state, not an average price, but the highest and lowest prices, comprehending any varieties of quality, as well as any variations of price in the period considered.* In this form, however, it is impossible to deduce any exact conclusions from the numbers. To ascertain whether prices are rising or falling, we must take the average of the highest and lowest, and consider it as the average price of a medium quality. To treat the higher and lower qualities as separate commodities, might be a more rigorously correct method, but it would double the labour of an inquiry already sufficiently laborious, without any adequate advantage. It is only in the case of a few commodities, such as indigo, that the range of qualities is so great as to cause uncertainty. In regard to the metals, oils, and many other important articles, there is little or no range of price.

## LIST OF THIRTY-NINE CHIEF COMMODITIES

### METALS

1. *Silver*—Standard bars per ounce Troy. From *The Economist,* with some quotations completed from "The London Mercantile Price Current," and "The Banker's Magazine."
2. *Tin*—English blocks, per ton.
3. *Copper*—tough cake, per ton.
4. *Lead*—English pig, per ton.
5. *Bar iron*—British, per ton.
6. *Pig iron*—No. 1 Wales, per ton.
7. *Tin plates*—(iron)—Charcoal, 1 C. per box.

Nos. 2-7 from *The Economist.*

### VEGETABLE AND ANIMAL MATERIALS

8. *Palm oil*—per ton.
9. *Linseed oil*—per ton.

* There is also the difference in some cases between the prices for sellers and for buyers.

10. *Tallow*—St. Petersburg, 1st yellow candle, per ton.
11. *Hides*—Buenos Ayres and Monte Video, dry, per lb.
12. *Leather*—Crop hides, 30 to 45 lb., per lb.
13. *Timber*—Dantzig and Memel fir, per load.
14. *Logwood*—Campeachy, per ton.
15. *Indigo*—Bengal, per lb.

Nos. 8-15 from *The Economist.*

FIBROUS MATERIALS

16. *Upland cotton*—per lb.
17. *Pernam. cotton*—per lb.
18. *Surat cotton*—per lb.

Nos. 16-18. The yearly average prices of the three chief varieties of cotton were taken from an excellent table and paper in "The Exchange Magazine" for October, 1862, reprinted in the "Journal of the Statistical Society" for December (vol. xxv. p. 527). The average price of *fair* quality for 1862 has been added on p. 38, from the data in *The Economist;* but to avoid the exceptional disturbances of prices in 1861-62, the low prices of 1860 have been repeated in those years in making up the averages in the table on page 42.

19. *Wool*—English fleeces, Southdown hogs, per pack of 240 lb.
20. *Silk*—Cossimbuzar, per lb.
21. *Flax*—Riga, W. F. P. K., per ton.
22. *Hemp*—St. Petersburg, clean, per ton.

Nos. 19-22 from *The Economist.*

CORN

23. *Wheat.* 24. *Barley.* 25. *Oats.* 26. *Rye.* 27. *Beans.* 28. *Peas.*

Nos. 23-28. The monthly average *Gazette* prices, per Imperial quarter, taken from "The Statistical Abstract" of the Board of Trade, or from the "Journal of the

Statistical Society." These averages are deduced from official returns from all the chief market-towns in England and Wales, and, of course, afford most reliable data. The numbers for 1862 apply only to the first nine months of the year.

AGRICULTURAL PRODUCE, MEAT, ETC.

29. *Hay.*
30. *Clover.*
31. *Straw.*

Nos. 29-31. Average of the highest and lowest prices, per load, as given in Dodsley's "Annual Register for the London Markets." Prices for 1862 in Smithfield Market are added from *The Times.*

32. *Beef.*
33. *Mutton.*
34. *Pork.*

Nos. 32-34. Average of the highest and lowest prices, per stone of 8 lb., in Smithfield, or the Metropolitan Cattle Market, as given in "The Annual Register." The numbers for 1862 were filled up from *The Times,* and seem rather *below* what they would have been given in "The Register," the exact mode of quotation in which is not stated.

35. *Butter*—per cwt. Limerick, 1845-50; afterwards Waterford, first quality new. In the earlier years Limerick and Waterford butter were often confused together in *The Economist,* the price of Limerick seeming, however, to be one or two shillings more than that of Waterford, though afterwards Waterford became superior to Limerick. To prevent any doubt, the rather higher prices of Limerick butter were taken in the earlier period from "The London Mercantile Price Current," and joined with the higher prices of Waterford butter from *The Economist* in the later period.

FOREIGN ARTICLES OF FOOD

36. *Sugar,* per cwt.—*Gazette* average price of the week nearest the middle of each month, of Muscovado sugar, being the average of West India, East India, and Mauritius sugar. From "The London Mercantile Price Current," 1844-47, and *The Economist* afterwards.

37. *Spirits*—Jamaica rum in bond, 15 to 25 O. P., per gallon. In some of the earlier years the strength of spirit quoted in *The Economist* is 10 to 20 O. P. As spirits afford an exception to the general rise of prices, this discrepancy need not be further noticed.

38. *Tea*—Congou in bond, per lb. The lowest price quoted in *The Economist*; but there is some little change in the description.

39. *Pepper*—Black Malabar in bond, per lb.

From the tables of monthly prices obtained as described in the above list, the simple arithmetic mean prices for each year were drawn. Double calculations were made to prevent error. The following table was thus prepared. It forms the basis of my deductions.

## *TABLE showing the Average Price of each of thirty-nine chief Commodities, during each of the Years 1845-62.*

| Description of Commodity. | 1845 | 1846 | 1847 | 1848 | 1849 | 1850 | 1851 | 1852 | 1853 | 1854 | 1855 | 1856 | 1857 | 1858 | 1859 | 1860 | 1861 | 1862 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Silver | 59·06 | 59·39 | 59·69 | 59·46 | 59·64 | 59·97 | 60·98 | 60·53 | 61·42 | 61·54 | 61·39 | 61·34 | 61·78 | 61·30 | 61·98 | 61·66 | 60·80 | 61·48 |
| 2. Tin | 87·0 | 94·8 | 90·5 | 77·5 | 79·7 | 80·5 | 84·8 | 90·2 | 115·0 | 121·0 | 118·3 | 132·4 | 136·1 | 118·8 | 131·4 | 136·2 | 122·1 | 116·2 |
| 3. Copper | 87·8 | 91·5 | 96·8 | 85·2 | 83·6 | 85·1 | 84·9 | 96·7 | 116·0 | 126·0 | 126·0 | 118·3 | 123·3 | 108·2 | 109·5 | 106·8 | 99·4 | 96·5 |
| 4. Lead | 18·5 | 19·0 | 18·7 | 16·9 | 15·8 | 17·7 | 17·3 | 17·8 | 23·9 | 23·9 | 23·4 | 25·1 | 24·3 | 22·3 | 22·5 | 22·0 | 20·5 | 20·7 |
| 5. Bar Iron | 185·0 | 191·5 | 194·5 | 144·0 | 124·8 | 118·0 | 111·4 | 124·0 | 185·0 | 198·3 | 171·3 | 181·1 | 168·4 | 143·7 | 140·2 | 131·4 | 125·0 | 124·8 |
| 6. Pig Iron | 106·2 | 100·4 | 95·8 | 82·5 | 74·7 | 70·6 | 66·5 | 72·6 | 96·7 | 116·0 | 100·8 | 114·2 | 106·5 | 90·2 | 76·2 | 75·0 | 68·3 | 65·0 |
| 7. Tin Plates | 34·3 | 31·6 | 30·2 | 29·5 | 32·0 | 32·4 | 32·0 | 29·1 | 35·6 | 33·1 | 33·4 | 37·3 | 39·4 | 33·3 | 32·9 | 31·4 | 29·0 | 27·9 |
| 8. Palm Oil | 28·8 | 30·7 | 36·7 | 32·6 | 32·0 | 30·3 | 28·1 | 29·0 | 37·5 | 47·5 | 44·0 | 42·5 | 44·8 | 39·6 | 45·2 | 46·1 | 45·0 | 42·5 |
| 9. Linseed Oil | 24·8 | 24·6 | 26·3 | 23·1 | 26·4 | 32·0 | 31·7 | 27·8 | 29·5 | 35·9 | 39·5 | 37·0 | 38·0 | 31·2 | 28·6 | 28·9 | 31·3 | 38·8 |
| 10. Tallow | 40·4 | 43·7 | 48·6 | 46·8 | 38·9 | 37·5 | 38·2 | 39·1 | 50·4 | 64·2 | 57·0 | 54·4 | 58·6 | 52·0 | 55·3 | 56·3 | 53·8 | 46·9 |
| 11. Hides | 6·4 | 6·6 | 6·0 | 4·8 | 4·6 | 4·9 | 5·7 | 5·4 | 6·4 | 7·5 | 8·5 | 10·5 | 13·6 | 11·1 | 11·2 | 11·3 | 10·1 | 9·2 |
| 12. Leather | 11·7 | 11·0 | 10·4 | 10·3 | 9·6 | 9·5 | 10·0 | 9·6 | 12·2 | 13·5 | 13·5 | 14·5 | 19·3 | 15·1 | 15·6 | 17·3 | 14·9 | 14·5 |
| 13. Timber | 86·0 | 85·0 | 85·3 | 73·3 | 67·3 | 61·5 | 60·0 | 59·6 | 78·2 | 82·0 | 80·5 | 72·1 | 71·8 | 64·2 | 68·4 | 66·9 | 69·4 | 64·4 |
| 14. Logwood | 8·70 | 8·08 | 7·46 | 6·69 | 6·28 | 6·69 | 6·73 | 6·42 | 7·26 | 8·23 | 7·71 | 8·89 | 8·71 | 8·75 | 7·15 | 6·64 | 7·83 | 104·6 |
| 15. Indigo | 4·1 | 4·0 | 4·0 | 3·4 | 3·4 | 3·9 | 4·6 | 4·9 | 6·4 | 6·0 | 4·1 | 4·4 | 4·8 | 5·0 | 4·6 | 5·1 | 5·4 | 5·9 |
| 16. Cotton, Upland | 4⅜ | 4⅞ | 6⅜ | 4¼ | 5⅛ | 7¼ | 5¾ | 5⅜ | 5⅜ | 5⅜ | 5¾ | 6 | 7¼ | 6¼ | 6½ | 5½ | (7¾) | (18¾) |
| 17. Cotton, Pernam. | 6⅜ | 7⅜ | 7⅝ | 6 | 5½ | 7⅞ | 7½ | 7 | 7 | 7 | 7 | 7⅛ | 8¾ | 8¼ | 8⅜ | 8¼ | (9½) | (17½) |
| 18. Cotton, Surat | 3 | 3⅜ | 4½ | 3¼ | 3⅜ | 5⅛ | 4 | 3¾ | 3½ | 3½ | 3⅞ | 4⅜ | 5⅜ | 4¼ | 4¼ | 4⅛ | (5⅞) | (12½) |
| 19. Wool | 15·6 | 15·3 | 13·5 | 10·5 | 11·6 | 13·3 | 13·9 | 15·0 | 17·8 | 13·9 | 13·8 | 17·6 | 20·2 | 15·3 | 18·6 | 19·7 | 17·4 | 18·0 |
| 20. Silk | 12·8 | 11·9 | 10·1 | 10·2 | 10·5 | 11·8 | 13·0 | 12·6 | 13·5 | 13·6 | 12·5 | 17·3 | 22·4 | 16·4 | 15·8 | 18·4 | 17·0 | 16·6 |
| 21. Flax | 46·2 | 49·3 | 49·7 | 39·1 | 36·9 | 41·5 | 44·5 | 46·9 | (48·3) | (57·5) | (54·8) | 53·2 | 54·9 | 55·4 | 70·8 | 64·8 | 67·0 | 65·6 |
| 22. Hemp | 28·8 | 32·5 | 38·2 | 32·0 | 30·1 | 30·8 | 29·2 | 31·7 | 37·4 | 58·5 | 47·0 | 35·7 | 34·1 | 29·5 | 29·2 | 30·1 | 31·9 | 36·0 |
| 23. Wheat | 50·8 | 54·7 | 69·7 | 50·5 | 44·3 | 40·3 | 38·5 | 40·7 | 53·3 | 72·4 | 74·7 | 69·2 | 56·3 | 44·2 | 43·7 | 53·3 | 55·3 | *55·4 |
| 24. Barley | 31·7 | 32·7 | 44·2 | 31·5 | 27·7 | 23·4 | 24·7 | 28·5 | 33·2 | 36·0 | 34·7 | 41·1 | 42·1 | 34·7 | 33·5 | 36·6 | 36·1 | *35·2 |
| 25. Oats | 22·5 | 23·7 | 28·7 | 20·5 | 17·5 | 16·4 | 18·6 | 19·1 | 21·0 | 27·9 | 27·4 | 25·2 | 25·0 | 24·5 | 23·2 | 24·4 | 23·7 | *23·0 |
| 26. Rye | 32·3 | 35·0 | 49·0 | 30·4 | 26·2 | 23·3 | 25·5 | 29·8 | 35·0 | 45·8 | 45·7 | 45·0 | 38·3 | 32·3 | 32·3 | 36·3 | 35·7 | *37·2 |
| 27. Beans | 39·0 | 38·9 | 50·5 | 36·7 | 30·6 | 26·8 | 28·6 | 32·3 | 40·1 | 47·3 | 46·5 | 43·9 | 43·0 | 41·9 | 42·3 | 44·7 | 42·4 | *40·3 |
| 28. Peas | 38·7 | 49·0 | 51·4 | 39·2 | 31·5 | 27·2 | 27·2 | 30·6 | 38·5 | 45·6 | 43·3 | 41·6 | 41·3 | 42·9 | 39·7 | 40·5 | 41·2 | *39·9 |
| 29. Hay | 92·3 | 69·4 | 61·0 | 64·0 | 62·0 | 61·1 | 68·0 | 70·0 | 86·6 | 80·2 | 87·7 | 90·4 | 68·5 | 69·6 | 72·1 | 79·7 | 73·3 | 67·2 |
| 30. Clover | 106·5 | 94·5 | 81·5 | 85·5 | 79·5 | 73·5 | 76·0 | 81·5 | 98·0 | 101·5 | 107·0 | 107·5 | 89·5 | 89·5 | 93·5 | 95·5 | 95·5 | 92·5 |
| 31. Straw | 38·4 | 32·7 | 30·8 | 26·6 | 27·9 | 25·0 | 24·3 | 27·1 | 31·4 | 34·4 | 26·6 | 26·9 | 27·4 | 28·5 | 28·0 | 31·6 | 34·0 | 36·3 |
| 32. Beef | 40·7 | 40·6 | 47·3 | 43·4 | 38·8 | 37·3 | 35·9 | 36·4 | 44·4 | 49·2 | 49·7 | 50·4 | 50·4 | 50·2 | 51·4 | 54·6 | 56·7 | 46·9 |
| 33. Mutton | 47·4 | 50·8 | 52·6 | 52·0 | 43·7 | 42·3 | 42·6 | 42·6 | 50·9 | 50·3 | 50·9 | 54·1 | 58·8 | 53·9 | 57·2 | 60·7 | 59·7 | 53·2 |
| 34. Pork | 46·8 | 51·6 | 53·9 | 52·2 | 45·8 | 42·8 | 38·8 | 38·5 | 45·1 | 46·7 | 47·4 | 52·4 | 54·6 | 44·1 | 48·8 | 54·2 | 56·4 | 52·2 |
| 35. Butter | 86·7 | 82·9 | 87·8 | 81·3 | 63·2 | 69·9 | 75·1 | 74·2 | 90·6 | 98·9 | 100·4 | 105·3 | 106·9 | 107·6 | 106·5 | 111·9 | 109·7 | 107·4 |
| 36. Sugar | 32·5 | 34·2 | 28·5 | 23·7 | 25·7 | 26·0 | 25·4 | 22·8 | 24·7 | 22·9 | 26·3 | 29·3 | 37·3 | 27·7 | 26·5 | 27·6 | 24·4 | 24·0 |
| 37. Spirits | 3·06 | 2·93 | 3·93 | 3·27 | 2·53 | 2·46 | 2·49 | 2·17 | 3·10 | 4·38 | 3·71 | 3·38 | 4·25 | 3·53 | 3·43 | 3·30 | 2·72 | 2·29 |
| 38. Tea | 9·9 | 9·2 | 9·0 | 7·7 | 8·6 | 10·9 | 10·6 | 8·6 | 11·5 | 11·7 | 9·0 | 8·9 | 13·2 | 10·3 | 12·8 | 14·5 | 9·3 | 10·1 |
| 39. Pepper | 3·4 | 3·0 | 3·0 | 2·8 | 3·1 | 3·6 | 3·3 | 3·9 | 4·3 | 4·8 | 5·0 | 5·2 | 5·2 | 5·0 | 4·5 | 4·9 | 4·8 | 4·3 |

* Average of first nine months.

*Reduction of the Tables.*

To obtain any accurate conclusions from the above table, it was necessary to reduce it in accordance with principles before considered. The simple arithmetic average price of each commodity for the six years 1845-50 was first drawn, and will be found stated in the tables in Section XVII. This average being assumed as the true or natural average, according to the undisturbed value of gold (see above, p. 31), was divided (arithmetically) into the average price of each separate year, 1845-62. The ratios or percentages thus obtained represent from 1845 to 1850 the proportional variation due to speculative or other ordinary fluctuations. Since 1850 the percentages express the rise of prices above their former ordinary level, affected of course by any temporary fluctuations. In the following table these percentages are given in detail.

*TABLE showing the ratio of the Average Price of each separate Year, 1845-62, to the Average of the Years 1845-50.*

| Commodity. | 1845 | 1846 | 1847 | 1848 | 1849 | 1850 | 1851 | 1852 | 1853 | 1854 | 1855 | 1856 | 1857 | 1858 | 1859 | 1860 | 1861 | 1862 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Silver | 99 | 100 | 100 | 100 | 100 | 101 | 102 | 102 | 103 | 103 | 103 | 103 | 104 | 103 | 104 | 104 | 102 | 103 |
| 2. Tin | 102 | 112 | 106 | 91 | 94 | 95 | 100 | 106 | 135 | 142 | 139 | 156 | 160 | 140 | 155 | 160 | 144 | 137 |
| 3. Copper | 99 | 104 | 110 | 96 | 95 | 96 | 96 | 109 | 131 | 143 | 143 | 134 | 140 | 122 | 124 | 121 | 112 | 109 |
| 4. Lead | 104 | 107 | 105 | 95 | 89 | 100 | 97 | 100 | 135 | 134 | 132 | 142 | 137 | 126 | 127 | 124 | 115 | 117 |
| 5. Bar Iron | 116 | 120 | 122 | 90 | 78 | 174 | 70 | 78 | 116 | 124 | 107 | 113 | 106 | 90 | 88 | 82 | 78 | 78 |
| 6. Pig Iron | 120 | 114 | 108 | 93 | 84 | 80 | 75 | 82 | 109 | 131 | 114 | 129 | 120 | 102 | 86 | 85 | 77 | 74 |
| 7. Tin Plates | 108 | 100 | 95 | 93 | 101 | 102 | 101 | 92 | 113 | 104 | 105 | 118 | 124 | 105 | 104 | 99 | 92 | 88 |
| 8. Palm Oil | 90 | 96 | 115 | 102 | 100 | 95 | 88 | 91 | 118 | 149 | 138 | 134 | 140 | 124 | 142 | 145 | 141 | 134 |
| 9. Linseed Oil | 95 | 94 | 100 | 88 | 101 | 122 | 121 | 106 | 113 | 137 | 151 | 141 | 145 | 119 | 109 | 110 | 119 | 148 |
| 10. Tallow | 95 | 102 | 114 | 110 | 91 | 88 | 90 | 92 | 118 | 150 | 134 | 128 | 137 | 122 | 130 | 132 | 126 | 110 |
| 11. Hides | 115 | 120 | 108 | 86 | 84 | 88 | 104 | 98 | 115 | 136 | 154 | 190 | 247 | 200 | 202 | 204 | 182 | 167 |
| 12. Leather | 112 | 105 | 100 | 99 | 92 | 91 | 96 | 92 | 117 | 130 | 130 | 139 | 185 | 145 | 149 | 166 | 143 | 139 |
| 13. Timber | 113 | 111 | 112 | 96 | 88 | 80 | 79 | 78 | 102 | 107 | 105 | 94 | 94 | 84 | 90 | 88 | 91 | 84 |
| 14. Logwood | 118 | 111 | 102 | 92 | 86 | 91 | 92 | 88 | 99 | 113 | 105 | 122 | 119 | 120 | 98 | 91 | 107 | 143 |
| 15. Indigo | 108 | 104 | 106 | 89 | 90 | 103 | 120 | 128 | 167 | 158 | 109 | 115 | 127 | 132 | 120 | 135 | 141 | 156 |
| 16. Upland Cotton | 81 | 91 | 119 | 79 | 95 | 135 | 107 | 100 | 100 | 100 | 107 | 112 | 135 | 116 | 121 | 102 | *144 | *349 |
| 17. Pernam. Cotton | 94 | 109 | 112 | 88 | 81 | 116 | 110 | 103 | 103 | 103 | 103 | 105 | 129 | 121 | 123 | 121 | *140 | *263 |
| 18. Surat Cotton | 78 | 88 | 117 | 84 | 101 | 133 | 104 | 97 | 91 | 91 | 101 | 114 | 140 | 123 | 123 | 108 | *153 | *315 |
| 19. Wool | 117 | 115 | 102 | 79 | 87 | 100 | 104 | 113 | 134 | 105 | 104 | 132 | 152 | 115 | 140 | 148 | 131 | 135 |
| 20. Silk | 114 | 106 | 90 | 91 | 94 | 105 | 115 | 113 | 120 | 121 | 111 | 154 | 199 | 116 | 140 | 164 | 151 | 148 |
| 21. Flax | 106 | 112 | 114 | 89 | 84 | 95 | 102 | 107 | 111 | 114 | 118 | 121 | 125 | 127 | 162 | 148 | 153 | 150 |
| 22. Hemp | 90 | 101 | 119 | 100 | 94 | 96 | 95 | 99 | 102 | 105 | 108 | 111 | 106 | 92 | 91 | 94 | 100 | 112 |
| 23. Wheat | 98 | 106 | 135 | 98 | 86 | 78 | 74 | 79 | 103 | 140 | 144 | 134 | 109 | 85 | 85 | 103 | 107 | 107 |
| 24. Barley | 99 | 103 | 139 | 99 | 87 | 73 | 78 | 89 | 104 | 113 | 109 | 129 | 132 | 109 | 105 | 115 | 113 | 110 |
| 25. Oats | 104 | 110 | 133 | 95 | 81 | 76 | 86 | 89 | 97 | 130 | 127 | 117 | 116 | 114 | 108 | 113 | 110 | 107 |
| 26. Rye | 99 | 107 | 150 | 93 | 80 | 71 | 78 | 91 | 107 | 140 | 140 | 138 | 117 | 99 | 99 | 111 | 109 | 113 |
| 27. Beans | 105 | 104 | 136 | 99 | 82 | 73 | 77 | 87 | 108 | 127 | 125 | 118 | 116 | 113 | 114 | 120 | 114 | 108 |
| 28. Peas | 98 | 124 | 130 | 99 | 90 | 69 | 69 | 77 | 98 | 116 | 110 | 105 | 105 | 109 | 101 | 103 | 104 | 101 |
| 29. Hay | 135 | 102 | 89 | 94 | 91 | 89 | 100 | 102 | 127 | 118 | 128 | 132 | 100 | 102 | 106 | 117 | 107 | 98 |
| 30. Clover | 123 | 109 | 94 | 98 | 92 | 85 | 88 | 94 | 113 | 117 | 123 | 124 | 103 | 103 | 108 | 110 | 110 | 107 |
| 31. Straw | 127 | 108 | 102 | 88 | 92 | 83 | 80 | 89 | 104 | 114 | 88 | 89 | 91 | 94 | 92 | 104 | 112 | 120 |
| 32. Beef | 98 | 98 | 114 | 105 | 94 | 90 | 87 | 88 | 107 | 119 | 120 | 122 | 122 | 121 | 124 | 132 | 137 | 113 |
| 33. Mutton | 99 | 106 | 109 | 108 | 91 | 88 | 88 | 88 | 106 | 105 | 106 | 112 | 122 | 112 | 119 | 126 | 124 | 110 |
| 34. Pork | 96 | 106 | 110 | 107 | 94 | 88 | 79 | 79 | 92 | 96 | 97 | 107 | 112 | 90 | 100 | 111 | 115 | 107 |
| 35. Butter | 110 | 105 | 112 | 103 | 80 | 89 | 95 | 94 | 115 | 126 | 128 | 134 | 136 | 137 | 135 | 142 | 140 | 137 |
| 36. Sugar | 114 | 120 | 100 | 83 | 90 | 91 | 89 | 80 | 87 | 80 | 92 | 103 | 131 | 97 | 93 | 97 | 86 | 84 |
| 37. Spirits | 101 | 97 | 130 | 108 | 83 | 81 | 82 | 72 | 102 | 143 | 122 | 110 | 140 | 116 | 113 | 109 | 90 | 76 |
| 38. Tea | 107 | 100 | 98 | 83 | 93 | 118 | 115 | 94 | 125 | 127 | 98 | 97 | 144 | 112 | 139 | 158 | 102 | 110 |
| 39. Pepper | 109 | 95 | 96 | 88 | 99 | 113 | 105 | 125 | 138 | 153 | 160 | 167 | 166 | 160 | 144 | 156 | 152 | 138 |

* Not further used.

To display more clearly the great variations in the above table, free from minor fluctuations, I have grouped together those commodities which seemed to have anything in common, and calculated the average ratios or percentages as described at pp. 19-21. I have lastly deduced the general average variation from year to year of the whole thirty-nine commodities. The descriptions of the groups and the average numbers are given in the following table, the contents of which are more easily seen in the accompanying diagram. The general course of the Bank minimum rate of discount is added in the diagram, because its comparison with the general average course of prices is interesting, and will probably justify my assumptions in Section XII., pp. 31-33.

*TABLE showing the Average ratio of Prices each year, 1845-62, to the Average Prices of 1845-50.*

| AVERAGE OF | 1845 | 1846 | 1847 | 1848 | 1849 | 1850 | 1851 | 1852 | 1853 | 1854 | 1855 | 1856 | 1857 | 1858 | 1859 | 1860 | 1861 | 1862 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Silver - | 99.2 | 99.7 | 100.3 | 99.9 | 100.2 | 100.7 | 102.4 | 101.7 | 103.2 | 103.4 | 103.1 | 103.0 | 103.8 | 103.0 | 104.1 | 103.6 | 102.2 | 103.3 |
| 2-7. Metals - | 108.1 | 109.0 | 107.5 | 93.2 | 89.9 | 90.5 | 88.9 | 93.8 | 122.7 | 129.2 | 122.5 | 131.2 | 130.1 | 113.0 | 111.4 | 108.8 | 100.5 | 98.0 |
| 13. Timber - | 112.6 | 111.3 | 111.7 | 96.0 | 88.1 | 80.4 | 78.5 | 78.0 | 102.4 | 107.3 | 105.3 | 94.3 | 93.9 | 84.0 | 89.6 | 87.5 | 90.8 | 84.3 |
| 8 & 9. Oils - - | 92.6 | 95.1 | 107.6 | 94.9 | 100.6 | 107.9 | 103.4 | 98.4 | 115.1 | 142.8 | 144.2 | 137.4 | 142.8 | 121.8 | 124.5 | 128.8 | 88.5 | 83.7 |
| 10-12. Tallow, etc. | 106 8 | 109.0 | 107.1 | 97.6 | 88.9 | 89.0 | 96.4 | 93.8 | 116.7 | 138.4 | 138.6 | 150.0 | 184.5 | 152.5 | 157.6 | 164.8 | 148.7 | 136.8 |
| 16-18. Cotton - | 84.1 | 95.3 | 115.9 | 83.8 | 92.0 | 127.7 | 107.0 | 100.1 | 97.8 | 97.8 | 103.5 | 110.0 | 134.3 | 120.3 | 122.5 | 110.0 | (110.0) | (110.0) |
| 19-21. Wool, etc. - | 112.0 | 111.0 | 101.2 | 86.4 | 88.4 | 100.0 | 106.9 | 110.9 | 120.1 | 113.1 | 110.8 | 135.2 | 155.9 | 119.0 | 147.0 | 153.0 | 144.8 | 144.0 |
| 23-28. Corn - - | 100.6 | 108.8 | 137.0 | 97.1 | 82.7 | 73.3 | 76.9 | 85.3 | 102.8 | 127.3 | 125.2 | 123.0 | 115.4 | 104.2 | 101.3 | 110.6 | 109.7 | 107.9 |
| 29-31. Hay, etc. - | 128.2 | 106.1 | 94.8 | 93.3 | 91.6 | 85.5 | 88.8 | 95.1 | 114.1 | 116.1 | 111.7 | 113.4 | 97.9 | 99.7 | 101.7 | 110.3 | 109.8 | 108.0 |
| 32-35. Meat - - | 100.6 | 103.6 | 111.4 | 105.8 | 89.5 | 88.6 | 87.4 | 87.2 | 104.8 | 110.6 | 112.0 | 118.5 | 122.7 | 113.8 | 118.9 | 127.3 | 128.7 | 116.3 |
| 36-39. Sugar, etc. - | 107.8 | 102.6 | 105.1 | 90.2 | 91.2 | 100.0 | 97.0 | 90.2 | 111.1 | 122.5 | 115.5 | 116.4 | 144.6 | 119.4 | 120.6 | 126.8 | 104.4 | 99.2 |
| 14 & 15. Dyes - | 113.0 | 107.5 | 103.8 | 90.2 | 88.0 | 97.2 | 105.2 | 106.1 | 128.9 | 133.4 | 107.3 | 118.2 | 122.9 | 125.6 | 108.3 | 110.8 | 122.8 | 149.4 |
| 22. Hemp omitted | — | — | — | — | — | — | — | — | — | -- | — | — | — | -- | — | — | — | — |
| The whole thirty-nine | 104.4 | 105.4 | 110.8 | 94.1 | 89.6 | 92.1 | 92.4 | 93.8 | 111.3 | 120.7 | 117.6 | 122.5 | 128.8 | 114.2 | 116.0 | 117.9 | 115.1 | 113.4 |

## XIV.—*Remarks on the Variation of Prices since* 1845.

The general average variation of the whole thirty-nine commodities may be taken as an approximate representation of the great fluctuations in speculation and investment which we have before considered. All the commodities, excepting perhaps silver, show in their separate fluctuations some influence of speculation. In such natural products as cotton, sugar, tea, logwood, and indigo, the variations due to speculative demand are much obscured by irregular fluctuations due to accidents of supply. We see that fibrous materials such as wool, silk, flax, and especially cotton, do not partake in any marked manner in the sudden rise during the period of speculation and permanent investment about 1853. It is in the metals, iron, copper, lead and tin, that we find the variation of demand most perfectly marked. Especially is it to be remarked that the curve of these metals is almost exactly that of the general average somewhat exaggerated. Metals, as has been before said (pp. 23-4), are subject only to variations of demand, or to very slow and occasional variations of supply. Timber manifests in the next degree the preponderance of demand-variations over supply-variations. Thus its variations closely resemble those of the metals, with a little more undulation and a general tendency downwards. Oils are chiefly remarkable for the great rise in 1853, more than compensated by the recent fall. The animal materials, tallow, hides, and leather, show a strong resemblance to the speculative variations of metals joined with a great and exceptional rise since 1852, which must indicate that the increase of demand tends to outrun a supply incapable of great increase. Butchers' meat displays a great rise in the last ten years, partly no doubt from the same cause. Its highest points usually follow those of hay, clover, and straw. The prices of the latter do not show the same tendency to a progressive rise, but then we should remember that the prices apply to London only. The prices of corn, meat, and fodder show so much relation

to the speculative changes of metals, to the general average variations, and to the rate of discount, that it cannot be doubted there is a close relation of cause and effect. The bountiful or scarce supplies of food with which Providence favours us in the several seasons, strongly contribute to hasten or retard the several periods of abundant capital and investment, and again those of scarcity and revulsion. The current of human business is ever ready to break into a ripple. A good or bad season marks it with a crest or a trough, and the fluctuation multiplies and continues itself. Yet, according to a known principle, it insensibly tends to fall into pace with the fluctuations of nature, which it may obey but cannot rule.*

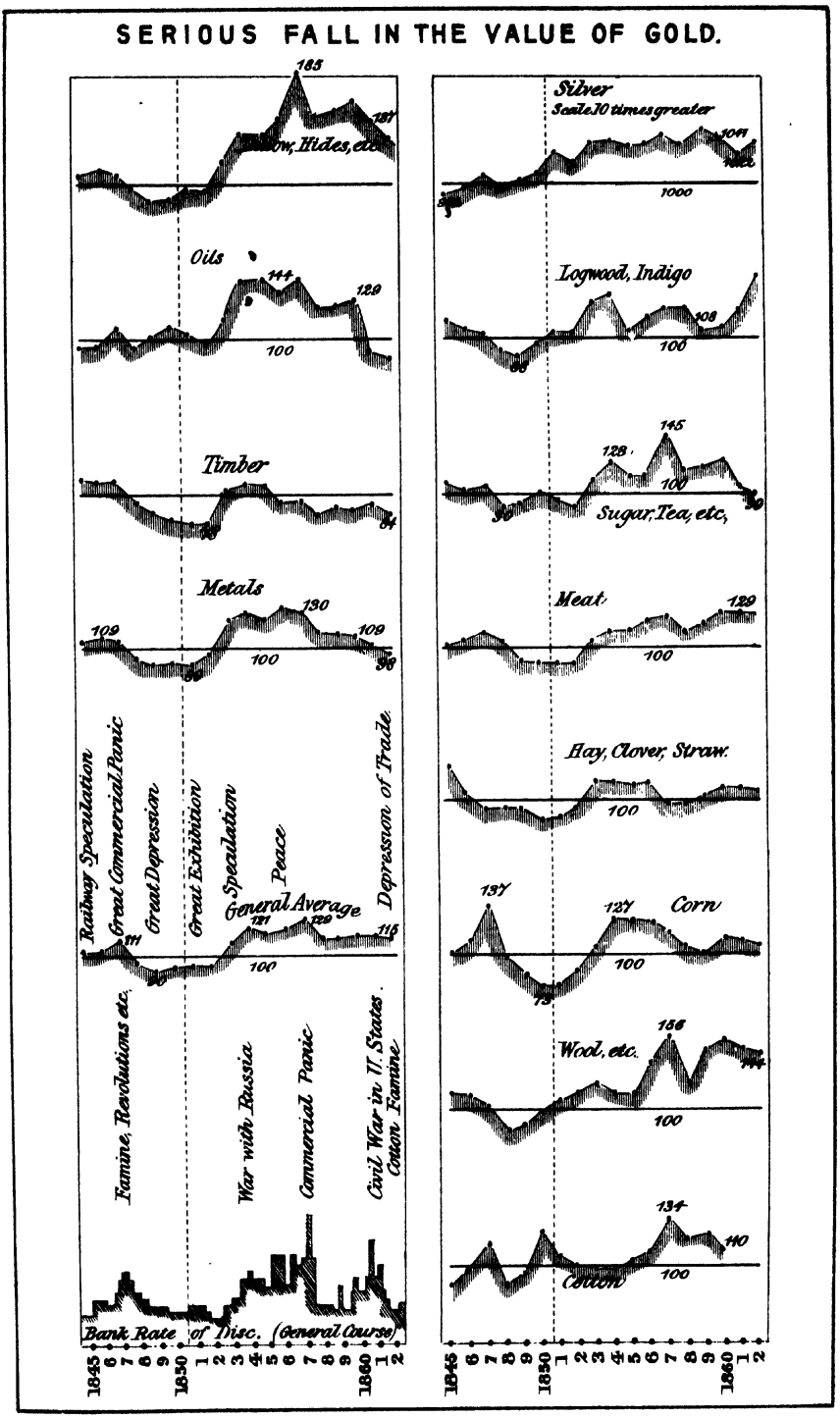
But we must hasten to conclusions which more immediately concern us.

### XV.—*Proof of Depreciation of Gold pointed out.*

It is hardly necessary to draw attention to the permanent elevation of prices since 1853, which is shown in the curve of the general average. Now we cannot possibly account for this permanent change by any excessive speculation, inflation of currency, or credit. For to every extraordinary increase caused by such means at one period there must be a corresponding revulsion soon following. Such a revulsion took place in 1857; but, although five years have since elapsed, prices are far from having fallen to their old level. In the last two years especially the dearth of cotton has caused a depression of trade of a formidable character. The lowest average range of prices since 1851 has indeed happened in the last year, 1862; but prices even then stood 13 per cent. above the average level of 1845-50; and it is most highly improbable that prices will long continue to fall; yet prices have continually stood above the high point they reached in 1847! *Examine the yearly average prices at any point of their fluctuations*

* This is the idea which I subsequently endeavoured to work out in the paper No. VI., read to the British Association in 1878. The succeeding papers on the relation of the Commercial to the Solar Cycle furnish, as I now conceive, the true explanation.

*PLATE II*




*To Face p 44*

*since 1852, and they stand above any point of their fluctuations before then within the scope of my tables!* There is but one way of accounting for such a fact, and that is by supposing a very considerable permanent depreciation of gold.

### XVI.—*That Prices are now near a Minimum.*

I think no one will doubt that during the last year, 1862, and at present, we are at or near the lowest point, and at very low water of the commercial tide. The low rate of discount in 1862, and the very low prices to which metals especially have fallen, testify this, apart from more general facts. Numerous large foreign loans, and innumerable schemes for foreign or home banks, discount companies, hotel, railway, and other undertakings, involving permanent investments, show that we are in one of those periods which must be followed by a rise of prices and of interest, unless extraordinary events should interfere. The depression of the cotton trade, and the sad political confusion in the United States, at present moderate the tendency to speculation. But when the end of the civil war, disastrous to the Northern States, comes, as it certainly must, and when the cotton trade begins to resume its wonted course, we may look forward, I confidently believe, to such a period of prosperity as even England has hardly yet experienced. The great danger is that the excess of speculation may bring its usual punishment. But the consequence that concerns us now is that prices cannot fall much further; that they must be regarded as ready to rise rapidly upon the first signs of a revival of trade; that the present minimum will be soon succeeded by a maximum, doubtless surpassing that of 1857. The permanent elevation of prices, due to gold depreciation, will then be more apparent to all.

### XVII.—*An extended Proof that Prices are now raised above their old Level.*

Having ascertained, as I think, beyond reasonable doubt, that prices in the last few years, though compara-

tively low, and near the turn of the tide, are yet greatly raised above their old natural level, I have not restricted myself to the thirty-nine commodities concerning which this was proved. We may safely say that the prices of all minor commodities are at the same point of their course, and *in the same comparative condition*. A far more expeditious comparison of the recent prices of such minor commodities with their former prices, will thus serve to confirm or refute the statement that there is a general rise of prices, not due to any temporary fluctuations, but perhaps to a permanent alteration in the value of gold. Taking again the lists of *The Economist*, I selected seventy-nine additional commodities, mostly distinct from any of the thirty-nine, and likely to vary independently of them and of each other. Quotations of these were taken, as before described, in the middle of the months of February and August, in each of the years 1845-50, and again in 1860-62. The arithmetical average of the twelve quotations 1845-50 was then divided by logarithms into the arithmetical average of the six quotations 1860-62. The ratio or percentage thus obtained represents the rise of price (during a speculative minimum) due to any fall of the value of gold, affected by any change of value peculiar to the commodity. Adding the corresponding data for the thirty-nine chief commodities from previous tables, we get the following list of 118 commodities, and the ratios of variation of their prices in the interval between 1845-50 and 1860-62.

| | Description of Commodity. (Numbers refer to List on pages 34-37.) | | Average Price, 1845-50. | Average Price, 1860-62. | Logarithm of Ratio. | Ratio, or per-centage. |
|---|---|---|---|---|---|---|
| 1. | *Silver* | std. oz.—*d* | 59.53 | 61.31 | .0128 | 103 |
| 2. | *Tin* | ton—£ | 85.00 | 124.80 | .1668 | 147 |
| 3. | *Copper* | ton—£ | 88.30 | 100.9 | .0578 | 114 |
| 4. | *Lead* | ton—£ | 17.8 | 21.0 | .0737 | 118 |
| | Red lead | ton—£ | 19.44 | 23.10 | .0749 | 119 |
| | White lead | ton—£ | 24.00 | 28.04 | .0676 | 117 |
| | Foreign spelter | ton—£ | 18.56 | 18.73 | .0039 | 101 |
| | Swedish steel | ton—£ | 14.86 | 16.71 | .0510 | 112 |
| 5. | *Bar Iron* | ton—*s* | 159.6 | 127.1 | 9.9011 | 80 |
| 6. | *Pig Iron* | ton—*s* | 88.4 | 69.4 | 9.8952 | 79 |
| 7. | *Tin Plates* (iron) | box—*s* | 31.66 | 29.45 | 9.9685 | 93 |
| 8. | *Palm Oil* | ton—£ | 31.87 | 44.57 | .1457 | 140 |
| 9. | *Linseed Oil* | ton—£ | 26.19 | 33.00 | .1000 | 126 |
| | Sperm oil | tun—£ | 80.94 | 96.33 | .0756 | 119 |
| | Olive oil, Gallipoli | tun—£ | 44.6 | 59.1 | .1220 | 132 |
| | Cocoa-nut oil | ton—£ | 38.63 | 48.60 | .0997 | 126 |
| | Rapeseed oil, pale | ton—£ | 37.20 | 45.12 | .0839 | 121 |
| | Linseed cake, foreign | ton—£ | 7.84 | 10.20 | .1086 | 128 |
| 10. | *Tallow* | cwt.—*s* | 42.67 | 52 37 | .0889 | 123 |
| 11. | *Hides* | lb.—*d* | 5.53 | 10.20 | .2656 | 184 |
| | Hides, Australian | lb.—*d* | 2.00 | 4.19 | .3212 | 210 |
| 12. | *Leather* | lb.—*d* | 10.42 | 15.58 | .1749 | 150 |
| | Calf skins, 28-35 lb. | lb.—*d* | 14.83 | 20.34 | .1373 | 137 |
| | Tar, Stockholm | barrel—*s* | 16.7 | 27.1 | .2103 | 162 |
| | Turpentine, American (1860-1) | cwt.—*d* | 100.75 | 129.7 | .1097 | 129 |
| | ,, English spirits | cwt.—*s* | 38.10 | 35.56 | 9.9701 | 93 |
| | ,, Foreign spirits | cwt.—*s* | 34.4 | 36.5 | .0257 | 106 |
| | Nitrate of Soda | cwt.—*s* | 14.27 | 16.10 | .0524 | 113 |
| 13. | *Timber* | load—*s* | 76.40 | 66.89 | 9.9423 | 88 |
| | Quebec oak | load—*s* | 93.1 | 115.0 | .0918 | 124 |
| | Baltic oak | load—*s* | 103.8 | 88.0 | 9.9283 | 85 |
| | African oak | load—*s* | 180.0 | 228.3 | .1032 | 127 |
| | Indian teak | load—*s* | 230.0 | 288.3 | .0981 | 125 |
| | Deals, Canada, 1st Pine | stand—£ | 16.44 | 17.50 | .0271 | 106 |
| 22. | *Hemp*, Russia | ton—£ | 32.04 | 32.69 | .0087 | 102 |
| | Manilla hemp | ton—£ | 32.58 | 30.10 | 9.9656 | 92 |
| | East Indian Sunn | ton—£ | 16.0 | 17.5 | .0389 | 109 |
| | Jute | ton—£ | 16.0 | 16.5 | .0134 | 103 |
| 16. | *Upland Cotton* | lb.—*d* | 5.38 | 5.5 | .0100 | 102 |
| 17. | *Pernam. Cotton* | lb.—*d* | 6.8 | 8.25 | .0845 | 121 |
| 18. | *Surat Cotton* | lb.—*d* | 3.85 | 4.13 | .0294 | 107 |
| 19. | *Wool*, Southdown | pack—£ | 13.31 | 18.35 | .1395 | 138 |
| | Wool, German, 1st and 2nd | lb.—*d* | 41.54 | 46.67 | .0505 | 112 |
| | Wool, German. tertia | lb.—*d* | 19.0 | 17.3 | 9.9592 | 91 |
| | Wool, Sydney lambs | lb.—*d* | 18.0 | 21.7 | .0812 | 121 |
| | Wool, V.D.L., Locks and Pieces, | lb.—*d* | 10.5 | 14.3 | .1350 | 136 |
| 20. | *Silk*, Cossimbuzar | lb.—*s* | 11.22 | 17.32 | .1883 | 154 |
| | Silk, China, Tsatlee | lb.—*s* | 16.0 | 21.5 | .1283 | 134 |
| | Silk, Raw, white Novi | lb.—*s* | 23.65 | 39.00 | .2173 | 164 |
| | Silk, Organzine, Piedm. 22-24 | lb.—*s* | 26.8 | 38.5 | .1574 | 144 |
| 21. | *Flax*, Riga | ton—£ | 43.8 | 65.8 | .1769 | 150 |
| 14. | *Logwood* | ton—£ | 7.32 | 8.31 | .0551 | 114 |
| 15. | *Indigo* | lb.—*s* | 3.796 | 5.465 | .1583 | 144 |
| | Cochineal, Teneriffe | lb.—*s* | 5.27 | 3.18 | 9.7808 | 60 |
| | Turmeric, Bengal | cwt.—*s* | 14.35 | 15.79 | .0415 | 110 |
| | Terra Japonica, Cutch | cwt.—*s* | 24.02 | 25.46 | .0253 | 106 |
| | Brazil wood | ton—£ | 34.0 | 80.0 | .3716 | 235 |
| | Fustic, Cuba | ton—£ | 8.083 | 8.926 | .0431 | 110 |
| | Sapan wood | ton—£ | 11.63 | 7.86 | 9.8298 | 68 |

| Description of Commodity. (Numbers refer to List on pages 34-37.) | | Average Price, 1845-50. | Average Price, 1860-62. | Logarithm of Ratio. | Ratio, or per-centage. |
|---|---|---|---|---|---|
| 23. | *Wheat* - - - - imp. qr.— *s* | 51.7 | 54.7 | .0244 | 106 |
| 24. | *Barley* - - - - imp. qr.— *s* | 31.87 | 35.90 | .0518 | 113 |
| 25. | *Oats* - - - - imp. qr.— *s* | 21.55 | 23.72 | .0418 | 110 |
| 26. | *Rye* - - - - imp. qr.— *s* | 32.68 | 36.39 | .0467 | 111 |
| 27. | *Beans* - - - - imp. qr.— *s* | 37.11 | 42.44 | .0584 | 114 |
| 28. | *Peas* - - - - imp. qr.— *s* | 39.50 | 40.53 | .0113 | 103 |
| | Rice, Bengal - - - cwt.— *s* | 14.12 | 12.00 | 9.9294 | 85 |
| | Sago, pearl - - - cwt.— *s* | 23.75 | 20.00 | 9.9253 | 84 |
| 29. | *Hay* - - - - load— *s* | 68.3 | 73.4 | .0313 | 107 |
| 30. | *Clover* - - - - load— *s* | 86.8 | 94.0 | .0346 | 108 |
| 31. | *Straw* - - - - load— *s* | 30.2 | 34.0 | .0515 | 112 |
| 32. | *Beef* - - - - stone— *d* | 41.35 | 52.73 | .1056 | 128 |
| | Beef, salt, American - tierce— *s* | 86.04 | 118.67 | .1396 | 138 |
| 33. | *Mutton* - - - - stone— *d* | 48.13 | 57.85 | .0799 | 120 |
| 34. | *Pork* - - - - stone— *d* | 48.87 | 54.27 | .0456 | 111 |
| | Pork, salt, American - tierce— *s* | 67.71 | 91.00 | .1283 | 134 |
| 35. | *Butter* - - - - cwt.— *s* | 78.63 | 109.66 | .1434 | 139 |
| | Cheese, American - - cwt.— *s* | 44.14 | 55.00 | .0956 | 125 |
| | Lard, American - - cwt.— *s* | 45.68 | 59.00 | .1112 | 129 |
| 36. | *Sugar*, Gazette average - cwt.— *s* | 28.45 | 25.33 | 9.9493 | 89 |
| | Sugar, Mauritius, yellow - cwt.— *s* | 42.3 | 27.0 | 9.8051 | 64 |
| | Sugar, Havana, white - cwt.— *s* | 44.33 | 32.46 | 9.8646 | 73 |
| | Sugar, Java, grey and white cwt.— *s* | 41.44 | 29.33 | 9.8499 | 71 |
| | Sugar, refined, 8-10 lb. - cwt.— *s* | 67.63 | 55.70 | 9.9158 | 82 |
| | Sugar, Bastards - - cwt.— *s* | 36.3 | 19.5 | 9.7301 | 54 |
| 38. | *Tea*, Congou - - - lb.— *d* | 9.19 | 11.30 | .0898 | 123 |
| | Tea, Souchong - - lb.— *d* | 22.05 | 23.83 | .0337 | 108 |
| | Tea, Orange Pekoe - lb.— *d* | 17.08 | 17.00 | 9.9979 | 100 |
| | Tea, Hyson - - - lb.— *d* | 19.08 | 20.75 | .0364 | 109 |
| | Tea, Gunpowder - - lb.— *d* | 32.75 | 32.50 | 9.9967 | 99 |
| | Coffee, Ceylon, ordinary - cwt.— *s* | 41.03 | 60.58 | .1692 | 148 |
| | Cocoa, Guayaquil - - cwt.— *s* | 33.42 | 64.25 | .2839 | 192 |
| 37. | *Spirits*, Jamaica Rum - gallon— *s* | 3.03 | 2.77 | 9.9610 | 91 |
| | East Indian Rum - - gallon— *d* | 22.06 | 18.50 | 9.9236 | 84 |
| | Spirits, Geneva, common - gallon— *d* | 26.17 | 25.50 | 9.9887 | 97 |
| 39. | *Pepper*, black - - - lb.— *d* | 3.14 | 4.67 | .1722 | 149 |
| | Pepper, white - - - lb.— *d* | 5.56 | 9.33 | .2248 | 168 |
| | Cinnamon, Ceylon - - lb.— *s* | 2.84 | 1.58 | 9.7454 | 56 |
| | Cassia Lignea - - - cwt.— *s* | 70.55 | 89.10 | .1014 | 126 |
| | Cloves, Amboyna - - lb.— *d* | 19.8 | 10.6 | 9.7286 | 54 |
| | Cloves, Bourbon - - lb.— *d* | 8.21 | 4.00 | 9.6878 | 49 |
| | Ginger, East Indian, common cwt.— *s* | 44.8 | 36.0 | 9.9050 | 80 |
| | Mace - - - - lb.— *d* | 35.6 | 19.3 | 9.7347 | 54 |
| | Nutmegs - - - - lb.— *d* | 29.7 | 29.5 | 9.9970 | 99 |
| | Tobacco, Maryland - - lb.— *d* | 6.2 | 6.5 | .0198 | 105 |
| | Seeds, Caraway - - cwt.— *s* | 37.21 | 31.50 | 9.9276 | 85 |
| | Seeds, Canary - - - qr.— *s* | 72.63 | 51.42 | 9.8500 | 71 |
| | Seeds, Clover, red - - cwt.— *s* | 45.60 | 51.33 | .0514 | 113 |
| | Seeds, Coriander - - cwt.— *s* | 17.08 | 15.50 | 9.9578 | 91 |
| | Seeds, Mustard - - bush.— *s* | 12.92 | 15.00 | .0648 | 116 |
| | Almonds, sweet Barbary - cwt.— *s* | 44.73 | 45.92 | .0114 | 103 |
| | Currants, Patras, new - cwt.— *s* | 44.00 | 30.93 | 9.8469 | 70 |
| | Figs, Turkey - - - cwt.— *s* | 55.8 | 42.2 | 9.8784 | 76 |
| | Prunes - - - - cwt.— *s* | 27.6 | 29.4 | .0274 | 107 |
| | Raisins, Valentia, new - cwt.— *s* | 39.85 | 32.83 | 9.9159 | 82 |
| | Port Wine - - - pipe—£ | 34.5 | 52.6 | .1832 | 152 |
| | Claret Wine - - - hhead.—£ | 26.5 | 36.5 | .1391 | 138 |
| | Sherry Wine - - - butt—£ | 44.0 | 48.3 | .0404 | 111 |
| | Madeira Wine - - - pipe—£ | 36.5 | 62.5 | .2336 | 17 |

The results of the above tables are displayed in the diagram following p. 52, in which large dots for the thirty-nine chief commodities, and small dots for the minor commodities, indicate the rise or fall in price of each upon a logarithmic scale. The thin horizontal lines, inserted at intervals, decreasing upwards, show the percentage of rise or fall. The average rise or fall of each group, and the average rise of the whole, are indicated by dotted lines. At the left-hand side the chief and minor commodities are represented in two groups, so as to point out more clearly the preponderating rise of prices.

## XVIII.—*Remarks upon the average and individual Changes of Price.*

From the preceding lists we may deduce the average rise of the whole 118 commodities, or varieties of commodity, by taking the arithmetical mean of the logarithms, and turning it back into ordinary numbers. Doing this separately for the thirty-nine chief, and the seventy-nine minor articles, I find that the prices of the former have on an average risen between 1845-50 and 1860-62 in the ratio of 100 to 116.2, which is equivalent to a depreciation of gold in the ratio of 100 to 86.0, or by 14.0 per cent.

The minor commodities, however, give a somewhat different result. In taking the mean I have treated those which are bracketed together in the last column as having the importance only of a single commodity, so that only the mean of the ratios bracketed entered into the general average. We thus find that there are sixty-four independent minor articles of which the prices have on the average risen between 1845-50 and 1860-62 in the ratio of 100 to 106.76, which would indicate a depreciation of gold in the ratio of 100 to 93.66, or by 6.34 per cent, not half the change shown by the chief commodities.

If we take the average of the whole, *the rise of prices is found to be in the ratio of* 100 *to* 110.25, *or by* 10¼ *per cent, corresponding to a depreciation of gold in the ratio of* 100 *to* 90.70, *or by about* 9⅓ *per cent.*

This result is one which must, I think, excite some surprise. During a period of depression, at low water of the commercial tide, the prices of 118 commodities or varieties of commodity, comprising nearly all the great staple articles, stand 10 per cent higher than they did before the gold discoveries, according to the mean level of prices during the preceding commercial tide. One naturally asks, if this is the rise at low tide, what will be the rise at high tide? Even in 1857, only five or six years after the supplies of gold began to arrive, prices at high tide were 29 per cent above the average, and within the next half-dozen years it may be reasonably expected that they will rise considerably higher still, probably from 40 to 50 per cent above the old average of 1845-50.*

The rise of the thirty-nine chief commodities in 1860-62 has been stated at about 16 per cent. If we deduce from the table on p. 42 the average ratio of rise for the whole twelve years, 1851-62, we find that it is 13 per cent. This is a correct average of a complete commercial tide, but it of course shows only partially the influence of the gold supplies which were constantly arriving *during* the period.

Nor is our surprise much decreased by considering merely the numbers of commodities which have risen and fallen in price. Of the thirty-nine chief commodities, thirty-three have risen more or less between 1845-50 and 1860-62, and only six have fallen; that is, less than one in six. Although it is against the principle I have adopted in this inquiry to refer to the individual circumstances of commodities, it hardly needs to be pointed out that of these six exceptions, three—bar iron, pig iron, and tinned-iron plates—are only forms of one commodity, for which there was an extraordinary demand during the interval 1845-50, and a very slack demand during 1860-62. Both iron and timber, another exception, being articles subject to great demand-variations, might thus, from their peculiar circumstances, have been excluded from the tables, had not the principle of the inquiry forbidden exclusion. Sugar and spirits stand out as the only two obstinate

* This prediction was not verified.

and real exceptions to a general rise of prices; but again, as Jamaica rum, quoted for spirits, is made from sugar, they might be said to form only a single exception.

It is somewhat otherwise with the minor articles. Of the seventy-nine varieties of commodity, twenty-nine, or more than one in three, have fallen in price. If we do not count separately those varieties of commodity which are bracketed together, we find that out of sixty-four articles, nineteen, or rather less than one in three, have fallen in price.

It is quite obvious that the exceptions consist almost entirely of spices, fruit, and foreign articles of food, which are not employed in manufacture by the English people, but only applied to their personal use. The distinction is so well marked and interesting that I give the following averages. Twelve groups of articles have risen in price, and by the following amounts:

| | | | |
|---|---|---|---|
| Tallow, hides, etc. | 58 per cent | Dyes | 9 per cent |
| Wines | 41 „ | Grain | 9 „ |
| Meat and butter | 28 „ | Hay, clover, & straw | 9 „ |
| Oils | 27 „ | Timber | 8 „ |
| Fibrous materials | 27 „ | Metals | 6 „ |
| Tar, turpentine, etc. | 18 „ | Hemp, jute, etc. | 2 „ |

Six groups of articles have fallen in price, and by the following amounts:

| | | | |
|---|---|---|---|
| Sugar, tea, and coffee | 5 per cent | Fruit (foreign) | 14 per cent |
| Seeds | 7 „ | Rice and sago | 15 „ |
| Spirits | 9 „ | Spices, tobacco, etc. | 15 „ |

There can be no doubt that the groups which have risen in the highest degree, such as hides, tallow, leather, wines, butchers' meat and oils, have so risen from preponderance of demand over supply. They comprise articles of which the demand increases rapidly with the wealth and population of the country, while the supply is naturally limited; they comprise the principal animal materials. On the other hand, all the groups which have fallen in price are

of vegetable origin, and chiefly of foreign growth.* As a general rule, then, animal and mineral substances have risen in price, and vegetable substances fallen. But this does not prevent our asserting that, on the whole, there is a great general rise. *The groups of articles which have risen are twice as numerous as those which have fallen, comprise immensely more important articles of wealth, and have risen more than the others have fallen.* There can be no room to doubt, then, the great preponderance of the rising prices over the falling prices, as will be more fully shown in the next section.

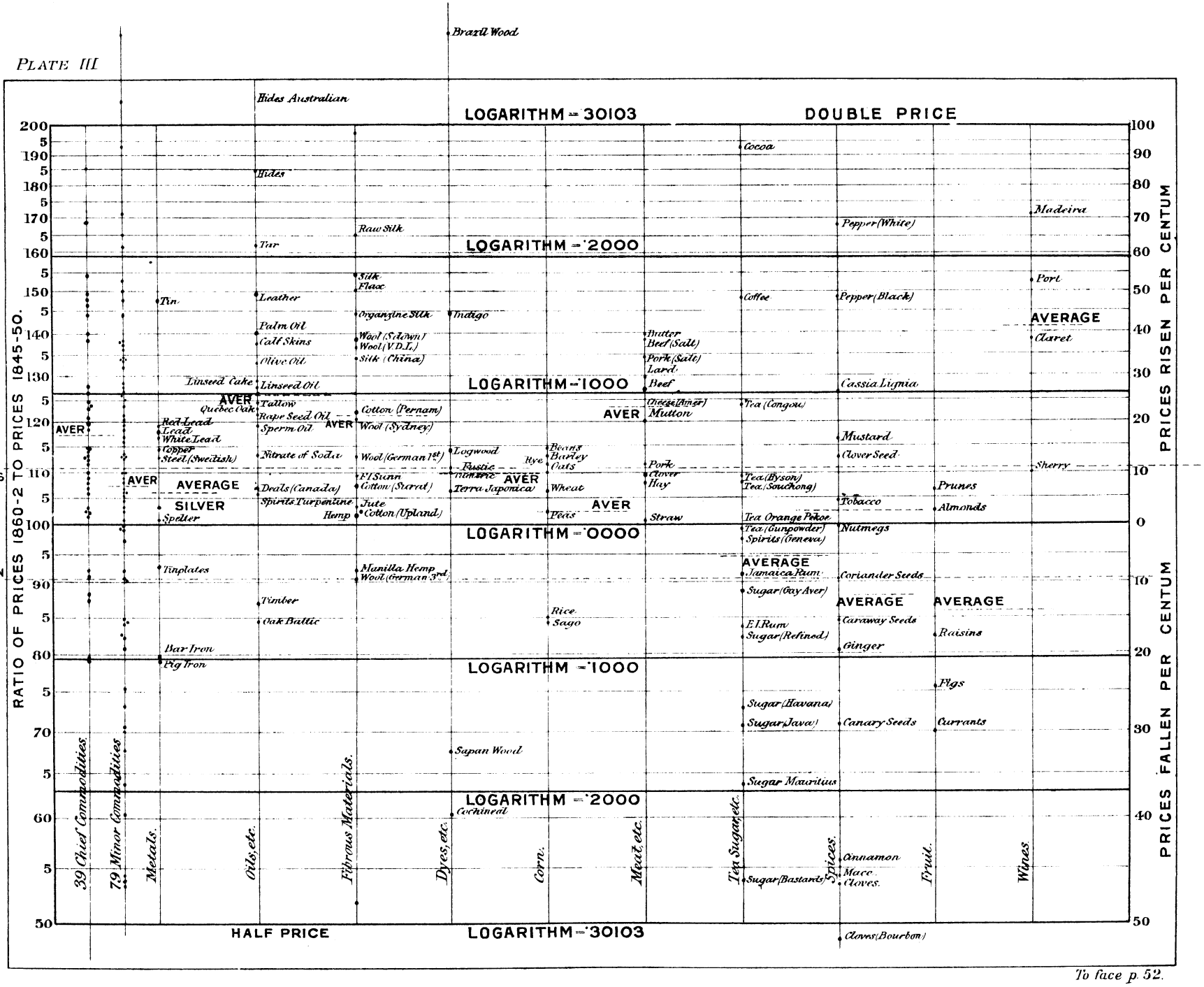
The marked distinction between the classes of materials which have risen in price, and those of foreign articles of food which have fallen suggests its own explanation. It is English manufacturing skill which invests the materials with such useful and attractive forms that they are desired all the world over. The great demand thus arising for our manufactures causes the demand for their materials to increase generally, and the prices of most of the materials must increase with their demand. On the other hand, foreigners can only purchase our manufactures by offering something in return. When they can offer materials of manufacture, they share the advantage of the rising prices; but often they can only offer foreign articles of food and luxury, for which there is a stationary, or but slightly growing demand. To increase their purchases it is necessary to increase their sales, which can only be done by forcing their produce upon our markets at reduced prices. It is thus that manufacturing skill, making our produce more desired and dearer, turns the balance of purchases in our favour, and makes foreign produce cheaper in our markets.†

* Compare these results with Cairnes' theoretical anticipations that the rise of price will be greater in animal than in vegetable productions: "While the commodities the last to feel the effects of the new money, and which will advance most slowly under its influence, are the productions of India and China."—"Essays in Political Economy, Theoretical and Applied," 1873 (Macmillan), p. 73; "British Association, 1858, Transactions of Sections," p. 174. This important paper is printed also in "The Journal of the Dublin Statistical Society," January, 1859, vol. ii. pp. 236–69.

† There may be some truth in this explanation, but Cairnes' theory of the course of depreciation, given in the essay just cited, no doubt contains the true key to the explanation of the phenomena in question.

# SERIOUS FALL IN THE VALUE OF GOLD.

PLATE III




To face p. 52.

## XIX.—*Of other Modes of Reduction.*

It may seem to many persons absurd to take a mass of 118 commodities, and treat them as equally good measures of the value of gold, some being so greatly more important and more free from fluctuations than others. I have considered and tried many ways of deducing an average which should obviate this objection more or less perfectly. I proposed to give to each commodity a greater weight, as the range between the highest and lowest prices of the interval 1845-62 was less; but on applying this notion to the thirty-nine chief articles, I found that, always excepting silver, the highest price of nearly every one was just about double the lowest price, so that the method could give no result appreciably different from the simple average.

If we were to assume that there is a certain interdependence between the prices of different commodities, it would follow that the true mode of deducing an average would be to give each commodity a weight proportional to the quantity of it sold in the country during a fixed period of time. The only result of such a method would be to make our final estimate approximate to that of the thirty-nine chief commodities. For the value of the total quantity of these sold in a year must be several times as great as that of the minor commodities. The superior importance too of some commodities is allowed for by quoting several varieties.

Another method which I tried was to exclude all commodities which have undergone exceptionally great changes. Thus assuming the logarithm .04202 to be the first approximation to a correct average, I took a fresh average of all those commodities whose ratios lay between —.1000 and .18404, or .14202 on each side of the first average .04202. The new result, however, was not noticeably different from the old one.

I conclude that 10 per cent may be taken as the best approximation which we can get to the rise of prices between 1845-50 and 1860-62. It corresponds to a de-

preciation of gold of about 9 per cent, that is 100:110 : :91 :100 nearly.

It may seem to some persons that the best and perhaps only way to ascertain whether and why prices have altered, is to examine the circumstances of demand and supply of each article. I do not hesitate to say that the whole inquiry would be thrown into confusion by any such attempt, and that for the particular purposes of our inquiry it is better not to know the details concerning the articles. If you are able to explain the rise or fall of one commodity by circumstances unconnected with gold, and throw it out of the inquiry, you must do the same with others, or else the impartial balance of the inquiry is overthrown. Now there is not a single article but is affected by many circumstances besides the alteration in gold. A searching inquiry into the conditions of supply and demand of every article would result in every one being thrown out as unworthy of reliance as a measure of the value of gold. It is only by ignoring all these individual circumstances, and trusting that in a wide average, such as that of 118 articles, all individual discrepancies will be neutralised, that we can arrive at any conclusion in this difficult question.

It should be clearly understood that all the preceding parts of this inquiry are independent of any assumptions as to the cause of the fall in the value of gold. I consider that I have simply established the fact of an alteration in the usual ratios at which gold is exchanged against the great mass of other commodities. Any variation of demand or of supply affecting most commodities, to the exclusion of gold or in a greater degree than gold, or on the other hand affecting gold to the exclusion of other commodities, or in a greater degree than these commodities, may be the complete or partial cause of the alteration. Numerous circumstances might be called in as contributing causes; but all facts I am aware of are so inconsiderable compared with the great discoveries of gold, that it is impossible not to treat these discoveries as the substantial cause of the depreciation. These explanations must be borne in mind in reading the following pages.

## XX.—*Of the Price of Silver.*

It will probably be asked—if prices in general have risen 10 per cent, or thereabouts, how is it with the price of silver? This metal is as good a standard of value as gold; by some it is thought to be better. Ought we not to find every change in the value of gold exactly indicated in the price of silver? This question has at once presented itself to everyone who turned his attention to the subject. It is, I conceive, because the question has not been in general rightly answered, that the depreciation of gold has been so much doubted.

In the first place, it is far from true that no change has taken place in the price of silver. In tables or diagrams already given, we see that a permanent rise of at least 3 per cent has taken place. Before the year 1850, the price might be said to stand permanently below sixty pence, or five shillings, the standard ounce Troy. During the year 1850 a sudden rise took place, and the change has proved so permanent that only one monthly quotation (May, 1852) has since been below sixty pence. It is true that the rise has not been progressive, having attained in 1854 an elevation of about $3\frac{1}{2}$ per cent over the old level, the price has remained nearly stationary, and has even slightly fallen back since 1859. That the gold price of silver should remain stationary has, however, been accounted for by Chevalier, though I must point out a great oversight in that writer's view of the matter.

By the French law of the 7 Germinal, year 11 of the Revolution, an attempt was made to combine gold and silver in the French currency. It was enacted that silver or gold might be used in any payment, in the proportion of $15\frac{1}{2}$ parts of silver for 1 part of gold. The law adopted the proportion of values which silver and gold had long possessed, and continued to possess for some fifty years longer. But this proportion, as we have shown, was altered to the extent of 3 per cent about the year 1850, so that $15\frac{1}{2}$ ounces of silver became more valuable than the ounce of gold for which they were legally payable

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as money in France. Thus it became cheaper to discharge debts in gold in France, and to pay the silver of France away in foreign payments. And so long as there is much silver coin current in France, and the law of the year 11 holds, it will be possible for merchants, by importing gold and exporting silver, to gain the difference of the natural and the legal rates of value in France, *minus* charges of carriage, insurance, etc. Very correctly Chevalier argues that so long as this state of things lasts, it will be impossible at London, Brussels, Hamburg, or even at New York, or any other great centre of commerce, for gold to fall in value much below that of $15\frac{1}{2}$ times its weight of silver. On these grounds he calls the French silver currency a *parachute which retards the fall of the value of gold*. Here is the great oversight. The French currency may and does prevent gold from falling much below its old *relative value to silver*, but it cannot prevent both gold and silver from falling in value. The inevitable conclusion drawn from my tables of prices is that gold has fallen, say 9 per cent; silver has risen in value compared with gold 3 per cent; the difference, 6 *per cent, must necessarily represent the depreciation of silver*. Nor is it hard to see that, from the change of the French currency, silver must participate temporarily in the fall of gold.

The moment the abundance of the Australian and Californian gold has altered the relative values of gold and silver by a certain amount, it becomes profitable for French merchants to buy up with silver *all* gold they can get at or below this new rate, on the single condition that other countries will take French silver in return. One hundred millions of gold flowing into France cause an overflow of one hundred millions of silver out of France. This vast supply of silver is just as unusual, sudden, and superfluous as the supplies of gold from Australia and California. France, in absorbing the new gold, pours out silver just as if it had come from newly-discovered silver mines of extraordinary richness. There can be but one result. The value of silver must fall before the new and unusual supplies can be disposed of. Suppose it to

fall so that silver and gold nearly resume their old relative values. The substitution of gold for silver in France is now no longer profitable. Gold accumulates on the London and other markets, and therefore again begins to fall in value. This cannot proceed far without it once more becoming profitable to substitute gold for silver in France. Gold is again readily absorbed; silver again becomes superfluous and depreciated. Gold and silver thus alternately accumulate upon the markets of the world, and their values alternately fall to the points at which it becomes possible to dispose of the one or other metal in foreign markets, especially in India. What is here described as taking place by steps, may also take place continuously and simultaneously. The superabundance of gold flowing into France causes a superabundance of silver to flow out, just as a stream flowing into one end of a reservoir that is already full, causes an equal stream to flow out at another part.* Both metals are depreciated in company, and nearly as much as gold alone would have fallen had the French currency law not existed. Not quite so low indeed, because by that law it is now possible to dispose of the new gold either by direct use, or indirectly by disposing of French silver at its reduced value, and putting gold in its place.

There is nothing new nor strange in this sympathy between the values of two articles. Any two articles which can be used more or less one in the place of the other, vary in price together. A comparative abundance of either article causes it to overflow into channels of consumption usually filled by the other. When wheat is cheap, it is lavishly used as fodder, for distilling, and for a variety of other uses to which inferior kinds of grain or other produce are usually applied. Thus the cheapness of wheat causes most other kinds of agricultural produce

* This action of the law of the double standard was more maturely treated in my book on "Money and the Mechanism of Exchange" (International Scientific Series), chapter xii.; on "The Battle of the Standards." The same simile of the *reservoir*, or of two reservoirs, was again employed. The matter has, of course, been debated *ad nauseam* during the recent controversies on "Bimetallism." See *post*, Papers XI. to XIII.

to be cheap, and similarly of other groups of commodities.*

These effects of the French currency law are far from being indicated by theory only. The tables already given show by the force of facts that the price of silver has not risen so much by some 6 per cent as the prices of 117 other articles on the average. *This fact constitutes depreciation of silver.* On the other hand, statistics of undoubted accuracy show that up to 1859 about £100,000,000 of gold had been absorbed by France, a large amount of silver being given out. Previously to the year 1852, the annual imports of silver into France had exceeded the exports. In that year, which succeeded the change in the price of silver, the stream turned, and the exports have since constantly exceeded the imports by a large amount. These facts are shown by the following table, calculated from data given in Cobden's translation of Chevalier's Essay, p. 48:

| | | |
|---|---|---|
| 1846 | Excess of *Imports* of silver into France | £1,870,868 |
| 1847 | ,, ,, ,, | 2,145,163 |
| 1848 | ,, ,, ,, | 8,557,338 |
| 1849 | ,, ,, ,, | 9,782,708 |
| 1850 | ,, ,, ,, | 2,615,378 |
| 1851 | ,, ,, ,, | 3,117,959 |
| 1852 | Excess of *Exports* of silver from France | 108,690 |
| 1853 | ,, ,, ,, | 4,675,418 |
| 1854 | ,, ,, ,, | 6,547,751 |
| 1855 | ,, ,, ,, | 7,886,385 |
| 1856 | ,, ,, ,, | 11,342,932 |
| 1857 | ,, ,, ,, | 14,500,835 |

The large amount of silver thrown by France upon European markets has been disposed of in Eastern markets, thus causing, as I think, that remarkable drain of silver to the East which for eight or ten years back has excited so much surprise in the commercial world. Some excellent writers have attributed this drain to the

* On the theory of *equivalence of commodities*, see the "Theory of Political Economy," pp. 127-30; 2nd ed. pp. 145-8; 3rd and 4th eds. pp. 134-7.

balance of trade between Europe and India, as disturbed by the transmission of English capital to railway works in India. The drain of precious metals thus accounted for serves to explain the supposed fact that the precious metals have not fallen in value here. It would be extremely difficult, if not impossible, to prove or disprove anything *à priori,* by the balance of trade between Europe and the East. But having shown upon a wide basis of facts that both gold and silver are depreciated here, I am much more inclined to regard this depreciation as the cause of the Eastern drain. The fall in the value of silver, compared with most other goods, makes it more profitable to pay for Eastern produce with silver bullion than with our manufactures, silver being always acceptable among Asiatic nations.*

* This explanation, viewed by the light of subsequent information, seems to be quite correct.

## CHAPTER III

### Deductions, on other Grounds, concerning the Future Value of Gold

#### XXI.—*Of the Rate of Fall of the Value of Gold.*

Writers have usually treated the fall of the value of gold as if it were a remote event that would happen suddenly *after* the accumulations have become great. Chevalier's theory about the *parachute* has contributed greatly to nourish and support this notion. Nothing, however, can be more mistaken. The most sudden fall must occur at first, and the value of gold will fall more and more slowly as time gets on, and the total accumulations of gold grow. This is a simple consequence of the fact that gold is chiefly used as currency, so that its value varies nearly inversely as the total quantity in use. Let us take the estimate of Tooke and Newmarch, and suppose that the quantity of gold in use at the end of the year 1848 was 560 million pounds sterling; let us further suppose 20 millions to be the subsequent annual excess of supply over consumption. Then, at the end of the first year 580 millions were in use, and the value of gold would be reduced in the ratio of 580 : 560; at the end of two years 600 millions were in use, and the value of gold would be reduced in the ratio of 600 : 560, and so on. Thus we get the following:

| End of Year. | Quantity of Gold in Use. Million £. | Total Fall in Value of Gold per cent. | Total Fall per cent during each Year.* |
|---|---|---|---|
| 1848 | 560 | .0 | .0 |
| 1849 | 580 | 3.4 | 3.4 |
| 1850 | 600 | 6.7 | 3.3 |
| 1851 | 620 | 9.7 | 3.2 |
| 1852 | 640 | 12.5 | 3.1 |
| 1853 | 660 | 15.1 | 3.0 |
| 1854 | 680 | 17.6 | 2.9 |
| 1855 | 700 | 20.0 | 2.9 |
| 1856 | 720 | 22.2 | 2.8 |
| 1857 | 740 | 24.3 | 2.7 |
| 1858 | 760 | 26.3 | 2.6 |
| 1859 | 780 | 28.2 | 2.6 |
| 1860 | 800 | 30.0 | 2.5 |

Of course the above numbers are not supposed to represent the real progress of the fall, but they show sufficiently that the rate of falling must be most rapid at first, and must decrease by nearly a third part within the first twelve years.

In a more general form: If $a$ be the quantity of gold in the world at any time, and $b$ the quantity added in each succeeding year, then at the end of $n$ years, the value of gold is reduced as 1 to $\frac{a}{a + nb}$, which is always growing less as $n$ increases, but at a constantly less rate. Thus the fall during the $n$th year is as 1 to $\frac{a + (n - 1)\ b}{a + nb}$, which approaches unity as $n$ increases constantly.

## XXII.—*Of the ultimate Equilibrium of the Supply and Consumption of Gold.*

It is obvious that the fall in the value of gold will become less and less rapid, even on the supposition that

* Not found from the preceding column by subtraction, but by dividing the quantity of gold each year into the quantity of the preceding year.

the annual supply of new gold remains constant. But this is a very wrong supposition. Even supposing the mines not to become exhausted, there are large numbers of diggers whose earnings are so small that any fall in the value of gold will render their labour incapable of supporting them. They will desert gold-digging for other more profitable occupations which the colonies offer. The more the value of gold falls, the greater the number who will thus desert the gold-fields, and the greater the decrease in the produce of gold. Again, as the total quantity of gold in use increases so must the consumption by wear and loss increase. In proportion as the value falls the consumption increases and the supply decreases. The consumption then must at length become equal to the supply, and thenceforth the value will be stationary, or nearly so.

Two assumptions, which are *not far from the truth,* will enable us to put this result in a simple form. Let us suppose that the consumption of gold increases in the same proportion as the whole mass in use; and since the value falls inversely as that whole quantity, let us further suppose that the supply decreases in the same proportion as the whole mass in use increases.

Let A be the quantity of gold in use at any time, $c$ the annual consumption then, and $p$, which is greater than $c$, the annual supply at the time. Let $d$ be the total addition up to the time when equilibrium of supply and demand is attained, and the value of gold becomes stationary. At that time the value of gold is reduced in the ratio of 1 to $\frac{A}{A+d}$. The annual supply at that time, according to our suppositions, is $p.\frac{A}{A+d}$. The consumption at that time is $c.\frac{A+d}{A}$ and the supply is equal to the consumption, or $p.\frac{A}{A+d}=c.\frac{A+d}{A}$.

The solution of this equation gives us $d=A.\sqrt{\frac{p}{c}}-A$. The greatest amount to which the accumulation of gold

will reach is $d + A$, or $A.\sqrt{\frac{p}{c}}$, and the greatest possible depreciation of gold is in the ratio of 1 to $\sqrt{\frac{c}{p}}$.

It is an interesting but obvious result of this theorem that the ultimate value of gold is independent of the amount of gold in use at any previous moment, and depends solely upon the conditions of supply and consumption.

Chevalier's estimate of the probable annual consumption of gold (according to the old value?) is as follows:

| | |
|---|---|
| For the extension of currency— | |
| 1. Of certain countries . . | £4,200,000 |
| 2. From increase of population, and well-being generally . | 3,080,000 |
| 3. From commercial extension . | 3,080,000 |
| For wear and tear of currency . | 490,000 |
| For hoarding and accidental losses | 2,100,000 |
| For use in the arts . . . | 4,900,000 |
| Total annual consumption . | £17,850,000 |

Joining to this his estimate of the annual production, which is stated as £35,000,000, we have an ultimate fall of the value of gold in the ratio of 1 to $\sqrt{\frac{17,85}{35,00}}$, or nearly as 1 to $\sqrt{\frac{1}{2}}$ or as 1 to .714. Thus gold would fall in value by less than 30 per cent.

But though Chevalier takes the annual production at £35,000,000, he thinks it may rise shortly to £42,000,000. In that case the ultimate fall of value will be as 1 to .65, or by 35 per cent. The estimated consumption adopted by Chevalier is in his opinion a great exaggeration, and only adopted to render his argument an *à fortiori* one. Macculloch,* however, would by no means be satisfied with even a consumption of £17,850,000 per annum, for he adopts the following large estimate of the annual con-

* "Encyc. Brit." (Eighth Edition), art. "Precious Metals," p. 466.

sumption of the precious metals, *merging the amounts of value of gold and silver together*:

| | |
|---|---|
| Wear and tear and loss of coin . | £7,500,000 |
| Increase in currency . . . | 10,000,000 |
| Used in the arts . . . . | 12,000,000 |
| | £29,500,000 |

As he estimates the annual production of the mines at £39,050,000, he finds there is only a surplus of £9,550,000, both of gold and silver, to be hoarded, exported to the East, or pressed upon the market. Under these circumstances, the maximum fall of value would be only 13 per cent!

For my part, I cannot but agree with Chevalier, that even his estimate of the consumption of gold is greatly exaggerated, especially as regards the extension of currency. A more moderate estimate would indicate a greater surplus produce of gold and a greater probable depreciation, say 50 per cent; but all such estimates are so uncertain that I care not to dwell upon them.

It remains to be remarked, that any conclusion drawn from the preceding calculations is based upon arbitrary assumptions, each of which is more favourable to the fall of gold than by right it ought to be; and that, for simplicity, I have also made an omission in the calculation which similarly tends to exaggerate the conclusion.

In the first place, I make no doubt that the consumption of gold will increase rather more rapidly than its value falls. That large part, indeed, which swells the currency of various countries will follow this simple law pretty exactly; but were gold to fall to anything like half its old value, there could not fail to be a new demand for the purposes of ornament, luxury, and use. This is the first thing that would tend to diminish the fall of value.

Secondly, the mines are far from maintaining their original richness. The alluvial deposits, even in the first ten years, show signs of exhaustion, and the deficiency cannot be fully supplied by quartz-mining. This decreasing fertility of the mines will so strongly tend to arrest

the fall of value that we must consider it more fully in another section.

Thirdly, we have treated the £10,000,000 or more of gold annually added to the currency, owing to the increasing requirements of trade, as if it were consumed and destroyed, which is not the case. Being retained in use as currency, it is not only subject to wear and tear, but also requires an increase every year, as its value is depreciated. The result is, that although the mass of gold eventually in use will exceed our estimate $(A + d)$, the annual consumption will also be greater—so that it will sooner balance the annual supply. The value of gold will be arrested before it falls to $\sqrt{\frac{c}{p}}$ of its original amount. To correct this omission would require calculations of a complexity unsuited to this inquiry, and to obtain any mathematical conclusion, proceeding on other than simple and arbitrary, but approximately correct laws, would, of course, be impossible.

The *extension* of the currency of the world, caused by the spread of commerce, tends to retard the fall of the value of gold. This extension must not be confused with that increase or *swelling* of the currency which is an effect of its depreciation. It seems to me that most writers have over-estimated the consumption of gold by the first cause, perhaps in consequence of not keeping it perfectly distinct from the latter effect.

## XXIII.—*Of the future Supplies of Gold from the Mines.*

The amount of gold which may be procured from almost any quarter of the globe is, so to say, unlimited; but the critical question is, Will it pay to extract it? If the gold-fields of Victoria offered to every labourer who chose to resort thither the reward of fifteen shillings per day, the country would soon be densely populated, its prosperity ever increasing, its produce of gold constantly

growing, and gold would soon be reduced in value to a half or a third of its present value. Thus Chevalier, quoting some statements of the year 1854, when the gold fever was at its height, takes the ordinary earnings of a miner, whether in Australia or California, to be at least nineteen francs per day. "If, then,"* he adds, "the auriferous regions preserved indefinitely the same richness, the value of gold might fall until the sum of nineteen of our present francs in gold (fifteen shillings and tenpence) was only equal to the ordinary price of a day's labour in California and Australia, after the cost of subsistence and the rate of wages should have there found their permanent level."

Such would, no doubt, be the conclusion from the data; but anything more erroneous than those data cannot be easily found. I speak with the advantage of having resided in a gold-producing colony, and travelled over nearly all the chief diggings of Australia,† when I say that the greater number of gold-diggers earn small and precarious wages. It has been said, that all mining industry, like speculation in lotteries, is carried on at a loss. This is especially true of gold-digging. From the first, the great attraction of the diggings was in the

* "De la Baisse Probable de l'Or," etc., 1859, p. 51. Cobden's translation, p. 43.

† I resided in Sydney, as one of the assayers of the Royal Mint, from October, 1854, until December, 1858. In 1856 I visited Sofala, the Turon river, and the diggings of the neighbourhood, then in an active state. In January, 1859, I had an interesting trip to Braidwood, Jembaicumbene, and the Araluen river. When leaving Australia, I travelled by mail-car from Sydney overland to Melbourne, seeing the Yackandandah and Beechworth diggings on the way, and subsequently examined the Ballaarat mines, Bendigo, Tarrengower, Adelong, Forest Creek, Creswick's Creek, etc. The results of my observations were given in a paper, entitled "Remarks on the Australian Gold Fields," read to the Manchester Literary and Philosophical Society, 15th November, 1859, and printed in the first volume of the third series of the memoirs of that society, session 1859–60 (1862), pp. 115–130. The supposed geological formation of the gold-fields of Victoria is shown by a large diagram. The geological remarks are doubtless of small value. I reprint as an appendix to this essay (below p. 107) the remarks on the future supply of gold which formed the third part of the paper, and which seem in some degree to have been verified by the subsequent course of events—events, however, not by any means yet brought to a close.

freedom and novelty of the life, and the exciting chance, however small, of a sudden fortune, rather than in the reasonable prospect of good steady earnings.

The greater number of the diggers pass a most laborious life, to gain average returns of only a few shillings a day. They continue the occupation more from love of independence than from love of the gold produced. They strive to keep up the pleasure of the chase by frequent removals from one digging to another, on the slightest report of new discoveries. There has, in fact, arisen a large class of experienced but nomadic diggers who are constantly making what are called "rushes," and who often, on the most unreasonable grounds, make journeys from one colony to another, a thousand miles or more away. I have seen ten thousand diggers and others assembled in a "rush" during two or three weeks, on a plot of ground where a rich discovery was "reported" to have been made, and where a town of wood and canvas was already risen, or quickly rising, with its shops for butchers, bakers, clothiers, jewellers, and even hotels, banks, and newspaper offices. The excitement of the occupation draws crowds to dig for gold who would make far better profits at their proper trades. The production of gold during past years has thus been altogether beyond the governance of economic laws; it has not been requisite that the produce should pay the cost of production, and remunerate labour equally well with other occupations which are open to the labourer.

I cannot think that this present state of gold getting will endure. The nomadic class of skilful "prospectors," or gold seekers, will die out in some ten or fifteen years more, and gold-digging will become a more steady and ordinary occupation. Having less of the attraction of a lottery, the total produce cannot fail to be reduced. Those who have hitherto formed the poorer classes of diggers will be attracted from the occupation by wages offered in other occupations, and any fall of the value of gold must accelerate this change. I believe it has already done so.

In opposition to Chevalier's quotation of a gold-miner's earnings in 1854, I will state that in a Parliamentary

Paper* the wages of a farm labourer in 1858, in New South Wales, are quoted at four shillings per day, and the wages of a shepherd at five shillings and sixpence. It is well known, too, that for some years back there have often been in Melbourne and Sydney crowds of strong labourers, chiefly unsuccessful diggers, clamouring for employment from the Government at about four shillings per day. Owing to the high cost of subsistence in the colonies, such wages were regarded, and were in fact scarcely more than a pauper's allowance. These facts prove that there is a wide margin of gold production which must be given up as the falling value of gold still further reduces the profits.

What has been said does not apply so fully to those men, or companies of men, who are furnished with capital and enabled to undertake large sluicing works, deep sinking, or quartz-mining and crushing. That there is an extensive area open for such works is beyond doubt. It is equally beyond doubt that certain quartz mines, and certain beds of alluvium, will yield gold for ages to come. But gold-mining will more and more become submitted to the principles of ordinary industry, by which both capital and labour seek the occupation which gives the largest returns. The falling value of gold cannot fail, therefore, seriously to retard such steady gold-mining. And these operations, however well conducted, will not yield the lottery-like returns that were got at the first scramble from the newly-discovered alluvium of Ballaarat and Bendigo. The gold produce of Victoria has long since reached its maximum, and is declining, partly perhaps owing to the "rushes" of diggers to New South Wales and New Zealand, but partly, as I think, to the failing richness of the deposits, and the falling value of gold.†

The only way in which the gold produce could be kept at the high amount of past years, would be by a succession

*Statistical Papers relating to the Colonial Possessions of the United Kingdom, Part V., 1858, p. 277. A statement more to the point is in Appendix, Note D, of this tract, p. 105.

†See Appendix, Note E, p. 106.

of discoveries of rich gold-bearing alluvium. But it seems to be the nature of these alluvial deposits to be easily discovered when once attention is drawn to their existence, and to be quickly rifled of their thickest riches. It is a most singular fact that, in Australia at least, all the richest deposits were found in the first year or two. Ballaarat and Bendigo seem as if they would always maintain the leading position they took at the very first. Though nearly the first spots worked in Victoria, they are likely also to be the last. And so of other gold-fields; the first *coup* has generally been followed by a great many lesser ones, but anything like a progressive discovery of gold alluvium seems to be against the nature of things.

The supposition, then, that the gold produce will decrease in the same proportion as the value of gold, is probably less than the truth. The failing richness of the gold deposits will occasion, in my opinion, a still greater decrease; so that the fall of the value of gold will be arrested earlier, and at a higher point, than according to my assumptions in the last section.

## XXIV.—*Of the probable ultimate Fall of Value.*

Chevalier suggests that the value of gold may fall to half its former amount, or by 50 per cent. From a general view of the facts and arguments already presented, I am inclined to think the fall will be arrested at, perhaps, 30 per cent. As I think it not improbable that a depreciation of some 15 per cent has already occurred (though I do not positively assert it), it will follow that the more serious and sudden part of the fall is already felt. As shown in Section XXI., the fall is most sudden at the first.

Having arrived near to the limiting value at a rate ever decreasing, the value of gold will probably long remain very steady, because its area of production has been so much extended.* Before the recent discoveries, no gold

* In making this remark no account was taken of the recent extreme variations in the demand for gold due to arbitrary changes in the currency systems of nations, consisting both in the substitution of the gold for the silver standard, as in

mines of value have been in the possession of any Anglo-Saxon nation. They have been chiefly in the hold of the Spanish and Russian Governments, subject to arbitrary restrictions and taxes. In English or American hands the production of gold becomes a matter of free industry and skill. It must follow that the produce will conform more closely to commercial principles; a rise or fall in the value of gold will be followed more exactly by an extension or cessation of the production. At the same time, the greater area of production, offering scope for more various competition and equalisation of local fluctuations, and the greater and more various modes of consumption, will all tend to render the demand and supply of gold more equable and its value more constant.

### XXV.—*That the Values of Gold and Silver will probably return to their ancient Proportion.*

It is curious that the utmost depreciation of gold which can be considered likely, will be just about sufficient to restore gold and silver to the proportional values which they usually held in the middle and older historical ages of the world.

According to the earliest authentic statement which occurs in Herodotus, gold was, in the reign of Darius, thirteen times more valuable, weight for weight, than silver.

About fifty years later, the proportion in Greece, according to a statement in the Hipparchus of Plato, seems to have been twelve to one.

The pillage of the temple of Delphi, in B.C. 357, throwing more than 10,000 talents of gold into circulation, reduced its value to about ten times that of silver. This rate, there is reason to suppose, continued until about 170 years after the death of Alexander.

Germany and Scandinavia, and the operations of paper currency emitted at one time and withdrawn at another, as in Italy and the United States. If governments will in this way derange the conditions of supply and demand, it is impossible that values can remain steady.

In the Roman world, the value of gold is said to have risen at one time as high as 17 times that of silver. When Cæsar returned from Gaul, with much spoil of gold, its value fell to 9 times that of silver; but these fluctuations were probably temporary. From the time of the Emperor Galba to that of Alexander Severus, the ratio of values was that of 12½ to 1. Under Constantine, it was 10½ to 1; after his reign, however, gold became 14⅔ times as valuable as silver. During the middle ages the ratio varied between about 10 and 12 to 1,* but soon after 1600 it began to rise gradually, in consequence of the supplies of silver from the new American mines predominating over the supplies of gold. In 1717 the values of the English silver and gold coins were fixed at the ratio of 15.209 to 1, and only changed in 1816, when silver coins were reduced to the subordinate rank of tokens.†

Thus, from the time of the earliest historical notice down to the discovery of America, gold was not on an average worth more than 10 or 12 times as much as silver. The superior abundance of silver in America appeared permanently to alter the proportional values, so that for some two centuries past, gold has been as much as 15 times as valuable as silver. And the proportion has been very steadily maintained.

The Australian and Californian discoveries have now come as the great counterpoise to the Peruvian and Mexican discoveries of the 16th century. Gold, in falling in value 30 per cent, will perhaps return to its old relation to silver—that of 10 or 12 to 1.

It is not at all unlikely, however, that silver is now suffering, or will soon suffer, a certain depreciation, independently of gold. The discovery of the Pattinson process for separating silver from lead, has been equivalent

* See a table of the English Coinage in Tooke's "History of Prices," vol vi., pp. 417–19.

† Fuller details concerning the history of the Comparative Value of Gold and Silver will be found in Lord Liverpool's Treatise on the Coins of the Realm, 1805, Appendix, pp. 239–266; Reprint by the Bank of England, 8vo, 1880, pp. 267–95; The American Report on the International Conference of 1878, with Appendix by Mr. Dana Horton.

to the discovery of new mines. And were the Spanish American States to be redeemed from anarchy by again falling into the possession of any European government, it is certain, as Chevalier has remarked, that they would throw largely increased supplies of silver upon the market. This possible permanent depreciation is, of course, quite distinct from the temporary depreciation of, say 6 per cent, caused by the pouring out of the French silver currency. When the silver currency is nearly exchanged for a gold one, as will soon have happened, this supply of silver will of course suddenly cease, and the price of silver will quickly rise to between 65 and 70 pence per ounce Troy. When the price rises above 66 pence per ounce, it will be necessary to diminish the weight of the English silver coins, in order to prevent their being exported like the French coins.*

* These anticipations have, of course, been falsified by the substitution of gold for silver currency, and also by the discovery of the great Nevada silver mines. The subject is further discussed in the later papers on Bimetallism and the Silver Question.

## CHAPTER IV

### Social Effects of the Depreciation of Gold set forth

#### XXVI.—*How the Effects will be apparent.*

It is worth while to consider what social effects the present depreciation of gold must have, through the virtual alteration of all fixed money payments. The ordinary dealings of manufacturers, merchants, and traders, being terminated in the course of a few months, or at the most, of several years, will be comparatively unaffected by an alteration of the standard which merely increases the figures in their cash-books and ledgers without altering the balance. It is otherwise with the accounts of any person who, by virtue of a contract, has a fixed sum of gold money to receive or pay on one side of his account, while the sums on the other side, depending on the prices of the chief articles of subsistence or commerce, increase as gold falls in value. The balance of his accounts is deranged in a very serious manner, as disadvantageous to the receiver of the fixed sum as it is advantageous to the payer. A fall in the value of gold virtually violates every contract expressed in gold money, and benefits the debtor at the expense of the creditor. Exactly the same effects will follow wherever a payment remains fixed at its former amount by the force of custom and habit. It may, perhaps, be said that there is hardly a person among the 30,000,000 in the kingdom but is affected more or less, for better or for worse, by the change which is taking place. The same may be said of every other country where contracts are performed, and payments made in gold.

There has been no want of alarming predictions of the social effects which must thus follow the alteration of the standard of value. Chevalier says* of the period of change:

"This transition will be an interval painful to pass over, and will be marked by innumerable shocks and sufferings. . . .

"The value of all properties will be subjected to a painful uncertainty, and to injurious fluctuations. It will be still worse for those persons to whom I have already alluded, whose incomes consist of a sum of money (napoleons or sovereigns) fixed in advance. They will live in a perpetual state of trouble, anxiety, and uneasiness. They will sink by whole sections from their present state to another, in which they will enjoy only the half of their previous comforts; reasoning, as I always do, upon the assumption that gold falls to the half of its present value. They will be flung headlong, without rule or measure, down to a lower station, and without ever having the chance of preparation, for it is the very essence of changes of this kind, subjected as they are to many opposing influences, to pursue an irregular and disorderly course."

Cobden, in the preface (p. ix) to his translation of Chevalier's Essay, expresses a similar opinion:

"Wages and salaries of all kinds would eventually rise in proportion to the enhanced price of commodities, but the transition would, I fear, be accompanied with much inconvenience and suffering. The rise would not be steady and continuous, but would be effected by leaps, and after struggles which would tend to derange and convulse the relations of capital and labour."

On the contrary, I think that the alteration of the value of gold must, especially for the future, be most gradual and gentle in its effects. Far from taking place with sudden and painful starts, flinging the rich headlong down to a lower station, and shaking the groundwork of society, nothing is more insidious, slow, and imperceptible. It is insidious because we are accustomed to use the standard

* Cobden's translation, p. 114. "De la Baisse Probable de l'Or," sec. vi. chap ii. p. 191.

as invariable, and to measure the changes of other things by it, and a rise in the price of any article, when observed, is naturally attributed to a hundred other causes than the true one. It is slow, because the total accumulations of gold in use are but little increased by the additions of any one or of several years.* It is imperceptible because the slow rise of prices due to gold depreciation is disturbed by much more sudden and considerable, but temporary fluctuations which are due to commercial causes, and are by no means a novelty.

It is almost impossible, too, for any person to detect the effects of the change of standard in his own personal affairs. Besides the interference of changes in prices and profits and activity of trade, which affect most persons, each individual has his own fluctuations of prosperity and adversity. If his income is not variable, at least his expenditure is more or less so. There are a hundred items of expenditure, some increased, some diminished, and among the variety of unmeasured circumstances, it is impossible for him to *feel* the very slow and measured change of 20 or 30 per cent, spread over twenty or thirty years. If his receipts are variable and increasing, he enjoys the consciousness of prosperity, and probably attributes it complacently to his own abilities and deserts. If his income consists of fixed dividends or rents, he receives the same pieces of money as before, and has no thought that they are not what they were. It is when he comes to pay his household bills that he can alone feel the difference. And then the difference seems to arise from the deficient harvest, from the growth of population, from the extortion of tradesmen, from anything rather than the change of a British sovereign fresh from the Mint. Value is the most invisible and impalpable of ghosts,† and comes and goes unthought of while the visible and dense matter remains as it was.

* As shown above, chap. iii. sec. xxi. p. 60.

† That is to say, value is an impalpable *relation*; there is no such thing as *intrinsic value*, as I have endeavoured to show in "The Theory of Political Economy," pp. 81–83; 2nd ed., pp. 82–91; 3rd and 4th eds., pp. 76-84; and "Money and the Mechanism of Exchange," p. 9.

So it certainly has been, I think, in the last fifteen years. Prices rose about 1853 so much that no trader or housekeeper could be ignorant of the change in the case of several articles at least. But then the rise of prices is diversified by occasional falls until the original state of things fades from the memory. The fluctuations noticed are rightly attributed to the prosperity or stagnation of trade, to an increase of demand, or to a war which happens to be waging in some part of the world. It is, in fact, impossible by the ordinary observation of two or three articles, to separate and detect the change of prices due to gold. Only a laborious inquiry extending over the commercial records of many years, and over most of the articles of commerce, can enable us surely to separate the gradual but permanent effects of gold depreciation from more noticeable but temporary changes. It is needless to add that the working out of long tables and logarithmic calculations is not a popular occupation. Thus it is that a considerable fall in the value of gold, and I believe *the most sudden and serious part of the fall that can be expected to occur,* has occurred while almost all the world were either without thought of such an event, or altogether in doubt about it.

## XXVII.—*Classification of Incomes according as they suffer from Depreciation.*

It will be well to examine rather more closely the effects of the depreciation of gold upon individuals in different circumstances. We can always arrive at the effect by separating those items in their accounts which are fixed money payments, from those which depend on the variable prices of commodities, or on rates of wages. So far as fixed receipts are balanced by fixed payments, or variable receipts by variable payments, there is neither loss nor gain. But so far as fixed receipts are balanced by variable payments, and variable receipts by fixed payments, there is respectively loss and gain to the whole extent of the depreciation of gold occurring since the pecuniary condi-

tions were fixed by contract or otherwise. A further distinction, however, will have to be drawn between receipts altogether fixed, and those depending on fixed charges. The fees of a lawyer are fixed by law, but his income chiefly depends on the number of his clients. The tolls of a bridge are usually defined by Act of Parliament, but the receipts of its owners depend on the amount of traffic. In every such case we shall have to consider separately in what degree the virtual lowering of the charges effected by the depreciation of the standard, will occasion so much more custom or traffic as to prevent loss of income.

Taking first the receipt side of the account, I will attempt to classify the various kinds and sources of income, according as they are more or less affected by gold depreciation:

*The incomes and property of the following classes of persons are perfectly fixed in money amount and suffer to the whole extent of the depreciation of gold,* it being understood that the payments contracted for are expressed in British or gold money.

British fundholders, stockholders, or annuitants, and holders of exchequer bonds or bills.

Holders of bonds, annuities, or any kind of debt (in gold money), due from Foreign Governments.

Holders of bonds, debentures, etc., with fixed interest on money advanced for roads, docks, or other public works.

Holders of preference shares or debentures of fixed interest, and, to some extent, all shares with guaranteed interest.

All creditors, the payment of whose fixed claims is deferred any considerable interval of time.

Mortgagees.

Owners of leasehold property, as regards the period of the lease.

Holders of policies of insurance, whether upon life or other risks.

Depositors in banks, savings banks, or in private institutions and firms, or in the hands of private individuals.

Owners of any contingent claims, definable in money,

upon friendly societies, or other institutions, or upon individuals.

Bank-stock proprietors, shareholders of joint-stock banks, discount companies, bankers, capitalists, bill discounters and dealers, money-lenders, and all who hold or own capital in the form of money. (It is very difficult in these cases to separate the effect of a variation in the value of gold, in which their capital really consists, from the variation of the value or interest of money, and the varying success of the business.)

Goldsmiths, bullion dealers, misers, or others who hold any considerable quantities of gold.

The Royal Family, officers of state, judges, government employés, and others upon the civil list, with fixed salaries or pensions.

Officers and men in the army and navy.*

Half-pay officers, and pensioners not receiving subsistence in kind.

Holders of endowed offices of any kind, fellowships, etc., where the receipts are defined in money.

All persons receiving pensions, alms, or allowances of fixed money amount.

Each of the above classes suffers the loss accruing from the depreciation of gold between the moment when the payment became defined in money, and that at which the payment or series of payments is made (or rather expended). The loss, of course, is inappreciable unless the interval of time concerned be several years at least. But a person may suffer the whole effect of the depreciation, although frequently changing the form of his property, so long as it is held continuously in any of the forms above described. Thus, if a person holds his fortune in gold or banknotes for a time, then as a bank deposit, next investing it in consols, or in bank stock, finally perhaps lending it on mortgage, he will still suffer the depreciation of the whole interval of time elapsed.

Secondly. The next class of incomes contains those *depending on fixed charges, established by law, custom, or*

* There has since, however, been a general advance in the rates of pay of almost all officers, soldiers, and other government employés.

*convenience*. It is impossible to form more than a rude conjecture as to how far the lowering of the rate of charge will increase the traffic, custom, or activity of business; but I will begin with those that seem likely to have least compensation from this source.

Solicitors, attorneys, and other lawyers whose charges are fixed. Their business can only in a very indirect and partial manner receive increase.

Physicians, with their customary fee of a guinea, will scarcely receive full compensation.*

A great variety of payments at exhibitions, theatres, and entertainments, fixed by custom at one shilling, of subscriptions to societies, clubs, charities, etc., school or college fees, pew rents, mostly fixed at customary amounts, are not likely to be wholly compensated.

Fees to registrars, clergymen, public officers, etc., will yield little or no compensation.

Tolls of roads, bridges, and ferries are usually fixed by law, but increased traffic will probably give ample compensation.

Tolls on railways, canals, telegraphs, steam-boats, etc., may be raised, or a lowering deferred by the fall of the value of gold; it will depend upon the skill with which the tolls were originally adjusted whether the revenue is increased or diminished by the slight alteration due to gold. In any case, it may be said that there are few kinds of property that will suffer less from depreciation of gold. The same may be said of water and gas companies.

Charges of cab-drivers, postmasters, carriers, licensed porters are usually fixed by law or custom, but will be fully compensated.

Post-office charges, especially the penny stamp, will certainly not be raised in consequence of gold depreciation, but the continuous increase of the revenue more than covers any depreciation.

Thirdly. Although each of the preceding classes of income includes a great aggregate amount, the third class

* But not a few of them have since raised the fee to two guineas.

is still greatly more comprehensive and important. Among those variable incomes which *are entirely independent of the value of gold, and therefore suffer no loss by its depreciation,* are those of manufacturers, farmers, contractors, mine-owners, ship-owners, who depend chiefly on their skill and good fortune; of merchants, brokers, agents, tradesmen, commercial travellers, hawkers, and dealers generally, whose profits usually consist of a percentage on the value of the articles turned over; of artisans, skilled workers, labourers, porters, domestic servants, and others receiving variable wages.

I may add innkeepers, lodging-house keepers, medical men, apothecaries, and others who make uncertain charges, performers of various kinds, and a host of others whose charges and earnings are equally uncertain.

Soldiers, sailors, pensioners, paupers, and others receiving support in kind will not suffer so far. All persons owning land, houses, or other property not in money, will suffer no loss so far as they either occupy or use the property or let it for short periods; in leasing it for long periods, and for money rents, they will lose. Clergymen, in receiving tithes and variable rents, will not be losers.

There is, however, a very large class of incomes, including wages or salaries, which must be considered of quite uncertain position. In a large proportion of cases the salaries of clerks, officials, and other employés, or the wages of servants and labourers, will remain unchanged for long periods of time by want of attention to the changed value of gold, or the general dislike to altering or discussing an agreement once made. In those cases, where the salary or rate of wages remains unchanged, the office or employment must usually be reduced to a lower rank, and command less efficient services. This will often be the case where the income from which the salaries are paid is also fixed, and liable to loss from depreciation. In other and the majority of cases the salary or wages will be raised after the lapse of a certain time.* Artisans, mill-

* This is what has taken place as a general rule.

hands, and other skilled labourers will obtain the increased wages by strike, if not by the free acquiescence of their employers. It is not unlikely that the great strikes which occurred a few years ago were partly caused by the depreciation of gold.

## XXVIII.—*Of Expenditure as affected by Depreciation.*

For every person who suffers loss in a fixed income or claim from depreciation of the money in which it is paid there must be some person or persons who gain. But, with few exceptions, the corresponding benefit is very much diffused. There are but few individuals subject to fixed payments of long endurance. The fixed payments enumerated in the first class of incomes are chiefly due from the Government, or from public or private companies, or institutions. It will be shown that, as regards the Government annuities and other fixed payments, the whole community gains in the unintentional remission of taxation which gold depreciation has effected. Foreign governments and peoples equally gain as regards debts in gold due from them. All public companies, corporations, or their members and shareholders, gain in the partial remission of their debts, the effect being a slight improvement of the dividends. In the case of banks, insurance companies, capitalists, goldsmiths, or others holding any part of their capital as money or gold, their loss, or that of their depositors or claimants, is not productive of any corresponding gain to other persons. They suffer from the actual depreciation of money in their hands. The lessees and mortgagors of property gain to the full extent of what lessors and mortgagees lose.

The lowering of fixed charges considered in the second class of incomes, was found to inflict a very partial loss on their receivers, but it occasions a great benefit to the public at large. The payments for conveyance, for amusements, and for a great variety of services, being virtually lowered, persons either spend less upon them than before, or else by availing themselves more freely of such services, they

gain in comfort and recreation. The effect is a general increase of business, inducing increased industry and energy, with very slight exceptions, of a most beneficial character to all classes.

As incomes in the third class suffer no loss, there is, of course, no corresponding gain.

The greater part of the expenditure of all individuals consists of payments for food, clothing, variable rent, and innumerable charges which increase *pari passu* with the depreciation of gold. If these charges are defrayed out of a fixed income, the increase of expenditure must either be met by cutting off former savings, by relinquishing former enjoyments, or by exertion in providing new sources of income.

## XXIX.—*Effects of Depreciation upon the Revenue and Expenditure of the Country.*

It is a principle, and a very good one, of the English tariff, to define all charges as much as possible by reference to fixed weights or measures of commodity. *Ad valorem* duties are imposed only upon such rich articles as lace, silks, and precious stones, of which the weight or measure bears no constant relation to the value.* Thus the tendency to fraudulent misrepresentations concerning the value of goods is, as far as possible, removed. Similarly all the excise charges and assessed taxes are defined by quantities—bushels of malt, gallons of spirit, number of horses, and so forth. The stamp charges are partly fixed, such as those on most kinds of legal documents. But when a legal document expresses a money claim, the stamp charge is regulated in some proportion to the amount of the money, as there can be but little misrepresentation for the purpose of evading the tax. Among these *ad valorem*

* There are no *ad valorem* duties at all in the present English tariff; nor were there, I think, when the above sentence was written. In 1821, jewels, excepting diamonds, were charged with a duty of 20 and 50 per cent of their value, according as they were not set, or were in any way manufactured. Lace and many other things were taxed *ad valorem*.

stamp duties fall the whole of the duties on legacies, letters of administration, and probates. The larger part of the income tax and the miscellaneous sources of revenue are also *ad valorem,* increasing with the prices of articles.

It would not be possible to determine with exactness how much the revenue suffers by the depreciation of gold, without going through the whole of the National accounts in detail. But separating *en masse,* and when necessary by conjecture, the part depending on fixed charges from that which is *ad valorem,* and therefore increases with the increase of prices, we have the following rude estimate for the year 1860:

| | Independent of the value of gold. | Variable with the value of gold. |
|---|---|---|
| Customs | £24,391,084 | Inconsiderable |
| Excise | 20,240,467 | None |
| Stamps (say) | 2,040,091 | say £6,000,000 |
| Income and property tax | Inconsiderable | 9,666,142 |
| Assessed taxes | 2,100,539 | None |
| Land tax | 1,137,034 | ,, |
| Post Office | 3,310,655 | ,, |
| Woods, Forests, etc. | Inconsiderable | 416,531 |
| Miscellaneous | ,, | 1,801,584 |

Adding up the respective columns we obtain the following totals:

| | | |
|---|---|---|
| Independent of value of gold | £53,219,870 | or 75 per cent. |
| Variable with the value of gold | 17,884,257 | ,, 25 ,, |
| Total revenue (1860) | £71,104,127 | 100 ,, |

It would appear then that almost exactly three-fourths of the revenue of the year 1860 afforded no equivalent to counterbalance the fall in its value.

Turning to the public expenditure of the country, we find it still more difficult to separate the fixed and variable payments with accuracy. The following estimate is therefore founded on little more than conjecture. It is made also on the assumption that no salaries or pensions had received

any increase in 1860, on account of the diminished value of gold:

PUBLIC EXPENDITURE, OF 1860 FOR THE UNITED KINGDOM.

| | Fixed payments. | Variable payments. |
|---|---|---|
| Public Debt | £28,638,726 | None |
| Civil List | 515,588 | „ |
| Civil Government (say) | 1,435,116 | £497,111 |
| Justice (say) | 1,833,078 | 1,620,681 |
| Diplomatic (say) | 374,336 | 50,000 |
| War in China | None | 858,057 |
| Army and Ordnance | 7,300,000 | 6,757,186 |
| Navy | 5,000,000 | 6,823,859 |
| Public Works | None | 945,860 |
| Education (say) | 844,334 | 446,297 |
| Colonial charges (say) | 142,625 | 100,000 |
| Miscellaneous (say) | 477,685 | 400,000 |
| Collection of Revenue (say) | 3,321,132 | 1,280,568 |

Adding up the columns as before we get:

| | | | |
|---|---|---|---|
| Total fixed payment | £49,882,620 | or | 72 per cent. |
| Total variable payment | 19,779,619 | „ | 28 „ |
| Total real expenditure | £69,662,239 | | 100 |
| Redemption of Exchequer bonds, | 2,000,000 | | |
| Total expenditure, | £71,662,239 | | |

From these estimates it would appear probable that the national balance-sheet is scarcely affected in a direct manner by the depreciation of gold. The increase of the variable charges dependent on prices, and forming one-fourth part of the expenditure, seems to be just balanced by a corresponding increase of one-fourth part of the revenue which happens to be levied *ad valorem*. This is on the assumption that Government salaries in general, and the pay of the army and navy, have not been increased. How far these Government employés can be said to suffer, in common with other classes of the community, by the retention of old rates of salary and pay will be shortly considered.

We must not forget, however, that even the three-fourths of the revenue which proceed from fixed duties is of the same nature for the most part as incomes included in the second class. Though the charge on each gallon of spirits or each pound of tea be virtually lowered, the usual effect follows, namely, an increase of trade and consumption. The breach in the real value or efficiency of the revenue, even when derived from fixed charges, is soon repaired by the secondary effects of the lowering of the charges. And the community derive nearly as much benefit from this unintentional remission of taxation as from any of the great remissions effected by Peel or Gladstone. I am thus unable to agree with the opinion of Chevalier, who, with the instincts of a French writer, thinks the results of the depreciation of gold will be a revolution at least.

"There are grounds," he says,* "for apprehending many other difficulties, political or administrative. It would be necessary to enlarge the budget, for wherever the State appeared as a customer, it would have to pay dearer than formerly. . . . The augmentation of the budget, assuming it to be considerable, means an aggravation of the public burdens, which excites, even when justifiable, the popular discontent, just in proportion to the degree to which taxation is increased. I believe I run no risk of contradiction, by any politician, in saying that a Government which should have to double the taxes in the course of a few years would thereby incur very great perils."

The revenue naturally increases more than *pari passu* with the expenditure during a time of depreciation, so that unless warlike preparations, or the demands of the people for lower taxes, absorb the surplus, there will be enough to give a fair increase to the lower classes of Government employés. But of late years the English people have seemed to think that the first duty of their Government is to take off taxes. The rise of the *nominal* amount of the revenue and expenditure no doubt contributes to the impression that the amount is excessive.

* Cobden's translation, p. 120. "De la Baisse Probable de l'Or," p. 197.

## XXX.—*Influence of Depreciation on the National Debt.*

The most remarkable effect of the depreciation of gold is a considerable reduction of the National Debt. This, it is needless to say, is an event which few of us could have hoped to live and see.

The National Debt of this country was in 1860 represented by a capital of £819,079,305. The annual charge was then £26,176,275. A gold depreciation of 9 per cent, which is quite the least I can believe to have occurred, must therefore have effected a reduction in the capital of about £75,000,000, and in the annual charge of nearly £2,500,000. The gain from this reduction is shared in by all taxpayers in the kingdom, almost proportionally to the amount of taxes they pay. Let us consider how the loss is distributed.

The Dividends of the National Debt were on the first dividend day of 1860 distributed among 268,242 persons, as follows:

| | | | Number of persons entitled to such dividends |
|---|---|---|---|
| Dividends not exceeding | £5 | - | 94,560 |
| " " | £10 | - | 43,845 |
| " " | £50 | - | 86,809 |
| " " | £100 | - | 22,516 |
| " " | £200 | - | 12,787 |
| " " | £300 | - | 3,646 |
| " " | £500 | - | 2,417 |
| " " | £1000 | - | 1,091 |
| " " | £2000 | - | 361 |
| Exceeding | £2000 | - | 210 |
| | | | 268,242 |

Nearly a quarter of a million of persons (247,730) receive dividends not exceeding £100. As several children or other dependents on an average must share in the benefit of each annuity, it is probable that about one million persons, or about one in every thirty of the total population of the kingdom, depend more or less for support upon the

public annuities. Of the larger sums too a considerable portion consists of the incomes of hospitals, schools, and other endowed institutions of public benefit. Some portion of the debt forms the reserve of securities of banks, insurance companies, and other monetary institutions. Nearly the whole sum of money in the Government and Post-Office savings banks is invested in the public funds. We should never forget, then, that the National Debt represents the savings of the poorer classes, rather than the money-bags and coffers of the rich and luxurious.

Should gold, in the course of years, fall in value some 30 per cent, as I think possible, the pressure of the National Debt will be no greater than if it were about 550 millions sterling, instead of 800 millions, according to the old value of gold. Annuitants will suffer and taxpayers in general gain in simple proportion to the fall.

## CHAPTER V

### Is a Remedy needful or possible?

XXXI.—*How far is Positive Hardship inflicted on Annuitants and Creditors by Depreciation?*

No one can feel much commiseration for the richer classes of the community even when their expenditure presses inconveniently close upon their income. A footman, a horse, a ball, or a shooting excursion retrenched during the year, will restore the balance without inflicting any very great hardship. How is it with the large mass of persons whose incomes of £50 to £150 a year afford them little more than the necessaries and decencies of modern life? A reduction of real income by 10, 15, or ultimately by 30 per cent, would sorely press upon their comforts, and even reduce them in the social scale, unless there were some compensating tendencies. But no one, I think, can look at the real progress of affairs in this country, during the period under consideration, without concluding that an alteration of 10, 15, or even 30 per cent, is almost swallowed up and rendered inconsiderable among the many improvements and ameliorations, and the general increase of industry, profit, and general prosperity which is taking place.

It must be distinctly understood that the general rise of prices which I have proved to exist refers to raw materials, and especially to those raised by the same processes now as twenty years ago. Manufactured articles in general have certainly not risen so much as the materials from which they are made; possibly they have fallen. They fall in price, or do not rise, because new and cheaper modes

are constantly invented for making them. Thus, to a great extent, we can scarcely be said to use the same articles now as we did twenty years ago, or as our fathers before us. Railways are radically different things from stage-coaches—telegraphs from postmen or private messengers; and, similarly, half the woven fabrics, hardwares, and other articles we use, though serving the same purposes, are different from what we used twenty or thirty years ago. It would be impossible to trace the effects of mechanical skill, of improved and more rapid conveyance, and of the removal of legislative restrictions in cheapening and advancing all processes of manufacture.

That manufactured articles grow cheaper rather than dearer is no contradiction to our conclusion concerning a rise of prices. New manufactures must be regarded as new productions altogether—new gifts of science and patient industry. It is the old materials which have risen in price, and contribute, indeed, to maintain even manufactures at a higher rate.

Again, the removal of customs duties from some hundreds of minor articles, and the reduction of duties on most of the chief articles, tends to counteract the rise of prices. For the prices quoted in commercial lists, and used in my tables, are mostly for articles in *bond,* duty unpaid. Then, we must remember, that charges enumerated in the second class of sources of income, as well as three-fourths of the whole taxation of the country, have not increased with the increased prices of materials. Moreover, the discovery of the American and Australian diggings, by creating two or three new colonies, drawing off part of our population, and opening new branches of trade of the most profitable kind, has contributed to the general prosperity. The Repeal of the Corn Laws alone, leading to an enormously increasing yearly importation of food, to a positive decrease of the agricultural population, and to a great increase of our town population, is a concession to the tendencies of our country, beneficially affecting (for the present at least) the position of certainly all save landowners, and them too as many persons think.

The effects of such and of many more changes effected

during the last twenty years or so, is seen in a general increase of wealth and of mercantile industry and profits. Thus only can be explained the extraordinarily high rate at which the interest of money has in the last ten years often stood. During 1854-57 the rate of interest was only for a few months below 5 per cent, but for many months above it. For more than half a year it stood at 6 and 7 per cent, and in the end of 1857 it remained for nearly two months at 10 per cent. Again, in 1861, interest rose to 6 and 8 per cent, and all this, to the surprise of the elder generation, without the general stoppage of trade, the breach of credit, and the flood of bankruptcy, which has hitherto attended such rates of interest. It is certainly not to increasing scarcity of capital we should attribute such rates, but rather to a greatly extended field for its profitable employment.

All these great changes beneficially affecting every individual in a hundred ways forbid us to assert that any person has suffered positive loss of the necessaries and comforts of life by the depreciation of his income in the last twenty years. The expenditure on the principal kinds of food must certainly be greater than it was; but there may easily be at least a corresponding decrease of expenditure on clothes and many other articles. To conclude, then, it cannot be proved that positive hardship, that is to say, *loss of comfortable subsistence,* is inflicted upon any person by the present depreciation of gold, nor would even a greater degree of depreciation necessarily produce that effect.

### XXXII.—*Of Comparative Hardship inflicted on Owners of fixed Incomes.*

There may be comparative if there is not positive hardship inflicted upon persons of fixed income. Half the expenditure of all classes, down to the artisan at least, is required to keep up a certain style of living, dressing, and appearing before the public eye, which is considered decent and necessary for each person's position, or, at least, which he considers necessary and desirable for himself and his

family. The great general increase of incomes in the third, and even in the second class, enables a large part of the community to improve their appearance and style of living. This is more especially apparent among the wealthier classes, as the altogether extraordinary extension of the West-End of London over Pimlico, Brompton, and Kensington, testifies in some degree. Now, every wealthy merchant, banker, builder, manufacturer, or landowner, who, by virtue of his increasing wealth, sets up a more handsome establishment than of old, commits a kind of wrong upon his poor relations and friends, who, with their fixed incomes and growing tradesmen's bills, can hardly make the two ends meet on the old footing.

Whatever we may conclude as to the positive hardship, it is impossible that any social improvement, or anything except restoration of the value of gold, can prevent comparative hardship. Those merchants, manufacturers, and artisans, whose profits and wages are growing by the new activity and efficiency of industry, have all the benefits of improved manufactures, and rapid communication as consumers. They gain at both ends.

## XXXIII.—*Of the Influence of Depreciation on the Community as a Whole.*

I cannot but agree with Macculloch,* that, putting out of sight individual cases of hardship, if such exist, a fall in the value of gold must have, and, as I should say, has already, a most powerfully beneficial effect. It loosens the country, as nothing else could, from its old bonds of debt and habit. It throws increased rewards before all who are making and acquiring wealth, somewhat at the expense of those who are enjoying acquired wealth. It excites the active and skilful classes of the community to new exertions, and is, to some extent, like a discharge from his debts is to the bankrupt long struggling against his burdens. All this is effected without a breach of national good faith, which nothing could compensate.

* "Encyc. Brit." (Eighth Edit.) art. "Precious Metals."

## XXXIV.—*That Creditors have no Equitable Claim to Compensation.*

That there is no legal breach of money contracts by the accidental and unforeseen depreciation of the money in which they are expressed, is obvious. But it will be worth while to consider how far creditors, especially public creditors, can have an equitable claim to consideration on the ground that the community or its government provides the money in which contracts are expressed, and seems perhaps to guarantee it as a standard of value.

All such claim seems to be done away with by the fact that, generally speaking, *the Legislature never obliged contracts to be made in gold money*. Though very rightly selecting gold as the best obtainable standard and providing a gold currency as a public convenience, it never professed to make gold an invariable measure of value, and accordingly never prevented any persons from selecting other standards if they desired. On the contrary, from the earliest feudal times, contracts, especially those concerning rents, have been made in corn and other commodities, as well as in personal services.

In the reign of Elizabeth, when the values of gold and silver were threatened, and actually affected by the discovery of America, as is gold now by the recent discoveries, it was expressly provided by Act of Parliament (18 Eliz. cap. 6, 1576), on the advice of the Lord Treasurer Burleigh, and of Thomas Smith, Secretary of State,* that in all

* This Act is so interesting as regards the theory of value and currency, that I quote the important parts of the Act in the original words: "An Act for maintenance of the colleges in the Universities, and of Winchester and Eaton. For the better maintenance of learning and the better relief of scholars in the Universities of Cambridge and Oxford, and the colleges of Winchester and Eaton. (2) Be it enacted . . . that no Master or chief ruler of any college . . . by what title, style, or name soever they now be, shall, or may be called, after the end of this present session of Parliament, shall make any lease for life, lives, or years, of any farm, or any their lands, tenements, or other hereditaments to the which any tithes, arable land, meadow, or pasture doth, or shall, appertain, except that the one-third part at the least of the old rent be reserved and paid in corn for the said colleges, cathedral church, halls, and houses; that is to say, in good wheat after six shillings and eightpence the quarter or under, and good malt at five shillings

future leases for life, or for a term of years, made by the several colleges in Oxford or Cambridge, and by those of Winchester and Eton, one-third at least of the old rent should be reserved in corn, according to the value of good wheat and good malt, to be taken after the rate at which they should be sold at their respective markets, on the next market-day before such rents should be due. And in quite late years, when the new imperial standard weights and measures were brought into use, Acts were passed (5 Geo. IV. cap. 74, sec. 17, and 5 & 6 Will. IV. cap. 63, sec. 14) recognising these corn rents and ascertaining their quantity according to the new measures. And we find, in fact, that the only legal condition of the validity of any rents, according to the Common Law of England, is "that the *quantum* must be either certainly mentioned, or be such as by a reference to something else may be reduced to a certainty." *

The rule was further shown by the exception made by Acts of Parliament in the case of the Truck System—that of paying labourers wages in kind. This system having given rise to many abuses, it was provided that in certain defined trades, wages must be paid in money, clearly

the quarter or under, to be delivered yearly, upon days prefixed, at the said colleges . . .; (3) and for default thereof, to pay to the said colleges . . . in ready money, at the election of the said lessees, their executors . . . after the rate of the best wheat and malt in the market of Cambridge, for the rents that are to be paid to the use of the house, or houses, there . . . (similarly for the other colleges) is or shall be sold the next market-day before the said rent shall be due, without fraud or deceit; (4) and that all leases otherwise hereafter to be made, and all collateral bonds or assurance to the contrary, by any of the said corporations, shall be void in law to all intents and purposes; (5) the same wheat, malt, or the money coming of the same, to be expended to the use of the relief of the commons and diet of the said colleges . . . only (6) and by no fraud or colour let or sold away from the profit of the said colleges . . . and the fellows and scholars in the same, and the use aforesaid, upon pain of deprivation of the governor and chief rulers of the said colleges . . . and all other thereunto consenting."

Two sections containing trifling exceptions complete the Act. The results following from the Statute may be studied in "Prices of Corn in Oxford," collected from manuscripts at Oxford, by the Rev. W. F. Lloyd. Oxford University Press, 1830.

* Bacon's Abridgment, Seventh Edit. vol. vii. p. 4.

showing the perfect freedom to contract in money, or in other commodities which existed and still exists in commercial transactions generally. It is true, sovereigns and Bank of England notes are a *legal tender*; but this only means that any claim expressed in pounds sterling is satisfied and discharged by the tender of good sovereigns or banknotes. Just as the Government provides certain measures and weights convenient for public use, and takes care that contracts made according to these shall be inviolate, so it provides money, which is nothing but a system of gold weights. But no one is obliged to use weights of gold rather than weights of any other commodities. All that is necessary to make a good contract is that the quantities of commodity mentioned therein may be certainly and accurately known.

Thus it seems obvious, that the law of England has always carefully avoided guaranteeing gold or any other commodity as a real standard of value. It has never guaranteed amounts of value at all, but only amounts of commodity. Consequently no claim for compensation can be founded on the fact that the value of gold is now varying. There is no violation of justice neither in letter nor in spirit.

## XXXV.—*Have Creditors any Claim to Charitable Relief?*

It is altogether another question, as to whether public annuitants, pensioners, or other creditors have any claim upon the charitable consideration of the community. Public annuitants and creditors, I think, have no more claim to consideration than private annuitants and creditors, the guarantee offered by the law being the same in both cases. Though the public, as debtors, might consent to compensate its creditors in some degree, it could not oblige the private debtor who gains by the depreciation of gold, to give up this gain, or any part of it, to compensate his creditor. Thus it would follow, that if the public undertook to compensate any annuitants or creditors, it would in mere justice have to undertake the whole cost

of compensating all private annuitants and creditors as well. This may be regarded as a simple impossibility. The consequence of any such attempt would be to increase greatly the public burdens, which otherwise are being decreased by the depreciation of gold. And if it be true that the reduction of income, even of the poorer annuitants, is compensated by the ameliorations of the age, so that no positive loss of comforts is inflicted, there cannot be any sufficient grounds for interfering with the natural course of events.

Secondly, we should remember that if there were positive hardship from the lowering of the value of gold, it is only one case of hardship out of hundreds which natural fluctuations inflict. No society could subsist under the condition that all calamities were to be relieved. The hardship in question is, at the worst, much slighter than what a commercial revulsion, like those of 1825 and 1847, or a failure of harvest such as usually occurs in every decade, or a great war and blockade, inflicts. The loss and suffering inflicted by the present scarcity of cotton is many times more serious than any which the probable fall in the value of gold will cause. Yet the executive Government and Parliament also have very rightly refused to admit any claim for unusual compensation or relief. By the poor law, indeed, the community saves all from positive starvation; but no Government could ever pretend to save any portion of the people from losses and minor hardships entailed by natural, unforeseen, and inevitable fluctuations. A Government which attempted to turn itself into an universal assurance company, superseding all individual forethought and liability to disaster, would soon come to grief, like other socialistic enterprises.

## XXXVI.—*Ought Gold as a Standard of Value to be abandoned?*

It may seem that there is one very simple way of avoiding all the evils and apparent injustice of gold depreciation, namely, to change the standard of value to silver. This

accordingly is what Chevalier would advise us to do. There is, no doubt, much to be said in favour of the proposal. It has always been a mere matter of opinion whether silver or gold were the better standard. Now that gold has actually lost its stability, all pretence for retaining it as the standard might seem to be gone. The country may be said to be calmly looking on while every contract, including that of the National Debt, is being violated against the intention of the contracting parties.

Had gold indeed utterly lost its ancient stability of value there would be no other course than to abandon it in favour of silver. But I think that the ultimate effect of the late gold discoveries will be to render gold more than ever the pre-eminent and natural standard of value. The greatly increased mass of gold in use, the extended area of production, and the greater variety of nations which share in its production, will finally render it far more steady in value even than it has been. In becoming more abundant gold will become more than ever the natural international currency, by the flow of which the balances of the exchanges of nations are adjusted. It will become more generally the money of the world.* So far from our changing from gold to silver as a standard, many years will probably not pass before several countries, which still cling to silver, will be constrained to change to gold. Gold will form the mass of the currency as regards value, even if it do not furnish the standard, and the inconveniences are very great of using coins varying in denomination, as was the case in England in the early part of the last century.

Gold has not lost its character of a standard by the late gold discoveries. These must be regarded as one of those runs of luck, one of those events of extreme improbability, which will in all likelihood not recur in the course of ages.

* These anticipations have been entirely realised within the last few years. The ideas here briefly expressed were developed more fully in some of the later papers published in this volume, as well as in the book on "Money and the Mechanism of Exchange," chap. xii. But I may fairly claim to have maintained the same opinion consistently from the first, namely, that gold must become the standard money of advanced nations.

According to the doctrine of chances, a person may play whist until he gets a complete hand of trumps, or any other particular hand he likes to name; or he may throw dice until at length sixes are thrown without fail for a whole day. He might have to play for years, or for centuries, or for geological ages before such events happened and equal periods before they should happen again. So it is with gold discovery. The great extension of the English race of late years had prepared the way for such discoveries, and when once the gold was accidentally found in California, the attention drawn to the subject led to the even greater discoveries in Australia, and to a tail of minor discoveries in New Zealand, Nova Scotia, and British Columbia. But the present gold fever at an end, centuries will probably pass without such another run of luck. The character of gold as a standard is not much damaged by a variation such as has not occurred more than two or three times in the history of the world; of which the last occurrence was in the sixteenth century, and of which the next occurrence may be as far in the future as that is in the past. The character of gold is no more changed by these discoveries than is the game of whist by the occurrence of an extraordinary hand of cards, or the climate of the British Islands by one of those extraordinary cyclones which at long intervals reach our shores.

It is worthy of remark, that gold and many other things will assume an altogether new condition of stability when there are no longer new lands to explore. The centre of Africa, Borneo, New Guinea, some parts, perhaps, of Asia, together with tracts at the north and south poles, alone offer new ground at present. After these parts have been examined as well as they may be, the chances will grow still less of any recurrence of great gold discoveries.

But whether gold be a good or a bad standard, it is to be questioned whether silver is a better one. A change of standard to silver at present would bring no relief, because silver, as I have shown,* is depreciated as much as gold, save 3 per cent, which is an inconsiderable

* See above, p. 56.

change. And when the French silver currency has ceased to overflow, as it soon must, and the value and price of silver rise, this restoration to the old value would not, for the most part, benefit creditors, who have suffered or are suffering, but a new set of creditors, including many who may have succeeded to or bought up the claims of former annuitants and creditors at their reduced value, and who have no claim whatever to the benefit.

It is also by no means clear that silver will be more free than gold from future variations of importance.

## XXXVII.—*Have the Gold Discoveries added to the Wealth of the World?*

If we take wealth to be that which is agreeable and useful to mankind, it may be safely said that the mere gold produced by Australia and California represents a great and almost dead loss of labour.

A century or more ago it was the fashion to consider gold and silver as the *only wealth,* because they happened to be the measures and vehicles of wealth. Now it is more correctly seen that gold is one of the last things which can be considered wealth in itself, and that in its most useful employment as money, the very scarcity of gold is its recommendation, rendering the value greater, and the weight or quantity to be carried as money less. *It is only so far as the cheapening of gold renders it more available for gilding and for plate, for purposes of ornament, and for use in other ways than as money, that we can be said to gain directly from the gold discoveries.* To over-estimate the *indirect* effects of these discoveries in creating new colonies, in spreading the English people and language, and in newly animating commerce, is not easy. But in itself gold-digging has ever seemed to me almost a dead loss of labour as regards the world in general—a wrong against the human race, just such as is that of a Government against its people, in over-issuing and depreciating its own currency.

# APPENDIX

NOTE A.—The sentence on the back of the title-page * is from certain brief dialogues "Imprinted at London in Fleetstreate, neere unto Saincte Dunstones Church, by Thomas Marshe," in 1581. They have been attributed to Shakespeare, and were reprinted with his name in 1751.†

The real writer, however, was William Stafford. The dialogues attack certain common prejudices against learning, trade, enclosure of land, etc., in a very able and enlightened manner. They are creditable even to the age of Shakespeare, and are interesting and worthy of perusal for many reasons. They are to be noticed here, and have before been noticed in Jacob's "History of the Precious Metals," with regard to the great rise of prices occurring at the time, chiefly in consequence of the American discoveries of gold and silver mines. The rise of prices was indeed attributed by W. S. to the debasement of the coin, against which he argued as clearly and successfully as has ever since been done. His mistake was not without excuse, considering that the coin had been debased under Henry VIII. and Edward VI. not long before. But the effects

* See above, p. 12.

† Hallam remarks of the book: "This bears the initials W. S., which some have idiotically taken for William Shakespeare." (Introduction to "The Literature of Europe," 1839, vol. iii. p. 361.) To complete the apparent absurdity, the book has since been beautifully reprinted, at the expense of the Earl of Derby, by the new Shakespeare Society (Trübner, 1876), not, it is to be hoped, because it was once attributed to Shakespeare, but because it throws much light upon the state of trade and agriculture in Shakespearean times. It is indeed a most remarkable work, and we may well be glad to have so good a reprint. The first passage quoted is found at page 63 of this new edition.

of any alteration of the standard are most clearly stated, and the distribution of loss and gain is thus explained:

"Knight.—I pray you what be those sorts that yee meane? And first of those that yee thinke should haue no losse thereby?

"Doctor.—I meane al these that liue by buying and selling; for, as they buy deare, they sell thereafter.

"Knight.—What is the next sort that yee say would win by it?

"Doctor.—Mary, all such as haue takinges, or Fearmes in theyr owne manurance* at the olde rent; for where they pay after the olde rate, they sell after the new; that is, they pay for theyr lande good cheape, and sell all things growing thereof deare.

"Knight.—What sorte is that which yee sayde should haue greater losse hereby, then these men had profit?

"Doctor.—It is all noblemen, gentlemen, and all other that liue either by a stented rent or stypend, or do not Manure the ground, or doe occupy no buying or selling."

And elsewhere the Knight says:

"You my neighbour the husbandman, you Maister Mercer and you Goodman Capper, with other artificers may save yourselves metely well. Forasmuch as all thinges are deerer than they were, so much doe you arise in the pryce of your wares and occupations that yee sell agayne. But we have nothing to sell whereby we might advaunce ye price thereof, to countervaile those things that we must buy againe."

## NOTE B. (*See* p. 29.)

It was the mistaken notion of some few persons that convertible Bank notes might have a peculiar efficacy in regulating prices and sowing the seeds of fluctuations. In the reaction from this error others have gone so far as to

* *Manœuvre*, cultivation.

assert that there is no obvious relation between the fluctuations of the note currency and the course of prices. The comparison of the general curve of prices in the diagram facing page 43, with the corresponding curve of the note circulation, as shown for instance in full detail in my Diagram of the Bank Accounts, will prove a striking relation, viz. that *an expansion of the currency occurs one or two years previous to a rise of prices.* The rise of prices once started, however, proceeds independently of the currency for a time. This is shown in the following table, from which it also appears that the chief additions to the metallic currency are made at periods of rising prices.

| Years. | Bank of England Note Circulation. | | Variation of Prices. (See p. 40.) | Gold and Silver Coin issued from the Mint. |
|---|---|---|---|---|
| | Average of March, June, Sept., Dec. | Ratio to average of 1845-50. | | |
| 1843 | £19,168,000 | 95.7 | ... | £6,895,000 |
| 1844 | 21,094,000 | 105.3 | ... | 4,198,000 |
| 1845 | 21,576,000 | 107.7 | 104.4 | 4,899,000 |
| 1846 | 20,787,000 | 103.7 | 105.4 | 4,901,000 |
| 1847 | 19,561,000 | 97.6 | 110.8 | 5,293,000 |
| 1848 | 18,790,000 | 93.8 | 94.1 | 2,490,000 |
| 1849 | 19,265,000 | 96.1 | 89.6 | 2,299,000 |
| 1850 | 20,261,000 | 101.1 | 92.1 | 1,621,000 |
| 1851 | 20,245,000 | 101.0 | 92.4 | 4,492,000 |
| 1852 | 23,028,000 | 115.0 | 93.8 | 8,936,000 |
| 1853 | 23,471,000 | 117.1 | 111.3 | 12,664,000 |
| 1854 | 21,329,000 | 106.4 | 120.7 | 4,354,000 |
| 1855 | 20,330,000 | 101.4 | 117.6 | 9,245,000 |
| 1856 | 20,083,000 | 100.2 | 122.5 | 6,476,000 |
| 1857 | 20,081,000 | 100.2 | 128.8 | 5,240,000 |
| 1858 | 20,860,000 | 104.0 | 114.2 | 1,690,000 |
| 1859 | 21,855,000 | 109.1 | 116.0 | 3,305,000 |
| 1860 | 21,572,000 | 107.6 | 117.9 | 3,378,000 |
| 1861 | 19,554,000 | 97.6 | 115.1 | 8,673,000 |
| 1862 | 20,303,000 | 101.3 | 113.4 | 8,338,000 |

It must be allowed that these facts are the very ones with which the currency theorists would support their notions. But they are not less mistaken in supposing that the notes have any peculiar effect; it is a superabundance of gold bullion that first turns prices upwards by a real but temporary lowering of the value of gold in the country.

All the gold coin and bullion in the country must be considered as constantly on sale. The issue department of the Bank is the national gold warehouse, and notes are but the warrants, exactly resembling dock-warrants, entitling the holder to certain portions of the gold stored up. Thus I apprehend that a superabundance of gold in the Bank reduces its value and raises prices, just as would a superabundant supply of sugar or tea in the London Docks reduce the value of sugar or tea. It is credit, or the creation of *prospective gold,* which allows prices to continue rising for a time while gold is decreasing. But the knotty point remains unexplained—that is to say, the exact relation of gold as *a commodity on sale* to gold as the most *perfect form of free capital on hire.*

## NOTE C. (*See* p. 33.)

Although the comparison of periods just before and after the gold discoveries will exhibit the effects of the new gold most free from other influences, there is an obvious advantage in extending the inquiry further back. By comparing the period 1851-62 with that of 1844-50, and then the latter with the previous period of 1833-43, we shall ascertain not only whether prices have altered since the gold discoveries, but also whether the alteration is of an unusual character. The gold discoveries being a new event intervening between 1844-50 and 1851-62, it is not the simple change of price then which is due to the gold, but the *difference of the change* between the two second periods from the change between the two first periods.

From Tooke's "History of Prices," the Annual Register, and other sources, I have formed hasty averages of twenty-four of the thirty-nine chief commodities for the years 1833-43. This interval of years seems to have formed the preceding rather broken period of fluctuation of investment.

It thus seems that silver was slightly dearer in 1833-43 than in 1845-50, but was still distinctly cheaper than since 1851. The metals in general did not vary much in price

between 1833-43 and 1845-50, but the majority of other commodities fell in price by some 12 per cent.

This considerable change suggested the notion that the average of 1845-50 might be too restricted and erroneously low. The best period, as shown on page 32, would be 1844-50, and the year 1843 might also be included without impropriety. Though complete and accurate data for 1843 and 1844 were not available, I carefully examined such as I could readily get, and thus satisfied myself that the inclusion of these two years would have slightly lowered the average (1845-50) adopted, instead of raising it, so that it is, if anything, a little *too high*. The extension of the period in the other direction into 1851 and 1852 would also have considerably lowered the average.

It is therefore certain that prices did truly fall between 1833-43, and 1844-50, but rose between the last period and 1851-62. It must, indeed, be generally known to all who concern themselves with these matters that the prices of materials of manufacture, and of most other articles had been continually falling since the great wars. I am the more sure of the fact, because I have by me diagrams constructed from data in Tooke's "History of Prices," and from other sources, representing the course of prices from various periods in the last century. Overlooking fluctuations due to variations of supply, and the greater fluctuations due to variations of demand, it may be confidently stated that prices pursued a downward course from 1820, about the time when the currency was re-established on a gold basis, to 1850. The fall, it is true, was most rapid at first. Silver, too, does not share in the fall. We can only explain these facts, so far as I am aware, by supposing that the supply of the precious metals did not keep pace with the demand, or that while modes of procuring, raising and making other articles more easily and cheaply were constantly being discovered, no such great improvements took place in the procuring of the precious metals. It should be remembered, too, that the supplies of Russian gold were failing, and the Spanish-American colonies were falling into anarchy.

Thus while industry, trade, and property were rapidly

advancing in Great Britain, America, and most other parts of the world, there was no corresponding advance in the production of the precious metals. Prices, both in gold and silver, continually receded. Now if, while the introduction of free trade, railways, telegraphs, and innumerable other improvements accelerated the extension of trade, and the consequent demand for the precious metals, no new discoveries of gold and silver had been made, what must have ensued? *Prices must have continued in the downward course they had pursued for thirty or forty years before. But they did not continue in this course—on the contrary they turned upwards in a sudden and decided manner,* as shown in the body of this tract. And this change was simultaneous with the discovery of the new gold-fields. Half the Prerogative Instances of Bacon are exemplified in this question, and if the philosophy of observation and common sense may be applied to statistical matters, we can draw but one conclusion—that prices have risen in consequence of the gold discoveries.

But we may now draw another speculative conclusion. The gold discoveries have had the double effect of arresting the fall of prices and then raising them. The total effect is not merely the rise that has occurred, but that rise *plus* the fall that would have occurred. This goes a considerable way to explain why prices have not risen so high as the vast supplies of gold might have led us to expect. It is true we touch upon the argument of several distinguished writers, that the rapid extension of trade would absorb the new supplies of gold and prevent them from pressing upon the markets and raising prices. But *an argument that a rise of prices is not to be expected does not weigh much against the fact that a rise of prices has occurred.* And when to explain away this rise of prices without reference to gold, we are told that the extension of trade and manufacture has caused a great demand for many materials, and *this has raised prices,* I can only answer that to a similar extension of trade and manufactures generally must be attributed the *fall of prices* between 1820 and 1850. Similar causes have similar effects. *He who allows prices to have risen since* 1850, *but denies it*

*to be the effect of the gold discoveries, must point out something else in the progress of industry since* 1850 *entirely different and contrary to the progress before;* otherwise, it is natural to point to these gold discoveries as that which has entirely altered the course of prices.*

## NOTE D. (*See* p. 68.)

The following extracts from *The Melbourne Argus,* quoted in the "Journal of the Statistical Society" for September, 1862, vol. xxv. p. 397, show how rapid has been the decline in the profits of gold-digging.

"We cannot estimate the aggregate earnings of our mining population at more than £8,000,000 sterling, which, divided among 100,000 diggers (the exact number returned is 100,463), only gives £80 per head per annum. But even this sum must be considerably in excess of the net earnings of each individual, since from the gross product must be deducted the interest on the mining plant employed, the cost of the fuel consumed by the steam-engines, and of the timber required for stabling, the maintenance of the horses used in connection with the whims, pumps, and puddling-machines, and a large sum to represent the deterioration of plant, and casualties.

"Probably £70 *a-year* would approximate more closely to the average earnings of each miner, and the bearing of this fact upon the value of labour generally in this colony is too important to be overlooked. The *income of the digger* has constituted a standard by which the wages of day labourers have been adjusted ever since the discovery of the gold-fields. The fluctuations in the wages of the latter have been determined by those of the former; and the close relation which has existed, and continues to exist, between the decline in the rate of wages and the average earnings of the miners, as a class, will become apparent by a comparison of them at the undermentioned rates and periods."

* The next ensuing Paper (III.) in this volume treats in a more general way of the variation of prices during the periods in question.

The data given, when uniformly reduced to the rate per day, are as follows:

| Rate of Wages per Day. | 1854. | | 1857. | | 1861. | |
|---|---|---|---|---|---|---|
| | *s.* | *d.* | *s.* | *d.* | *s.* | *d.* |
| Farm labourers (with rations?) - - | 5 | 10 | 4 | 2 | 2 | 6 |
| Stock keepers (with rations?) - - | 4 | 4 | 3 | 4 | 2 | 8 |
| Masons - - - - - - - | 32 | 0 | 16 | 0 | 14 | 0 |
| Carpenters - - - - - | 28 | 0 | 14 | 0 | 11 | 0 |
| General labourers - - - - | 12 | 6 | 9 | 0 | 7 | 0 |
| Miners (gold-diggers) - - - | 8 | 8 | 5 | 6 | 4 | 8 |

As the above are the average earnings of diggers, and many earned much more, of course the majority must have earned something less. Though in the past years of the gold excitement wages were much raised by the attraction of the diggings, it is obvious that the real profits cannot fall much lower without the occupation being deserted. A successful gold-digger must be a strong, active, intelligent, and even ingenious man, capable of earning good wages in a score of occupations.

## NOTE E. (*See* p. 68.)

The following estimate of the gold produce of Victoria up to the end of 1859 is given by the Registrar-General of Victoria.

| | | | |
|---|---|---|---|
| 1851 - - | £580,587 | 1855 - - | £11,172,261 |
| 1852 - - | 10,899,733 | 1856 - - | 11,942,783 |
| 1853 - - | 12,600,083 | 1857 - - | 11,046,113 |
| 1854 - - | 9,568,262 | 1858 - - | 10,112,752 |
| 1859 - - - - | £9,122,702 | | |

The greatest productiveness of the Victoria diggings was attained within two years from their discovery. The fluctuations are chiefly caused by the migrations of diggers, and the following account of the produce of New South Wales, from *The Sydney Morning Herald* of January 21, 1863, shows a continuous decrease down to the year 1855, and then a continuous increase up to the present time,

which about compensates the falling off of the Victoria produce.

| | Ounces. | | Ounces. |
|---|---|---|---|
| 1851 - - | 161,880 | 1857 - - | 148,126 |
| 1852 - - | 199,500 | 1858 - - | 255,535 |
| 1853 - - | 173,960 | 1859 - - | 293,574 |
| 1854 - - | 148,900 | 1860 - - | 355,328 |
| 1855 - - | 107,250 | 1861 - - | 403,139 |
| 1856 - - | 134,950 | 1862 - - | 584,219 |

The produce of 1851 is that of half a year only. Some writers have fallen into a serious mistake by treating the export of gold dust from New South Wales as the whole produce. They should have added many millions of pounds coined at the Sydney Royal Mint.

The total supply of new gold during the twelve years 1849-60 has been stated by Mr. Newmarch at 300 millions sterling, which is equal to about 50 per cent, or the half of the total stock of gold supposed to be in use at the beginning of the period. Is it likely?—Is it conceivable that the stock of gold in the world, which before 1848 must have been nearly stationary, should suddenly have grown half as large again without a considerable effect upon prices?

## NOTE F. (*See* p. 66.)

I reprint below the third part of a paper, entitled "Remarks on the Australian Gold Fields," prepared by me for the Literary and Philosophical Society of Manchester, and published in vol. i. series iii. of the Memoirs of the Society, session 1859-60 (1862), pp. 115-30.

### *On the future Supply of Gold.*

The question, Will the supply of gold from Australia increase, remain constant, or diminish? is of evident and high importance. I will therefore conclude with a few remarks by way of answer.

The rich diggings of Ballaarat, Bendigo, and Forest Creek were all discovered in the course of one or two years after attention was first drawn by Hargreaves to the presence of gold in the Australian rocks. Since then the most favourable localities have been well prospected, or tested, for alluvial gold by the many thousands of experienced diggers with whom Victoria now abounds. I regard it as certain, therefore, that no alluvial deposits, equally rich and equally accessible, will ever be laid open in future. But it is by no means certain that great and rich "leads" of gold may not exist in many places still concealed by the great thickness of the overlying alluvium, or by a portion of the basaltic formation or sheet of lava. Such leads would be comparable to the new and deep leads beneath the new town of Ballaarat, and would be discovered only by a very lucky chance, or by a skilful and expensive search. From the mode in which schistose hills, bearing fine auriferous reefs, only just appear here and there through the basaltic formation, as at Clunes and Melbourne, we may consider it very possible that complete gold districts may lie hidden, perhaps for ever, at considerable depths beneath other parts of the basaltic plain. Not much, perhaps, is to be hoped from the future discovery of alluvial gold.

The chief diggings of Victoria have, during the past eight years, been so vigorously undermined and turned up by small parties of miners that scarcely a square yard of untouched auriferous ground is left—at least such ground as would have formerly been considered profitable to men without experience and means of undertaking large works. But these diggings are by no means exhausted. The miners, learning the advantages of co-operation and the use of machinery, find that masses of alluvium, only slightly auriferous, now afford a handsome and also a steady profit. Ground exhausted in the old style is being reworked in a much more complete manner, and even the *tailings*, or refuse from the cradles of previous diggers, is valuable to those provided with more improved washing apparatus. As science, capital, and co-operation are more and more introduced, auriferous land of less and less

richness will successively become profitable, and of such land the quantity, it may be stated, is certainly very great.

It follows, then, that the supply of gold, even from the present alluvial diggings, would diminish but slowly, unless, indeed, other social circumstances, as may well happen, should interfere. The many thousands of Chinese diggers, with their quiet, plodding, and, so to say, mean industry, assist to maintain and steady the supply. Yet it must certainly be allowed that the deposits of alluvial gold will begin to fail gradually in a very moderate interval of time.

The answer is otherwise, I believe, when we take into account the quartz reefs which are real *gold mines*. The number of reefs now known to be auriferous is great; of the rest some may be devoid of gold, but the majority probably contain a proportion of the valuable metal which, either now or in some years to come, as machinery is improved, will repay extraction. As reefs are now worked by small parties of miners, each owning a small claim and sinking an independent shaft, even the richest reefs would cease to be profitable at a certain depth, from the great comparative expense of draining and working so small a mine. But if a whole reef were in possession of one large moneyed company, two or three shafts and a single establishment would suffice; powerful engines and pumps would be employed to drain the mine, and the quartz reef might be followed as deeply as copper veins or coal beds. There is no known reason, beyond a mere fancy in the minds of some geologists,* that reefs should become impoverished in sinking; the fancy is now proved to be contrary to fact. Even a few large reefs then would, I believe, yield a considerable and constant supply of gold for many years to come. For how much more may we not hope when greater experience is attained in quartz mining, now so new an employment; when improved machinery is brought into use for the rapid, complete, and cheap extraction of the gold from the quartz matrix; when capital is attracted in great sums to the pursuit: and when the search for new auriferous reefs, becoming

* Murchison's "Siluria," 1854, ch. xvii. p. 455.

more keen, is rewarded, as I believe it will be, by abundant discoveries?

My conclusions, expressed as shortly as possible, are:

1. That no great and recurring discoveries of alluvial gold are to be expected; so that the yield of alluvial gold must notably, yet gradually, fall off.

2. That the supply of gold from its quartz matrix is subject to entirely different laws; that we at present know of no limit to the amount procurable with the aid of capital; and that that amount, whatever it be, will probably remain constant for a long interval of time; that, in short, the supply of gold from Australia will prove as inexhaustible as the supply of tin and copper from the Cornish mines, or as the supply of almost any other metal from its most common source.

## NOTE G.

The following extract from *The Economist* newspaper, of 4th March, 1882 (vol. xl. p. 252), gives the latest information about the yield of gold in Victoria. It would appear that the deep leads of alluvial gold are now being discovered.

"After dwindling for many years prior to 1879, the gold production of Victoria has begun again to increase. The total amount raised in 1880, it is estimated, exceeded the product of 1879 by fully 70,000 ounces, and now for 1881 a further increase in the yield is reported. According to the estimates of *The Melbourne Argus*, which are generally reliable, the output last year was as follows:

| | Ounces. |
|---|---|
| Victorian gold exported - - - - - | 398,641 |
| Do. minted - - - - - | 519,884 |
| Do. held by banks, 31st December last - | 60,438 |
| Total - - - - - | 978,963 |
| Deduct held by banks, 31st December, 1880 - - | 92,547 |
| Total output for 1881 - - | 886,416 |
| „ „ „ 1880 - - | 812,092 |
| Increase for 1881 - - - | 74,324 |

Estimating the value of the gold raised at £4 per ounce, last year's yield represents a value of £3,546,000. As to the causes of the increased gold production, the Mining Department reports that it is considered to be due to the opening up of new gold-producing areas, in which the rich deposits have been hitherto hidden beneath deep flows of volcanic rock. The discoveries in these tracks have been greatly facilitated by the operations of the diamond drills imported and worked by the Government. The rapid borings through dense basalt by those machines, and the information disclosed by the cores of rock obtained, have given a great impetus to alluvial mining, and have enabled mining companies to determine the downward courses of auriferous lodes at distant points, and to sink shafts with precision either upon or in close proximity thereto."

The following table gives the average number of gold-miners employed in the colony of Victoria during each of the fifteen years ending 1880, and the quantity obtained during each of the past sixteen years:

| Year. | Number of Miners. | Yield of Gold. Ounces. | Year. | Number of Miners. | Yield of Gold. Ounces. |
|---|---|---|---|---|---|
| 1866 | 73,749 | 1,536,581 | 1874 | 46,800 | 1,102,614 |
| 1867 | 65,857 | 1,493,831 | 1875 | 42,000 | 1,058,823 |
| 1868 | 63,181 | 1,474,187 | 1876 | 41,564 | 937,260 |
| 1869 | 68,037 | 1,367,903 | 1877 | 38,882 | 792,839 |
| 1870 | 60,367 | 1,281,841 | 1878 | 37,400 | 753,793 |
| 1871 | 58,101 | 1,303,379 | 1879 | 37,553 | 718,208 |
| 1872 | 54,651 | 1,317,102 | 1880 | 38,568 | 812,092 |
| 1873 | 52,544 | 1,249,407 | 1881 | — | 883,625 |

A similar increase of production is reported from the goldfields of New South Wales and Tasmania.

## III

# THE VARIATION OF PRICES AND THE VALUE OF THE CURRENCY SINCE 1782*

THE results which I wish to explain in this paper were obtained by applying more extensively the method of investigation employed in a pamphlet on the "Value of Gold," published by me about two years ago. Although my purpose then was only to ascertain the much-questioned effect of the gold discoveries, a review of the prices of a period of twenty years seemed hardly sufficient even for that inquiry. We cannot safely assert a given change of prices to be occasioned by an alteration in the supply of gold, unless we observe the general course of prices for a considerable interval, and show that there was an *unusual change* in the course of prices subsequent to an *unusual change* in the supply of gold.

Nor do I think it useless, when assisted by a distinct method of inquiry, to go still further back, and bring into question the course of prices at the beginning of this century. No one, indeed, who knows the division of opinion which existed on this subject, the hundreds of publications which it called forth, and the incessant discussion which it created, would wish uselessly to raise the subject into debate again. But I think that a true understanding of the course of prices can alone explain many important facts in the statistical and commercial history of the country.

It is true that we have Tooke's "History of Prices," a unique work, of which we can hardly overestimate the value. But it has struck me that Tooke, and other writers

* Printed in the "Journal of the Statistical Society of London" for June, 1865, vol. xxviii. pp. 294-320, having been read before the Society in May, 1865.

on the subject of prices, were in want of some method of reducing their tables of prices, and eliciting the general facts contained in them. Large tables of figures are but a mass of confused information for those casually looking into them. They will probably be the source of error to those who pick out a few figures only; a systematic but probably tedious course of calculation and reduction is necessary to their safe and complete use.

My inquiry has accordingly consisted in applying such a method of reduction to the tables of prices contained in the "History of Prices" by Tooke and Newmarch, extending with little interruption from 1782 to recent years, the purpose being to ascertain the course of prices of commodities generally, or of any distinct class of commodities separately.

The method of reduction used consists in calculating the ratios of change of prices year after year, and then taking, by the aid of logarithms, the *geometric mean ratio of change of prices for each year.* The reasons for adopting the geometric mean were explained in my pamphlet,* and I still think those reasons sufficient. I must mention, however, that the method has been called in question by Dr. E. Laspeyres, Professor in the University of Basle, who has published † a complete and very valuable investigation concerning prices in Hamburg, including a review of some English writings, and of the previous labours of Soetbeer in the same subject. Dr. Laspeyres urges, if I read him aright, that as the value of gold meant its *purchasing power,* we ought to take the simple arithmetic average of the quantities of gold necessary for purchasing uniform quantities of given commodities. There is certainly some ground for the argument. But it may be urged with equal reason that we should suppose a certain uniform quantity of gold to be expended in equal portions in the purchase of certain commodities, and that we ought to take the average quantity purchased each year. This might be ascertained by taking the *harmonic mean.* Thus

* "Serious Fall in the Value of Gold," pp. 6-7. (See above, pp. 19-20.)

† "Hamburger Waarenpreise," in the "Jahrbuch von Nationaloekonomie," Bd. iii. s. 81, etc.

there are no less than three different kinds of averages which might be drawn.

Suppose, for example, that the price $a$ of one commodity were to change to $b$, and the price $p$ of another commodity were to change to $q$, then the arithmetic mean ratio of change which Dr. Laspeyres would adopt is

$$\frac{1}{2}\left(\frac{b}{a}+\frac{q}{p}\right) \text{ or } \frac{bp+aq}{2ap}.$$

The geometric mean is $\sqrt{\frac{b}{a}\times\frac{q}{p}}$.

The harmonic mean would be $\frac{1}{\frac{1}{2}\left(\frac{a}{b}+\frac{p}{q}\right)}$ or $\frac{2bq}{aq+bp}$.

Suppose one commodity to remain unchanged in price ($a=1$, $b=1$), the other to be doubled ($p=1$, $q=2$); then the mean rise of price might be thus variously stated:

| | Per cent |
|---|---|
| Arithmetic mean - - - - - | 50 |
| Geometric „ - - - - - | 41 |
| Harmonic „ - - - - - | 33 |

It is probable that each of these is right for its own purposes when these are more clearly understood in theory. But for the present approximate results I adopt the geometric mean, because (1) it lies between the other two; (2) it presents facilities for the calculation and correction of results by the continual use of logarithms, without which the inquiry could hardly be undertaken; (3) it seems likely to give in the most accurate manner such general change in prices as is due to a change on the part of gold. For any change in gold will affect all prices in an equal ratio; and if other disturbing causes may be considered proportional to the ratio of change of price they produce in one or more commodities, then all the individual variations of prices will be correctly balanced off against each other in the geometric mean, and the true variation of the value of gold will be detected.

In any case my tables will present a sufficient first approximation, and the striking phenomena detected will

be under-estimated rather than over-estimated by my calculations. Thus the general rise of prices between 1845-50 and 1860-62, which I had estimated at 10.25 per cent,* would have been 13.1 per cent, according to Dr. Laspeyres' method of calculation by the arithmetic mean.†

Calculations of this kind are far from being advocated now for the first time. Not to speak of Sir George Shuckburgh Evelyn's well known paper in the "Philosophical Transactions" for 1798 (Part I. p. 176), it was proposed, more than thirty years ago, "to correct the legal standard of value (or at least, to afford to individuals the means of ascertaining its errors), by the periodical publication of an authentic price current, containing a list of a large number of articles in general use, arranged in quantities corresponding to their relative consumption, so as to give the rise or fall, from time to time, of the mean of prices; which will indicate, with all the exactness desirable for commercial purposes, the variations in the value of money; and enable individuals, if they shall think fit, to regulate their pecuniary engagements by reference to this *tabular standard.*" ‡

Such a proposal, though scarcely practicable, is interesting, and perhaps sound in a theoretical point of view.

I may add, that I had almost completed my calculations before I found that no less an authority than Mr. G. R. Porter had distinctly advocated and adopted a similar

* "A Serious Fall," etc. p. 29. (See above, p. 49.)

† "Hamburger Waarenpreise," etc., Hildebrand's "Jahrbuch," etc., Bd. iii. s. 97.

‡ "Principles of Political Economy," p. 406, by G. Poulett Scrope, M.P., London, 1833. See also the second edition of the same work under the title "Political Economy for Plain People," p. 308, London, 1873. Scrope's first reference to this subject is contained in his very able pamphlet, "An Examination of the Bank Charter Question, with an Inquiry into the Nature of a just Standard of Value," published in 1833. The idea was perhaps derived from the ingenious work of Joseph Lowe, "The Present State of England in regard to Agriculture, Trade, and Finance," etc., ch. ix., London, 1822. A second edition of this book appeared in 1823, and it was also reprinted (in German) in Leipsic in the same year, and in New York in 1824. See Horton on "Silver and Gold," pp. 37, 157, Cincinnati, 1877. My book in the International Scientific Series, on "Money and the Mechanism of Exchange," 1875, contains a chapter (xxv.) on "A Tabular Standard of Value," and Lowe's proposal.

method. In the first edition of his "Progress of the Nation," * he proposes the formation of extensive tables of prices, but adds: "It is not meant by this to recommend a mere record of the prices of goods, such as would be afforded by a collection of prices current, but a calculation conducted upon the plan already described, or some other that should be equivalent to it, and which would afford, on inspection, a correct comparative view of the average fluctuations that should occur." Mr. Porter actually publishes † such a table, giving for each month, 1833-37, the average ratio of variation (probably the arithmetic average) of the prices of fifty commodities. The tables greatly exaggerate the fluctuations compared with my tables, as may be seen in the following comparison:

*Comparative Prices in the Month of March.*

| Year. | Porter. Fifty Articles. | Jevons. Forty Articles. |
|---|---|---|
| 1833 - - - | 100 | 100 |
| 1834 - - - | 110 | 103 |
| 1835 - - - | 117 | 104 |
| 1836 - - - | 128 | 114 |
| 1837 - - - | 125 | 111 |

This subject of mean prices was again considered (p. 36) in a most curious mathematical pamphlet "On Currency," anonymously published in the year 1840.‡ Several able articles, too, by M. Levasseur, in the "Journal des Economistes," bear upon the subject.

* Vol. ii. p. 235; section III. chap. xii.

† Ibid., vol. ii., pp. 236-7; edition of 1847, pp. 444-5.

‡ I have lately ascertained that this remarkable pamphlet was the work of the late Sir J. W. Lubbock, the father of the present Sir John Lubbock. It is, in fact, acknowledged to be his in a list of publications given on the cover of one of his other works, and on this ground was entered under his name in the catalogue of the Graves Library at University College. (See the catalogue of books in the General Library, etc. at University College, vol. ii. p. 399.) Sir John Lubbock has also informed me that such a pamphlet was written by his father. It was published by Knight, London.

I come now to the actual construction of my tables. I selected from Tooke's tables about forty of the chief commodities, including the official prices of corn, and the prices of butchers' meat and fodder. The particulars are stated in the Appendix. A single quotation having been obtained for each year (in the case of some commodities, a yearly average, but in general the medium of the highest and lowest prices in the March quotations of Tooke's tables), the ratio of each yearly price to that of the preceding year was calculated by logarithms, as in the following example:

*Price of Wheat.*

| Year. | Yearly Price. | Logarithm of Number of Pence. | Difference. |
|---|---|---|---|
| | £ s. d. | | |
| 1782 - - - | 2 9 3 | 0.772 | — |
| 1783 - - - | 2 14 3 | 0.814 | 0.042 |
| 1784 - - - | 2 10 4 | 0.781 | $\bar{1}$.967 |
| 1785 - - - | 2 3 1 | 0.714 | $\bar{1}$.933 |
| 1786 - - - | 2 0 0 | 0.681 | $\bar{1}$.967 |
| 1787 - - - | 2 2 5 | 0.707 | 0.026 |

The logarithm in the third column is obtained by subtracting each logarithm in the second column from the logarithm for the succeeding year. In practice it was more convenient to subtract each logarithm from the preceding one, the reciprocals of the ratios being used all through the calculations until the averages were completed, when they were easily turned back.

Tables of the above form having been made nearly complete for the series of years 1782-1864, in respect of about forty kinds of commodity, the logarithmic ratios for each year were copied out in perpendicular columns, and in an order carefully determined on. The several proximate groups were then added up and averaged. By adding together the sums of the first groups, larger groups can readily be formed, and the addition of these gives the final aggregates of the ratios of the whole forty com-

modities. The following is a specimen of the second series of tables:

*Prices of Agricultural Produce.*

| Line. | Commodities. | Logarithmic Ratios of Prices. | |
|---|---|---|---|
| | | 1832 to 1831. | 1833 to 1832. |
| 1 | Wheat | .014 | $\bar{1}$.947 |
| 2 | Barley | .067 | $\bar{1}$.940 |
| 3 | Oats | .016 | $\bar{1}$.906 |
| 4 | Rye | .047 | $\bar{1}$.937 |
| 5 | Beans | .042 | $\bar{1}$.948 |
| 6 | Peas | .030 | $\bar{1}$.945 |
| 7 | Hay | $\bar{1}$.945 | .033 |
| 8 | Clover | .020 | .038 |
| 9 | Straw | $\bar{1}$.903 | .000 |
| 10 | Sum of corn (1—6) | .216 | $\bar{1}$.623 |
| 11 | Average of corn | .036 | $\bar{1}$.937 |
| 12 | Sum of fodder (7—9) | $\bar{1}$.868 | .071 |
| 13 | Average of fodder | $\bar{1}$.956 | .024 |
| 14 | Sum of corn and fodder (10, 12) | .084 | $\bar{1}$.694 |

The averages thus determined, however, give only the ratio of prices each year to those of the preceding year. To get the complete and continuous course of prices of any set of commodities, we must join the separate yearly ratios to each other year after year, by the simple addition of the logarithms, as in the following example:

*Price of Metals, Copper, Lead, Tin, Iron.*

| Year. | Ratio of Prices each Year to those of the Preceding Year. | Ratio of Prices each Year to Prices of 1782. | |
|---|---|---|---|
| | Logarithm. | Logarithm. | Common Number. |
| 1782 | 0.000 | 0.000 | 100 |
| 1783 | $\bar{1}$.999 | $\bar{1}$.999 | 100 |
| 1784 | $\bar{1}$.957 | $\bar{1}$.956 | 90 |
| 1785 | $\bar{1}$.995 | $\bar{1}$.951 | 89 |
| 1786 | 0.026 | $\bar{1}$.977 | 95 |
| 1787 | $\bar{1}$.992 | $\bar{1}$.969 | 93 |
| 1788 | 0.011 | $\bar{1}$.980 | 96 |

In the third column each number is found by adding the preceding number to the number of the succeeding year in the second column, as for instance:

$$\bar{1}.977 = \bar{1}.951 + .026.$$

A difficulty arises concerning the classification of commodities, that there is no single system of groups into which they naturally fall. It may always be objected that any one arrangement is arbitrary. The fact is, that a mass of forty commodities may be classified in a great number of ways. The principle I adopted, therefore, was to try all systems of classification which seemed to be founded on any material distinctions; in short, to try as many different systems as I could, and then to adopt any which seemed to elicit important information.

The first proximate grouping was nearly that adopted in my gold pamphlet, and in most other arrangements it was sufficient to join these groups together.

A complete classification according to *locality of production* was rendered impossible, because most commodities are produced in several different parts of the world. The natural and impassable division of tropical and temperate regions, however, enables us to separate their respective products, and it will appear that important results may be obtained by considering the products of eastern countries apart from other commodities.

For the interval of years 1800 to 1820 a correction is obviously necessary to reduce prices and their variations to a gold standard. A table is to be found in most works on the currency, giving the depreciation of the Bank of England paper during each of those years, and the authorities for some of these numbers are given in a pamphlet by the Earl of Lauderdale.* These numbers, indeed, bear some internal signs of want of accuracy and reliability, arising, no doubt, from the fact that the depreciation of the currency was not recognised by the law. The prices of silver probably furnish a better criterion of the value of the paper currency, and their variation is

* "Depreciation of the Paper Currency of Great Britain proved." London: 1812.

shown in Table I. (Appendix), calculated from the average variations of the price of standard silver and Spanish dollars, as given in Tooke's "History" (vol. ii. p. 384), and the "Report of the Bullion Committee, 1810," p. [22]. There is, however, a general accordance between the variation of price of silver and gold, and as it is convenient to keep to a single standard, I have reduced all the tables to the gold standard by the subtraction of the logarithms in column (3) of Table I. from the logarithmic ratios of prices in the corresponding years to prices in 1782.

A further step seemed necessary to present the information contained in these tables in the simplest form. The price of each commodity and group of commodities varies both from causes peculiar to each commodity, and from causes affecting gold, the measure of value. The latter are common to all, and their effects are more or less truly shown in the general variation of price of all commodities. If, then, we divide the ratios of variations of individual commodities and partial groups by the ratios of all commodities, which is done by the simple subtraction of the corresponding logarithms, we get the variations peculiar to each commodity or partial group. (See Appendix, Table VIII., comparative variations.)

The logarithmic ratios thus prepared may be turned back into natural numbers, giving the ratios of prices each year to prices in 1872. But, for most purposes, I should prefer to retain the ratios in their logarithmic form, and represent them to the eye upon a diagram. The diagrams* appended to this paper are thus drawn, and have several advantages over those drawn on the scale of common numbers. Equal perpendicular distances represent equal ratios of change, and straight lines represent numbers in geometric, not in arithmetic, progression. A tendency may be observed in most statistical curves to become divergent, or to run up into excessive elevations. This is easily understood when we consider that in almost every branch of statistics numbers should be considered relatively

* These diagrams represent the variations of prices in currency, not corrected during the interval 1800-20 for depreciation of the paper currency. In the tables the correction has been made.

to each other, which may most easily be done by representing them on a logarithmic scale.*

The datum point to which the numbers in the tables and curves are referred is given by the prices of the year 1782, the first year of Tooke's tables. This is a purely arbitrary commencement, and it might seem desirable to substitute for it some carefully-selected average of a period of years. But I conceive that when we have the variations of a long series of years presented in a curve, no such datum line is necessary, as the eye easily compares any year or period with any other year or period.

It is impossible here to notice more than a very small part of the information contained in the tables. We notice the tendency of animal and mineral substances to rise in price, and of vegetable substances, at least in this country, to decline.

The curve of the general variation of prices is perhaps the most interesting. In this we detect a series of smaller undulations, riding, as it were, on one very great one. We see elevations of prices probably due to speculation, and reaching their highest points in the years 1796, 1801, 1809, 1814, 1818, 1825, 1836, 1839, 1847, and 1857. The speculation of 1793 is hardly perceptible, and the extraordinary rise of prices in 1825 is chiefly marked by a pause in the very rapid downward course of prices about that time. From 1833 to 1843, there is an elevation of prices of a more extensive character than can well be assigned to speculation alone. Since 1852, lastly, prices have risen in a permanent manner, which points to the effect of the Californian and Australian discoveries.

* During the years which have elapsed since this paper and the previous essay on the value of gold were printed, I have not happened to learn that logarithmic diagrams had been used before their employment in these inquiries. It must be evident, however, that they furnish the true mode of representing all statistical and other numbers of which the ratios, not the absolute amounts, are in question. Now this is, strictly speaking, the case with almost all numbers used for statistical research, as apart from mere practical accounts. Professor Osborne Reynolds has recently used logarithmic curves for the purpose of comparing the ratios of pressures of gases in his researches on diffusion. (See "Philosophical Transactions," 1879, vol. clxx. pp. 753, etc.) He calls these curves the *logarithmic homologues* of the plain curves. In his figures both the ordinates and abscissæ are logarithmic.

It is, however, the general form of the undulation of prices which is most remarkable. After the year 1790 an enormous and long-continued elevation presents itself. And when prices had reached their highest, about the year 1809, a still more surprising fall commences, reaching its lowest point in 1849. Between 1809 and 1849, prices fell in the ratio of 100 to 41.*

My purpose has been to ascertain and measure these great changes with some approach to certainty and accuracy, and to establish them as facts of observation. To explain or account for them is a matter which I do not undertake. I cannot help noticing, however, the insufficiency of all explanations yet given of the state of prices in the early part of the century. Fiercely though the subject was debated, it was impossible at the time, perhaps, to form any adequate notions of the great movement which was taking place. Some writers laboured to prove that prices were unchanged, and those who were less wrong about the fact were hardly less wrong in attributing that fact to the deranged state of currency and banking at the time. Subsequently Tooke's "History of Prices" came to be regarded as the authority on the subject. Tooke's main purpose was to disprove all the prevailing notions about the extraordinary influence of currency. He allowed, of course, that the note currency was depreciated in the comparatively small degree marked by the increased price of gold bullion. But, beyond this, he would not allow any influence to the derangement of currencies, and what elevation of prices he supposed to exist, was attributed by him to the frequency of bad harvests at the time, or to the disturbance by war of the ordinary relations of supply and demand. In these opinions I conceive that Tooke was partly, and only partly right. On the one hand, I cannot

* I have not been able to discover the cause of this remarkable check and reversal of the prevailing downward course of prices. But it is worthy of notice that, in the years 1831-33, there was an altogether exceptional reversal of the drain of specie to the East, the imports thence exceeding the exports by the amount of £730,000. (See below, p. 126, and Table VI., p. 133.) There was also a great expansion of bank circulation in the United States, followed by a general breakdown of the banks there. (See Sumner's "History of American Currency," pp. 123, etc.)

too fully concur in his protest against the common practice of attributing every evil to the monetary circulation, which is a very passive thing, and does not deserve to be made the scapegoat it has long been. But, on the other hand, 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. Other amounts were similarly displaced by the paper currencies of France, Austria, Russia, and some other countries. In the aggregate a considerable mass of precious metals must have been thrown on European markets, and to this cause we must assign some part of the elevation of prices. William Jacob,* indeed, argues that this effect of the paper currencies would be inconsiderable, and without attempting to discuss the subject further here, I am quite ready to allow it would only produce a small part of the elevation of prices.

But then I think the cause assigned by Tooke was equally insufficient, namely, the unusual frequency of bad seasons. I cannot think that Tooke, when assigning such a cause, was fully aware how great and general was the rise of prices. Bad seasons might well raise the prices of all kinds of corn, fodder, meat, and agricultural produce, but could not have any permanent effect upon the prices of other articles. Now, though corn did rise extravagantly in price on several occasions during the period under review, on the whole it did not rise so much as metals, fibres, oils, and some other articles. At the most, I think the unusual frequency of bad harvests could only be a partial contributing cause to the general rise.

The elevation of prices in the early part of the century is still more striking when contrasted with the subsequent great fall, proceeding from 1818 to 1830, and reaching its lowest point as yet in 1849. This fall is less difficult to understand. The production of almost all articles has been improved, extended, and cheapened during this period,

* "Historical Inquiry into the Production and Consumption of the Precious Metals," vol. ii. pp. 366-71. Jacob's opinion is disputed in the "Quarterly Review," No. 94, July, 1832, vol. xlvii. p. 427.

and all imported articles must, too, have been affected by improvements in navigation, while there was no corresponding improvement in the production of the precious metals, from the derangement of the American mines in 1810 to the Californian discoveries in 1849.

But this argument tells two ways, for manufactories and modes of production were undergoing improvement in the earlier period while prices were rising, as well as in the latter period while they were falling. Even our foreign trade suffered no great check during the wars, and the very foundations of our home industries were being energetically laid throughout the period from 1782 to 1815, when prices were high or rising. The progress of our industry, in short, has been continuous, and its only change that of acceleration in recent years. There is nothing in such constant progress that can account for a great rise of price followed by a great fall.

If the progress of invention causes a fall of price, then we need even more potent causes to raise prices in opposition to it in the early part of this century, when invention was most active.

The production of gold, on the other hand, has* been far from uniformly progressive. It progressed up to the beginning of the century, but suffered a serious relapse in 1810, when the American mines were deranged by the Spanish war of independence. Jacob estimates the average produce, from 1810 to 1830, at one-half the previous amount, and this failure must be regarded as one of the contributing causes to the fall of prices.

Further light may, however, be thrown upon the question, whether gold could be said to be depreciated in the early part of this century, by considering the relative prices of the products of different countries and the state of the exchanges. Professor Cairnes has most clearly pointed out the effects of a flood of gold in successively raising prices in the countries into which it flows.† He estab-

* See the diagram prefixed to Stirling's "Gold Discoveries," Edinburgh, 1853.

† "Report of the British Association," 1858; "Dublin Statistical Journal," January, 1859; "Frazer's Magazine," September, 1859, and January, 1860; "Economist," 30th May, 1863.

lished theoretically that while the precious metals are copiously flowing, for instance, from this country to India, prices here must be higher than in India; hence all articles will be dear in price here except those tropical products which we buy from India.

It was, if I recollect aright, noticed by Mr. Newmarch, in the sixth volume of Tooke's "History," that the prices of tropical and some colonial produce had scarcely risen of late years. I encountered the same fact, which I stated, being then quite unacquainted with Professor Cairnes' writings on the subject, in the following words: "All the groups which have fallen in price are of vegetable origin, and chiefly of foreign growth," and I gave what I thought an obvious, though perhaps mistaken, explanation of "the marked distinction between the classes of materials which have risen in price and those of foreign articles of food which have fallen." *

When Professor Cairnes read my pamphlet he detected, in this comparative fall of the price of oriental produce, a confirmation of his own theoretical views of the effects of an excess of gold in one country and its motion towards another country. These three facts, (1) a distinct, though moderate general rise of prices here; (2) a drain of bullion to the East; (3) a comparative fall in the price of oriental produce, formed, in his opinion, when taken in union, a complete demonstration of some depreciation of gold since the Australian discoveries.

When I had nearly completed the reduction of Tooke's tables, I could not help being struck by the fact that when prices were highest here, between 1800 and 1815, the prices of Eastern produce were not higher than they had been, and consequently, in comparison with the prices of other articles, had fallen. This fact, according to Professor Cairnes' views, would inevitably point to a comparative redundancy of gold in Europe. I was therefore led to inquire into the past fluctuations of the current of specie towards the East.

It does not seem possible to form any one complete series of accounts of the export of bullion extending over

* "A Serious Fall," etc. p. 31. (See above, p. 51.)

the whole period of our inquiry, but we may perhaps pretty safely infer the character of the fluctuations from tables given in the Appendix.

The current of gold having been very steady during the earlier half of last century, fluctuated a good deal during the second half of the century. It was considerable in the period 1785 to 1791 or 1792; then it fell off very much, and only began to rise again into importance in 1797. In the years 1798, 1799, 1802, 1803, 1804, and 1805 the exports both of the East India Company and of private persons were very great, the exports of the Company at least reaching greater amounts than had ever been known before.

Independent evidence of the increased current of precious metals setting towards the East in the early years of this century is seen in the table of imports into Bengal, given in Macpherson's "Commerce with India." And the later course of the trade is given in the semi-official tables published in Martin's "British Colonies," p. 360, B, etc.*

The current greatly fell off in the period 1806-13, but stood at a very high amount in the years 1814-19. After 1820 the drain decreased very rapidly, and the exports of other merchandise increased, so that about the year 1832 the current of treasure actually turned in the opposite direction for a year or two. With slight exceptions, there was then no considerable movement until the Californian and Australian discoveries of gold, which were followed almost immediately by the great drain, unremitted to the present time.

Viewed by itself, the current of specie would not afford any safe criterion of variations in value of gold here. It might easily be asserted that the growth of our trade about the beginning of the century required increased remittances, especially after the opening of the trade to India in 1814; that afterwards the increased export of cotton and other manufactures took the place of treasure. Under this view, however, the recent drain of bullion stands out as unaccountable.

Then again it will probably be said that the great wars

* See also Tooke on "High and Low Prices," p. 211.

were sufficient to account for vast remittances of treasure and for interruptions of trade. I am quite willing to allow to such causes all that can be fairly attributed to them, but I cannot regard occasional and temporary events as the causes of long-continued changes of trade.

When we compare the large average exportation of treasure during the period 1798-1820 with the high general range of prices at the time, and the comparatively low price of oriental produce; when we remember that the increased abundance of gold in late years has been accompanied by somewhat increased prices, by an enormous drain of bullion to the East, and again by a low price of oriental produce; and when we observe especially that between these two periods, when prices in general were very rapidly falling, or were low, and oriental produce comparatively high, the drain of bullion was either small or actually reversed, we can hardly help connecting these events as causes and effects.

I am far from asserting, indeed, that there is any exact coincidence between the state of prices and the drain of bullion in the period 1798-1820 that would put the question beyond doubt. The drain, for instance, was greatest after 1814, when general prices here had already fallen, and the prices of oriental produce had risen. But this discordance is of a kind which might be accounted for by the opening of markets and by political events. Such events may dislocate and reverse a trade for a few years, but on an average of a long period trade will assert its own character, and deeper causes will produce their effects.

I do not attempt to account for the comparative redundancy and depreciation of gold, which I believe to have existed in Europe in the early part of this century. No single cause that I know of can be sufficient to account for so singular an event. The discovery of the Russian mines and the increased yield of the Spanish American mines would contribute something to the observed effects, but would be totally inadequate to their complete explanation. It seems impossible to tell the net effect of the long-continued wars. The displacement of metallic by paper currency, and the diminished sphere for its use by the

restriction of trade, would tend to throw quantities of metal on the market. But, on the other hand, the hoarding or sluggish use of currency occasioned by war, and the demand and dispersion of metallic money by armies in the field, would tend to absorb those supplies. It seems impossible to say what the balance would be. I assert, the redundancy of gold in the early part of the century, then, as a simple *fact of observation*.

These views of the relation of the Eastern drain of treasure to the state of prices here, if accepted, throw considerable light upon the course of prices since the gold discoveries. Those who predicted a revolution in monetary affairs from the great flood of gold have been thoroughly disappointed. Fifteen years have elapsed, and the diggings have perhaps passed the meridian point of their prosperity without any appearance of a commercial revolution. But those, I conceive, are also wrong who proved there was and could be no depreciation of gold; who even went so far as to assert that gold naturally opens a way for its own employment.

European markets, where expedients for economising currency are in common and growing use, could not possibly absorb the continuous supplies from the diggings without a complete revolution in prices. But no sooner had a certain moderate rise occurred than the surplus of the precious metals flowed off to the East, where an immense metallic currency, an absence of any modes of economising it, and a general taste for the luxurious use of the precious metals, opens a great sphere for their absorption and consumption. That this current was occasioned by the redundancy of gold is proved, as Professor Cairnes anticipated, by a low price of oriental produce.* Had it been occasioned by an immense demand here for oriental produce, and a consequent balance of trade out-

* I had also said ("Serious Fall," etc. p. 37), "having shown upon a wide basis of facts that both gold and silver are depreciated here, I am much more inclined to regard this depreciation as the cause of the Eastern drain. The fall in the value of silver, compared with most other goods, makes it more profitable to pay for Eastern produce with silver bullion than with our manufactures, silver being always acceptable among Asiatic nations." (See above, p. 59.)

wards, oriental produce would have been comparatively high, not low in price.

Asia, then, is the great reservoir and sink of the precious metals. It has saved us from a commercial revolution, and taken off our hands many millions of bullion which would be worse than useless here. And from the earliest historical ages it has stood in a similar relation to Europe. In the middle ages it relieved Europe of the excess of Spanish American treasure, just as it now relieves us of the excess of Australian treasure. "The Indian trade," says Macpherson,* "arose to considerable magnitude at the same time that the American mines began to pour their treasures into Europe, which has happily been preserved by the exportation of silver to India from being overwhelmed by the inundation of the precious metals, as it must have been had no such exportation taken place." And "Raynal affirms that the Spaniards must have abandoned their most productive mines of silver in America, as they had already abandoned many of the less productive ones, if the progress of the depreciation of silver had not been somewhat retarded by the exportation of it to India." †

If the state of prices here, then, depends upon prices in India, we should be backward in making predictions of their future course. But we may perhaps speak with the more confidence of the accomplished results of the gold discoveries. Prices had been falling with little interruption from 1810 to 1849. The years 1836-39 form a temporary but remarkable exception. In 1849-52 prices were unprecedentedly low, and *cæteris paribus*, we might have expected that after another period of speculation and its corresponding relapse of trade prices should descend still lower. But prices in 1858 were still 18 per cent above those of 1852.

Since 1858 enormous fluctuations have taken place in the prices of many commodities. The price of cotton has been quadrupled and again halved. Corn has fallen to

* "Commerce with India," p. 337.

† "Commerce with India," quoting "Histoire Philosophique et Politique des deux Indes," vol. iii. p. 169, edit. 1782.

what seems a natural minimum price, and meat and fodder have greatly advanced. There has been a recent great fall, too, in the price of many kinds of imported produce. Yet when the average of all kinds of commodity is struck we find that prices, since 1858, have been uniform in an unprecedented manner. The average fall since last year has been trifling. If we compare prices now (March, 1865) with what they were at their lowest in 1849, we find there has been a rise of 21 per cent. If we take the average of 1845-50 as our standard of comparison, the rise is 11 per cent. The real permanent rise due to the gold discoveries is doubtless something between these, or probably nearer the higher limit, 21 per cent. The gold discoveries have caused this rise of price. They have also neutralised the fall of prices which might have been expected from the continuous progress of invention and production, but of which the amount is necessarily unknown. It may be confidently asserted, then, that the Californian and Australian discoveries have had a considerable effect in reversing the previous course of prices, but it is impossible to state the amount of that effect with any approach to certainty.

I.—*Table showing the Variation of the Prices of Gold and Silver Bullion during the Suspension of Specie Payments at the Bank of England.*

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| Year. | Price of Gold. | Ratio of Price of Gold to Standard Price. | | Ratio of Price of Silver to the Price of Silver in 1798. | |
| | | Logarithm. | Number. | Number. | Logarithm. |
| | £ s. d. | | | | |
| 1798 | 3 17 10½ | 0.000 | 100 | 100 | .000 |
| 1799 | — | 0.000 | 100 | 103 | .014 |
| 1800 | — | 0.000 | 100 | 111 | .047 |
| 1801 | 4 5 0 | 0.038 | 109 | 115 | .060 |
| 1802 | 4 4 0 | 0.033 | 108 | 109 | .037 |
| 1803 | 4 0 0 | 0.012 | 103 | 108 | .033 |
| 1804 | — | 0.012 | 103 | 105 | .023 |
| 1805 | — | 0.012 | 103 | 109 | .035 |
| 1806 | — | 0.012 | 103 | 108 | .032 |
| 1807 | — | 0.012 | 103 | 106 | .025 |
| 1808 | — | 0.012 | 103 | 105 | .023 |
| 1809 | — | 0.012 | 103 | 106 | .025 |
| 1810 | 4 10 0 | 0.063 | 116 | 111 | .045 |
| 1811 | 4 4 6 | 0.036 | 109 | 118 | .071 |
| 1812 | 4 15 6 | 0.089 | 123 | 122 | .088 |
| 1813 | 5 1 0 | 0.113 | 130 | 133 | .125 |
| 1814 | 5 4 0 | 0.126 | 134 | 123 | .089 |
| 1815 | 4 13 6 | 0.080 | 120 | 105 | .022 |
| 1816 | 4 13 6 | 0.080 | 120 | 94 | $\bar{1}$.971 |
| 1817 | 4 0 0 | 0.012 | 103 | 91 | $\bar{1}$.960 |
| 1818 | 4 0 0 | 0.012 | 103 | 97 | $\bar{1}$.988 |
| 1819 | 4 1 6 | 0.020 | 105 | 99 | $\bar{1}$.994 |
| 1820 | 3 19 11 | 0.011 | 103 | 93 | $\bar{1}$.968 |
| 1821 | 3 17 10½ | 0.000 | 100 | 91 | $\bar{1}$.957 |

*Note.*—Column 3 of the above table contains the logarithms by the subtraction of which prices are reduced to a gold standard.

**Tables showing the Variations in the Movement of Bullion to the East.**

II.—*Average Yearly Value of the Exports of Treasure by the East India Company.*

| Decennial Period. | Value in Pounds Sterling. |
|---|---|
| 1711–20 | 434,000 |
| 1721–30 | 532,000 |
| 1731–40 | 487,000 |
| 1741–50 | 631,000 |
| 1751–60 | 571,000 |
| 1761–70 | 152,000 |
| 1771–80 | 43,000 |
| 1781–90 | 393,000 |
| 1791–1800 | 352,000 |
| 1801–1807 | 852,000 |

*Note.*—The yearly exports of treasure and merchandise, 1710–1807, are given at length in Macpherson's "Commerce with India," p. 419.

III.—*Average Yearly Weight of Bullion, chiefly Silver, exported by the East India Company and by Private Persons.* (See Table V.)

| Period. | Ounces. |
|---|---|
| 1791–1800 | 2,055,000 |
| 1801–1808 | 3,781,000 |

IV.—*Average Yearly Value of Bullion absorbed by the Presidencies of India, being the excess of Imports over Exports.* (See Table VI.)

| Period of Years. | Value in Pounds Sterling. |
|---|---|
| 1802–10 | 1,998,000 |
| 1811–20 | 2,827,000 |
| 1821–30 | 1,333,000 |
| 1831–40 | 1,373,000 |
| 1841–50 | 2,308,000 |
| 1851–56 | 6,320,000 |

V.—*Table showing the Quantity of Gold and Silver in each Year, 1788–1808, exported by the East India Company to China and the East Indies, whether on account of the Company or of Private Persons.*

[0,000's omitted.]

| Year. | Millions of Ounces. | Year. | Millions of Ounces. |
|---|---|---|---|
| 1788 | 2,68 | 1798 | 3,57 |
| 1789 | 2,15 | 1799 | 7,29 |
| 1790 | 4,04 | 1800 | 1,38 |
| 1791 | 3,49 | 1801 | 2,26 |
| 1792 | 2,92 | 1802 | 2,48 |
| 1793 | 32 | 1803 | 7,98 |
| 1794 | 18 | 1804 | 4,08 |
| 1795 | 15 | 1805 | 8,74 |
| 1796 | 29 | 1806 | 3,43 |
| 1797 | 96 | 1807 | 36 |
| | | 1808 | 92 |

*Note.*—Calculated from Account No. IX. in the Appendix to the "Report of the Bullion Committee," 1810.

VI.—*Table showing the Value of the Treasure absorbed in each Year, 1802-56, by the Three Presidencies of India, being the Excess of Imports from all parts over Exports.*

[0,000's omitted.]

| Year. | Value in Millions of Pounds Sterling. | Year. | Value in Millions of Pounds Sterling. |
|---|---|---|---|
| 1802-03 | 1,73 | 1830-31 | 93 |
| 1803-04 | 1,58 | 1831-32 | — 41 |
| 1804-05 | 2,27 | 1832-33 | — 32 |
| | | 1833-34 | 1,10 |
| 1805-06 | 2,21 | 1834-35 | 1,70 |
| 1806-07 | 2,65 | | |
| 1807-08 | 2,01 | 1835-36 | 2,04 |
| 1808-09 | 1,01 | 1836-37 | 1,77 |
| 1809-10 | 2,37 | 1837-38 | 2,30 |
| | | 1838-39 | 2,66 |
| 1810-11 | 2,15 | 1839-40 | 1,47 |
| 1811-12 | 1,07 | | |
| 1812-13 | 87 | 1840-41 | 1,42 |
| 1813-14 | 62 | 1841-42 | 1,33 |
| 1814-15 | 1,21 | 1842-43 | 3,23 |
| | | 1843-44 | 4,05 |
| 1815-16 | 2,10 | 1844-45 | 2,65 |
| 1816-17 | 4,01 | | |
| 1817-18 | 4,30 | 1845-46 | 1,68 |
| 1818-19 | 6,77 | 1846-47 | 2,23 |
| 1819-20 | 4,25 | 1847-48 | 55 |
| | | 1848-49 | 1,66 |
| 1820-21 | 3,05 | 1849-50 | 2,43 |
| 1821-22 | 1,61 | | |
| 1822-23 | 2,02 | 1850-51 | 3,27 |
| 1823-24 | 39 | 1851-52 | 4,13 |
| 1824-25 | 96 | 1852-53 | 5,78 |
| | | 1853-54 | 3,39 |
| 1825-26 | 1,54 | 1854-55 | 76 |
| 1826-27 | 1,80 | | |
| 1827-28 | 1,89 | 1855-56 | 10,70 |
| 1828-29 | 1,20 | 1856-57 | 13,16 |
| 1829-30 | 99 | | |

*Note.*—The numbers 1802-33 are reduced from the table in Martin's "British Colonies," p. 360, B. The continuation of the account is from McCulloch's article, "Precious Metals," in the "Encyclopaedia Britannica," Eighth Edit. p. 469.

During the years 1831-32 and 1832-33, there was an excess of exports over imports of £410,000 and £320,000 respectively.

About 1818 there was an unusually large Government remittance to India.

## VII.—*List of Commodities treated in the Tables*

From 1782 to 1844 the prices were mostly taken from Tooke's tables. After 1844 the average prices, as calculated from the price lists of *The Economist*, and printed in my "Serious Fall," etc., p. 21 (see above, p. 38), were mostly used, the commodities being nearly identical with those quoted in Tooke's tables, and subsequently in the valuable annual review of trade in *The Economist* newspaper. Concerning inconvenient but unavoidable changes of quotation, see Mr. Danson's note in Tooke's "History," vol. vi. p. 491. The following list notices the more important changes only.

The brackets indicate the groups of commodities, or else point out where several qualities of one commodity have been joined and averaged before being thrown as one unit into larger groups.

**METALS**

- Copper, tough cakes.
- Lead, British pigs.
- Tin, English bars.
- Iron
  - Pig, Tooke, 1782–94, 1816–39, 1801–32, Matthews' "Report of Commission on Manufactures."
  - Wrought, Russia, 1782–1839; Swedish, 1839–56; Swedish steel, 1857–65.
  - Welsh bars, 1806–57, "Serious Fall," etc., p. 12.

**OILS**

- Gallipoli, in bond; linseed after 1844.
- Fish, palm after 1844.

Tallow, St. Petersburg.
Tar, Stockholm.

- Ashes, barilla; Carthagena in bond to 1836.
- ,, pearl; Dantzic or Russia to 1839.
- ,, Canadian pearl, first sort, 1840–45.

**TIMBER**

- Memel fir, in bond.
- Quebec, yellow pine, 1784–1806, 1820–39, 1813–21, McCulloch's "Dictionary," Canadian yellow pine, 1856–65.

Hemp, St. Petersburg, clean.

**FIBRES**

- Cotton, upland, 1793 } after 1801, from table in "Exchange
- ,, Pernam., 1788 } Magazine," October, 1862, or "Journal
- ,, Surat, 1790 } Statistical Society," December, 1862.
- ,, Surinam, 1782–1844; Demerara after 1820.

- Wool, Southdown, average 1784–1845, McCulloch's "Dictionary."
- ,, Spanish, South Australian lambs, 1861–65.

- Silk, China, raw.
- ,, Reggio, raw, 1844; Italian raw, all descriptions.

- Flax, St. Petersburg.

**DYE MATERIALS**

- Logwood, Jamaica.
- Indigo, superior and inferior, East India.
- Cochineal, Spanish; Teneriffe after 1861.

## VII.—*List of Commodities treated in the Tables—continued.*

- Hides, B.A. and M.V. dry, after 1844.
- Leather, crop hides, after 1844.

**Corn**
- Wheat, *Gazette* average.
- Barley, ,,
- Oats, ,,
- Rye, ,,
- Beans, ,,
- Peas, ,, from 1792.

**Fodder**
- Hay, "Gentleman's Magazine," 1798.
- Clover, ,, 1803.
- Straw, ,, 1798.

**Meat**
- Mutton, St. Thomas's Hospital, average.
- Beef, ,, ,,
- Irish Mess Beef, after 1848 American and Canadian.
- Pork, after 1845.

Butter, Waterford, etc.

- Sugar, Muscovados, *Gazette* average after 1800.
- ,, Havannah for exportation, 1801–46.

- Tea, congou.
- ,, hyson.

- Coffee, superior British plantation.
- ,, inferior ,,
- ,, St. Domingo for exportation, after 1807.

Spirits, Jamaica rum.

Rice, Carolina, 1782–1839.
Pepper, East India black.
Cinnamon, first quality in bond.
Tobacco, Virginia, in bond.

The following groups are thus composed :

| Oriental Produce. | Tropical Food. |
|---|---|
| Indigo. | Sugar. |
| Pepper. | Tea. |
| Cinnamon. | Coffee. |
| Tea. | Spirits. |
| Sugar. | Pepper. |
| China silk. | Cinnamon. |
| Surat cotton. | Rice. |
| | Tobacco. |

## VIII.—*Proportional Variation of Prices from* 1782.

| Year. | General Variation of all the Forty Commodities. | | | Oriental Products. | | Tropical Food. | |
|---|---|---|---|---|---|---|---|
| | Gold Standard. | Paper Standard. | Gold Standard Logarithm. | Actual. | Comparative. | Actual. | Comparative. |
| 1782 - | 100 | | .000 | 100 | 100 | 100 | 100 |
| 1783 - | 100 | | .001 | 101 | 101 | 87 | 87 |
| 1784 - | 93 | | $\bar{1}$.966 | 94 | 102 | 82 | 89 |
| 1785 - | 90 | | $\bar{1}$.956 | 93 | 103 | 70 | 77 |
| 1786 - | 85 | | $\bar{1}$.927 | 82 | 97 | 64 | 76 |
| 1787 - | 87 | | $\bar{1}$.941 | 91 | 105 | 70 | 79 |
| 1788 - | 87 | | $\bar{1}$.941 | 91 | 105 | 74 | 84 |
| 1789 - | 85 | | $\bar{1}$.930 | 85 | 100 | 70 | 82 |
| 1790 - | 87 | | $\bar{1}$.937 | 80 | 92 | 69 | 80 |
| 1791 - | 89 | | $\bar{1}$.947 | 89 | 101 | 72 | 81 |
| 1792 - | 93 | | $\bar{1}$.969 | 107 | 115 | 81 | 87 |
| 1793 - | 99 | | $\bar{1}$.994 | 96 | 97 | 79 | 80 |
| 1794 - | 98 | | $\bar{1}$.989 | 84 | 86 | 72 | 74 |
| 1795 - | 117 | | .067 | 96 | 82 | 93 | 80 |
| 1796 - | 125 | | .097 | 105 | 84 | 102 | 82 |
| 1797 - | 110 | | .043 | 85 | 77 | 87 | 79 |
| 1798 - | 118 | | .070 | 107 | 91 | 98 | 83 |
| 1799 - | 130 | | .113 | 100 | 77 | 86 | 66 |
| 1800 - | 141 | | .148 | 80 | 57 | 84 | 60 |
| 1801 - | 140 | 153 | .147 | 80 | 57 | 73 | 52 |
| 1802 - | 110 | 119 | .042 | 74 | 67 | 68 | 62 |
| 1803 - | 125 | 128 | .096 | 74 | 60 | 67 | 54 |
| 1804 - | 119 | 122 | .074 | 71 | 60 | 64 | 54 |
| 1805 - | 132 | 136 | .120 | 79 | 60 | 75 | 57 |
| 1806 - | 130 | 133 | .113 | 79 | 61 | 70 | 54 |
| 1807 - | 129 | 132 | .110 | 73 | 57 | 63 | 49 |
| 1808 - | 145 | 149 | .160 | 84 | 58 | 71 | 49 |
| 1809 - | 157 | 161 | .195 | 86 | 55 | 82 | 52 |
| 1810 - | 142 | 164 | .152 | 83 | 59 | 75 | 53 |
| 1811 - | 136 | 147 | .132 | 74 | 55 | 60 | 44 |
| 1812 - | 121 | 148 | .081 | 66 | 55 | 58 | 48 |
| 1813 - | 115 | 149 | .060 | 68 | 59 | 67 | 59 |
| 1814 - | 114 | 153 | .058 | 90 | 78 | 84 | 73 |
| 1815 - | 109 | 132 | .039 | 82 | 75 | 77 | 71 |
| 1816 - | 91 | 109 | $\bar{1}$.959 | 68 | 75 | 63 | 69 |
| 1817 - | 117 | 120 | .067 | 81 | 69 | 77 | 66 |
| 1818 - | 132 | 135 | .119 | 90 | 69 | 92 | 70 |
| 1819 - | 112 | 117 | .048 | 74 | 66 | 73 | 65 |
| 1820 - | 103 | 106 | .013 | 65 | 63 | 67 | 65 |

Uncorrected for depreciation (1801–20).

VIII.—*Proportional Variation of Prices—continued.*

| Year. | All Commodities. | | Oriental Products. | | Tropical Food. | |
|---|---|---|---|---|---|---|
| | Gold Standard. | Logarithm. | Actual. | Comparative. | Actual. | Comparative. |
| 1821 | 94 | $\bar{1}$.975 | 68 | 72 | 63 | 66 |
| 1822 | 88 | $\bar{1}$.946 | 67 | 76 | 61 | 70 |
| 1823 | 89 | $\bar{1}$.948 | 65 | 73 | 62 | 70 |
| 1824 | 88 | $\bar{1}$.946 | 61 | 69 | 52 | 58 |
| 1825 | 103 | .014 | 80 | 78 | 65 | 63 |
| 1826 | 90 | $\bar{1}$.953 | 56 | 62 | 55 | 61 |
| 1827 | 90 | $\bar{1}$.956 | 58 | 64 | 54 | 60 |
| 1828 | 81 | $\bar{1}$.909 | 53 | 65 | 48 | 60 |
| 1829 | 79 | $\bar{1}$.899 | 51 | 64 | 49 | 62 |
| 1830 | 81 | $\bar{1}$.906 | 52 | 64 | 47 | 59 |
| 1831 | 82 | $\bar{1}$.915 | 49 | 59 | 48 | 58 |
| 1832 | 78 | $\bar{1}$.893 | 49 | 62 | 50 | 63 |
| 1833 | 75 | $\bar{1}$.877 | 50 | 67 | 49 | 65 |
| 1834 | 78 | $\bar{1}$.891 | 53 | 68 | 50 | 64 |
| 1835 | 80 | $\bar{1}$.905 | 58 | 72 | 51 | 64 |
| 1836 | 86 | $\bar{1}$.935 | 60 | 69 | 54 | 63 |
| 1837 | 84 | $\bar{1}$.922 | 50 | 60 | 48 | 63 |
| 1838 | 84 | $\bar{1}$.924 | 53 | 63 | 52 | 62 |
| 1839 | 92 | $\bar{1}$.965 | 56 | 61 | 61 | 66 |
| 1840 | 87 | $\bar{1}$.940 | 56 | 64 | 60 | 68 |
| 1841 | 85 | $\bar{1}$.928 | 51 | 60 | 53 | 63 |
| 1842 | 75 | $\bar{1}$.875 | 45 | 60 | 46 | 62 |
| 1843 | 71 | $\bar{1}$.851 | 45 | 64 | 44 | 62 |
| 1844 | 69 | $\bar{1}$.840 | 42 | 61 | 42 | 60 |
| 1845 | 74 | $\bar{1}$.867 | 38 | 51 | 40 | 54 |
| 1846 | 74 | $\bar{1}$.871 | 37 | 49 | 38 | 52 |
| 1847 | 78 | $\bar{1}$.894 | 36 | 46 | 40 | 51 |
| 1848 | 68 | $\bar{1}$.831 | 31 | 46 | 35 | 52 |
| 1849 | 64 | $\bar{1}$.806 | 33 | 52 | 36 | 56 |
| 1850 | 64 | $\bar{1}$.808 | 38 | 59 | 39 | 61 |
| 1851 | 66 | $\bar{1}$.817 | 36 | 56 | 41 | 62 |
| 1852 | 65 | $\bar{1}$.810 | 34 | 53 | 34 | 52 |
| 1853 | 74 | $\bar{1}$.871 | 36 | 49 | 38 | 52 |
| 1854 | 83 | $\bar{1}$.919 | 34 | 41 | 40 | 48 |
| 1855 | 80 | $\bar{1}$.903 | 31 | 39 | 39 | 48 |
| 1856 | 82 | $\bar{1}$.916 | 36 | 44 | 40 | 48 |
| 1857 | 85 | $\bar{1}$.928 | 39 | 46 | 43 | 51 |
| 1858 | 76 | $\bar{1}$.878 | 35 | 46 | 37 | 49 |
| 1859 | 77 | $\bar{1}$.884 | 35 | 46 | 37 | 49 |
| 1860 | 79 | $\bar{1}$.898 | 30 | 46 | 39 | 50 |
| 1861 | 78 | $\bar{1}$.894 | 36 | 46 | 38 | 49 |
| 1862 | 79 | $\bar{1}$.900 | 42 | 52 | 39 | 49 |
| 1863 | 78 | $\bar{1}$.894 | 43 | 55 | 39 | 50 |
| 1864 | 78 | $\bar{1}$.894 | 44 | 56 | 42 | 53 |
| 1865 | 78 | $\bar{1}$.890 | 44 | 56 | 42 | 54 |

## VIII.—*Proportional Variation of Prices from* 1782.

| Year. | Metals. Copper, Lead, Tin, Iron. | | Iron. Several Varieties. | | Timber. | | Oils. | | Dye Materials. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. |
| 1782 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1783 | 100 | 100 | 97 | 97 | 108 | 107 | 94 | 94 | 92 | 91 |
| 1784 | 90 | 98 | 72 | 78 | 54 | 58 | 96 | 104 | 98 | 106 |
| 1785 | 89 | 99 | 67 | 74 | 73 | 81 | 104 | 115 | 90 | 99 |
| 1786 | 95 | 112 | 84 | 100 | 58 | 69 | 91 | 107 | 69 | 81 |
| 1787 | 93 | 107 | 72 | 82 | 61 | 70 | 87 | 100 | 75 | 86 |
| 1788 | 96 | 109 | 73 | 83 | 58 | 67 | 81 | 93 | 78 | 89 |
| 1789 | 93 | 109 | 78 | 91 | 58 | 69 | 84 | 98 | 73 | 85 |
| 1790 | 92 | 106 | 76 | 87 | 56 | 65 | 88 | 101 | 64 | 74 |
| 1791 | 100 | 113 | 92 | 104 | 85 | 96 | 82 | 92 | 77 | 87 |
| 1792 | 108 | 116 | 92 | 99 | 73 | 79 | 86 | 92 | 79 | 85 |
| 1793 | 113 | 115 | 91 | 92 | 70 | 71 | 103 | 104 | 79 | 80 |
| 1794 | 111 | 114 | 94 | 96 | 78 | 80 | 103 | 106 | 81 | 83 |
| 1795 | 108 | 93 | 86 | 74 | 108 | 93 | 124 | 106 | 109 | 93 |
| 1796 | 117 | 94 | 101 | 81 | 105 | 84 | 134 | 107 | 116 | 93 |
| 1797 | 123 | 111 | 124 | 113 | 77 | 70 | 120 | 108 | 96 | 87 |
| 1798 | 122 | 104 | 127 | 108 | 98 | 84 | 123 | 105 | 137 | 116 |
| 1799 | 127 | 98 | 126 | 97 | 120 | 93 | 134 | 104 | 125 | 97 |
| 1800 | 135 | 96 | 115 | 82 | 168 | 119 | 122 | 87 | 101 | 72 |
| 1801 | 139 | 99 | 139 | 99 | 167 | 119 | 134 | 95 | 108 | 77 |
| 1802 | 137 | 125 | 119 | 108 | 125 | 114 | 102 | 92 | 83 | 76 |
| 1803 | 144 | 115 | 118 | 94 | 182 | 146 | 124 | 100 | 128 | 103 |
| 1804 | 147 | 124 | 116 | 98 | 152 | 128 | 115 | 97 | 105 | 89 |
| 1805 | 161 | 122 | 118 | 89 | 146 | 111 | 131 | 100 | 135 | 102 |
| 1806 | 169 | 130 | 123 | 95 | 136 | 105 | 132 | 101 | 131 | 101 |
| 1807 | 152 | 118 | 116 | 90 | 168 | 131 | 125 | 96 | 113 | 88 |
| 1808 | 155 | 107 | 113 | 78 | 253 | 175 | 166 | 115 | 116 | 80 |
| 1809 | 159 | 101 | 114 | 73 | 533 | 340 | 162 | 103 | 110 | 70 |
| 1810 | 142 | 100 | 99 | 70 | 300 | 211 | 141 | 99 | 157 | 111 |
| 1811 | 148 | 109 | 106 | 78 | 381 | 281 | 136 | 100 | 107 | 79 |
| 1812 | 118 | 98 | 88 | 73 | 306 | 254 | 120 | 99 | 91 | 75 |
| 1813 | 111 | 97 | 81 | 71 | 185 | 161 | 115 | 100 | 82 | 71 |
| 1814 | 113 | 99 | 77 | 68 | 197 | 172 | 113 | 99 | 132 | 116 |
| 1815 | 115 | 105 | 81 | 74 | 161 | 148 | 114 | 104 | 106 | 97 |
| 1816 | 96 | 105 | 71 | 78 | 116 | 127 | 82 | 90 | 68 | 75 |
| 1817 | 107 | 92 | 78 | 67 | 115 | 99 | 124 | 106 | 86 | 73 |
| 1818 | 119 | 91 | 98 | 75 | 134 | 102 | 129 | 98 | 95 | 72 |
| 1819 | 113 | 101 | 104 | 93 | 138 | 124 | 100 | 90 | 80 | 72 |
| 1820 | 106 | 103 | 95 | 92 | 113 | 110 | 105 | 101 | 69 | 67 |

*Note.*—The *actual* variation is shown by the average proportion of gold prices in each year to the gold prices of 1782. The *comparative* variation is the ratio in which the prices of each commodity or group of commodities have risen or fallen more than the whole forty commodities.

VIII.—*Proportional Variation of Prices—continued.*

| Year. | Metals. Copper, Lead, Tin, Iron. | | Iron. Several Varieties. | | Timber. | | Oils. | | Dye Materials. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. |
| 1821 | 101 | 107 | 82 | 87 | 116 | 123 | 89 | 94 | 74 | 78 |
| 1822 | 100 | 113 | 74 | 83 | 101 | 115 | 93 | 105 | 89 | 101 |
| 1823 | 107 | 121 | 78 | 88 | 137 | 155 | 85 | 96 | 96 | 108 |
| 1824 | 108 | 123 | 94 | 106 | 126 | 143 | 78 | 88 | 83 | 94 |
| 1825 | 123 | 119 | 114 | 110 | 133 | 129 | 86 | 84 | 98 | 95 |
| 1826 | 111 | 124 | 100 | 111 | 107 | 119 | 81 | 90 | 70 | 79 |
| 1827 | 103 | 114 | 86 | 96 | 95 | 105 | 82 | 90 | 73 | 81 |
| 1828 | 95 | 117 | 80 | 98 | 93 | 115 | 75 | 92 | 61 | 75 |
| 1829 | 89 | 113 | 72 | 91 | 101 | 128 | 78 | 98 | 59 | 75 |
| 1830 | 81 | 100 | 66 | 82 | 98 | 121 | 86 | 106 | 56 | 69 |
| 1831 | 80 | 98 | 63 | 77 | 104 | 126 | 90 | 110 | 49 | 59 |
| 1832 | 77 | 99 | 61 | 78 | 108 | 139 | 79 | 101 | 47 | 60 |
| 1833 | 82 | 109 | 65 | 87 | 106 | 141 | 79 | 105 | 43 | 57 |
| 1834 | 87 | 112 | 65 | 83 | 106 | 137 | 75 | 96 | 47 | 61 |
| 1835 | 90 | 111 | 64 | 79 | 116 | 145 | 78 | 97 | 48 | 60 |
| 1836 | 114 | 132 | 86 | 100 | 126 | 146 | 93 | 108 | 46 | 53 |
| 1837 | 97 | 116 | 74 | 89 | 119 | 142 | 89 | 107 | 49 | 59 |
| 1838 | 96 | 114 | 77 | 92 | 111 | 132 | 92 | 109 | 52 | 62 |
| 1839 | 94 | 102 | 77 | 83 | 111 | 120 | 92 | 100 | 59 | 64 |
| 1840 | 87 | 100 | 63 | 72 | —* | — | 91 | 105 | 47 | 54 |
| 1841 | 90 | 106 | 61 | 71 | 113 | 133 | 97 | 115 | 40 | 47 |
| 1842 | 80 | 107 | 51 | 68 | 113 | 151 | 96 | 127 | 33 | 44 |
| 1843 | 71 | 100 | 43 | 61 | 85 | 120 | 89 | 125 | 36 | 51 |
| 1844 | 74 | 107 | 43 | 63 | 84 | 122 | 79 | 114 | 34 | 50 |
| 1845 | 86 | 117 | 59 | 80 | 96 | 130 | 84 | 114 | 35 | 48 |
| 1846 | 90 | 121 | 60 | 81 | 90 | 122 | 86 | 116 | 36 | 48 |
| 1847 | 90 | 115 | 60 | 76 | 91 | 116 | 99 | 127 | 35 | 45 |
| 1848 | 77 | 113 | 47 | 69 | 84 | 124 | 95 | 141 | 30 | 45 |
| 1849 | 73 | 114 | 40 | 63 | 72 | 112 | 96 | 150 | 28 | 44 |
| 1850 | 74 | 115 | 37 | 58 | 66 | 103 | 91 | 142 | 30 | 46 |
| 1851 | 73 | 112 | 36 | 54 | 68 | 103 | 90 | 137 | 31 | 47 |
| 1852 | 80 | 124 | 40 | 63 | 62 | 96 | 84 | 130 | 31 | 48 |
| 1853 | 103 | 138 | 53 | 72 | 81 | 109 | 95 | 128 | 37 | 50 |
| 1854 | 109 | 131 | 60 | 72 | 87 | 105 | 121 | 146 | 38 | 46 |
| 1855 | 104 | 130 | 51 | 64 | 88 | 110 | 117 | 146 | 31 | 38 |
| 1856 | 109 | 132 | 55 | 66 | 78 | 95 | 110 | 134 | 35 | 42 |
| 1857 | 108 | 127 | 51 | 60 | 84 | 99 | 113 | 133 | 36 | 43 |
| 1858 | 96 | 127 | 46 | 62 | 69 | 92 | 96 | 127 | 36 | 48 |
| 1859 | 97 | 127 | 42 | 55 | 70 | 92 | 101 | 132 | 32 | 42 |
| 1860 | 95 | 121 | 40 | 51 | 70 | 88 | 105 | 132 | 32 | 40 |
| 1861 | 88 | 112 | 37 | 47 | 69 | 89 | 111 | 142 | 32 | 41 |
| 1862 | 85 | 107 | 35 | 44 | 72 | 90 | 113 | 142 | 35 | 44 |
| 1863 | 85 | 108 | 37 | 47 | 74 | 95 | 107 | 137 | 34 | 43 |
| 1864 | 92 | 117 | 44 | 57 | 73 | 94 | 98 | 125 | 35 | 45 |
| 1865 | 81 | 105 | 39 | 51 | 74 | 96 | 90 | 115 | 34 | 44 |

* Uncertain from interference of customs duties; the uncertainty extends to the succeeding in relation to the preceding numbers.

## VIII.—*Proportional Variation of Prices from* 1782.

| Year. | Fibres. Cotton, Wool, Silk, Flax. | | Cotton. Several Varieties. | | Corn. Wheat, Barley, Oats, Rye, Beans, Peas. | | Wheat. "Gazette" Average. | | Fodder. Hay, Clover, Straw. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. |
| 1782 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | — | — |
| 1783 | 112 | 111 | 102 | 102 | 127 | 126 | 110 | 110 | — | — |
| 1784 | 93 | 101 | 61 | 66 | 116 | 126 | 102 | 110 | — | — |
| 1785 | 107 | 118 | 84 | 93 | 104 | 115 | 88 | 97 | — | — |
| 1786 | 108 | 128 | 86 | 101 | 105 | 124 | 81 | 96 | — | — |
| 1787 | 107 | 123 | 91 | 105 | 102 | 117 | 86 | 99 | — | — |
| 1788 | 107 | 123 | 96 | 110 | 99 | 114 | 94 | 108 | — | — |
| 1789 | 93 | 110 | 57 | 67 | 105 | 123 | 107 | 126 | — | — |
| 1790 | 90 | 115 | 66 | 77 | 117 | 136 | 111 | 129 | — | — |
| 1791 | 96 | 109 | 64 | 72 | 112 | 126 | 99 | 111 | — | — |
| 1792 | 109 | 117 | 81 | 87 | 110 | 118 | 87 | 94 | — | — |
| 1793 | 103 | 105 | 76 | 77 | 129 | 131 | 100 | 101 | — | — |
| 1794 | 88 | 90 | 68 | 70 | 140 | 144 | 106 | 109 | — | — |
| 1795 | 103 | 89 | 79 | 68 | 168 | 144 | 152 | 131 | — | — |
| 1796 | 126 | 101 | 115 | 92 | 153 | 123 | 160 | 128 | — | — |
| 1797 | 118 | 107 | 92 | 83 | 112 | 101 | 109 | 99 | —* | —* |
| 1798 | 130 | 111 | 139 | 118 | 116 | 99 | 105 | 90 | 118 | 100 |
| 1799 | 172 | 133 | 204 | 157 | 159 | 122 | 140 | 108 | 171 | 132 |
| 1800 | 143 | 102 | 116 | 82 | 252 | 179 | 231 | 164 | 235 | 167 |
| 1801 | 142 | 101 | 114 | 81 | 232 | 165 | 222 | 159 | 244 | 174 |
| 1802 | 132 | 120 | 94 | 86 | 130 | 118 | 131 | 119 | 164 | 149 |
| 1803 | 149 | 120 | 86 | 69 | 123 | 98 | 116 | 93 | 230 | 185 |
| 1804 | 149 | 125 | 86 | 73 | 134 | 113 | 123 | 104 | 191 | 161 |
| 1805 | 155 | 118 | 100 | 76 | 177 | 134 | 177 | 134 | 162 | 123 |
| 1806 | 144 | 111 | 93 | 71 | 158 | 122 | 156 | 120 | 181 | 139 |
| 1807 | 150 | 117 | 85 | 66 | 168 | 131 | 149 | 115 | 233 | 181 |
| 1808 | 168 | 116 | 105 | 73 | 195 | 135 | 160 | 111 | 230 | 159 |
| 1809 | 214 | 137 | 103 | 65 | 205 | 131 | 192 | 123 | 214 | 137 |
| 1810 | 165 | 116 | 86 | 60 | 175 | 124 | 187 | 132 | 242 | 171 |
| 1811 | 149 | 110 | 66 | 49 | 167 | 123 | 178 | 131 | 308 | 228 |
| 1812 | 147 | 122 | 70 | 58 | 221 | 183 | 209 | 173 | 203 | 169 |
| 1813 | 134 | 117 | 83 | 72 | 197 | 172 | 172 | 150 | 182 | 159 |
| 1814 | 131 | 114 | 111 | 97 | 123 | 108 | 113 | 99 | 167 | 146 |
| 1815 | 138 | 126 | 94 | 86 | 114 | 104 | 111 | 101 | 166 | 152 |
| 1816 | 106 | 116 | 87 | 96 | 123 | 135 | 132 | 146 | 222 | 244 |
| 1817 | 140 | 120 | 110 | 94 | 192 | 165 | 191 | 164 | 224 | 192 |
| 1818 | 161 | 122 | 106 | 80 | 203 | 155 | 170 | 129 | 252 | 192 |
| 1819 | 118 | 105 | 67 | 60 | 177 | 159 | 144 | 129 | 254 | 228 |
| 1820 | 121 | 117 | 61 | 60 | 148 | 144 | 134 | 130 | 171 | 166 |

* Quotations of fodder previous to 1797 were wanting; the ratios were therefore made to commence from the general average of all commodities for 1797.

VIII.—*Proportional Variation of Prices—continued.*

| Year. | Fibres. Cotton, Wool, Silk, Flax. | | Cotton. Several Varieties. | | Corn. Wheat, Barley, Oats, Rye, Beans, Peas. | | Wheat. "Gazette" Average. | | Fodder. Hay, Clover, Straw. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. | Actual. | Comparative. |
| 1821 | 112 | 119 | 53 | 56 | 116 | 123 | 114 | 121 | 182 | 193 |
| 1822 | 110 | 125 | 47 | 53 | 92 | 105 | 90 | 102 | 170 | 193 |
| 1823 | 115 | 129 | 46 | 52 | 125 | 140 | 108 | 122 | 215 | 243 |
| 1824 | 103 | 116 | 48 | 54 | 147 | 167 | 130 | 147 | 250 | 283 |
| 1825 | 121 | 117 | 63 | 61 | 157 | 152 | 139 | 135 | — | — |
| 1826 | 86 | 96 | 40 | 45 | 152 | 169 | 119 | 132 | — | — |
| 1827 | 86 | 95 | 38 | 42 | 155 | 171 | 119 | 131 | 245 | 271 |
| 1828 | 83 | 102 | 34 | 42 | 136 | 168 | 123 | 151 | 197 | 243 |
| 1829 | 76 | 95 | 41 | 39 | 135 | 171 | 134 | 169 | 180 | 228 |
| 1830 | 78 | 96 | 36 | 45 | 138 | 171 | 130 | 162 | 220 | 274 |
| 1831 | 87 | 106 | 33 | 40 | 150 | 182 | 135 | 164 | 199 | 242 |
| 1832 | 82 | 105 | 35 | 45 | 130 | 166 | 119 | 152 | 210 | 269 |
| 1833 | 89 | 118 | 43 | 58 | 119 | 158 | 107 | 143 | 169 | 224 |
| 1834 | 106 | 136 | 48 | 62 | 123 | 158 | 94 | 121 | 177 | 228 |
| 1835 | 116 | 145 | 55 | 69 | 119 | 148 | 80 | 99 | 218 | 271 |
| 1836 | 111 | 129 | 53 | 62 | 131 | 152 | 98 | 114 | 185 | 215 |
| 1837 | 97 | 116 | 40 | 48 | 132 | 158 | 113 | 136 | 228 | 272 |
| 1838 | 91 | 108 | 38 | 46 | 134 | 160 | 131 | 156 | 211 | 252 |
| 1839 | 96 | 104 | 41 | 44 | 155 | 168 | 143 | 155 | 234 | 254 |
| 1840 | 92 | 106 | 36 | 41 | 150 | 173 | 135 | 155 | 200 | 230 |
| 1841 | 88 | 104 | 37 | 44 | 140 | 166 | 131 | 154 | 227 | 267 |
| 1842 | 77 | 103 | 31 | 41 | 120 | 160 | 116 | 155 | 210 | 280 |
| 1843 | 72 | 102 | 27 | 37 | 113 | 159 | 102 | 143 | 221 | 311 |
| 1844 | 79 | 114 | 27 | 39 | 125 | 180 | 104 | 150 | 173 | 251 |
| 1845 | 81 | 110 | 24 | 33 | 130 | 176 | 103 | 140 | 233 | 316 |
| 1846 | 83 | 112 | 28 | 37 | 140 | 188 | 111 | 149 | 200 | 269 |
| 1847 | 77 | 98 | 29 | 37 | 176 | 224 | 142 | 181 | 180 | 230 |
| 1848 | 61 | 90 | 21 | 31 | 125 | 184 | 103 | 151 | 173 | 256 |
| 1849 | 62 | 96 | 23 | 36 | 106 | 166 | 90 | 140 | 177 | 277 |
| 1850 | 76 | 119 | 32 | 50 | 94 | 146 | 82 | 127 | 156 | 243 |
| 1851 | 77 | 117 | 27 | 41 | 98 | 150 | 78 | 119 | 163 | 248 |
| 1852 | 76 | 118 | 25 | 39 | 109 | 169 | 83 | 128 | 176 | 273 |
| 1853 | 77 | 104 | 24 | 33 | 127 | 170 | 108 | 146 | 189 | 254 |
| 1854 | 75 | 90 | 24 | 30 | 157 | 189 | 147 | 177 | 226 | 272 |
| 1855 | 75 | 94 | 26 | 32 | 154 | 193 | 151 | 189 | 217 | 272 |
| 1856 | 89 | 108 | 30 | 36 | 151 | 184 | 140 | 170 | 221 | 268 |
| 1857 | 98 | 116 | 36 | 43 | 142 | 168 | 114 | 135 | 191 | 225 |
| 1858 | 87 | 115 | 32 | 43 | 128 | 169 | 90 | 119 | 194 | 257 |
| 1859 | 97 | 127 | 33 | 43 | 125 | 163 | 89 | 116 | 198 | 258 |
| 1860 | 95 | 121 | 30 | 37 | 136 | 172 | 108 | 137 | 214 | 271 |
| 1861 | 96 | 122 | 39 | 50 | 135 | 172 | 113 | 144 | 213 | 272 |
| 1862 | 111 | 140 | 82 | 104 | 131 | 165 | 113 | 142 | 210 | 264 |
| 1863 | 127 | 161 | 117 | 150 | 119 | 152 | 91 | 116 | 199 | 254 |
| 1864 | 129 | 164 | 128 | 164 | 109 | 139 | 81 | 104 | 199 | 254 |
| 1865 | 120 | 155 | 77 | 100 | 107 | 138 | 78 | 101 | 229 | 295 |

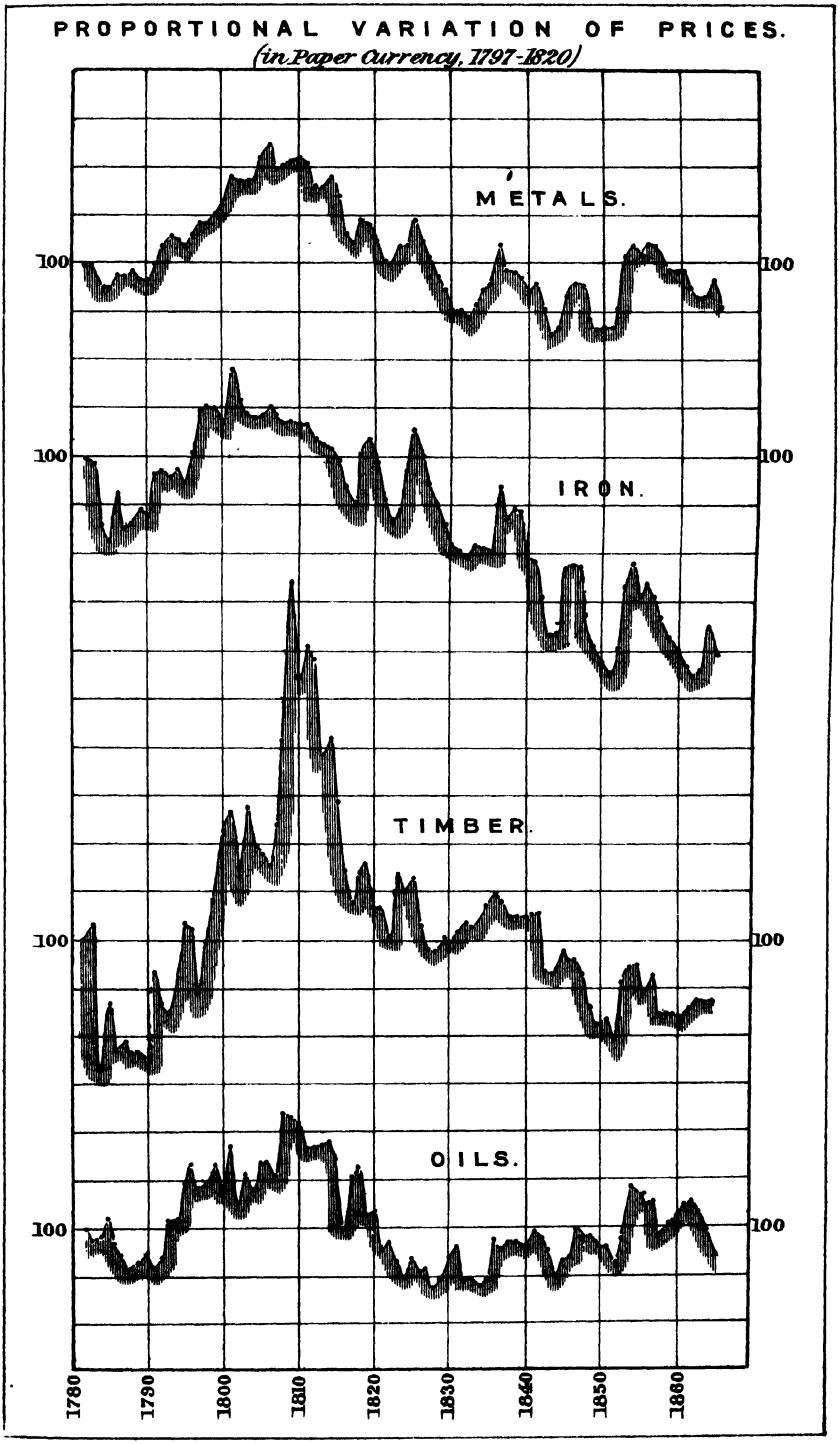
## IX.—*Description of the Diagrams.*

Each point on a curve has been laid down at a distance from the thick zero line, so as to represent the ratio of prices of each year to the prices of 1782, on the scale of one quarter of an inch to the logarithm .100. The horizontal reference lines represent, from below upwards, the logarithms $\bar{1}.500$, $\bar{1}.600$, $\bar{1}.700$, $\bar{1}.800$, $\bar{1}.900$, 0.000, 0.100, 0.200, 0.300, etc. Since the logarithm of 2 is nearly .300 (.30103) and that of $\frac{1}{2}$, $\bar{1}.700$, the third line above the zero line represents a *doubled* price, the third line below it a halved price.

In the case of the important curve showing the general variation of value of all the commodities, horizontal lines representing the ratios in common numbers have been substituted for the logarithmic lines, the logarithmic scale however being preserved.

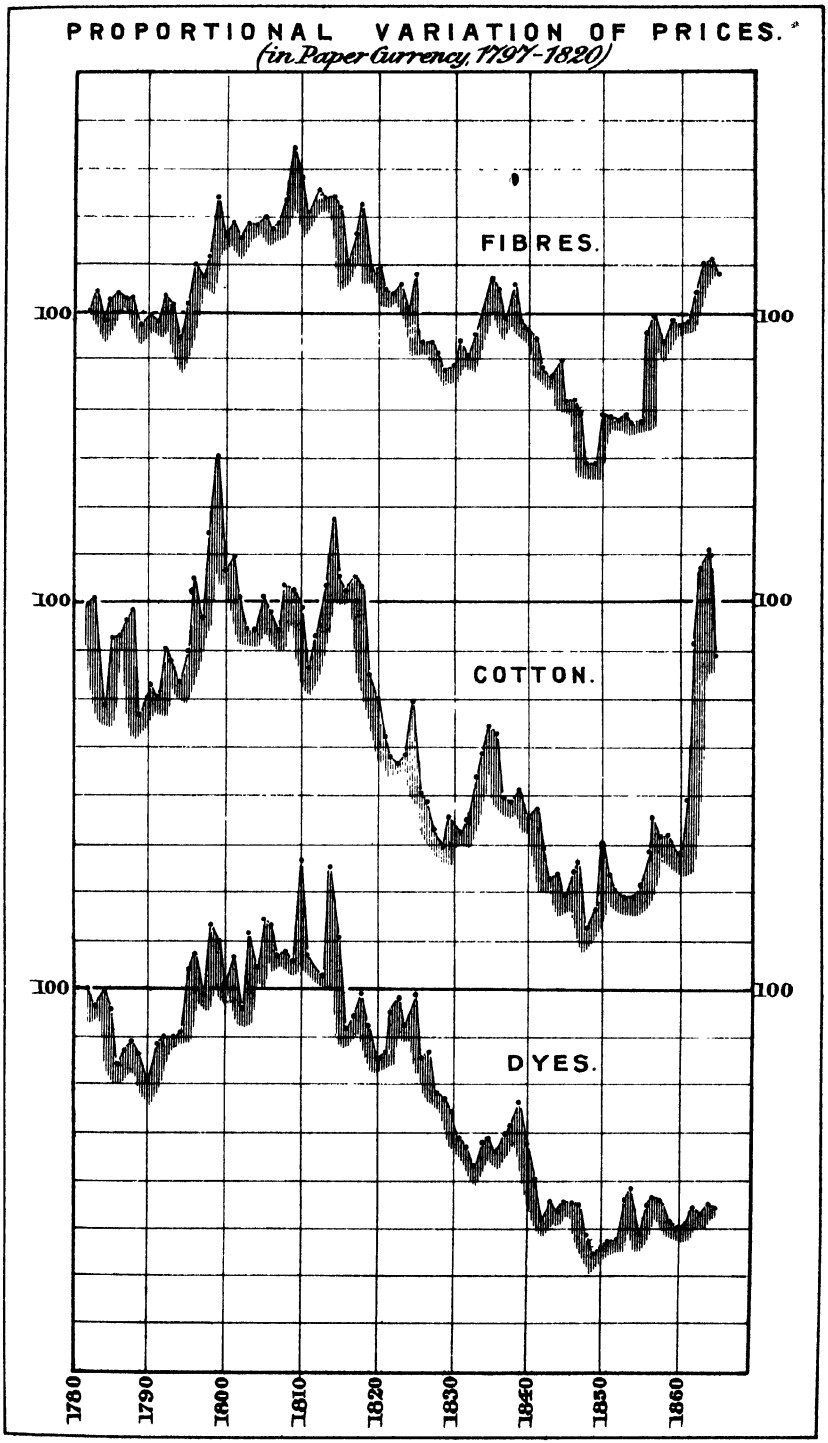
The diagrams are intended only to show the general character of the variations, the numerical results being given in the tables. It has not been thought needful to draw out the comparative variations except in a few cases.

*PLATE IV*



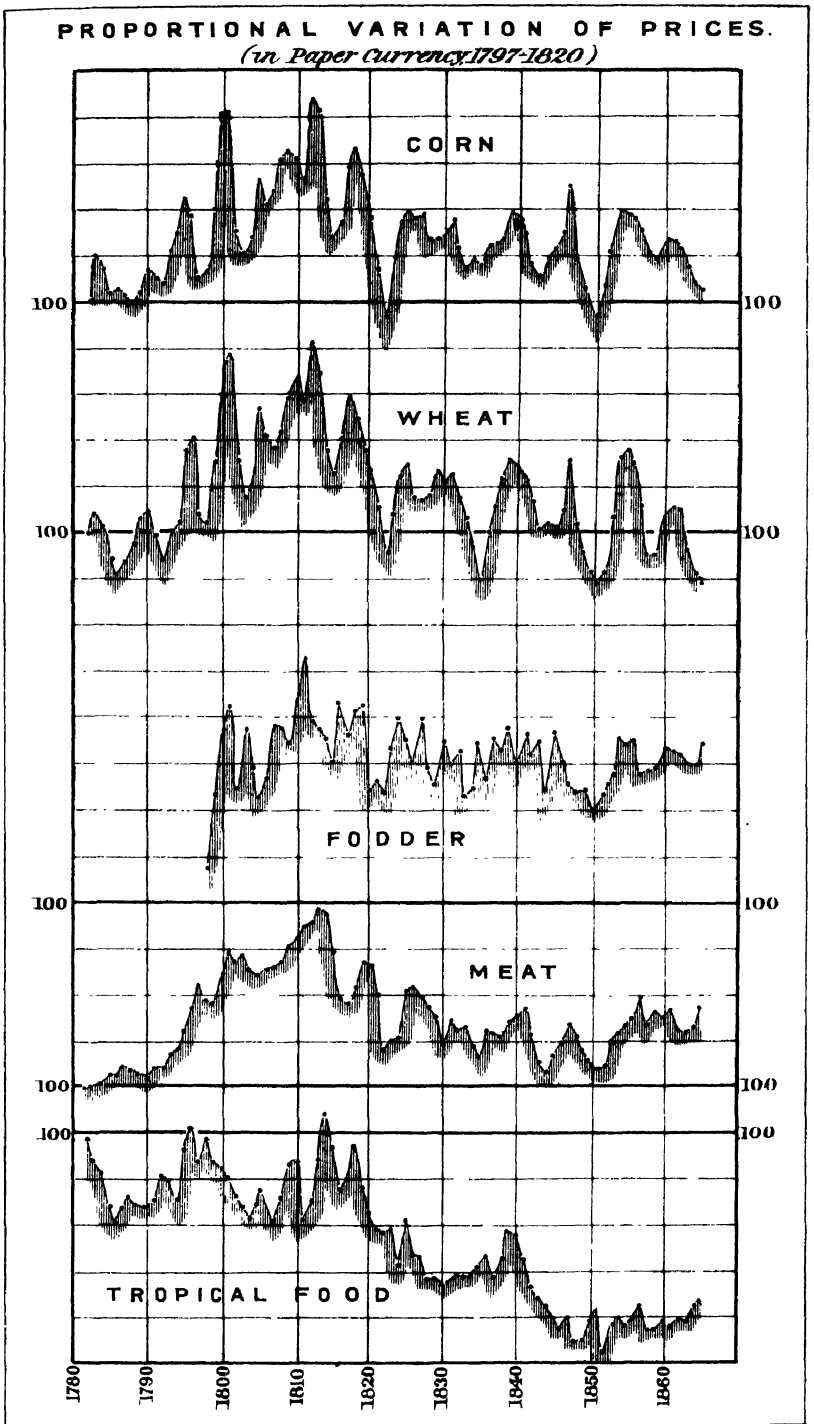

*To face p. 142 (1)*

*PLATE V*



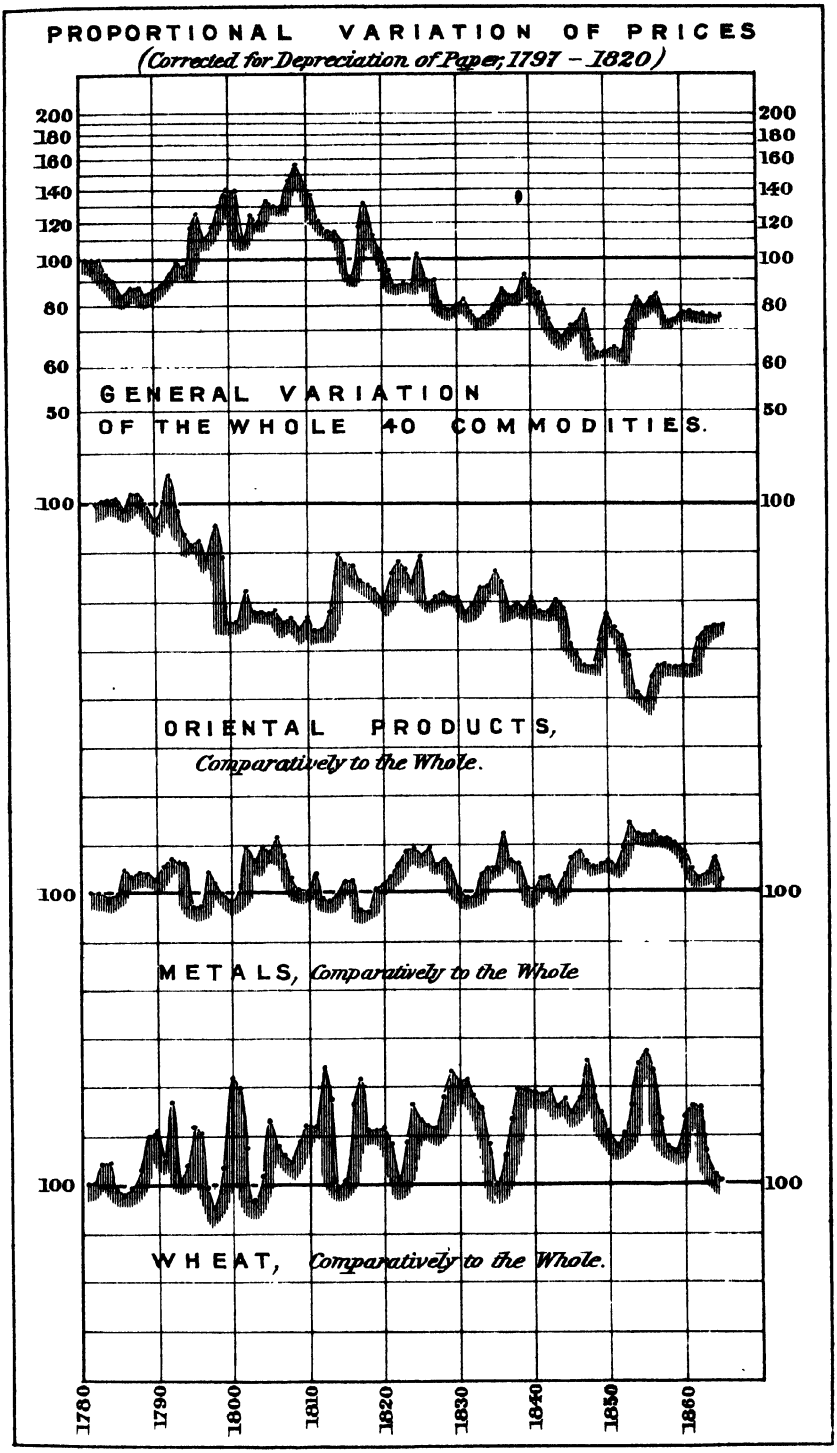

*To face p. 142 (2)*

*Plate VI*




*To face p. 142 (3)*

*PLATE VII*




*To face p. 142 (4)*

# IV

## THE DEPRECIATION OF GOLD

IT is interesting to examine at intervals the evidence brought by the efflux of time concerning the effects of the great gold discoveries of 1849 and 1851 upon the value of gold. Almost twenty years have now elapsed since the new supplies began to be received, and taking into account the rapid means of communication with all parts of the world which this age enjoys, it can hardly be doubted that a certain equilibrium has been attained in the distribution of the precious metals, and that the character of the results will now be manifest.

The present year is especially suitable for a retrospective inquiry, because we have just passed through nearly three years of commercial prostration, during which the use of credit has been undoubtedly reduced to its minimum, and prices have suffered a corresponding depression. Taken in connection with the similar depression which followed the collapse of 1857, this gives us ample means of judging whether a real rise of prices has been established, because it assures us that any rise of prices which may be detected is not due to a temporary cause, such as the inflation of prices by credit.

I have therefore made some calculations founded upon your price lists, in order to bring down to the present time the estimates of the general variation of prices which I

* Letter to "The Economist" newspaper, May 8th, 1869, vol. xxvii. pp. 530–32. Reprinted in the "Journal of the Statistical Society," December, 1869, vol. xxxii. pp. 445–49.

first attempted in my pamphlet on the "Value of Gold," and afterwards extended over the whole period embraced in Tooke's "History of Prices," the complete results being published in the "Journal of the London Statistical Society" for June, 1865. The inquiry is substantially of the same nature as that which was originated by Mr. Newmarch in the "Statistical Journal" for 1859, and which has since been continued in your valuable "Annual Review." Your readers will probably have noticed on p. 44 of the "Commercial History and Review" of 1868, a table containing the proportionate prices of a number of commodities compared with their average range in 1845-50, and a column is added containing what you have called the total index number, formed by the simple addition of the percentage numbers of the separate commodities. My method is very similar, but consists in calculating, in a manner fully described in the "Statistical Journal," the average ratio of prices in March of each year to prices in the same part of the previous year, so that by the junction of these ratios the prices of each year can be compared with those of any year before or after, just as in taking the levels of a line of country the difference of level of each two successive points is measured, and then the difference of any two points on the route can be ascertained by the simple junction of the intervening differences. Any year may readily be made the *datum line* or point of comparison, but the year 1849 is peculiarly fitted to be the starting-point, because it was not only the first year of the gold discoveries, but it also happens that prices then reached the lowest point which they have attained during the present century.

The following numbers thus deduced show the average ratios of the prices of about fifty of the chief articles of commerce during the last twenty-two years to the prices of the same articles in 1849:

| Year. | Average Ratio of Prices to those of 1849. | Year. | Average Ratio of Prices to those of 1849. |
|---|---|---|---|
| 1847 | 122 | 1859 | 120 |
| 1848 | 106 | 1860 | 124 |
| 1849 | 100 | 1861 | 123 |
| 1850 | 101 | 1862 | 124 |
| 1851 | 103 | 1863 | 123 |
| 1852 | 101 | 1864 | 122 |
| 1853 | 116 | 1865 | 121 |
| 1854 | 130 | 1866 | 128 |
| 1855 | 125 | 1867 | 118 |
| 1856 | 129 | 1868 | 120 |
| 1857 | 132 | 1869 | 119 |
| 1858 | 118 | | |

It appears from the above that the range of prices has since 1853 been always considerably above the point they attained in 1849. The three great collapses of credit and enterprise occurred in the years 1847, 1857, and 1866, and the depression of prices thereby occasioned were respectively 22, 14, and 10 per cent; it is perfectly fair therefore to compare together the three lowest points thus attained in the years 1849, 1858, and 1867, and we thus learn that there has been a *net* or permanent rise of 18 per cent accomplished in the prices of about fifty of the chief materials and commodities. The still greater elevations of 32 per cent in 1857 and 28 per cent in 1866 are partly due to the inflated credit and excessive speculation of those periods. It may seem that my numbers underestimate rather than overestimate the fluctuations of prices; but it must be remembered that, though many commodities in which speculation chiefly takes place vary much more than is shown in the average, there are many articles—such as butchers' meat and provisions—which are little subject to speculative changes, and in drawing a wide average many considerable changes in individual commodities are entirely obliterated.

The results given above will be found to correspond pretty closely with the like results which are easily drawn from the index numbers in your "Annual Review," except

that from 1863 to 1867 you represent prices as having risen much more than I state them. This I find is due to your index number being the sum of twenty-two different numbers, of which four numbers represent the increased prices of raw or manufactured cotton; as these prices have risen in one case as much as by 360 per cent, a great effect is produced on the aggregate. My quotations include only three out of fifty depending on cotton; besides which my mode of drawing a geometrical average always gives a less result than the simple addition employed in the "Annual Review." It may be a matter of opinion which result is the truer one, but at any rate I am satisfied to feel that I underestimate the fluctuations of prices as compared with the results in your "Annual Review."

I cannot help then reasserting with the utmost confidence that a real rise of prices, to the extent of 18 per cent, as measured by fifty chief commodities, has been established since the year 1849. This is an undoubted depreciation of gold, because it represents a real diminution in the general purchasing power of gold. Nor can we well avoid attributing it to the effect of the gold discoveries. Indeed, as Professor Cairnes has so distinctly pointed out, the effect of those discoveries is probably much greater than any we can prove, because the course of prices was in previous years decidedly downwards, so that the new gold has both prevented a further fall and occasioned a rise in its stead. To illustrate this, I have formed from the tables given in my paper in the "Statistical Journal" (founded upon Tooke's tables of prices) the following comparison of prices at intervals of ten years, taking the year 1849 as the datum point:

| Year. | Average Ratio of Prices to Prices of the Year 1849. |
|---|---|
| 1789 | 133 |
| 1799 | 202 |
| 1809 | 245 |
| 1819 | 175 |
| 1829 | 124 |
| 1839 | 144 |
| 1849 | 100 |
| 1859 | 120 |
| 1869 | 119 |

Between 1809 and 1849 we notice a vast decline of prices, to the extent of 145 per cent, the previous rise having been nearly as great. With this great revolution in the value of gold, we are only concerned so far as regards the fact that previous to 1849 a great decline in prices was in progress. This decline was interrupted during the years 1835-39 by a temporary rise, due perhaps to excessive speculation, but the decline was renewed as rapidly as before until we reach the critical year 1849. Since then the course of prices seems to have been entirely altered, and a permanent rise has been established.

Not a few able writers, including Professor T. C. Leslie, who lately addressed you on the subject, are accustomed to throw doubt upon all such conclusions, by remarking that until we have allowed for all the particular causes which may have elevated or depressed the price of each commodity we cannot be sure that gold is affected. Were a complete explanation of each fluctuation thus necessary, not only would all inquiry into this subject be hopeless, but the whole of the statistical and social sciences, so far as they depend upon numerical facts, would have to be abandoned. It has been abundantly shown by Quetelet and others, that many subjects of this nature are so hopelessly intricate, that we can only attack them by the use of averages, and by trusting to probabilities. The price of any one commodity, even silver, utterly fails as a measure of the value of gold, because it is sure to be affected by numerous conflicting causes of rise and fall, no one of which we can accurately estimate. Even the intimate knowledge which a merchant gains of the commodity in which he deals is insufficient to enable him to explain, still less to predict, the changes in its price with confidence. But when we take a large list of fifty commodities the probability is almost infinite that particular influences will not all act the same way, so that a rise in one case will balance a fall in another. The average then must in all reasonable probability represent some single influence acting on all the commodities. This influence may indeed be something affecting the commodities rather than gold—for instance, a general increase of demand not

met by a corresponding supply. This is possible but not likely, because the supply of many articles is exceedingly increased and cheapened by the progress of civilisation. Even if it were the commodities which were altered in their conditions of supply and demand, the result would not the less be an alteration in the purchasing power or value of gold. But considering that there is no reason to suppose the supply and demand for gold would always maintain an equilibrium, and that a most extraordinary change has taken place in the conditions of supply, the probability is excessively great that we find the true cause in the gold discoveries.

To complete the argument, I have only to ask those who think that the growth of population, the increase of demand, or the progress of trade is the cause of the rise of prices, whether population, demand, trade, etc., were not expanding before 1849, not so rapidly perhaps as since, but still expanding; and how it is that causes of the same kind have produced falling prices before 1849 and rising prices since?

To gain some notion of the degree of probability of conclusions on this subject, it has occurred to me to apply the ordinary methods of the theory of probabilities to the results stated in my pamphlet on the value of gold. The list of commodities there given (including cotton) contained thirty-six different articles, of which twenty-nine were found to have risen in price in 1862, as compared with the average of the years 1845-50, while only seven had fallen in price. All the alterations of price (excluding the extreme rise in the case of cotton) lay between a fall of 26 per cent and a rise of 67 per cent, but most of the alterations were of about 10 or 20 per cent. Regarding each of these thirty-six commodities as a separate and independent measure of the alteration in the value of gold, I first took the average rise of prices, namely, 16 per cent, as the most probable estimate which these thirty-six measures give, and then proceeded to calculate by the ordinary method of least squares the probable error of this result. This probable error proved to be just $2\frac{1}{2}$ per cent—that is to say, *it is as likely as not that the true*

*alteration of gold lies within* $2\frac{1}{2}$ *per cent of* 16 *per cent;* or between $13\frac{1}{2}$ and $18\frac{1}{2}$ per cent. From this result we can readily calculate the probability, that gold is depreciated *in some degree,* or that the true result if it be not 16 per cent rise is above 0 per cent rise. This probability proves to be so near to certainty that the tables required in the calculation do not go sufficiently far to enable me to give it exactly. It may be safely said that the odds are 10,000 to 1 in favour of a real depreciation of gold. The meaning of this is, that the chances are 10,000 to 1 against a series of disconnected and casual circumstances having caused the rise of price—one in the case of one commodity, another in the case of another—instead of some general cause acting over them all. It is true that as the commodities do not all vary independently, different kinds of corn, for instance, generally varying together, the improbability is not so great as stated; but if we reduce it ten times, to 1000 to 1, it is great enough for my purposes.

Taking into account the separate probability that such a result would follow from the gold discoveries, I believe it is wholly beyond doubt that the expected result has been manifested, but not in the mode predicted. Many eminent men, especially Chevalier, looked upon the depreciation of gold as a sudden and revolutionary event which would happen in the course of time, and yet I believe that when Chevalier was writing the most sudden and serious part of the effect had already been produced. Prices have never since stood so high as they did in 1854 and 1857, and though returning enterprise and expansion of credit will doubtless occasion another rise in the next few years, there seems to be no reason to suppose that we shall get beyond the point attained in 1857. I should therefore not venture to call in question the remark of your annual reviewer, that the tendency is now in an opposite direction—in that of appreciation rather than depreciation. It is quite possible that the causes which occasioned a great fall of prices before 1849 are now again beginning to make themselves felt. All I contend for is the existence of some disturbance which in the last twenty years has prevented the previous fall of prices from continuing. The tables

of your "Annual Review" unmistakably prove the existence of a rise: to what must we attribute it? To the growth of population and trade? I think that the growth of population and trade tend to lower prices by increasing the use of gold, and to this cause we may reasonably attribute the fall of prices before 1849. But to attribute to the same cause, as some do, the diametrically opposite change which has occurred since 1849, is illogical in the extreme. The normal course of prices in the present progressive state of things is, I think, downwards; but for twenty years at least this normal course has been checked or even reversed, and why should we hesitate to attribute this abnormal effect to the contemporary and extraordinary discoveries of gold?

It would not be difficult to show that not only have prices risen during the period in question, but that the relations of society have readjusted themselves in accordance. While statisticians have been disputing, society has practically accepted the fact of a rise. The pay of the army is increased, the whole of the Civil Service and the staff of the Bank of England receive larger salaries, and could the information be obtained, I believe the same change might be shown to have occurred in most private establishments. Trades unionists point to the services rendered by their societies in gaining a rise of wages. Financial reformers, on the other hand, point to the great increase in the public expenditure of the kingdom as a proof of extravagance. To all these effects the alteration in the value of gold has, I believe, contributed something; it would not be too much to say, that the increased cost of materials and wages has added three or even five millions to the public expenditure, and wages not unnaturally rose when gold was perceptibly depreciated.

# V

# ON THE FREQUENT AUTUMNAL PRESSURE IN THE MONEY MARKET, AND THE ACTION OF THE BANK OF ENGLAND*

## *Preliminary Remarks.*

At the beginning of last October (1865), the commercial world of England was disturbed by a remarkable withdrawal of coin from the Bank of England, causing a great decrease of the loanable capital, and necessitating a corresponding rise in the terms of discount. The commercial editor of *The Times,* writing on Saturday evening, 7th October, said:

"The Bank of England this morning made a further advance of 1 per cent in their rate of discount, the charge being now 7 per cent. The rise during the week has, therefore, been 2½ per cent, a movement unprecedented in so short a space. . . . At no former period, except during panics or runs from political or commercial disasters, has it ever been found requisite to advance the rate of discount in the face of a prolonged favourable condition of the foreign exchanges. For four months there has almost uninterruptedly been a favourable balance, week by week, in the operations of the bullion market, as regards exports and imports, and during that time the home com-

* Read before the Statistical Society of London, on April 17th, 1866, and printed in the Journal of the Society for June, 1866, vol. xxix. pp. 235-53. Reprinted by the Manchester Statistical Society, 1876. Transactions, Session 1875-76, Appendix, pp. 17-41.

munity have absorbed, not only the surplus thus left, but about £3,000,000 from the Bank, in addition to an extra one or two millions in notes. As the amount of currency used for internal purposes rarely experiences any great or permanent fluctuation, the Bank directors were entitled to assume, week by week, as the absorption became more remarkable, that a turn must be rapidly witnessed, and that the market would then be oversupplied with the amounts that had been so strangely removed from it. But there was a point below which, whatever might be their confidence as to the supply of money actually available in the country, they could not allow their reserve of notes to fall, and that point having been reached ten days ago, the present measures commenced. And here, again, nothing but abnormal results were witnessed. With a rise of half per cent, the demand still increased, and an additional movement of 1 per cent seemed to have no restrictive effect."

The commercial press were in considerable perplexity as to the cause of this demand for money. *The Times* of the morning of 7th October had allowed that "the question is still unsolved as to the causes that can have led to that excessive absorption of gold and notes by the public to which, in the absence of any unfavourable condition of the foreign exchanges, the existing pressure is solely due. In addition to the influences of active employment and high wages, it is suggested that there has been a partial drain for Ireland, but the last published returns showed that the coin held by the banks in that country was only £168,000 in excess of the total at this time last year."

In "Travers' Circular" it was remarked that "a further half-million sterling has been taken from the Bank by the public during the past week, yet no additional suggestions have been offered to account for this singular drain. Not only must the amounts withdrawn in August and September, in connection with election and harvest payments, have been returned long ago to their natural channels, but the sums withdrawn for autumn pleasure traffic must now also be finding their way back to the banks. The absorption, therefore, becomes every day more inexplicable."

By other papers or their correspondents the absorption of money was attributed variously to the large American purchases on credit, to extensive speculations in cotton at Liverpool, to the sinking of capital in joint-stock enterprise, or to the Fenian conspiracy.

The remarks of *The Economist,* although written during the progress of the pressure, appear to be substantially correct. In the issue of October 14th, the editor said: "The present rise in the value of money is owing to the simultaneous occurrence of three causes. There is a sort of *tide* in the cash transactions of the country which periodically empties and periodically fills the Bank till. At the close of every quarter there is a strong outgoing current. The non-banking classes then get their money. Salaries are paid, wages are paid, small dividends are paid; each of these transactions is very minute, but their aggregate mass is very large. . . . Little people are paid in actual cash; they take so much from the Bank till. . . . Speaking generally, the middle of each quarter is marked by an incoming current towards the Bank, and the close of every quarter by an outgoing current from the Bank."

The periodical quarterly outflow of money from the Bank was, then, according to *The Economist,* the chief cause of the pressure, aggravated in this particular case, as it goes on to explain, by two minor causes, the Irish demand for coin, and the creation of bills by large cotton speculators. A few weeks later *The Economist* pointed out an unusual increase of the export and import trade of the country, revealed by the Board of Trade returns, as the chief aggravating cause.

It was, however, a correspondent whose letter, signed "G. F.," was inserted in *The Economist* of October 21st, who most correctly, as I think, attributed the pressure to an *annual tide* in the movement of money.

"Why," he says, "was the pressure in *October,* 1847, in *October,* 1857, in *October* last year, in *October* this year, and more or less in *October* every year? It is because there is an *annual tide* in the cash transactions of this country, and I believe of all countries. The currency generally, including bank-notes of all our banks,

gold coin and silver coin, expands from July to the end of October or beginning of November; it contracts from the middle of November to the end of March, and is, on the whole, stationary in April, May, and June. . . . Such is the annual tide, masked to some extent by the action of the quarterly tides. . . . I believe that observations in the direction I have indicated would be found to confirm the law of annual tides arising from agricultural as distinguished from manufacturing causes; and to prove that they are a periodical source of disturbance in the money markets of the world, of greater force and importance than has hitherto been acknowledged."

In these able remarks I thoroughly concur, and I think it therefore a work of interest to direct the attention of the Society to such analysis of the periodical fluctuations as "G. F." suggests. It is the more needful because "G. F." is not aware of the great peculiarity of the October drain; and even *The Economist* is so far from being quite accurately informed concerning these fluctuations that it considers the most serious demand for coin to occur in December.*

What I have to point out is, that in the beginning of October there are several causes concurring towards a drain of currency which renders this by far the most critical period of the whole year. In September, 1862, I pointed out this tendency to an autumnal disturbance in the money market. In a paper read before the British Association, in 1862, I said:†

"Some, perhaps, would attribute the sudden changes in the rate of discount, bankruptcies, and consols, to the occurrence of panics during the months of October and November. It would be more correct to say that there is a periodic tendency to commercial distress and difficulty during these months, of which all concerned should be aware. It is when great irregular fluctuations aggravate this distress, as in the years 1836, 1839, 1847, 1857, that disastrous breaches in commercial credit occur."

* *The Economist*, December 2nd, 1865, vol. xxiii. p. 1453.

† See above, p. 8.

In two of the three succeeding years, namely, 1863 and 1865, this autumnal pressure has been strikingly manifested, and these occurrences, considered in connection with the fact that since 1825 all the severest pressures have either commenced or culminated in the last quarter of the year, are sufficient *primâ facie* evidence of a dangerous tendency in these months worthy of the deliberate attention of commercial men.

I have lately found, however, that so long ago as December, 1857, this autumnal pressure was distinctly described by Mr. William Langton to the Manchester Statistical Society. After noticing the fluctuation caused by the payment of the dividends he makes the following very able and true remarks:* "This short and superficial wave is accompanied by another, not so easily detected (because sometimes absorbed in a larger movement), and more difficult to account for. It has an annual increment and collapse, and is doubtless connected with the action of the seasons upon trade. In the midst of other disturbances, this wave may be traced in the magnitude of the operations of the third and fourth quarters, and the almost invariable lull in the second quarter of each year, the third quarter being generally marked by rapid increase in the demand for accommodation at the Bank. The culminating point in the movement, originating in the third quarter of the year, appears to be a moment favourable to the bursting of those periodical storms in which the commercial difficulties in the country find their crisis."

Now, I have no hesitation in saying that the autumnal pressure of 1865 was little more than an unusually distinct exhibition of this curious tendency to a drain of currency and capital in the autumn, and especially in the month of

* "Observations on a table showing the balance of account between the mercantile public and the Bank of England." Read December 30th, 1857. Transactions, Session 1857-58, p. 9. This admirable paper was lately reprinted by the Manchester Statistical Society; Transactions, Session 1875-6, Appendix, pp. 1-16. In the Transactions of the Society will also be found several other papers by the same most acute and sound of bankers and financiers. All who had the advantage of being acquainted with Mr. Langton will understand how difficult it is to pass over his name without paying a slight tribute of esteem and admiration.

October. I wish, therefore, to divide the remainder of my remarks among four points:

(1) To analyse somewhat closely the nature of this tendency, as shown in average tables of the circulation of bank-notes and of the Bank of England accounts.

(2) To offer some suggestions as to its cause.

(3) To examine how far, and from what unusual causes, the pressure of 1865 exceeded the average autumnal pressure.

(4) To consider whether the action of the Bank during disturbances of this kind is faulty, and whether any legislative change could alleviate the evil.

### (1).—*On the Average Fluctuations of the Currency and of the Bank of England Accounts within the Year.*

The nature and extent of the autumnal pressure is clearly seen in tables of the average fluctuations of the Bank accounts from week to week, which I prepared for reading at the meeting of the British Association in 1862, and which are printed and explained in the Appendix.*

The fact which first strikes us in examining these tables is the great quarterly variation in all the principal elements of the Bank accounts, caused chiefly by the payment of the dividends.† Coincident with this payment, we observe a sudden increase in the note circulation and in the private deposits, a considerable decrease of private securities or commercial bills, a slight decrease of the bullion, accompanied by a larger but otherwise similar variation of the loanable capital.

* See Plate VIII. Most of the tables are not reproduced in this edition (1908), but the numbers referred to in this essay are represented in the diagrams opposite p. 174. See also above, pp. 5–8.

† The disturbances created in the money market by the dividend payments, and the arrangements on the part of the Bank of England rendered requisite by them, were described by David Ricardo in his pamphlet, entitled, "Proposals for an Economical and Secure Currency," 1816, pp. 37-41. He suggested a method of payment by the issue of post-dated dividend warrants, which, he thought, would mitigate the locking up of money before the dividend-day.

The amounts of these variations are approximately as follows:

| | Mils. |
|---|---|
| Government deposits, decrease - - - | £4,26 |
| Private securities, „ - - - | 1,91 |
| Bullion and coin, „ - - - | 0,62 |
| Loanable capital, „ - - - | 1,91 |
| Notes in circulation, increase - - - | 1,40 |
| Private deposits, „ - - - | 1,55 |

It is easy to detect in the tables evidence of a monthly variation due partly to the occurrence of the settling-day at the commencement of the month.

The *annual tide* in the accounts, however, is far more interesting than these artificial quarterly and monthly variations. It is ascertained in a manner very imperfect, no doubt, but sufficient for our purposes, by first determining the average variations within the quarter, and then subtracting these variations from the general variations in Table I.

Thus Plate XI. gives the variation within the year of the five principal elements of the Bank accounts, after elimination of the quarterly disturbance. We observe that [for the period 1845-61] the note circulation is at a minimum in January and February; that it rises gradually to a maximum in the third quarter, and then rapidly decreases during November and December. The private securities and private deposits exhibit great and opposite changes during the third and fourth quarters; the securities rise to a remarkable maximum, and the deposits fall to a very low minimum in the first week of October.

The bullion and loanable capital undergo a curious double oscillation during the year, both rising to a maximum in the first quarter, and again at the beginning of the third quarter. I am at a loss to explain this double oscillation, but it does not directly bear upon our present subject. The important fact for us is, that both the bullion and capital undergo a continuous decrease from the beginning of the third quarter, until about the middle of the fourth.

We may sum up these variations so far as they touch our present purpose, by saying that the Bank experiences during the latter part of the year, especially in the beginning of October, an unusual demand for money. Both by the withdrawal of deposits, and the presentation of bills for discount, the public try to get what they can from the Bank.

These accounts do not, however, reveal the most singular fact concerning the autumnal pressure. The movements of metallic money undergo curious fluctuations throughout the year, and reach a most remarkable crisis in the month of October.

The volumes of the "Miscellaneous Statistics of the Board of Trade" contain certain tables of the receipts and payments of coin by the Bank of England, which I have not seen noticed. From these tables I deduce the following interesting statements:

*Average Amount* (1855-62) *of Gold Coin sent to the Branches of the Bank of England during each month of the Year.*

| | | | |
|---|---|---|---|
| January | £293,000 | July | £174,000 |
| February | 50,000 | August | 219,000 |
| March | 82,000 | September | 209,000 |
| April | 119,000 | October | 463,000 |
| May | 166,000 | November | 263,000 |
| June | 140,000 | December | 214,000 |

It is seen that far more gold is sent out during October than during any other month, and more than twice as much as during either of the preceding harvest months.

*Average Excess* (1855-62) *of Payments or Receipts of British Coin at the Bank of England.*

| | Excess of Payments. | Excess of Receipts. |
|---|---|---|
| January (dividend) | 163,000 | ... |
| February (excess of receipts) | ... | 307,000 |
| March | 111,000 | ... |

| | | |
|---|---|---|
| April (dividend) | 808,000 | ... |
| May | 363,000 | ... |
| June (excess of receipts) | ... | 74,000 |
| July (dividend) | 763,000 | ... |
| August | 529,000 | ... |
| September | 704,000 | ... |
| October (dividend) | 1,509,000 | ... |
| November | 258,000 | ... |
| December | 123,000 | ... |

We find, as we should expect, that the payments of coin are far larger in the first month of each quarter than in either of the succeeding months—on an average about four times as large. But we cannot fail to be struck with the fact, that the excess of payments of coin over receipts is nearly twice as great in October as in any other month.

The result is very remarkable, too, when we take the aggregate excess of payments over receipts in each quarter, or *vice versâ*, as follows:

| | | |
|---|---|---|
| First quarter, | January—March | £33,000 Receipts. |
| Second „ | April—June | 1,097,000 Payments. |
| Third „ | July—September | 1,996,000 „ |
| Fourth „ | October—December | 1,890,000 „ |

I may add, that these fluctuations do not appear to be due to any very great or all-extensive influence of the seasons upon trade. For, on carefully examining Mr. Newmarch's well-known statistics of bills created in the years 1830-53,* I find no great difference between the four quarters of the year. The average aggregate amounts of bills of all sizes drawn are as follows:

| | |
|---|---|
| First quarter | £64,050,000 |
| Second „ | 61,550,000 |
| Third „ | 65,690,000 |
| Fourth „ | 61,960,000 |

The variation is greatest in the large bills, but the extreme variation of the aggregate is only to the extent

* "History of Prices," vol. vi. Appendix XI. pp. 584-92.

of about 6 per cent. It is curious that we meet here again the double oscillation shown in the bullion and in the reserve of loanable capital.

### (2).—*On the Causes of the Autumnal Pressure.*

It being now sufficiently obvious how extensive is the autumnal disturbance of the money market, and especially how singular is the periodical crisis in October, I come to the question: What are the causes of the disturbance? These causes must be sought in the influence of the seasons upon trade and industry, but the difficult point is: Why does the drain fall so peculiarly in the first few weeks of October?

It is not hard to see that there must be an excess of coin in circulation in the latter half of the year. In the prosecution of agriculture, in the building and outdoor trades generally, and in pleasure-seeking and travelling, there is an excess of wages and payments dispersed in the summer, and especially in the three months July, August, and September. Large numbers of labourers and others must then receive wages in coin upon which they will have to maintain themselves partly or wholly until the next spring. As such persons belong to a social class which does not make any considerable use of banks (even of savings' banks), they must actually hold a certain amount of coin by them in a temporary hoard.

This view of the subject is supported by the fact that the variation is more important in the metallic circulation than in that of notes, of which few would in England be held by the working classes.

But then, why do we not find the drain most excessive during the months June, July, August, and September, when the industry is most active? Why does the drain fall with most intensity into the month of October? I cannot give an explanation with any confidence, and would rather expect it from members of the Society who are better acquainted with the details of banking business. But it seems to me likely that the drain falls in the first place upon private firms and country banks, whose reserves in con-

sequence run down. Advantage is then taken of the payments of the dividends in October to replenish the banking reserves of notes and coin. It is evident, in fact, from Plate XI., that in October the dividends are withdrawn rather than placed in deposit, as is usual at the other dividend payments.

Thus it would seem evident that there is a tendency during every autumn to use the Bank of England as a bank of support, and of last resort. While the newspapers are arguing in October that the harvest is done, and pleasure traffic over, and that therefore the coin should be flowing back, the coin is really dispersed among the non-banking classes of the country, and the drain having previously fallen on the smaller banks is only just reaching the Bank of England. "What is seen and what is not seen" should always be discriminated in these matters. We do not see the movements of coin until the drain falls upon the Bank in the first weeks of October with unexpected and alarming severity.

It is interesting to compare the variation of the Bank of England circulation with that of the country and joint-stock banks, or with that of the Scotch and Irish note currencies. I have calculated the average variation from week to week of the English country note circulation for the series of years 1845-62, and have shown it in Plate XII.

It will be seen that there is an increase of circulation at the commencement of each quarter, but that in April and October the increase is much greater and more lasting than in the other quarters. The currency falls to its lowest in August and the beginning of September, then rises rapidly to the highest point of the year in the end of October, whence it falls continuously until the end of the year. These variations do not agree well with Gilbart's "Laws of the Currency," deduced from an observation of monthly returns for ten years.*

His description, however, of the changes in the Scotch currency is very accurate.† "In Scotland the lowest point of the circulation is in March, and the highest in

* "Statistical Journal," vol. xvii. p. 295 (December, 1854). See above, p. 4.

† *Ibid.* pp. 297, 298 (December, 1854).

November. The advance, however, between these two points is not uniform; for the highest of the intervening months is May, after which there is a slight reaction; but it increases again until November and falls off in December. The reason of the great increase in May and November is that these are the seasons of making payments. The interest due on mortgages is then settled, annuities are then paid, the country people usually take the interest on their deposit receipts, and the servants receive their wages. There are frequently large sums transferred by way of mortgage."

The variation of the Irish note circulation does not agree exactly with Gilbart's remarks. The notes of £5 and upwards vary like the English country issues. The smaller note circulation falls to a low point in July and August, and then rises rapidly until November, owing to the purchase of harvest produce. It remains high until March, when it begins to fall gradually up to the month of July.

A complete explanation of all these variations, pointing out how much is due to each particular cause, could only be founded on a wide basis of statistics, which do not exist. Much might, indeed, be done by minute inquiry into the customary payments at different times of the year, and in different parts of the country; but such an inquiry I am not at present able to undertake. I must content myself with pointing out the precise character and amount of the fluctuations, in order that we may rightly appreciate the amount of disturbance they will usually occasion in the money market.

To sum up, then, the October drain is due, like many other economic disturbances, to a concurrence of causes. The dispersion of money in wages during the summer, and the absorption of money and capital in buying up the produce of the harvest, occasion a general autumnal drain upon the resources of the banks, causing the private deposits, the bullion, and the reserve of notes to fall. Then the general quarterly payments of rents, bills, and especially the dividends at the beginning of October, cause a sudden extra run upon the resources of the Bank, quite

sufficient in certain states of the money market to engender a panic, unless, indeed, its normal and temporary nature be well understood.

### (3).—*Special Examination of the Pressure of* 1865.

I now proceed to compare the drain of bullion in the autumn of 1865 with that normal drain shown in the average tables of the Bank accounts. The following statement gives the comparison in detail:

[o,ooo's omitted.]

| Year. | Notes in Circulation. | | Bullion in Issue Department. | | Reserve of Loanable Capital (Notes). | |
|---|---|---|---|---|---|---|
| | Average of 1845–61. | 1865. | Average of 1845–61. | 1865. | Average of 1845–61. | 1865. |
| June 7 - | 19,88 | 21,16 | 14,35 | 14,89 | 8,65 | 8,38 |
| ,, 14 - | 19,63 | 20,73 | 14,58 | 15,09 | 9,12 | 9,01 |
| ,, 21 - | 19,52 | 20,71 | 14,80 | 15,35 | 9,45 | 9,29 |
| ,, 28 - | 19,81 | 21,12 | 14,99 | 15,42 | 9,35 | 8,95 |
| July 5 - | 20,20 | 22,22 | 14,85 | 15,12 | 8,82 | 7,55 |
| ,, 12 - | 20,82 | 22,39 | 14,67 | 14,56 | 8,02 | 6,82 |
| ,, 19 - | 21,00 | 22,24 | 14,55 | 14,15 | 7,72 | 6,56 |
| ,, 26 - | 20,80 | 22,07 | 14,49 | 13,60 | 7,85 | 6,18 |
| Aug. 2 - | 20,81 | 22,64 | 14,37 | 13,60 | 7,73 | 5,61 |
| ,, 9 - | 20,57 | 22,03 | 14,33 | 13,35 | 7,93 | 5,97 |
| ,, 16 - | 20,46 | 21,97 | 14,38 | 13,24 | 8,09 | 5,92 |
| ,, 23 - | 20,24 | 21,78 | 14,35 | 13,27 | 8,29 | 6,14 |
| ,, 30 - | 20,19 | 21,60 | 14,35 | 13,57 | 8,34 | 6,62 |
| Sept. 6 - | 20,10 | 21,70 | 14,29 | 13,42 | 8,36 | 6,37 |
| ,, 13 - | 19,77 | 21,39 | 14,33 | 13,30 | 8,73 | 6,56 |
| ,, 20 - | 19,70 | 21,32 | 14,36 | 13,34 | 8,83 | 6,67 |
| ,, 27 - | 19,86 | 21,50 | 14,33 | 13,13 | 8,64 | 6,28 |
| Oct. 4 - | 20,41 | 22,73 | 14,14 | 12,44 | 7,90 | 4,36 |
| ,, 11 - | 20,47 | 22,32 | 13,91 | 11,96 | 7,61 | 4,29 |
| ,, 18 - | 21,06 | 22,31 | 13,69 | 12,00 | 6,81 | 4,34 |
| ,, 25 - | 20,90 | 21,82 | 13,60 | 12,41 | 6,88 | 5,24 |
| Nov. 1 - | 20,97 | 21,85 | 13,57 | 12,51 | 6,78 | 5,31 |
| ,, 8 - | 20,64 | 21,47 | 13,55 | 12,57 | 7,08 | 5,75 |
| ,, 15 - | 20,31 | 21,15 | 13,55 | 12,86 | 7,41 | 6,36 |
| ,, 22 - | 20,04 | 20,58 | 13,68 | 13,67 | 7,81 | 7,74 |
| ,, 29 - | 19,89 | 20,72 | 13,82 | 13,84 | 8,11 | 7,77 |

The fairest mode of bringing the matter into a narrow compass will be to take the extreme highest and lowest points.

| Average of Years, 1845-61. | Millions. | The Year 1865. | Millions. |
|---|---|---|---|
| | £ | | £ |
| *Notes in Circulation*— | | | |
| September 20 | 19,70 | September 20 | 21,32 |
| October 18 | 21,06 | October 4 | 22,73 |
| Difference | 1,36 | Difference | 1,41 |
| *Bullion*— | | | |
| June 28 | 14,99 | June 28 | 15,42 |
| November 8 | 13,55 | October 11 | 11,96 |
| Difference | 1,44 | Difference | 3,46 |
| *Reserve of Notes*— | | | |
| June 21 | 9,45 | June 21 | 9,29 |
| November 1 | 6,78 | October 11 | 4,29 |
| Difference | 2,67 | Difference | 5,00 |

If we restrict our view more particularly to the October drain, by comparing the extreme points of September and October, the change of the circulation remains as already shown, and the drain of gold and capital is as under:

| Average of Years, 1845-61. | Millions. | The Year 1865. | Millions. |
|---|---|---|---|
| | £ | | £ |
| *Bullion*— | | | |
| September 20 | 14,36 | September 6 | 13,42 |
| October 25 | 13,60 | October 11 | 11,96 |
| Difference | ,76 | Difference | 1,46 |
| *Reserve of Notes*— | | | |
| September 20 | 8,83 | September 20 | 6,67 |
| October 11 | 7,61 | October 11 | 4,29 |
| Difference | 1,22 | Difference | 2,38 |

However we view it, the drain of 1865 is seen to be considerably beyond, and in fact about double of what is shown as the normal change in my average tables.

This excess may arise either from (1) exceptional circumstances affecting the trade of 1865, or from (2) the general and gradual development of our industry.

I shall not dwell much upon the special disturbing circumstances of 1865. Many of them were mentioned in the beginning of the paper. The considerable degree of pressure in the money market, which has existed during the winter, shows, however, that excessive investments in joint-stock and other enterprises have diminished the ready capital of the country, in spite of the late unusual abundance and cheapness of corn. It is well known, too, that during the last year, and one or two previous years, buildings of all sorts have been erected in great numbers in most of our towns. Large sums of money must have been dispersed in wages during the progress of these works, and especially during the summer.

Secondly, the ordinary export trade of the country expanded very rapidly during the year, as noticed by *The Economist*. Not only do these exports represent so much money dispersed in wages over the country, but being sold to a great extent on credit, they cause a temporary abstraction of the floating capital of the country.

What I have chiefly to remark, however, is that, with the rapid growth of our system of trade and industry, our money market is necessarily becoming more and more delicate. We must look this fact boldly in the face. We must not needlessly complain of what is to a great extent an inevitable result of our progress, nor on the other hand must we omit any efforts to apply a remedy so far as this is possible.

The following figures will aid in showing what I mean:

| Year. | Bullion in the Bank, September. | Notes in Circulation. | Total Exports of Year. | Computed Real Value of Total Imports of Year. |
|---|---|---|---|---|
| | Millions. £ | Millions. £ | Millions. £ | Millions. £ |
| 1844 - | 14,35 | 20,17 | 59,00 | — |
| 1854 - | 12,63 | 19,62 | 116,00 | 152,00 |
| 1864 - | 12,22 | 21,36 | 213,00 | 275,00 |

Whether we consider these numbers, or whether we look to the increasing perfection of our system of credit, clearing, and banking generally, which, as shown by Sir John

Lubbock,* enables coin to be almost dispensed with in large transactions, we see that we are carrying on a vaster and vaster system of trade upon a nearly stationary reserve of currency. Our trade goes upon a method resembling that of barter,† except that the values exchanged or written off against each other are all determined and expressed in gold. Now, it is the aggregate of coin and gold in circulation or reserve—in short, the supply of gold as compared with the work it has to do—which determines the range of prices, and which must in the last resort be used to make payments either in an internal or foreign drain.

Admirably has M. de Laveleye said, in a passage of the "Revue des Deux Mondes," quoted by *The Economist* in its "Commercial History and Review of 1864":

"All countries which carry on gigantic transactions with small reserves of gold and silver, and which have a vast movement of importations and exportations, must be exposed to these economical perturbations. . . . The more a country expels the precious metals from the channels of circulation, and replaces them by instruments of credit, bank-notes, cheques, warrants, deposits, clearing-houses, etc., and the more at the same time it develops its relations with foreign countries, the more it will be exposed to the periodical return of financial perturbations, because more easily an unfavourable balance of trade and payments will disturb all the mechanism of exchanges, and will require from the managers of credit institutions redoubled circumspection, prudence, and ability."

Now this is just as true of internal as of foreign drains of gold. The larger our system of trade is, the larger the excess of wages dispersed at some periods of the year. When our reserve of coin is stationary, the greater will be the inconvenience and alarm excited. Even without taking into account exceptional circumstances, the unbounded prosperity of the last few years seems sufficient to explain why the autumnal drain has of late manifested itself with far more than the normal severity of the years 1845-61. We must bear in mind that we are moving onwards, and

* "Statistical Journal," September, 1865, vol. xxviii. pp. 361-71.

† See "Money and the Mechanism of Exchange," p. 288.

rapid progress such as ours, however desirable in itself, must beget some difficulties.

(4).—*On the Action of the Bank of England.*

We come now to the last question, namely, whether the action of the Bank of England as at present governed is beneficial to trade during these frequently recurring pressures.

It is well known that many merchants and gentlemen of influence in Glasgow, Liverpool, and elsewhere, have a strong desire to unsettle our monetary system again. They spare no pains in urging upon us that the Bank of England is the cause of all our troubles. While some go so far as to propose an inconvertible currency, others advise a return to a system of free issue of notes, the convertibility of which shall be dependent on the credit and discretion of the issuing banks, according to the method which used to prevail in Scotland. It is the latter scheme alone that I need consider here.

I will not deny that there is some apparent harshness in the action of the Bank during the temporary fluctuations which I have attempted to describe. But after considerable reflection I have satisfied myself that this harshness is not necessarily inflicted under the conditions of the Bank Act; or, more precisely, I should say that what harshness is a necessary consequence of that Act is legitimate and ultimately beneficial to trade.

In the first place, as regards a foreign drain of bullion, Lord Overstone and the supporters of the Bank Act seem to me to be in an impregnable position. Nothing can be more desirable, nothing more in accordance with the natural laws of economics and trade, than that a foreign drain should at once cause a reduction in the currency, and thus tend to restore the exchanges to equilibrium as quickly as possible. In a system of unrestricted issues the drain will for a time probably act upon the bankers' metallic reserves without leading them at once to reduce their advances of notes. The revulsion is thus deferred only to become ultimately more severe and hazardous.

It is, however, an internal drain which we have now to consider, and it is in this respect that the *primâ facie* inconvenience of a restricted paper currency is manifested. Mr. Guthrie, the able advocate of the Scotch system, in his "Practical Contrast of English Banking, and British Free Banking," puts this point clearly enough. In our present system, he says:

"The natural demand at rent-terms and other seasons for increased circulation, has the same deranging and distressing effect upon the money market as an export of bullion, and the people of England are excluded from a privilege which the people of Scotland have found to be both safe and most profitable and convenient."

In contrast to this, he adds:

"The circulation has increased in Scotland at certain seasons, to the amount of 10 or 15 per cent, but this natural periodical demand was met by the elasticity of the Scotch £1 note circulation without the slightest difficulty or disturbance of the money market, and a similar circulation, with its corresponding advantages, should of course be allowed to England."

These remarks are perfectly applicable to the autumnal pressures we have been considering. Had we an unrestricted note circulation, the three millions and a half of additional currency required might have been furnished by a proper number of bits of paper.* Bankers and the Bank of England would readily have issued these notes in discount or payment of deposits and dividends. No one, perhaps, would have known until the proper blue-book appeared long afterwards, how great an excess was issued, and the money market might have proceeded without apparent disturbance.

The question here becomes twofold:

1. How far is such an absence of apparent disturbance desirable?

* This point has since been very strongly put by Mr. R. H. Inglis Palgrave in his "Analysis of the Minutes of Evidence taken before the Select Committee of the House of Commons on Banks of Issue, 1875" (London, 1876, printed for private circulation). See Preface, pp. 42-48, on the periodic fluctuations of the provincial circulation, and the evidence of witnesses there referred to, especially that of Mr. Palgrave himself (Questions 5507-6168).

2. How far may it be attained under the present system?

The answers, I take it, are as follows:

1. So far as a demand is a purely temporary demand for internal circulation, it is desirable that it should be furnished by an extended issue of notes or gold from the Bank reserves. This excess of currency will return spontaneously as the seasons go round.

2. So far as a demand for gold or notes is known to be of this temporary character, it may even now be properly supplied by the Bank of England and the other banks without exciting pressure on the money market.

On the other hand, so far as a drain is not certainly known to be of a periodic or temporary nature, bankers are bound to raise the terms of advance and to restrict their amount. Under the same circumstances bankers would be bound in prudence to reduce their issues, even did the Bank Act not exist. I hold, in short, that *the Bank of England and bankers generally have just the same legitimate latitude in increasing or diminishing their advances now as they would have under an unrestricted system.* It is only the illegitimate expansion of the note currency which is put out of their power by the Bank Acts of 1844 and 1845.

If it be clearly known that in the early part of October there is a normal demand for currency far greater than at any other time of the year, then I take it to be an expedient and necessary policy of the Bank to prepare themselves for it somewhat beforehand, and when it does occur, to let their reserve run down to a lower point than they would do at any other time of the year, knowing that the excess of currency issued will in the natural course of events return.

This is the policy to a considerable extent adopted even at present. *The Times* represents the Bank directors as feeling confidence that the amounts of currency gradually withdrawn during July, August, and September would shortly return. But their confidence failed when the sudden October pressure fell upon the Bank. Here, I apprehend, was to some extent a double error. The news-

paper press and the mercantile world were not sufficiently aware that the chief pressure falls into October. Had this been thoroughly known it would have been only prudent for the Bank directors to strengthen their position somewhat earlier than they did. When the expected run in the beginning of October came upon them it would have been quite unnecessary to put on so violent a pressure as a rise of 2½ per cent in the rate of discount in ten days.

It cannot be denied, indeed, that to some extent the periodic drain was aggravated by a more chronic scarcity of capital, which has been felt ever since. Still I have no hesitation in asserting that if the public and the commercial press had been thoroughly aware how peculiar those first few weeks of October naturally are, far less alarm, pressure, revulsion of prices and injury would have been excited during last autumn.*

I take it, therefore, that careful observation and comparison of the fluctuations of the money market are sufficient to enable us to avoid the inconveniences of these periodic pressures. We should learn to discriminate what is usual and normal in the changes of the Bank accounts, from what is irregular or abnormal. It is a matter of skill and discretion to *allow for the normal changes*. It is the abnormal changes which are alone threatening or worthy of very much attention. These changes arise from deficient or excessive harvests, from sudden changes of supply or demand in any of our great staple commodities, from manias of excessive investment or speculation, from wars and political disturbances, or other fortuitous occurrences which we cannot calculate upon and allow for. In such matters of high uncertainty it is desirable to trust as little to discretion and to commit as much to the operation of natural laws as is possible. The Bank Act of 1844 carries this principle into effect, and relieves the directors from vast responsibility, by making the circulation identical in amount and variations with that of a purely metallic cur-

* Some remarks on these periodic variations were made by Mr. R. H. Inglis Palgrave in his important paper entitled "Notes on Banking in the United Kingdom, Sweden, Denmark, and Hamburg."—"Statistical Journal," March, 1873, vol. xxxvi. pp. 90, 96-99, and separate reprint.

rency. I must maintain, then, that under the present system the English currency is governed by the natural laws of supply and demand of a metallic currency, and not by merely artificial regulations. If the terms are interpreted aright, we have already a natural and free-trade system of currency. And I venture to take this auspicious expression—Free Trade—from those who use it wrongly, and who confuse the free manufacture of currency with *free trade in capital,* the true business of the banker.

# APPENDIX I

## *Description of the* TABLES I. *to* VII.

Table I. was formed by arranging the Bank of England accounts of the years 1845-61 under each other, so that the average state of the accounts for the first week, for the second week, and so on could be drawn.

Table II. was formed from Table I., by arranging the accounts of the corresponding weeks of each quarter under each other, and drawing the average of the first week of the quarter, the second week, and so on.

Table IV. represents the divergence of each of the principal elements of the Bank account from its average point, after elimination of the quarterly variation. It was formed by subtracting the numbers in Table II. from the corresponding numbers of each quarter in Table I. Thus—

| | | |
|---|---|---|
| 20,200,000 | = average note circulation of 27th week. | |
| 20,110,000 | „ | „ 1st week of quarter. |
| Difference 90,000 | = divergence of note circulation. | |

The numbers in Table IV. are only approximate, and in the forty-first week are thrown wrong by the fact that the dividend-day falls five days later than usual.

The other tables sufficiently explain themselves.

All the tables were calculated to a further place of figures, and thus an apparent discrepancy of a unit will sometimes be discovered in the last place of figures given.

In cutting off useless columns of figures a unit has always been added to the last place retained when *the highest figure cut off was* 5 *or more*. Thus, instead of 10,665 I should write 10,67 according to a rule approved by Professor De Morgan.

TABLE I.

[Omitted. See Plate VIII.]

TABLE II.

[Omitted. See Plate IX.]

TABLE III.

[Omitted. See Plate X.]

TABLE IV.

[Omitted. See Plate XI.]

TABLE V.—*Average Amount of the Chief Elements of the Bank Accounts during the Whole Period* (1845-61).

| | £ |
|---|---|
| Notes in the hands of the public | 20,146,000 |
| Seven-day and other bills | 984,000 |
| Total circulation | 21,130,000 |
| *Gold and Silver Bullion and Coin—* | |
| Issue department | 14,163,000 |
| Banking | 667,000 |
| Total | 14,830,000 |
| Reserve of notes and coin in Banking department | 8,854,000 |
| Private securities | 15,269,000 |
| ,, deposits | 11,451,000 |
| Public ,, | 5,940,000 |

TABLES VI. AND VII.

[Omitted. See Plate XII.]

## POSTSCRIPT

Twenty years having elapsed since the preceding tables were drawn up, it has become desirable to repeat the calculations then made. We might reasonably expect that the great increase in commerce and financial transactions in the interval would produce some changes in the variations of the Bank accounts, involving probably an aggravation of the seasonal fluctuations. Some interesting results might be obtained in this direction. In any case, it is obvious that for practical purposes the most recent data are the most valuable.

The accounts fall naturally into two intervals of ten years each, and as there was little, if any, more labour in making two sets of averages

rather than a single set of averages of the whole twenty years, double tables were drawn up. Their comparison with each other and with the preceding tables of the interval 1845-61, serves either to confirm the existence of well-marked fluctuations, or else to detect changes of management on the part of the Bank authorities.

The preparation of these tables has cost a great deal of labour, each number in the principal tables of weekly averages being derived from the addition of ten numbers for the corresponding weeks of ten years. I am much indebted to my friend Mr. William Thornely for undertaking a part of the requisite work.

Any remarks which I may have to make upon the inferences to be deduced from these tables will be best given in the Introductory Discussions.

TABLES VIII. AND IX.

[Omitted. See Plate VIII.]

TABLES X. AND XII.

[Omitted. See Plate IX.]

TABLES XI. AND XIII.

[Omitted. See Plate X.]

TABLE XIV.

[Omitted. See Plate XI.]

TABLE XV.—*Average Amount of the Chief Elements of the Bank Accounts during each of the Decennial intervals* 1862-71 *and* 1872-81.

| | Average of 1862-71. | Average of 1871-81. |
|---|---|---|
| | £ | £ |
| Notes in the hands of the public | 22,560,000 | 27,090,000 |
| Seven-day and other bills | 570,000 | 330,000 |
| Total circulation | 23,130,000 | 27,420,000 |
| *Gold and Silver Bullion and Coin—* | | |
| Issue department | 17,030,000 | 24,560,000 |
| Banking department | 900,000 | 910,000 |
| Total | 17,930,000 | 25,470,000 |
| Reserve of notes and coin in Banking department | 10,290,000 | 13,410,000 |
| Private securities | 19,290,000 | 19,770,000 |
| ,, deposits | 16,940,000 | 23,060,000 |
| Public ,, | 6,490,000 | 6,720,000 |

# VI

## THE SOLAR PERIOD AND THE PRICE OF CORN *

IT is a well-known principle of mechanics that the effects of a periodically varying cause are themselves periodic, and usually go through their phases in periods of time equal to those of the cause. There is no doubt that the energy poured upon the earth's surface in the form of sunbeams is the principal agent in maintaining life here. It has lately been proved, too, beyond all reasonable doubt, that there is a periodic variation of the sun's condition, which was first discovered in the alternate increase and decrease of area of the sun-spots, but which is also marked by the occurrence of auroras, magnetic storms, cyclones, and other meteorological disturbances. Little doubt is now entertained, moreover, that the rainfall and other atmospheric phenomena of any locality are more or less influenced by the same changes in the sun's condition, though we do not yet know either the exact nature of these solar variations nor the way in which they would act upon the weather of any particular country.

The success of the harvest in any year certainly depends upon the weather, especially that of the summer and autumn months. Now, if this weather depends in any degree upon the solar period, it follows that the harvest and the price of grain will depend more or less upon the solar period, and will go through periodic fluctuations in

* This paper was read by me at the meeting of the British Association, at Bristol, in 1875, Section F. See Report, "Transaction of Sections," p. 217. It has not been previously printed, as explained in the Introductory Discussions.

periods of time equal to those of the sun-spots. This almost necessary result seems to have occurred to Mr. R. C. Carrington, F.R.S., and in his standard work upon the sun, he gave a diagram * comparing the price of corn with the sun-spot curve during portions of the last and present centuries. Between the phenomena as thus treated there is no apparent correspondence sufficient to found any conclusions on. Mr. A. Schuster, of the Owens College, has since then ingeniously pointed out that the years of good vintage in Western Europe have occurred at intervals somewhat approximating to eleven years, the average length of the principal sun-spot cycle. The correspondence appeared to him sufficiently close to afford some evidence of connection.

It might seem easy to decide whether any such dependence exists or not by taking tables of prices, such as those given in Tooke's "History of Prices," and observing whether there is any tendency to fluctuate in a similar manner at intervals of eleven years. During the last hundred years, however, the prices of grain and all other commodities have been greatly affected by all kinds of political and social events. There have been great wars, great industrial discoveries, and great inventions. The currencies of the principal nations have been, at two or more distinct times, revolutionised by the introduction of paper currency, which, by driving out specie, has produced enormous fluctuations in the values of the precious metals,† even greater than the variations due to the vast discoveries

* "Observations of the Spots on the Sun from November 9th, 1853, to March 24th, 1861." 1863, 4to. Williams & Norgate. See plate 166, at the end of the volume, and pp. 247, 248, where Carrington made the following remark: "I attach no importance to the wheat diagram, but data of this kind were employed in an interesting and original investigation of the elder Herschel, which has been frequently referred to in subsequent years. The present diagram appears to me rather to indicate that, concurrently with abundant and deficient crops, social and political causes affect prices to an extent sufficient to destroy their value for the purpose for which he selected them. It will probably be noticed that no previously uninformed person could from the curve infer the year of the abolition of the corn laws." Carrington, it will be seen, does not assert the influence on prices to be null; but only to be overborne and disguised by those due to social and political causes.

† See above, pp. 69, 122-4, 127.

of gold. For these and other reasons, there is no interval of time less suitable than the last hundred years for the detection of variations due solely to meteorological conditions.

It occurred to me, however, that we have in the wonderful "History of Agriculture and Prices in England," deduced entirely from original and contemporaneous records by Professor James E. Thorold Rogers, and published by the Clarendon Press,* exactly what we want for the purpose in view. I will take the present opportunity to say of this work, that the more I study it the more I am inclined to regard it as the most valuable and remarkable contribution to the history and statistics of a past century ever made by a single individual in a single work. It makes us almost better acquainted with the state of prices and the details of many kinds of industry in the thirteenth and fourteenth centuries than we are with such matters as regards the last fifty years. No one who has not studied these two volumes can have any notion of the infinite fund of information of a wholly new kind which they contain, nor the immense labour which their preparation must have entailed. In the second volume of this work we find one hundred and seventy pages of close print occupied with the details of the prices of all kinds of grain in all parts of England, from the year 1259 to the year 1400. These are the actual prices as quoted in innumerable transactions recorded in the ancient accounts of the Oxford Colleges, relating to their landed possessions, and are of unquestionable accuracy and genuineness. It is hardly needful to point out that in those days, when the means of inland or oversea conveyance were so simple and imperfect compared with what we now have, the prices of grain in any locality were mainly governed by the harvest of that locality, and thus depended immediately upon the weather. From the average tables drawn up by Professor Rogers for

* "A History of Agriculture and Prices in England, from the year after the Oxford Parliament (1259) to the Commencement of the Continental War (1793). Compiled entirely from Original and Contemporaneous Records." Oxford, 1866. 2 vols. During the course of the present year Professor Rogers has issued vols. iii. and iv. of this grand work.

decennial periods, it appears that there was not during the long interval of one hundred and forty years any great revolution in the value of the precious metals. Credit cycles, crises, floods of paper money, and other causes, which now so often cause fluctuations, were unknown, and though wars were frequent enough, they were not of a kind to make revolutionary changes in the primitive commerce of the time. The Black Death and the changes in the rates of wages thence arising are the only interfering events of any importance tending to obscure the action of simple meteorological conditions upon the prices of grain.

Professor Rogers' volumes, then, contain precisely the kind of data suitable for testing the effects of the sun-spot variation on human affairs. The labour of treating such a mass of numerical information would have been almost impossibly great for me, had not Professor Rogers himself drawn up elaborate tables, giving the average prices of each kind of commodity in each year. In the case of grain he has also reduced the prices to their expression in grains of pure silver, so as to remove the disturbances due to depreciation of the coinage.

Taking these tables of the prices of wheat, barley, oats, beans, peas, vetches, and rye (vol. i. pp. 236-44), I proceeded to make a further reduction by dividing up the table into successive intervals of eleven years, writing the prices of each year under the corresponding year of the previous eleven years' interval, and then drawing averages, so as to get the average of the first, of the second, of the third, etc., years of the cycle of eleven years. As, indeed, the sun-spot period is believed to be more nearly of a length of 11.11 years than exactly eleven years, it was requisite in arranging the prices to omit one year's quotations in the course of the one hundred and forty years. As the years of maximum or minimum sun-spots are quite unknown as regards such earlier centuries, and even their occurrence is only a matter of inference, the exact relation of prices to the sun-spots cannot be disclosed at present by this inquiry. My purpose has been solely to ascertain whether in one part of the eleven years' period, as accidentally chosen, prices tended on the average to be higher or lower than

at another part. In reading the following tables it must be remembered that the *first year* of the solar cycle corresponds with any and all of the years 1259, 1270, 1281, 1292, 1303, 1315 (1314 being omitted), 1326, 1337, 1348, 1359, 1370, 1381, 1392. The average price of wheat for the *first year* means, therefore, the average price for all those years taken together. The second year of the cycle corresponds in like manner to 1260, 1271, 1282, 1293, 1304, 1316, 1327, 1338, 1349, 1360, 1371, 1382, 1393, and similarly of the third and other years of the cycle. The following table, showing the average price of each kind of corn in terms of grains of silver in each year of the cycle, will now be intelligible:

| Years - | 1st 1259 etc. | 2nd 1260 etc. | 3rd 1261 etc. | 4th 1262 etc. | 5th 1263 etc. | 6th 1264 etc. | 7th 1265 etc. | 8th 1266 etc. | 9th 1267 etc. | 10th 1268 etc. | 11th 1269 etc. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheat - | 1490 | 1490 | 1570 (*mx*) | 1570 (*mx*) | 1460 | 1490 | 1410 | 1370 | 1290 (*mn*) | 1320 | 1540 |
| Barley - | 1058 | 1021 | 1026 | 1111 (*mx*) | 979 | 1017 | 1010 | 1027 | 965 | 902 (*mn*) | 1036 |
| Oats - | 598 | 596 | 619 | 699 (*mx*) | 593 | 625 | 592 | 575 | 581 | 555 (*mn*) | 626 |
| Beans - | 993 | 1064 | 1243 | 1424 (*mx*) | 1111 | 1116 | 980 | 1095 | 983 | 843 (*mn*) | 1049 |
| Peas - | 928 | 818 | 1019 | 1231 (*mx*) | 1016 | 891 | 870 | 880 | 757 (*mn*) | 767 | 929 |
| Vetches- | 900 | 848 | 1139 | 1228 (*mx*) | 1016 | 953 | 916 | 824 | 850 | 920 | 808 (*mn*) |
| Rye - | 1047 | 1025 | 1245 (*mx*) | 1161 | 1011 | 1142 | 1065 | 1139 | 1027 | 968 (*mn*) | 1094 |
| Sums - | 7014 | 6862 | 7861 | 8424 | 7186 | 7234 | 6843 | 6910 | 6453 | 6275 | 7082 |

(*mx*) denotes that the preceding number is the greatest in the line, and (*mn*) similarly the least.

We may observe that the price of every kind of commodity, without exception, rises in the second, third, or fourth years, and afterwards falls. The fluctuations of each kind of grain are marked by some peculiarity. The changes are greatest in vetches, peas, and beans, which exhibit many points of resemblance; they are least in barley and oats. We find that in every case the maximum price occurs either in the third or the fourth year, and in five or six cases out of seven in the fourth year. Looking

to the lowest average prices, we find them occur twice in the ninth year, four times in the tenth, and once in the eleventh.

We may draw a further kind of average if we add together the prices of wheat, barley, oats, etc., in each of the eleven years. Thus, in the lowest line of the table, 7014 means the number of grains of pure silver which would, on the average, in the first year of the assumed sun-spot period, buy one bushel of wheat, *plus* one bushel of barley, *plus* one of oats, of beans, of peas, of vetches, and of rye, all taken together. These figures require such careful examination that I repeat them:

| 1st year | 2nd | 3rd | 4th | 5th |
|---|---|---|---|---|
| 7014 | 6862 | 7861 | 8424 | 7186 |

| 6th | 7th | 8th | 9th | 10th | 11th |
|---|---|---|---|---|---|
| 7234 | 6843 | 6910 | 6453 | 6275 | 7082 |

In these figures we observe a minimum in the second year, a very sudden rise of 22½ per cent to an absolute maximum in the fourth year, a fall, only slightly interrupted in the sixth year, down to an absolute minimum in the tenth year, the average of the fourth being 34 per cent above that of the tenth year; lastly, a recovery in the eleventh and first years.

The fluctuation in the aggregate price of grain and fodder thus disclosed is of so very considerable an amount, and so well marked in form, that it might be deemed quite conclusive. It seems in the highest degree unlikely that wars, plagues, legislative enactments, or other accidental events should have happened to recur at such intervals, approximating to eleven years, as to produce upon the average of from ten to thirteen such periods a total variation of 34 per cent. Two considerations, indeed, somewhat weaken the value of these averages. In the first place an intense and universal famine occurred in the years 1315 and 1316, the prices rising to three or more times above the average rates, and all kinds of grain naturally participated in such extreme prices. These two years contribute con-

siderably towards the rapid rise in the second year. It might have been well to strike out the excessive prices of these years altogether, but I find, on removing these divergent numbers and recalculating the averages, that there is still a variation of much the same form as before. The general averages of all the prices of corn now become as follows:

| 1st year | 2nd | 3rd | 4th | 5th | 6th |
|---|---|---|---|---|---|
| 7014 | 6351 | 7317 | 7470 | 7186 | 7234 |

| 7th | 8th | 9th | 10th | 11th |
|---|---|---|---|---|
| 6843 | 6910 | 6453 | 6275 | 7082 |

It will be observed that the maximum is still to be found in the fourth year of the cycle, but its amount is reduced and the extreme range of variation does not exceed about 19 per cent. I am inclined to believe, however, that the great famine of the years 1315 and 1316 is really to be regarded as only an excessive manifestation of the tendency to bad harvests, which these numbers show to recur in almost every eleven years, and if so, the exclusion of the numbers is hardly to be justified.

To show in another manner that the high prices occur in the early years of the assumed period, I marked in every eleven-years' series of prices of each kind of grain the price which was the highest and that which was the lowest of the set of eleven. I then counted up the number of times that a maximum or a minimum price occurred in the first, second, third, etc., year of the period. The results are given in the accompanying tables; and, looking to the totals at the foot, it will be seen that there is a decided excess of maxima in the second and third years. Still more remarkable, however, is the almost complete absence of high prices in the eighth and ninth years, in which only 3 out of 82 maxima occur. It is hardly conceivable that this unequal distribution of high prices can be accidental. The aggregate number of maxima occurring in the fourth, fifth, sixth, seventh, eighth, and ninth years is only 31, as against 51 in the tenth and eleventh, and first, second, and

**Occurrence of Maxima Prices.**

| Years. | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheat - | 1 | 2 | 2 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 2 |
| Barley - | 1 | 1 | 1 | 1 | 0 | 2 | 2 | 0 | 1 | 2 | 2 |
| Oats - | 1 | 2 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 3 | 1 |
| Beans - | 2 | 0 | 3 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1 |
| Peas - | 0 | 1 | 5 | 0 | 2 | 1 | 1 | 0 | 0 | 1 | 1 |
| Vetches - | 1 | 2 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| Rye - | 0 | 2 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 1 | 2 |
| Sums - | 6 | 10 | 16 | 6 | 7 | 8 | 7 | 1 | 2 | 9 | 10 |

**Occurrence of Minima Prices.**

| Years. | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheat - | 4 | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 2 | 0 | 0 |
| Barley - | 3 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 3 | 0 | 2 |
| Oats - | 3 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 2 | 1 |
| Beans - | 0 | 2 | 0 | 1 | 0 | 2 | 2 | 0 | 2 | 2 | 0 |
| Peas - | 0 | 2 | 0 | 0 | 2 | 1 | 2 | 2 | 2 | 1 | 0 |
| Vetches - | 2 | 2 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| Rye - | 4 | 1 | 0 | 1 | 0 | 2 | 0 | 3 | 0 | 0 | 1 |
| Sums - | 16 | 11 | 1 | 4 | 4 | 6 | 12 | 7 | 11 | 6 | 5 |

third years. Comparing this with the distribution which would be most probable in the absence of any regular fluctuation, we find the following results:

| | Number of observed maxima. | Calculated proportion. |
|---|---|---|
| Six years of fewest maxima - - | 31 - | $45 = \frac{6}{11} \times 82$ |
| Five years of most frequent maxima - | 51 - | $37 = \frac{5}{11} \times 82$ |

Thus the maxima are found to be nearly 40 per cent more numerous than they would be if accidentally distributed in the tenth, eleventh, and first, second, and third years.

Looking to the other table we find that the minimum prices are more evenly distributed, except that they are numerous in the first year and very deficient in the third year. Adding, we get altogether 44 for the six years from the fourth to the ninth, against 38 for the remaining five years. Now 44 is to 38, nearly as 7 to 6. We thus have reason to believe that it is remarkably high rather than remarkably low prices which manifest a tendency to periodical recurrence.

A second objection which may be taken to this inquiry is that the prices of each kind of grain are more or less influenced by those of other kinds, so that a few considerable fluctuations being shared by all the commodities quoted would produce much effect on the averages. The results which I have given would be altogether conclusive as to the influence of the sun-spot if each of the seven commodities varied independently of the rest. As they are, however, not independent I must regard these results as of a merely provisional value, showing the need of further investigations of the same nature, which will, however, be surrounded by difficulties. I have already partially examined the series of prices of wheat in the Windsor market and elsewhere between the years 1595 and 1761 as given by Adam Smith in his "Wealth of Nations."* When treated in the same manner as Professor Rogers' figures, they give a curve in some degree resembling that of wheat in the thirteenth and fourteenth centuries, but showing a total variation of only 16 per cent instead of 22, which is the range of variation in Professor Rogers' quotations of wheat.

I do not venture to assert positively that the average fluctuations as given in the preceding tables are solely due to variations of solar power. They seem to show that the subject deserves further investigation, which I hope to give to it when I have leisure.

Before concluding I will throw out a surmise, which, though it is a mere surmise, seems worth making. It is

* Book I. chap. xi. *ad finem.* In Professor Rogers' edition of the "Wealth of Nations" (Oxford, Clarendon Press), vol. i. pp. 269-71, these tables are completed and extended.

now pretty generally allowed that the fluctuations of the money market, though often apparently due to exceptional and accidental events, such as wars, great commercial failures, unfounded panics, and so forth, yet do exhibit a remarkable tendency to recur at intervals approximating to ten or eleven years. Thus the principal commercial crises have happened in the years 1825, 1836-39, 1847, 1857, 1866, and I was almost adding 1879, so convinced do I feel that there will, within the next few years, be another great crisis. Now, if there should be, in or about the year 1879, a great collapse * comparable with those of the years mentioned, there will have been five such occurrences in fifty-four years, giving almost exactly eleven years (10.8 years) as the average interval, which sufficiently approximates to 11.11, the supposed exact length of the sun-spot period, to warrant speculation as to their possible connection.

It is true that Mr. John Mills, in his very excellent papers upon Credit Cycles in the Transactions of the Manchester Statistical Society (1867-68, pp. 5-40), has shown that these periodic collapses are really mental in their nature, depending upon variations of despondency, hopefulness, excitement, disappointment and panic. But it seems to me very probable that these moods of the commercial mind, while constituting the principal part of the phenomena, may be controlled by outward events, especially the condition of the harvests.

Assuming that variations of commercial credit and enterprise are essentially mental in their nature, must there not be external events to excite hopefulness at one time or disappointment and despondency at another? It may be that the commercial classes of the English nation, as at present constituted, form a body, suited by mental and other conditions, to go through a complete oscillation in a period nearly corresponding to that of the sun-spots. In such conditions a comparatively slight variation of the prices of food, repeated in a similar manner, at correspond-

* The collapse here anticipated actually did occur; but it must be assigned to the autumn of the year 1878, as shown by statistics of bankruptcy appended to the next paper (VII.).

ing points of the oscillation, would suffice to produce violent effects. A ship rolls badly at sea, when its period of vibration corresponds nearly with that of the waves which strike it, so that similar impulses are received at similar positions. A glass is sometimes broken by a musical sound of the same tone as that which the glass produces when struck. A child's swing is set and kept in motion by a very small push, given each time that it returns to the same place. If, then, the English money market is naturally fitted to swing or roll in periods of ten or eleven years, comparatively slight variations in the goodness of harvests repeated at like intervals would suffice to produce those alternations of depression, activity, excitement, and collapse which undoubtedly recur in well-marked succession. I have shown reason to suppose that there is an average variation in the price of corn to the extent of some 16 or 20 per cent recurring at these intervals, and these variations form the impulses, as I apprehend, which produce the rolling of the commercial ship. I am aware that speculations of this kind may seem somewhat far-fetched and finely-wrought; but financial collapses have recurred with such approach to regularity in the last fifty years, that either this or some other explanation is needed.

It is curious to reflect that if these speculations should prove to have any validity, we get back to something which might be mistaken for the astrology of the middle ages. Professor Balfour Stewart has shown much reason for believing that the sun-spot period is connected with the configuration of the planets.*

Now, if the planets govern the sun, and the sun governs the vintages and harvests, and thus the prices of food and raw materials and the state of the money market, it follows that the configurations of the planets may prove to be the remote causes of the greatest commercial disasters.

It is a curious fact, not sufficiently known, that the electric telegraph was a favourite dream of the physicists

* I have since re-read some of Professor Stewart's "Memoirs" on the subject, and am inclined to think that the relation of the planets and solar variations is of a more remote nature than he believes.

and romancists of the sixteenth and seventeenth centuries.* It would be equally curious if the pseudo-science of astrology should, in like manner, foreshadow the triumphs which precise and methodical investigations may yet disclose, as to the obscure periodic causes affecting our welfare when we are least aware of it.

*See "Proceedings of the Manchester Literary and Philosophical Society," 6th March, 1877, vol. xvi. No. 10, p. 164, referring to an article in *The Spectator* newspaper of 27th April, 1867, pp. 475, 476, on "Early Presentiments of the Electric Telegraph," in which I traced out the history of this very curious subject. See also an article on the same topic by Henry B. Wheatley, F.S.A., in the "Antiquary," August, 1881, vol. iv. pp. 62–64; also "Journal of the Society of Arts," August, 1881, vol. xxix. p. 756; also "List of a Selection of Works relating to Electricity and Magnetism, exhibited by Latimer Clark, M.I.C.E., at the Exposition Internationale d'Électricité, Paris, 1881;" and the admirable "Catalogue of the Ronald's Library of the Society of Telegraph Engineers," edited by Mr. Alfred J. Frost.

# VII

## THE PERIODICITY OF COMMERCIAL CRISES AND ITS PHYSICAL EXPLANATION *

THE depression of trade, which has now lasted for some four or five years, with gradually increasing intensity, has naturally attracted considerable attention. All kinds of reasons have been offered to explain its origin—wars, foreign competition, luxurious living, the greed of capitalists, the errors of trades' unions, and the like. No accidental cause, however, is sufficient to explain so widespread and recurrent a state of trade. The present depression is no new and exceptional phenomenon; it is, as I shall show, only one instance added to a long series of events of the same kind, occurring with remarkable regularity at intervals of about ten years. The cause can only be found in some great and widespread meteorological influence recurring at like periods.

This suggestion is by no means a new one; for Sir William Herschel † endeavoured, in the first year of this century, to discover a connection between the price of corn and the power of the sun's rays as marked by the decennial variation of the sun's spots. He failed, and so did Carrington subsequently.‡ Three years ago, at the

* This paper was read at the Dublin meeting of the British Association, Section F, August 19th, 1878. An abstract is printed in the "Transactions of Sections," p. 666. The complete paper was published in the "Journal of the Statistical and Social Inquiry Society of Ireland," August, 1878, vol. vii. pp. 334-42.

† "Philosophical Transactions," 1801, vol. xci. pp. 265-318.

‡ See above, p. 176.

Bristol meeting of the British Association, I read a paper giving the supposed results of a new attempt to prove the relation suspected by Herschel. Subsequent inquiry convinced me that my figures would not support the conclusion I derived from them, and I withdrew the paper from publication. I have since made several attempts to discover a regular periodicity in the price of corn in Europe, but without success.

Nevertheless, I have long felt convinced that a well-marked decennial periodicity can be traced in the activity of trade and the recurrence of commercial crises. If we start backwards from the very distinct collapse of 1866, we observe that there was an almost equally distinct crisis in 1857—nine years before—a crisis, too, which was very severe in the United States. Just ten years before that we reach the memorable panic of 1847. Proceeding backwards we find there was in England some kind of crisis in 1839, and a previous one in 1836, so that the series appears to be broken; but in the United States there was an intense crisis, and a general stoppage of the banks in 1837, punctually at the ten years' interval. In England some exceptional causes appear to have broken up the crises into two minor crises, the mean position of which however satisfactorily accords with the theory. From 1837 we regress eleven or twelve years to the great bubble year, 1825, and the collapse of 1825-26, the most extraordinary event of its kind since the time of the South Sea Bubble. Receding yet nine or ten years more, we find in the year 1816 the commercial distress and increase of bankruptcy which mark a crisis. Here the series is somewhat interrupted, for there was in 1810-11-12 a commercial panic which can in no way be brought into accordance with the theory. Nevertheless, in 1805, there was a minor fluctuation,* which falls well into the series, and that of 1810-12

*Though I have seen the year 1805 mentioned as a year of crisis, it is doubtful whether it can be so described. That it was a year of great activity of investment is shown by the fact that the metals were higher in price in 1805 and 1806 than ever before or after in modern times. Bankruptcies were considerably more numerous in 1805 than in 1804 or 1806, but much less than in 1807 to 1810, when the great and, as I hold, exceptional collapse took place.

must be set down as exceptional. If we consider the political state of Europe at this time, and the manner in which trade was then disturbed by wars, tariffs, Orders in Council, etc., it can be no matter of wonder that the regular march of the decennial variation was somewhat broken.

The periodicity of the events which I have briefly enumerated has long been recognised by Dr. Hyde Clarke, Mr. John Mills, and others who have written on the subject. It does not seem to have occurred to any writer, however, to inquire whether the decennial period, so well marked in the nineteenth century, could be traced also in the eighteenth century. Yet, for some steps at least, the periodicity is unquestionable. In 1793, just before the great wars of the Revolution, occurred a commercial panic so severe and genuine that it has been described as "the first modern panic." It is true that 1793 precedes 1805 by an interval of twelve years, which is rather too much;* but now comes the remarkable fact that crises of more or less intensity also occurred in the years 1783, 1772-73, and most distinctly in the year 1763. The mean interval here is almost exactly ten years.

It is impossible that I should in this paper adduce proper evidence of the accuracy of the statements I make. This I hope to do in some more detailed publication. But as regards these crises, I may refer to Mr. Macleod's unfinished "Dictionary of Political Economy," where, in the article on Crisis (Commercial), is to be found a concise account of these events. Thus, on p. 627, we find a brief description of the crisis of 1763. Mr. Macleod then proceeds: "Ten years after the preceding crisis of 1763, another of a very severe nature took place in 1772 and the beginning of 1773. It extended over all the trading

* It is worthy of notice that in the interval between 1790 and 1820, which presents the greatest difficulty in tracing the periodical recurrence of crises, there is a corresponding irregularity in the sun-spot curve, as delineated in the diagram at the end of Carrington's work on the sun. (See above, p. 176.) This curve shows no maximum between 1789 and 1804, an interval of fifteen years; and then again there is a gap of twelve years more up to about 1816. On the whole the commercial crises recur with greater regularity than the flexures of the sun-spot curve.

nations of Europe." The article which commences with these words is headed, "The Crisis of 1783," and Mr. Macleod goes on to explain how the termination of the war with America led to a great extension of foreign commerce, and soon after to a foreign drain of bullion, which greatly embarrassed the Bank of England and occasioned a panic in October, 1783. Then Mr. Macleod proceeds to an article headed "The Crisis of 1793," in which he commences as follows: "The great crisis of 1793 may be considered as the first of those great catastrophes in modern times of which we have a sufficiently distinct account for scientific purposes." Now, Mr. Macleod, when he wrote his Dictionary, does not seem to have entertained any theory of periodicity, so that I can appeal with confidence to his unbiassed statement that there were crises in 1763, 1772-73, 1783, and 1793.

Reflecting upon the wonderful periodicity of these events, it at length occurred to me to ask why such a series should commence abruptly in 1763. If the sun-spot theory have any real foundation, we should expect to find some vestige of decennial variation in previous years. Everyone knows, of course, that the great South Sea Bubble occurred in 1720, and was accompanied with a commercial mania and subsequent collapse never since equalled. But this seemed to be a unique and isolated event. Inquiry, however, soon led me to doubt this isolation. The extreme intensity of the mania in 1720 has blinded both contemporary and subsequent writers to the existence of periods of "stock-jobbing," as it was then generally called, both before and after that event. Now the South Sea Bubble is generally attributed to the year 1720, and it is true that the South Sea Company got into serious trouble in that year. But the general European crisis—for European it was—is more correctly assigned to the year 1721 at the earliest. Turning to Mr. Fox Bourne's interesting work on "The Romance of Trade," we find that it contains an excellent popular account* of these early manias and panics, and it is curious to find that both the years 1701 and 1711 are mentioned in connection with

* Chapter xi. See p. 312.

"stock-jobbing." I suspect that there was a slight mania about 1700, but I will not at present attempt to adduce evidence about this early period, or about the previous bubbles of the seventeenth century. There were manias about the years 1682, 1692, 1695; but so exceedingly tedious and difficult has been the labour of finding the right sort of contemporary information about such events, that I have confined myself as yet to the eighteenth century. There can be no doubt, however, about the existence of a stock-jobbing mania in the year 1710 or thereabouts. It was in 1710 and 1711 that the South Sea Company was incorporated by Acts of Parliament (9 Anne, c. 21, and 10 Anne, c. 37), so that this greatest of bubbles completed the first stage of its strange career in just about ten years. In 1710 and 1711 also we find Parliament complaining of the prevalence of gambling and bubbling, and in both these years Acts were passed to restrain these evils—(9 Anne, c. 6, ss. 56, 57, and 10 Anne, c. 26, s. 109). But it is hardly requisite to quote further evidence than that which I have been fortunate enough to acquire through the kindness of Mr. Cornelius Walford.

In the course of his minute inquiries into the history of insurance, he compiled a nearly complete list of the numerous small insurance companies formed at the commencement of the eighteenth century. From this list I learn that the numbers of companies created in each of the following years were as follows:

| | | | |
|---|---|---|---|
| 1704 | 2 | 1713 | 0 |
| 1705 | 0 | 1714 | 6 |
| 1706 | 2 | 1715 | 1 |
| 1707 | 1 | 1716 | 2 |
| 1708 | 2 | 1717 | 4 |
| 1709 | 8 | 1718 | 0 |
| 1710 | 37 | 1719 | 6 |
| 1711 | 35 | 1720 | 52 |
| 1712 | 20 | | |

Nothing can be more plain, looking at these figures, than that there was a mania in the years 1710-12, preceding by ten years the mania of 1720.

It now becomes a matter of great interest to discover whether there are connecting links between 1721 and 1763. One step can be made with confidence: there was unquestionably a period of stock-jobbing about 1731-33. Thus in the second edition of Defoe's "Tour through the whole Island of Great Britain," published in 1738, we read*: "This sort of trade is too well known to be insisted on here. It was, in short, by this, that the madness of the year 1720 was carried on . . . And it was again getting head as fast as it could, and possibly might in time have utterly ruined the kingdom . . . But a happy stop was put to this spreading mischief, by a wise Act of Parliament against stock-jobbing, which passed in the year 1733." "The Gentleman's Magazine"† also remarks that the state of things "as much requires speedy and effectual remedies now as in 1720."

The state of things was thought to be so serious that Parliament passed an Act (7 Geo. II. c. 8—1733-34) to prevent "the infamous practice of stock-jobbing." Yet the evil was one arising rather from prosperity than adversity; for "The Gentleman's Magazine"‡ expressly tells us that the woollen trade never was in a better condition, and there was a decided rise in the price of wool in 1731-32. Some prices of lead and tin, which I have found in "The London Magazine" for the years 1732-36, show a pretty steady decline, indicating that the years 1731-32 were probably years of active trade. I have other evidence which there is not time to quote.

Assuming the existence of a mania ten or eleven years subsequent to the great South Sea collapse to be shown, it becomes still more important to discover corresponding events about the years 1742 and 1752; but here the real difficulty begins. It is quite clear that there was nothing to call a mania or a crisis at either of these periods. As Holland was at that time the commercial centre of the world, I thought it desirable to make inquiries in that country, and I was fortunate enough to receive assistance from the eminent and learned Dutch economists, Dr. S.

* Vol. ii. p. 106. † January, 1732, vol. ii. p. 561.
‡ Vol. ii. p. 1047.

Vissering and Dr. W. Vissering. The former wrote, in 1856, a small treatise upon the South Sea mania, for a copy of which I am much indebted to him.* In answer to my inquiries, Dr. W. Vissering wrote: "Of crises in 1731-32 and 1741-42, I found no trace whatever; perhaps a now forgotten depression of trade may have happened in those years . . . but our economic history did not preserve any memory of it." I feel bound to quote this adverse statement, and I have no doubt that it is correct as far as it goes. But I have already shown that 1731-32 were years of bubbles and stock-jobbing, and I believe that there was a distinct tendency to brisk trade at the subsequent decennial periods.

The best proof I possess concerning 1743 consists in a remarkable rise in the price of wool; for wool which had been sold at 13*s.* per tod in 1739 rose to 19*s.* and 21*s.* in 1743-44. This rise was said to be general all over the kingdom; it was attributed not to any deficiency in the growth, but either to the arts of stock-jobbing, or more probably to the great demand for woollen goods for exportation.†

In Parliament the prosperity of the trade was attributed to the fact that the East India Company exported woollen goods to the value of £200,000 in 1742, while in the previous years the exports did not exceed £40,000. It is stated, too, that in the memory of man there had never been a larger demand for our woollen manufactures, and that the warehouses in Holland and other markets were emptied of goods which had been in hand several years.‡ I regret that I have been unable to meet with any prices of metals which would throw light upon this period.

Passing on to the next decennial period, we find a still greater rise in the price of wool occasioned, as it was said, by a brisk trade and a great consumption and exportation. Notwithstanding the complaints and the arts

* "Het Groote Tafereel der Dwaasheid." 1856. 8vo, 44 pp. I regret that I cannot make much use of this apparently very interesting pamphlet, being unable to read Dutch.

† Smith's "Memoirs of Wool," vol. ii. pp. 468–72.

‡ "Gentleman's Magazine," vol. xiii. p. 658.

of the manufacturers to depress the price of wool, it rose so that "in the years 1750, 1751 the very best and finest Lincolnshire wool was sold upon the spot at 25*s.* a tod."* In another work we are told that English wool sold at Amsterdam in 1751 at 37*s.*, and fell in two years to 21*s.* and 25*s.*† Light is thrown upon this period by a table of prices of tin in Cornwall, beginning in 1746, which is to be found in the "Statistical Journal," vol. ii. p. 262. I quote the earlier part of the table.

| | Price of tin per cwt.—*s.* | *d.* | | Price of tin per cwt —*s.* | *d.* |
|---|---|---|---|---|---|
| 1746 | 60 | 0 | 1755 | 66 | 3 |
| 1747 | 62 | 0 | 1756 | 62 | 3 |
| 1748 | 63 | 4 | 1757 | 59 | 0 |
| 1749 | 63 | 9 | 1758 | 56 | 6 |
| 1750 | 65 | 0 | 1759 | 56 | 0 |
| 1751 | 65 | 0 | 1760 | 56 | 0 |
| 1752 | 67 | 0 | 1761 | 60 | 0 |
| 1753 | 68 | 0 | 1762 | 64 | 6 |
| 1754 | 67 | 9 | 1763 | 69 | 0 |

1764 - - - - 69*s.* 0*d.*

It may easily be shown that the prices of the metals form the best index to the general activity of trade and credit, and in the above figures we see a steady rise up to a maximum of 68*s.* in 1753, followed by a steady fall to 56*s.* in 1759, when a rapid rise, connected with the collapse of 1763, commences. In a book called "A General View of England respecting its Policy, Trade, etc., from the Years 1600 to 1762," translated from the French, London, 1766, I find the following statement (p. 150):

"England being obliged to pay abroad what balances were against her, species became so scarce in 1753 and in 1754, that at the bankers of London you could scarcely obtain a payment of one hundred pounds in the lawful gold coin of the country; and as for silver, there was scarcely any left. . . ."

* "A Short View of the Rise, etc. of the Woollen Manufacture in England." London, 1753, p. 61.

† "Sheffield on the Trade of Ireland," p. 167.

Without entering into further details at present, I hold, then, that there is more or less evidence that trade reached a maximum of activity in or about the years 1701, 1711, 1721, 1732, 1742, 1753, 1763, 1772, 1783, 1793, 1805, 1815, 1825, 1837, 1847, 1857, 1866. These years, whether marked by the bursting of a commercial panic or not, are, as nearly as I can judge, corresponding years, and the intervals vary only from nine to twelve years. There being in all an interval of one hundred and sixty-five years, broken into sixteen periods, the average length of the period is about 10.3 years. But the earlier dates, 1701 and 1711, are not well established, and the panic of 1866 was probably precipitated by the fall of Overends, Gurney and Co. Judging by the events of 1837, 1847, and 1857, we should naturally place the proper date of the collapse in 1867. If we compare the unquestionable collapse of 1721 with 1867, the average interval is 10.43 years; if we prefer to compare 1721 with 1857, in which year there was an undoubted collapse, then the mean interval becomes 10.46. As the year 1763 was also a year of well-marked crisis it is instructive to compare it with 1857, which gives the average interval just 10.444 years, which falls nearly between the previous results, and may be accepted as the most probable. Now it is very curious to bring this result into connection with the following statement of Mr. J. A. Broun, in *Nature,* of the 24th May, 1877.* "The mean duration of the period at which I arrive is therefore almost exactly that which Dr. Lamont had previously obtained, or 10.45 years."

Judging this close coincidence of results according to the theory of probabilities, it becomes highly probable that two periodic phenomena, varying so nearly in the same mean period, are connected as cause and effect. Mr. John Mills, who has so ably treated of *credit cycles,* as he has named them, in the Transactions of the Manchester Statistical Society,† attributes the periodic variations to mental action. A commercial panic, he holds, is the

* Vol. xvi. p. 63.

† Session 1867–68, pp. 5–40. "On Credit Cycles, and the Origin of Commercial Panics."

destruction of belief and hope in the minds of merchants and bankers. But though I quite agree with him so far, I can see no reason why the human mind, in its own spontaneous action, should select a period of just 10.44 years to vary in. Surely we must go beyond the mind to its industrial environment. Merchants and bankers are continually influenced in their dealings by accounts of the success of harvests, the comparative abundance or scarcity of goods; and when we know that there is a cause, the variation of the solar activity, which is just of the nature to affect the produce of agriculture, and which does vary in the same period, it becomes almost certain that the two series of phenomena, credit cycles and solar variations, are connected as effect and cause.

It is, no doubt, a great difficulty in the way of this theory that no one has yet been able to detect a periodic variation in the price of corn in Europe, coincident with the sun-spot variations. But the fact, no doubt, is that the success of the European corn harvest depends upon a conjunction of fortunate events: a frosty winter to prepare the ground, a good ploughing and sowing season, moisture for the growing plant, a favourable blooming-time, a warm sun to ripen the grain, and a dry period to harvest it. Failure in any one of several points involves a poor harvest. Under such circumstances it is quite likely that no obvious connection could be traced. The conditions of our climate are too complicated. But we must not suppose that things are the same all over the world as they are in England, or in Western Europe. As Mr. A. Schuster has pointed out,* the good wine years in Germany correspond closely with the years of minimum sun-spots, and it is quite likely that, if we had the requisite information and the patience to investigate the matter thoroughly, similar relations might be discovered as regards other products.

But, however this may be as regards Europe, there cannot be much doubt that in India periods of scarcity and plenty show a decennial tendency. The theory of Dr. W. W. Hunter, concerning the periodicity of famines in India, has been too recently and fully discussed to need

* *Nature*, May 17th, 1877, vol. xvi. p. 45.

recapitulation here; and it is quite likely that what takes place in India may also occur more or less distinctly in China, tropical Africa, and other tropical parts of the earth, which contain by far the largest part of the world's population. The population of those parts, too, lives almost entirely upon vegetable produce, so that any important variations in the solar activity might be expected to affect them profoundly and immediately.

It is well worthy of notice that nearly forty years ago (in 1840), Mr. James Wilson, the well-known founder of *The Economist* newspaper, published a small book, or large pamphlet, on "Fluctuations of Currency, Commerce, and Manufactures; referable to the Corn Laws." Mr. Wilson speaks of "the frequent recurrence of periods of excitement and depression in the monetarial and commercial interests of the country," as if the idea of periods was familiar to him; and he attributes them (p. 10) "to the huge fluctuations in the amount of its means, which, from time to time, have been required to pay for the necessary subsistence of life; or, in other words, to the fluctuations of the price of food." The idea may have been a novel one forty years ago; but it is now well known to manufacturers that an active demand for their produce is to be expected only when food is cheap. By far the largest part of the population have but a small margin of income remaining when their necessary expenditure on food has been provided for. Thus arises the singular connection between the prosperity of Lancashire and the price of rice in India, which has been well explained by Mr. J. C. Ollerenshaw in the Transactions of the Manchester Statistical Society.* It might seem that Tenterden Church steeple and the Goodwin Sands are not more remotely connected than the cotton-mills of Lancashire, the paddy-fields of India, and the spots on the sun; yet the connection is obvious when we carefully trace it out. The depressed trade of Lancashire at the present time is generally attributed to the slackness of the export trade to India, which is due to the scarcity of food in many parts of that country, this scarcity absorbing the whole earnings of the poorer classes.

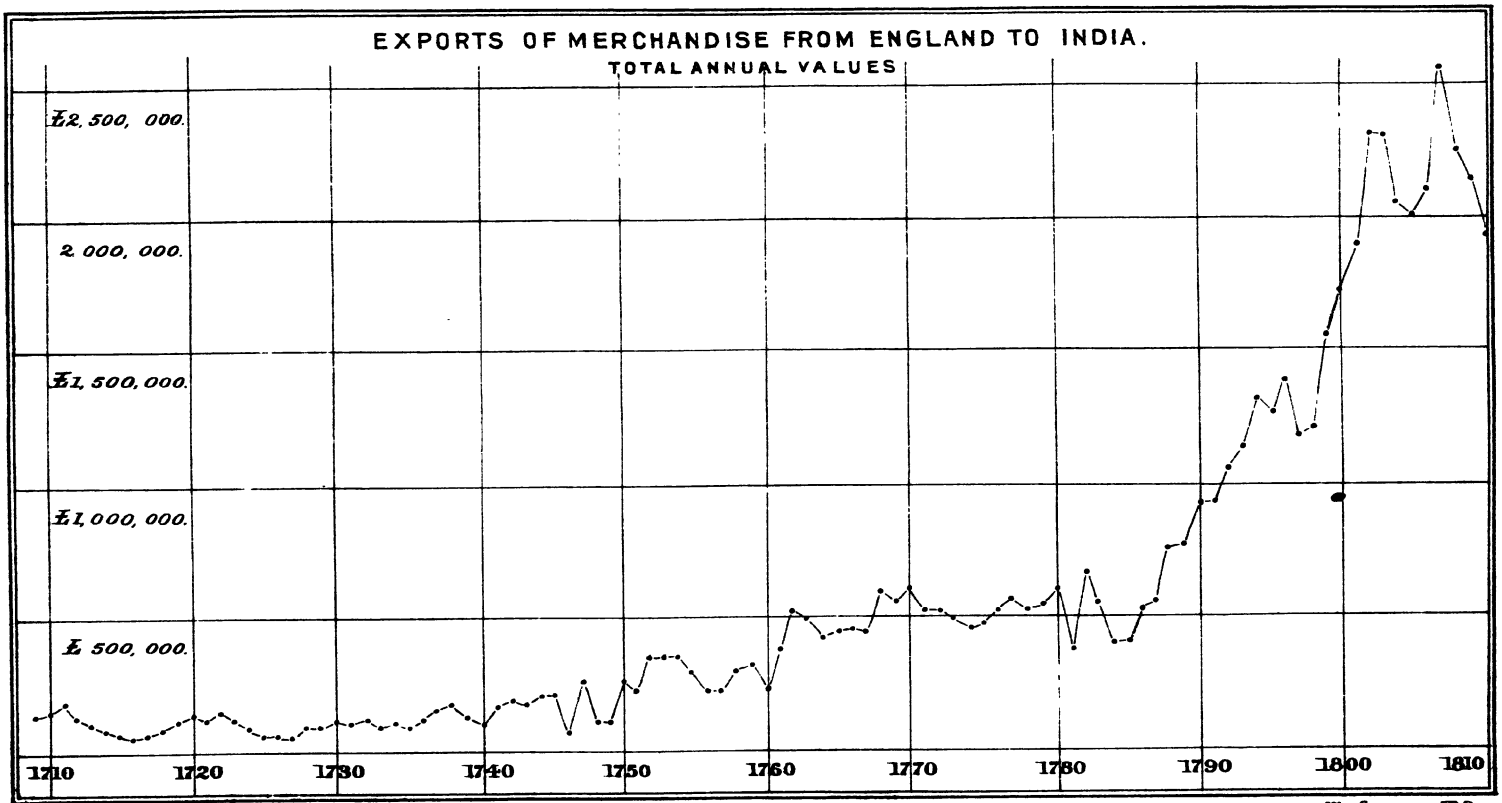
* Session 1869-70, p. 109.

In corroboration of this view, I may point to the remarkable curves exhibited in the accompanying diagram, which represent the variation of the value of merchandise exported to India in each year from 1708-9 to 1809-10, as given in Millburn's treatise.* In curve No. I. are shown the simple yearly values of merchandise (without bullion) exported. To make the general form of the curve more apparent, I have prepared curve No. II. by substituting for each yearly amount the average of three years, of which the year in question is the centre, representing these averages logarithmically, so as to show the true comparative importance of the variations. On examining this curve attentively, it will be seen that there is in most parts of its course a strongly-marked decennial variation. Thus, after 1711, the curve begins to fall rapidly, not to attain a maximum again until 1721 or 1722. A second marked depression is followed by a new rise up to 1731. These three maxima correspond satisfactorily with the crises which I have already described. Then the curve becomes somewhat irregular, and we have no decided maximum until we come to 1743 or 1744. In 1753 we have a further decided maximum, and the same may perhaps be said of 1761-63. After this point the correspondence of the curve with the decennial crises is much less marked, if not doubtful; but we may notice a retrogression after 1783, and an important continuous rise up to 1795. I ought to add that I have examined many tables of exports and imports, and other statistical facts, without finding evidence of decennial variation so strongly marked as in these curves; but the subject is altogether too new and complicated to take the absence of variation in certain figures as conclusive negative evidence. The distinct and unquestionable tendency to a decennial period shown in these curves seems to me an important corroborative fact, and outweighs a great deal of failure and discouragement which attends any one investigating a subject of this nature.

I have so far made no allusion to the last decade of years now just terminating. The latest panic mentioned

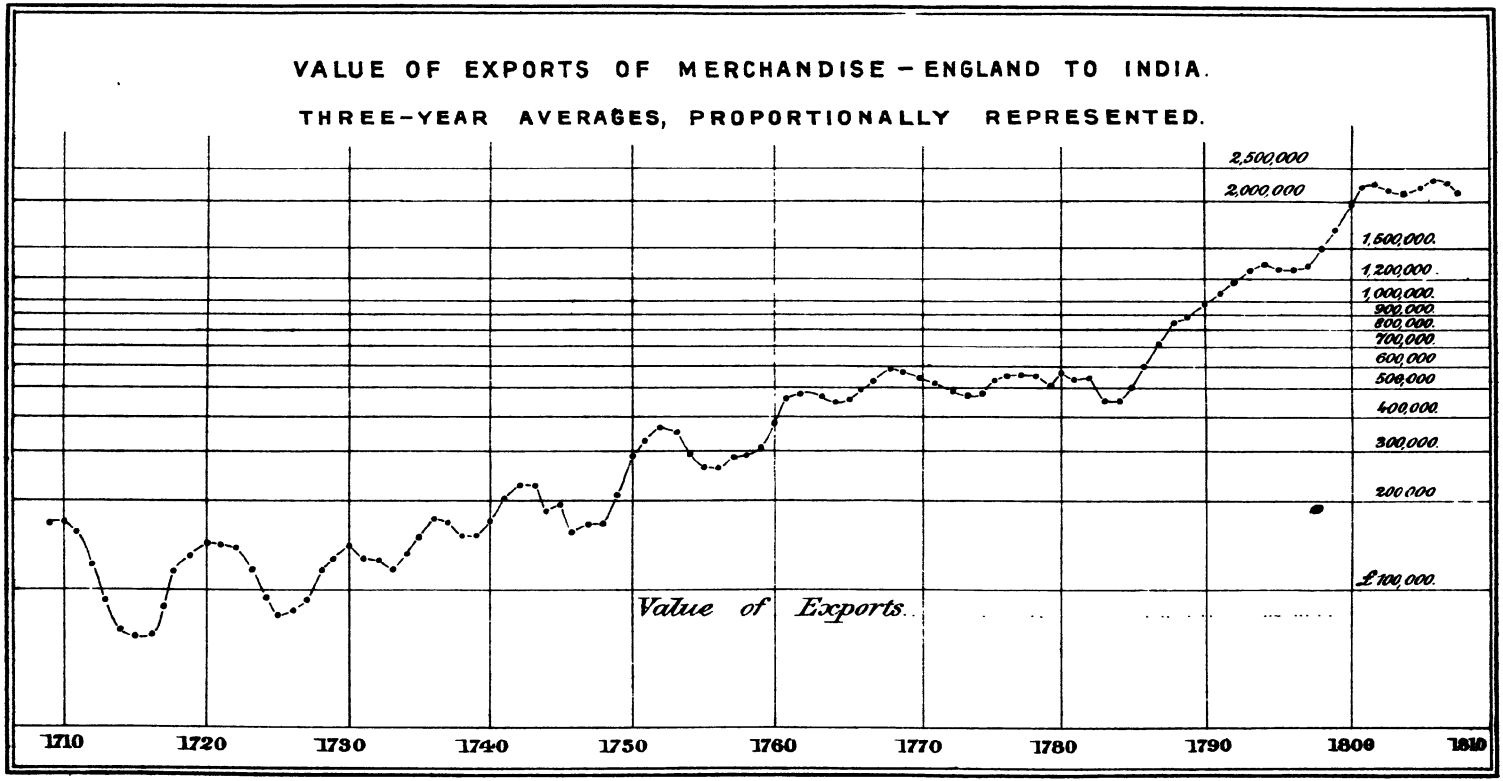
* "Oriental Commerce," vol. i. pp. xlviii. liii. xci.

*PLATE XIII*




*To face p. 198.*

*PLATE XIV*




*To face p. 198*

was that of 1866. The kind of collapse which took place in the United States in 1872-73, and which was followed both there and here by commercial depression, might seem to conflict with the sun-spot theory; but from a circular of Messrs. John Kemp & Co., reprinted in the last number of the (London) "Statistical Journal,"* it appears that the number of bankruptcies was comparatively small about the years 1871-73, and has been increasing since, reaching a maximum in the United States in 1876, and in England either in 1877 or possibly in the present year, the number in the first quarter of the year having been very great. Thus, in spite of all peculiar and exceptional circumstances, the period of disaster is recurring almost as inexorably and regularly as the march of the seasons.

Taken altogether, the historical facts concerning the periodic recurrence of crises appear to me too strong to admit of doubt, and it is only the nature of the explanation of that recurrence which is matter of speculation. So far as can be seen at present, brisk trade is produced by the abundance of certain kinds of produce yielded by the harvests in certain parts of the earth, especially in India; but much fuller information and more careful investigation will be needed to trace out the details of this explanation and place them beyond doubt.

* Vol. xli. p. 384.

## POSTSCRIPT

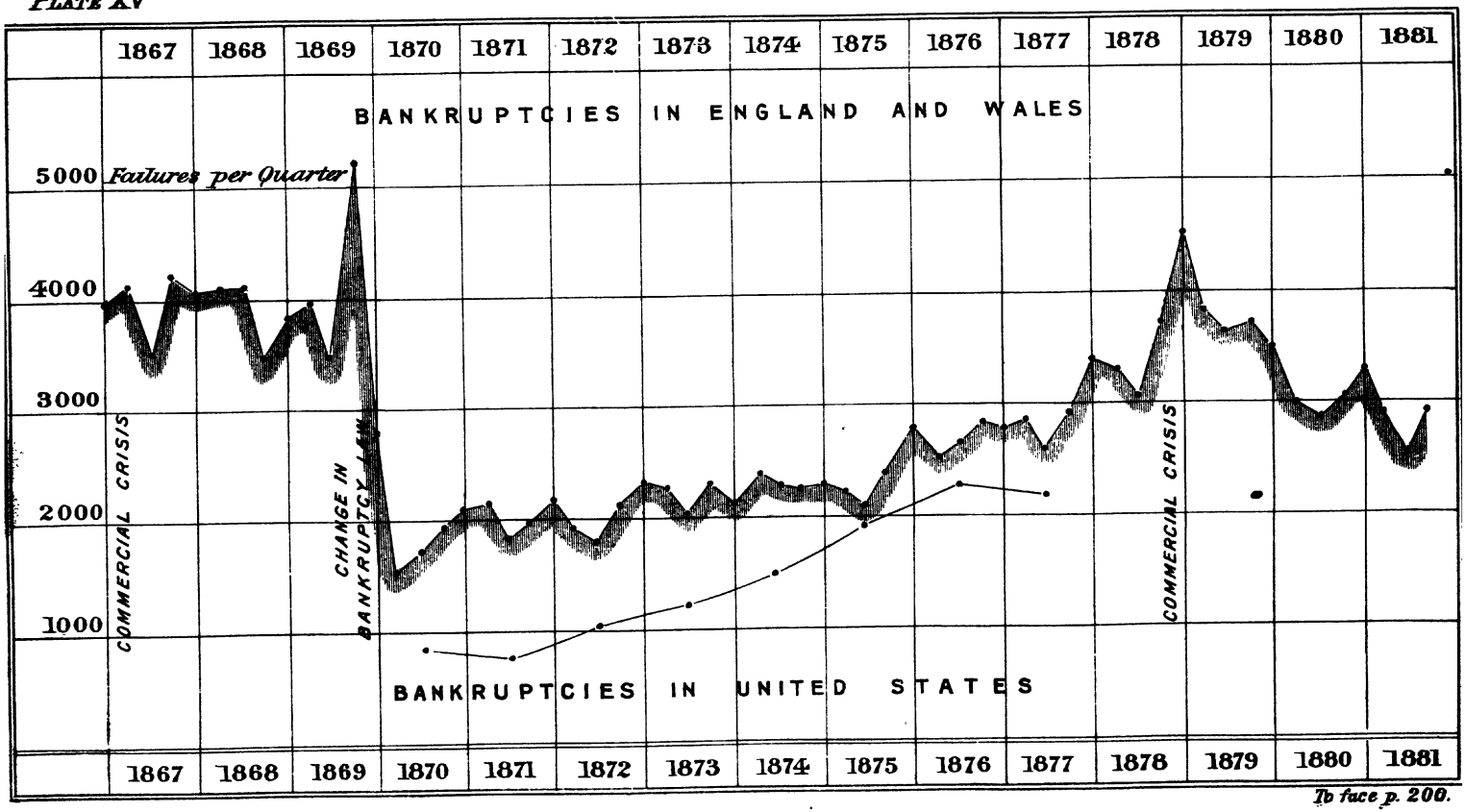
(APRIL, 1882.)

These remarks have been satisfactorily verified by the subsequent course of events, as shown in the following valuable table of failures in England and Wales, given in the supplement of 4th January, 1882, of Kemp's *Mercantile Gazette*:

| Years. | 1st Quarter. | 2nd Quarter. | 3rd Quarter. | 4th Quarter. | Totals. |
|---|---|---|---|---|---|
| 1867 - | 3,981 | 4,081 | 3,555 | 4,233 | 15,850 |
| 1868 - | 4,091 | 4,131 | 4,139 | 3,501 | 15,862 |
| 1869 - | 3,819 | 3,997 | 3,495 | 5,207 | 16,518 |
| 1870 - | 2,804 | 1,589 | 1,773 | 1,985 | 8,151 |
| 1871 - | 2,142 | 2,191 | 1,837 | 1,994 | 8,164 |
| 1872 - | 2,192 | 1,980 | 1,795 | 2,145 | 8,112 |
| 1873 - | 2,354 | 2,299 | 2,054 | 2,357 | 9,064 |
| 1874 - | 2,193 | 2,428 | 2,339 | 2,290 | 9,250 |
| 1875 - | 2,331 | 2,277 | 2,133 | 2,453 | 9,194 |
| 1876 - | 2,744 | 2,573 | 2,670 | 2,861 | 10,848 |
| 1877 - | 2,829 | 2,856 | 2,610 | 2,952 | 11,247 |
| 1878 - | 3,439 | 3,373 | 3,069 | 3,749 | 13,630 |
| 1879 - | 4,478 | 3,852 | 3,629 | 3,773 | 15,732 |
| 1880 - | 3,486 | 3,002 | 2,899 | 3,084 | 12,471 |
| 1881 - | 3,276 | 2,871 | 2,574 | 2,911 | 11,632 |

The extraordinary fall between 1869 and 1870 was due to a change in the law, and is of no interest to us here. The subsequent rise from 1873 up to the maximum in 1879 is very marked, as is also the succeeding depression to 1881. The highest quarterly aggregate is 4478, that of the first quarter of 1879, and as bankruptcies naturally follow a crisis, we must assign the date of the last decennial crisis to the autumn of 1878, a date which accords perfectly with the theory of periodicity maintained in these papers.

*Plate XV*




*To face p. 200.*

# VIII

## COMMERCIAL CRISES AND SUN-SPOTS

### PART I

"Thou Sun, of this great world both eye and soul."

IT is curious to notice the variety of the explanations offered by commercial writers concerning the cause of the present state of trade. Foreign competition, beer-drinking, over-production, trades-unionism, war, peace, want of gold, superabundance of silver, Lord Beaconsfield, Sir Stafford Northcote, their extravagant expenditure, the Government policy, the Glasgow Bank directors, Mr. Edison and the electric light, are a few of the happy and consistent suggestions continually made to explain the present disastrous collapse of industry and credit.

It occurs to but few people to remember that what is happening now is but a mild repetition of what has previously happened time after time. October, 1878, is comparable with May, 1866, with November, 1857, with October, 1847, and, going yet farther back, with a somewhat similar condition of things, in 1837, in 1825-26, and even in 1815-16. The incidental circumstances of these commercial collapses have indeed been infinitely diversified. At one time the cause seemed to be the misconduct of the great firm of Overends; in 1857 there was the

* This article, printed in *Nature* for November 14th, 1878, vol. xix. pp. 33-37, contains, to a considerable extent, the same matter as that communicated to the British Association, reprinted above, p. 187. It embodies, however, a good many additional facts and remarks, and, having been the subject of Mr. R. A. Proctor's criticism, it seems best to reprint it in spite of the repetition.

mutiny in India, the peace with Russia, and a commercial collapse in the United States; in 1847 occurred the Irish famine and a failure of European harvests generally, following upon the great railway mania; the crisis of 1837 succeeded an immense expansion of home trade, the establishment of joint-stock banks, and the building of multitudes of factories and other permanent works; 1825 was preceded by extravagant foreign speculations and foreign loans; 1815 was the year of the general peace. All kinds of distinct reasons can thus be given why trade should be now inflated and again depressed and collapsed. But, so long as these causes are various and disconnected, nothing emerges to explain the remarkable appearance of regularity and periodicity which characterises these events.

The periodicity of the earlier portion of the series is so remarkable that, even without the corroboration since received, it convinced scientific inquirers that there was some deep cause in action. Dr. Hyde Clarke, for instance, wrote, more than thirty years ago, a paper entitled "Physical Economy—a Preliminary Inquiry into the Physical Laws governing the Periods of Famines and Panics." This paper was published in the "Railway Register" for 1847, and is well worth reading. In the commencement he remarks: "We have just gone through a time of busy industry, and are come upon sorrow and ill-fortune; but the same things have befallen us often within the knowledge of those now living. Of 1837, of 1827, of 1817, of 1806, of 1796, there are men among us who can remember the same things as we now see in 1847. A period of bustle, or of gambling, cut short in a trice and turned into a period of suffering and loss, is a phenomenon so often recorded, that what is most to be noticed is that it should excite any wonder." Dr. Hyde Clarke then proceeds to argue in a highly scientific spirit that events so regularly recurring cannot be attributed to accidental causes; there must, he thinks, be some physical groundwork, and he proposed to search this out by means of a science to be called Physical Economy. In the third page of his paper he tells us that he had previously written a paper on the laws of periodical or cyclical action, printed

in Herapath's "Railway Magazine" for 1838. "At this time," he says, "it was my impression that the period of speculation was a period of ten years, but I was led also to look for a period of thirteen or fourteen years. . . . In the course of these inquiries I looked at the astronomical periods and the meteorological theories without finding anything at all available for my purposes." A little below, Dr. Hyde Clarke continues: "Still thinking that the interval was an interval of about ten years, I was, during the present famine, led to look for a larger period, which would contain the smaller periods, and as the present famine and distress seemed particularly severe, my attention was directed to the famine so strongly felt during the French Revolution. This gave a period of about fifty-four years, with five intervals of about ten or eleven years each, which I took thus:

"1793 1804 1815 1826 1837 1847."

Dr. Hyde Clarke was by no means the only statist who adopted a theory of periodicity thirty or forty years ago. In February, 1848, Mr. J. T. Danson read a paper to the Statistical Society of London, attempting to trace a connection between periodic changes in the condition of the people and the variations occurring in the same period in the prices of the most necessary articles of food.* Mr. James Wilson had published, in 1840, a separate work or large pamphlet upon "Fluctuations of Currency, Commerce, and Manufactures," in which he speaks of the frequent recurrence of periods of excitement and depression. In later years Mr. William Langton, the esteemed banker of Manchester, independently remarked the existence of the decennial cycle, saying: "These disturbances are the accompaniment of another wave, which appears to have a decennial period, and in the generation of which moral causes have no doubt an important share." The paper in which this remark occurs is contained in the Transactions of the Manchester Statistical Society for 1857, and is one of the most luminous inquiries concerning

* "Journal of the Statistical Society," vol. xi. pp. 101–40.

commercial fluctuations anywhere to be found.* In still later years Mr. John Mills, of the Manchester Statistical Society, has almost made this subject his own, insisting, however, mainly upon the mental origin of what he has aptly called the Credit Cycle.

The peculiar interest of Dr. Hyde Clarke's speculations consists in the fact that he not only remarked the cycle of ten or eleven years, but sought to explain it as due to physical causes, although he had not succeeded in discovering any similar astronomical or meteorological variation with which to connect it. Writing as he did in 1838 and 1847, this failure is not to be wondered at. His supposed period of fifty-four years is perhaps deserving of further investigation, but it is with his period of ten or eleven years that we are now concerned.

My own inquiries into this interesting subject naturally fall much posterior to those of Dr. Clarke; but, about the year 1862, I prepared two elaborate statistical diagrams, one of which exhibited in a single sheet all the accounts of the Bank of England since 1844, while the other embraced all the monthly statements I could procure of the price of corn, state of the funds, rate of discount, and number of bankruptcies in England from the year 1731 onwards. Subsequent study of these diagrams produced upon my mind a deep conviction that the events of 1815, 1825, 1836-39, 1847, and 1857, exhibited a true but mysterious periodicity. There was no appearance, indeed, of like periodicity in the earlier parts of my second diagram. In the first fifteen years of this century statistical numbers were thrown into confusion by the great wars, the suspension of specie payments, and the frequent extremely high prices of corn. It must be allowed, moreover, that the statistical diagram, so far as concerns the eighteenth century, presents no appreciable trace of decennial periodicity. The recent continual discussions concerning the solar or sun-spot period much increased the interest of this matter, and in 1875 I made a laborious reduction of the data contained in Professor Thorold Rogers' admirable "History of Agriculture and Prices in

* See above, p. 155.

England from the Year 1259." I then believed that I had discovered the solar period in the prices of corn and various agricultural commodities, and I accordingly read a paper to that effect at the British Association at Bristol. Subsequent inquiry, however, seemed to show that periods of three, five, seven, nine, or even thirteen years would agree with Professor Rogers' data just as well as a period of eleven years; in disgust at this result I withdrew the paper from further publication. I should like, however, to be now allowed to quote the following passage from the manuscript of the paper in question:

"Before concluding I will throw out a surmise, which, though it is a mere surmise, seems worth making. It is now pretty generally allowed that the fluctuations of the money market, though often apparently due to exceptional and accidental events, such as wars, great commercial failures, unfounded panics, and so forth, yet do exhibit a remarkable tendency to recur at intervals approximating to ten or eleven years. Thus the principal commercial crises have happened in the years 1825, 1836-39, 1847, 1857, 1866, and I was almost adding 1879, so convinced do I feel that there will, within the next few years, be another great crisis. Now if there should be in or about the year 1879 a great collapse comparable with those of the years mentioned, there will have been five such occurrences in fifty-four years, giving almost exactly eleven years (10.8) as the average interval, which sufficiently approximates to 11.1, the supposed exact length of the sun-spot period, to warrant speculation as to their possible connection."

I was led to assign the then coming (that is, the now present) crisis to the year 1879, because 11.1 years added twice over to 1857, the date of the last perfectly normal crisis, brings the calculator to 1879. If I could have employed instead Mr. J. A. Broun's since published estimate of the sun-spot period, to be presently mentioned, namely, 10.45 years, I should have come exactly to the present year 1878. My mistake of one year was due to the meteorologist's mistake of eight months, which, as crises usually happen in October and November, was sufficient

to throw the estimate of the event into the next twelve months.

While writing my 1875 paper for the British Association, I was much embarrassed by the fact that the commercial fluctuations could with difficulty be reconciled with a period of 11.1 years. If, indeed, we start from 1825, and add 11.1 years time after time, we get 1836.1, 1847.2, 1858.3, 1869.4, 1880.5, which show a gradually increasing discrepancy from 1837, 1847, 1857, 1866 (and now 1878), the true dates of the crises. To explain this discrepancy I went so far as to form the rather fanciful hypothesis that the commercial world might be a body so mentally constituted, as Mr. John Mills must hold, as to be capable of vibrating in a period of ten years, so that it would every now and then be thrown into oscillation by physical causes having a period of eleven years. The subsequent publication, however, of Mr. J. A. Broun's inquiries, tending to show that the solar period is 10.45 years, not 11.1,* placed the matter in a very different light, and removed the difficulties. Thus, if we take Mr. John Mills' "Synopsis of Six Commercial Panics in the present Century," and, rejecting 1866 as an instance of a premature panic, count from 1815 to 1857, we find that four credit cycles, occupying forty-two years, give an average duration of 10.5 years, which is a remarkably close approximation to Mr. Broun's solar period. Thus encouraged, it at last occurred to me to look back into the previous century, where facts of a strongly confirmatory character at once presented themselves. Not only was there a great panic in 1793, as Dr. Hyde Clarke remarked, but there were very distinct events of a similar nature in the years 1783, 1772-73, and 1763. About these dates there can be no question, for they may all be found clearly stated on pp. 627 and 628 of the first volume of Mr. Macleod's unfinished "Dictionary of Political Economy." Mr. Macleod gives a concise, but, I believe, correct account of these events, and as he seems to entertain no theory of periodicity, his evidence is perfectly unbiased. Yet, in the space of a few lines, he unconsciously states this

* *Nature*, vol. xvi. p. 63.

periodicity, saying: "Ten years after the preceding crisis of 1763, another of a very severe nature took place in 1772, and the beginning of 1773. It extended over all the trading nations of Europe." A few lines below he goes on to state that in May, 1783, a rapid drain of bullion to the Continent set in, which greatly alarmed the Bank directors and embarrassed the merchants. The paragraph in which this occurs is headed, "The Crisis of 1783," and on turning the page we at once come on another paragraph headed, "The Crisis of 1793." Here then we have, in a few lines of a good authority concerning the history of finance, a statement of four crises occurring at almost exactly decennial intervals. It is wonderful that no writer has, so far as I know, previously pointed out the strictly periodic nature of these events; and I may add that I have several times lectured to my college classes about these crises without remarking their periodicity. It is true that we cannot, by any management of the figures, bring them into co-ordination with later crises so long as we adhere to the former estimate of the solar period. If, starting from 1857, we count back nine intervals of 11.1 years each, we get to 1757 instead of 1763; we are landed in the middle of a cycle instead of in the beginning or end; and there can be no possible doubt about the crises of 1763 and 1857. But, if we are once allowed to substitute the new estimate of Broun, which is the same as the old one of Lamont, the difficulty disappears; for the average interval is 10.44 years.

This beautiful coincidence led me to look still further backwards, and to form the apparently wild notion that the great crisis, generally known as that of the South Sea Bubble, might not be an isolated and casual event, but only an early and remarkable manifestation of the commercial cycle. The South Sea Bubble is generally set down to the year 1720, and the speculations in the shares of that company did attain their climax and commence their collapse in that year. But it is perfectly well known to the historians of commerce that the general collapse of trade, which profoundly affected all the more advanced European nations, especially the Dutch, French, and Eng-

lish, occurred in 1721. Now, if we assume that there have been since 1721, up to 1857, thirteen commercial cycles, the average interval comes out 10.46 years; or if we consider that we are in this very month (November, 1878) passing through a normal crisis, then the interval of 157 years from 1721 to 1878 gives an average cycle of 10.466 years.

It would be impossible, however, to enlist the South Sea Bubble in our series unless there were some links to connect it with subsequent events. I have, therefore, spent much labour during the past summer in a most tedious and discouraging search among the pamphlets, magazines, and newspapers of the period, with a view to discover other decennial crises. I am free to confess that in this search I have been thoroughly biased in favour of a theory, and that the evidence which I have so far found would have no weight, if standing by itself. It is impossible in this place to state properly the facts which I possess; I can only briefly mention what I hope to establish by future more thorough inquiry.

It is remarkable to notice that the South Sea Company, which came to grief in 1720-21, was founded in 1711, just ten years before, and that on the very page (312) of Mr. Fox Bourne's "Romance of Trade" * which mentions this fact the year 1701 also occurs in connection with speculation and *stock-jobbing,* as the promotion of companies was then called. The occurrence of a crisis in the years 1710-11-12, is indeed almost established by the lists of bubble insurance companies formed in those years, as collected by Mr. Cornelius Walford, and obligingly shown to me by him.†

Again, it is quite plain that about ten years after stock-jobbing had been crushed by the crisis of 1721, it reared its head again. A significant passage in "The Gentleman's Magazine" of 1732 (vol. ii. p. 561) remarks that "Stock-jobbing is grown almost epidemical. Fraud, cor-

* This book contains an interesting account of some of these early manias and panics.

† These lists are partially published in Mr. Walford's "Insurance Cyclopædia," art. "Gambling."

ruption, and iniquity in great companies as much require speedy and effectual remedies, now, as in 1720. The scarcity of money and stagnation of trade in all the distant parts of England is a proof that too much of our current coin is got into the hands of a few persons." This "getting the current coin into the hands of a few people" was the favourite theory at that time to explain any slackness of trade, just as now over-production is a theme of every short-sighted politician. But the Legislature of that day thought they could remedy these things in a drastic manner, so they passed, in 1734, "An Act to prevent the infamous practice of Stock-jobbing." Mr. Walford, who has inquired into the commercial history of this time far more minutely than any other writer, remarks * that "gambling in stocks and funds had broken out with considerable fervour again during the few years preceding 1734. It was the first symptom of recovery from the events of 1720."

I may add that there was in 1732 a great collapse of a society called the "Charitable Corporation for Relief of the Industrious Poor." A great many people were ruined by the unexpected deficit discovered in the funds of this kind of bank, and Parliament and the public were asked to assist the sufferers, just as they might now be asked to aid the shareholders of the City of Glasgow Bank. Thus does history repeat itself!

Whether it was that the Act of 1734 really did diminish the infamous practice of stock-jobbing, or whether the sun-spots manifested less variation than usual, it is clear that between 1732 and 1763 it is very difficult to discover anything approaching a mania or crisis. My learned and obliging correspondents at Amsterdam and Leiden, Drs. S. and W. Vissering, disclaim any knowledge of such events in the trade of Holland at that time, and my own diagram, showing the monthly bankruptcies throughout the interval, displays a flatness of a thoroughly discouraging character. Nevertheless, inquiry leads me to believe that although there really was nothing to call a crisis, mania, or panic, yet there were remarkable variations in

* "Insurance Cyclopædia," art. "Gambling."

the activity of trade and the prices of some staple commodities, such as wool and tin, sufficient to connect the earlier with the later periods. It is a matter of much regret that I have hitherto been quite unable to discover a connected series of price-lists of commodities of the early part of last century. The accounts of prices of goods at Greenwich Hospital, to be found in several statistical works, are not only incomplete, but probably misleading. Any reader of this article who can point out to me series of prices of metals or other commodities, not merely agricultural, before 1782, will confer a very great obligation upon me by doing so.

Deferring, however, for the present, any minuter inquiry, I permit myself to assume that there were about the years 1742 and 1752 fluctuations of trade which connect the undoubted decennial series of 1711, 1721, and 1732, with that commencing again in the most unquestionable manner in 1763. Thus the whole series of decennial crises may be stated as follows: (1701 ?), 1711, 1721, 1731-32, (1742 ? 1752 ?), 1763, 1772-73, 1783, 1793, (1804-5 ?), 1815, 1825, 1836-39 (1837 in the United States), 1847, 1857, 1866, 1878. A series of this sort is not, like a chain, as weak as its weakest part; on the contrary, the strong parts add strength to the weak parts. In spite, therefore, of the doubtful existence of some of the crises, as marked in the list, I can entertain no doubt whatever that the principal commercial crises do fall into a series having the average period of about 10.466 years. Moreover, the almost perfect coincidence of this period with Broun's estimate of the sun-spot period (10.45) is by itself strong evidence that the phenomena are causally connected. The exact nature of the connection cannot at present be established. As we have seen, Hyde Clarke, Wilson, and Danson all argued, some thirty or forty years ago, that commercial fluctuations must be governed by physical causes. But here we are embarrassed by the fact that no inquirer has been able to discover a clear periodic variation in the price of corn. This is what Sir William Herschel attempted to do, at the beginning of this century, in his truly prophetic inquiry about the economic effects of the sun-spots;

but his facts are evidently too few to justify any sure inference. Carrington also compared the sun-spot curve with that of the price of corn, without detecting any coincidence; and my own repeated inquiries have been equally without result as to this point. The fact is, I believe, that cereal crops, as grown and gathered in Europe, depend for their success upon very complicated conditions, so that the solar influence is disguised. But it does not follow that other crops in other latitudes may not manifest the decennial period. Dr. Schuster* has pointed out a coincidence between good vintages and minima of sun-spots which can hardly be due to accident, and the whole controversy about the connection of Indian famines with the sun-spot period is of course familiar to all readers of *Nature*. Now if we may assume Dr. Hunter's famine theory to be true, there is little difficulty in explaining the remarkable series of periodic crises which I have pointed out.

The trade of Western Europe has always been strongly affected by communication with the Indies. Several of the crises are distinctly traceable to this cause, especially those at the beginning of the eighteenth century. That was a time of wild enterprise in the tropical regions, as the very names of the South Sea Company, the Mississippi scheme, the Darien project, etc. show. The Dutch, English, and French East India Companies were then potent bodies, the constant subject of legislation and controversy. Thus it is my present belief that to trade with India, China, and probably other parts of the tropical and semi-tropical regions, we must attribute the principal fluctuations in European commerce. Surely there is nothing absurd in such a theory when we remember that the present crisis is at least partly due to the involvement of the City of Glasgow Bank in the India trade, through the medium of some of their chief debtors. Thus the crisis of 1878 is clearly connected with the recent famines in India and China, and these famines are confidently attributed to solar disturbance.

To establish this view of the matter in a satisfactory

* *Nature*, vol. xvi. p. 45.

manner, it would be desirable to show that there has been a decennial variation of trade with India during the one hundred and seventy years under review. The complications and disturbances produced in the statistics of such a trade by various events are so considerable that I have not yet attempted to disentangle them properly. Yet the accounts of the merchandise (not including bullion) exported by the English East India Company between the years 1708-9 and 1733-34 display a wonderful tendency to decennial variation, as is apparent on examining with care the diagram representing these statistics.*

In the above table there are three well-marked maxima in 1710-11, 1721-22, and 1731-32, at intervals closely approximating to that of the sun-spot curve. I believe that there are some traces of the same decennial variation in subsequent portions of the same tables. The fact that this variation is difficult to trace may possibly explain the absence of any serious crises in 1742 and 1752.

Probably, however, we ought not to attribute the decennial fluctuation wholly to Indian trade. It is quite possible that tropical Africa, America, the West Indies, and even the Levant are affected by the same meteorological influences which occasion the famines in India. Thus it is the nations which trade most largely to those parts of the world, *and which give long credits to their customers*, which suffer most from these crises. Holland was most easily affected a century ago; England is most deeply affected now; France usually participates, together with some of the German trading towns. But I am not aware that these decennial crises extend in equal severity to such countries as Austria, Hungary, Switzerland, Italy, and Russia, which have comparatively little foreign trade. Even when they are affected, it may be indirectly through sympathy with the great commercial nations.

There is nothing in this theory inconsistent with the fact that crises and panics arise from other than meteorological causes. There was a great political crisis in 1798, a great commercial collapse in 1810-11 (which will not fall into the decennial series); there was a Stock Exchange

* See above, p. 198.

panic in 1859; and the great American collapse of 1873-75. There have also been several minor disturbances in the money market, such as those of February 1861, May and September 1864, August 1870, November 1873; but they are probably due to exceptional and disconnected reasons. Moreover, they have seldom, if ever, the intensity, profundity, and wide extension of the true decennial crises.

If it were permitted to draw any immediate conclusion from these speculations, I should point to the necessity of at once undertaking direct observations upon the varying power and character of the sun's rays. There are hundreds of meteorological observatories registering, at every hour of the day and night, the most minute facts about the atmosphere; but that very influence, upon which all atmospheric changes ultimately depend, *the solar radiation,* is not, I believe, measured in any one of them, at least in the proper manner.* Pouillet showed long ago (1838) how the absolute heating power of the sun's rays might be accurately determined by his Pyrheliometer. This instrument, and the results which he drew from its use, are fully described in his "Éléments de Physique Expérimentale et de Météorologie," livre 8me, chap. i. section 285. But I have never heard that his experiments have been repeated, except so far as this may have been done by Sir John Herschel, with his so-called Actinometer, as described by him in the Admiralty Manual of Scientific Inquiry. I fancy that physicists still depend upon Pouillet's observations in 1837 and 1838 for one of the most important constants of the solar system, if constant it can be called. While astronomers agitate themselves and spend infinite labour about the two-hundredth planetoid, or some imperceptible satellite, the very fountain of heat and light and life is left unmeasured. Pouillet indeed assumed that the heating power of the sun's rays is a constant quantity, which accounts for his not continuing the solar observations. But, if there is any truth in all the sun-spot speculations, there must be a periodic variation in the sun's rays, of which the sun-spots are a mere

* Of course there have been abundance of black-bulb thermometer observations made in various parts of the world, but I doubt whether they are of much value.

sign, and perhaps an unsatisfactory one. It is possible that the real variations are more regular than the sun-spot indications, and thus perhaps may be explained the curious fact that the decennial crises recur more regularly on the whole than the maxima and minima of sun-spots.

But why do we beat about the bush when all that is needed is half-a-dozen of Pouillet's pyrheliometers with skilled observers, who will seize every clear day to determine directly the heating power of the sun? Why do we not go direct to the Great Luminary himself, and ask him plainly whether he varies or not? If he answers No! then some of us must reconsider our theories, and perhaps endure a little ridicule. But if, as is much more probable, he should answer Yes! then the time will come when the most important news in *The Times* will be the usual cablegram of the solar power. Solar observatories ought to be established on the table-lands of Quito or Cuzco, in Cashmere, in Piazzi Smith's observatory on the Peak of Teneriffe, in Central Australia, or wherever else the sun can be observed most free from atmospheric opacity. An empire on which the sun never sets, and whose commerce pervades every port and creek of the sunny south, cannot wisely neglect to keep a watch on the great fountain of energy. From that sun, which is truly "of this great world both eye and soul," we derive our strength and our weakness, our success and our failure, our elation in commercial mania, and our despondency and ruin in commercial collapse.

## COMMERCIAL CRISES AND SUN-SPOTS*

### PART II

I have been repeatedly told by men who have good opportunity of hearing current opinions, that they who theorise about the relations of sun-spots, rainfall, famines, and commercial crises are supposed to be jesting, or at

*Article printed in *Nature*, April 24th, 1879, vol. xix. pp. 588–90. Much of the matter of this article was given also in two letters printed in *The Times* of January 17th, 1879, p. 6, *f.* and of April 19th, 1879, p. 6, *f.*

the best romancing. I am, of course, responsible only for a small part of what has been put forth on this subject, but so far as I am concerned in the matter, I beg leave to affirm that I never was more in earnest, and that after some further careful inquiry, I am perfectly convinced that these decennial crises do depend upon meteorological variations of like period, which again depend, in all probability, upon cosmical variations of which we have evidence in the frequency of sun-spots, auroras, and magnetic perturbations. I believe that I have, in fact, found the missing link required to complete the first outline of the evidence.

About ten years ago it was carefully explained by Mr. J. C. Ollerenshaw, in a communication to the Manchester Statistical Society (Transactions, 1869-70, p. 109), that the secret of good trade in Lancashire is the low price of rice and other grain in India.* Here again some may jest at the folly of those who theorise about such incongruous things as the cotton-mills of Manchester and the paddy-fields of Hindostan. But to those who look a little below the surface the connection is obvious. Cheapness of food leaves the poor Hindo ryot a small margin of earnings, which he can spend on new clothes; and a small margin multiplied by the vast population of British India, not to mention China, produces a marked change in the demand for Lancashire goods. Now, it has been lately argued by Dr. Hunter, the Government statist of India, that the famines of India do recur at intervals of about ten or eleven years. The idea of the periodicity of Indian famines is far from being a new one; it is discussed in various previous publications, as, for instance, "The Companion to the British Almanack" for 1857, p. 76. The principal scarcities in the North-Western and Upper Provinces of Bengal are there assigned to the years 1782-83, 1792-93, 1802-3, 1812-13, 1819-20, 1826, 1832-33. Here we notice precise periodicity up to 1812-13, which, after being broken for a time, seems to recur in 1832-33.

Partly through the kind assistance of Mr. Garnett, the

*This view is confirmed by the opinion of Mr. E. Helm, as given in the Transactions of the same Society, 1868-69, p. 76.

Superintendent of the British Museum Reading Room, I have now succeeded in finding the data so much wanted to confirm these views—namely, a long series of prices of grain in Bengal (Delhi). These data are found in a publication so accessible as the "Journal of the London Statistical Society" for 1843, vol. vi. pp. 246-48, where is printed a very brief but important paper by the Rev. Robert Everest, chaplain to the East India Company, "On the Famines that have devastated India, and on the Probability of their being Periodical."

Efforts have, I believe, been made by Dr. Hunter, Mr. J. H. Twigg, and probably others, to obtain facts of this kind, which would confirm or controvert prevailing theories; but this little paper, which seems to contain almost the only available table of prices, has hitherto escaped the notice of all inquirers, except, indeed, Mr. Cornelius Walford. The last number of the "Journal of the London Statistical Society" contains the second portion of Mr. Walford's marvellously complete account of "The Famines of the World, Past and Present," a kind of digest of the facts and literature of the subject. At pp. 260, 261 (vol. xlii.) we find Everest's paper noticed. In this latter paper we have a list of prices of wheat at Delhi for seventy-three years, ending with 1835, stated in terms of the numbers of seers of wheat—a seer is equal to about 2 lb. avoirdupois—to be purchased with one rupee. As this mode of quotation is confusing, I have calculated the prices in rupees per 1000 seers of wheat, and have thus obtained the following remarkable table:

*Price of Wheat at Delhi.*

| | | | |
|---|---|---|---|
| 1763 | 50 M.C. | 1772 | 38 C. |
| 1764 | 35 | 1773 | 100 M.C. |
| 1765 | 27 | 1774 | 53 |
| 1766 | 24 | 1775 | 40 |
| 1767 | 23 | 1776 | 25 |
| 1768 | 21 | 1777 | 17 |
| 1769 | 24 | 1778 | 25 |
| 1770 | 28 | 1779 | 33 |
| 1771 | 33 | 1780 | 45 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1781 | - | - | 55 | | 1809 | - - | 40 | |
| 1782 | - | - | 91 | | 1810 | - - | 25 | C. |
| 1783 | - | - | 167 | M.C. | 1811 | - - | 28 | |
| 1784 | - | - | 40 | | 1812 | - - | 44 | |
| 1785 | - | - | 25 | | 1813 | - - | 43 | |
| 1786 | - | - | 23 | | 1814 | - - | 30 | |
| 1787 | - | - | 22 | | 1815 | - - | 23 | C. |
| 1788 | - | - | 23 | | 1816 | - - | 28 | |
| 1789 | - | - | 24 | | 1817 | - - | 41 | |
| 1790 | - | - | 26 | | 1818 | - - | 39 | |
| 1791 | - | | 33 | | 1819 | - - | 42 | |
| 1792 | | - | 81 | M. | 1820 | - - | 46 | |
| 1793 | - | - | 54 | C. | 1821 | - - | 38 | |
| 1794 | - | - | 32 | | 1822 | - - | 35 | |
| 1795 | | - | 14 | | 1823 | - - | 33 | |
| 1796 | - | - | 14 | | 1824 | - - | 39 | |
| 1797 | - | - | 15 | | 1825 | - - | 39 | C. |
| 1798 | - | - | 8 | | 1826 | - - | 48 | M.C. |
| 1799 | - | - | 17 | | 1827 | - - | 30 | |
| 1800 | - | - | 22 | | 1828 | - - | 22 | |
| 1801 | - | - | 23 | | 1829 | - - | 21 | |
| 1802 | - | - | 25 | | 1830 | - - | 21 | |
| 1803 | - | - | 65 | M. | 1831 | - - | 26 | |
| 1804 | - | - | 48 | C. | 1832 | - - | 22 | |
| 1805 | - | - | 33 | | 1833 | - - | 33 | |
| 1806 | - | - | 31 | | 1834 | - - | 40 | M. |
| 1807 | - | - | 28 | | 1835 | - - | 25 | |
| 1808 | - | - | 36 | | 1836 | - - | — | C. |

The letter M indicates the maxima attained by the price, and we see that up to 1803, at least, the maxima occur with great regularity at intervals of ten years. Referring to Mr. Macleod's "Dictionary of Political Economy," pp. 627, 628, we learn that commercial crises occurred in the years 1763, 1772-73, 1783, and 1793, in almost perfect coincidence with scarcity at Delhi. M. Clément Juglar, in his work, "Des Crises commerciales, et de leur Retour périodique," also assigns one to the year 1804. After this date the variation of prices becomes for a time much less marked and regular, and there also occurs a serious crisis about the year 1810, which appears to be exceptional; but in 1825 and 1836 the decennial periodicity again mani-

fests itself, both in the prices of wheat at Delhi and in the state of English trade. The years of crisis are marked with the letter C.

When the above numbers are plotted out in the form of a curve, the earlier part of the series presents the appearance of a saw, with four or five high sharp-pointed teeth at almost exactly equal distances of ten years. The first maximum, that of 1763, is perhaps imperfectly represented, and were the table extended backwards, the true maximum might fall in 1762. It is remarkable that after about the year 1807 the character of the curve suddenly and entirely changes, the oscillations becoming comparatively small, irregular, and rounded, although the periodicity, as already remarked, seems to recur in a less intense degree after 1823. This change in the curve may be due to some local causes, such as the opening of new roads and markets, and it is obviously important that we should learn whether this is the case, or whether some important meteorological variation is here manifested. This is not the only instance in which a well-marked decennial oscillation appears to be for a time suddenly arrested or thrown into confusion.

One difficulty which presents itself in connection with the above table is that the commercial crises in England occur *simultaneously* with the high prices in Delhi, or even in anticipation of the latter; now the effect cannot precede its cause, and in commercial matters we should expect an interval of a year or two to elapse before bad seasons in India make their effects felt here. The fact, however, is, that the famines in Bengal appear to follow similar events in Madras. Thus it is well known that the great famine occurred in the year 1770, or even began in 1769, though it seems not to have made its mark at Delhi until 1773. This quite explains the fact that the English crisis was in 1772-73. Mr. F. C. Danvers, of the India Office ("Journal of Science," N.S., vol. viii. p. 436), assigns famines in the Madras Presidency to the years 1781-83 and 1790-92. In fact Mr. Danvers explicitly points out this tendency of famines to travel northward, saying (p. 441): "It is a point worthy of remark that

severe droughts in Northern India have, on several occasions, followed closely upon distress similarly caused in the Peninsula of India: thus, the Madras famine of 1781 to 1783 was followed by one which affected Bengal, the North-Western Provinces, and the Punjab in 1783-84; the failure of rains which resulted in scarcity in many of the provinces of the Madras Presidency in 1824-25 was followed by a similar calamity in the North-Western Provinces in the succeeding years. The 'Guntoor' famine of 1833 preceded, only by a few years, one which affected the North-West and Lower Provinces of Bengal in 1837-38, and the Madras famine of 1866 was very closely followed by one in the North-West Provinces and the Punjab in 1868 to 1870." We see, then, that in looking for periodicity, we must confine each comparison to events of the same locality. It must also be allowed that the *commencement* of famine in India precedes by about two years the occurrence of commercial collapse in England.

It ought to be added that Everest refers to a journal published at Calcutta, called "Gleanings in Science," which contain (vol. i. p. 368) a table of the prices of various kinds of grain at Chinsurah, in Bengal, from 1700 to 1813. The volume is to be found in the British Museum; but on referring to it and plotting out the curve for the price of rice, it was very disappointing to find the series broken by gaps of several years every here and there, which renders it impossible to draw any safe inference, affirmative or negative. The table is said to have been drawn up by G. Herklots, the fiscal of Chinsurah, from authentic documents. Now, if such documents existed half a century ago, it is indispensable that minute inquiry should be made for any local records of the kind which may still exist.

Returning to the prices at Delhi, and taking the above table in connection with a mass of considerations of which I have given a mere outline at the last meeting of the British Association,* I hold it to be established with a high degree of probability that the recurrence of manias and crises among the principal trading nations depends

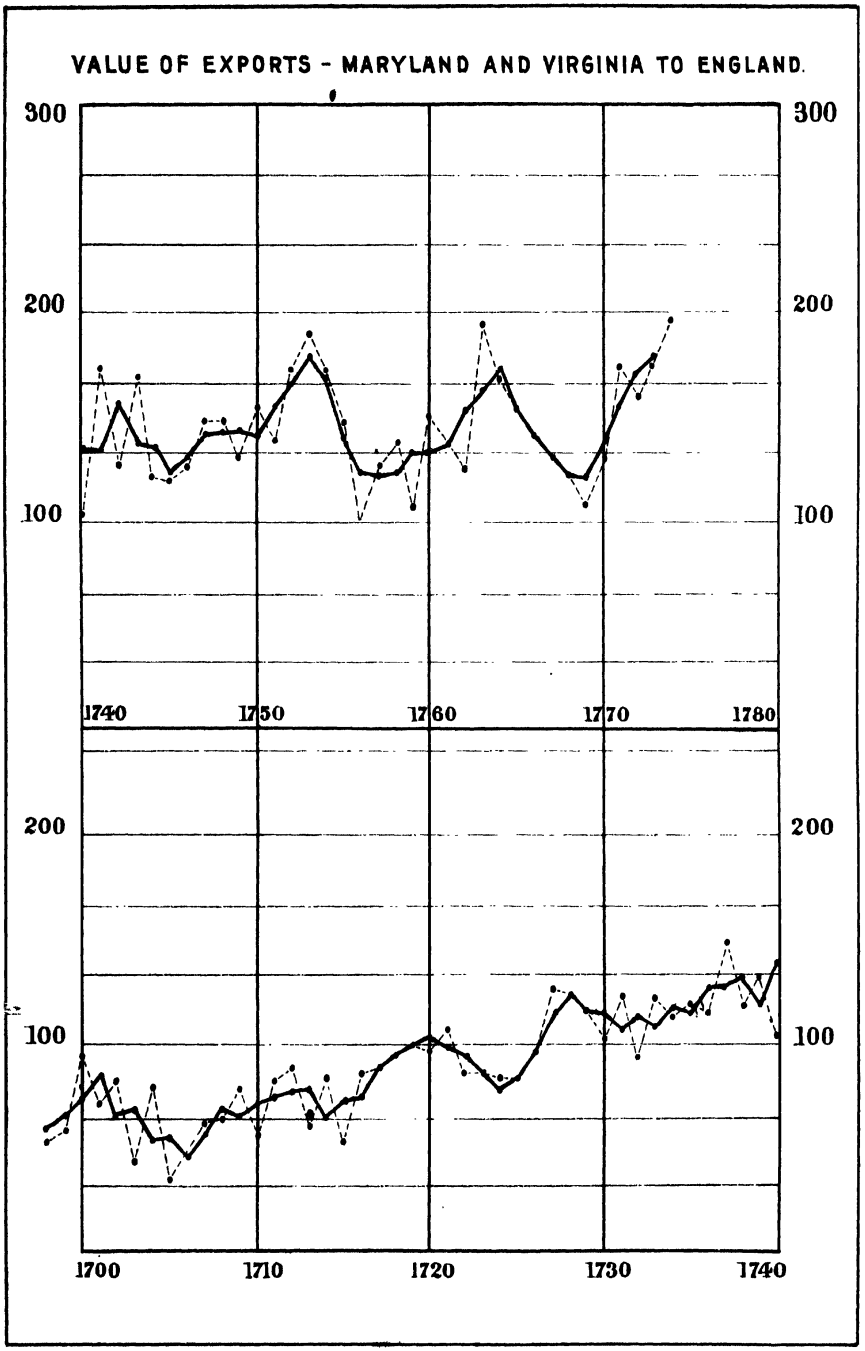
* See above, No. VII., pp. 187-199.

upon commerce with the East. This conclusion is confirmed by the fact that these fluctuations are but slightly felt by the non-trading nations, and that what these nations do feel is easily accounted for as an indirect effect.

It has been objected by *The Economist* that this explanation cannot be applied to the earlier crises in the years 1711, 1721, and 1732, because trade with India was then of insignificant dimensions. But the reading of many old books and tracts of the seventeenth and eighteenth centuries has convinced me that trade with India was always looked upon as of the highest importance. A large part of the political literature of the time was devoted to the subject, and under the Mercantile Theory the financial system of the country was framed mainly with an eye to Indian trade. The published returns of exports and imports probably give us little idea of the real amount of trade, as smuggling was very common in those days, and much of the Indian trade went on secretly in private ships or indirectly through Holland.

Dr. George Birdwood has lately been studying the records of the India Office, and he gives as the result of his extensive reading "that the history of modern Europe, and emphatically of England, has been the quest of the aromatic gum-resins, and balsams and condiments, and spices of India and the Indian Archipelago" ("Journal of the Society of Arts," February 7th, 1879, vol. xxvii. p. 192). This closely corresponds with the view which I have been gradually led to adopt of the cause of decennial crises.

While India is, no doubt, together with China, the principal source of disturbance, there is no reason to suppose that it is the only source. A nearly exhaustive analysis which I have made of the trade of England with various parts of the world during the last century, as given in Whitworth's valuable tables, fails to disclose any clear periodicity as regards European trade. The investigation of various long series of prices of agricultural produce in Europe also leads me to believe that the decennial periodicity, if felt in Europe at all, is overborne by disturbing causes, or involved in too great complication




*The Annual Values, as given in Whitworth's Tables, are represented by the dots: Three Years Averages by the Curve. Scale 300 to £1,000,000.*

to admit of discovery. On the other hand, I have fallen upon the very interesting and significant fact that the export trade from Maryland and Virginia exhibits what seems to me unquestionable periodicity, with maxima in the years 1701, 1711-13, 1720, 1742, 1753, 1764, and 1774. The same tendency is not apparent in the trade of New England. Thus it is likely that crises may have an independent meteorological origin in the semi-tropical States of the Union; and, if so, it is probable that there are other tropical parts of the world where the meteorological conditions allow the cycle to manifest itself. This subject, so far as it has yet been studied, is full of important and mysterious facts, which stimulate the interest of the inquirer in a high degree. At the same time it is plain that sound conclusions can be reached only by most extensive analyses and comparisons of large series of facts. The search for the facts, too, among the records of the last two centuries, the suitable part of which has in too many cases probably perished, is so tedious and disappointing that it taxes the patience of the inquirer very severely. It is no jest at all.

But whatever be the area of the tropical and semi-tropical regions from which the decennial impulse comes, mainly India and China, no doubt, it does not follow that the extent of the commercial mania or crisis here is bounded by the variation of the foreign trade. The impulse from abroad is like the match which fires the inflammable spirits of the speculative classes. The history of many bubbles shows that there is no proportion between the stimulating cause and the height of folly to which the inflation of credit and prices may be carried. A mania is, in short, a kind of explosion of commercial folly followed by the natural collapse. The difficulty is to explain why this collapse so often comes at intervals of ten or eleven years, and I feel sure the explanation will be found in the cessation of demand from India and China occasioned by the failure of harvests there, ultimately due to changes of solar activity. Certainly the events of the last few years, as too well known to many sufferers, entirely coincide with this view.

# IX

# ON THE CONDITION OF THE GOLD COINAGE OF THE UNITED KINGDOM WITH REFERENCE TO THE QUESTION OF INTERNATIONAL CURRENCY*

## I.—*On the Necessity for a Recoinage, and the Introduction of an International Money.*

> All thinges good chepe I trust to se er I dye,
> Coyns, measures and weyghtes in good uniformitie
> Thorow all the world, I trust to se schortely.†

FOR nearly half a century the subject of the metallic currency has been left to slumber. The deficiency and imperfections of the coinage were, in previous years, an ever-recurring matter of complaint, and our libraries bear evidence to the inquiry and thought bestowed upon the removal of these defects by Vaughan, Locke, Lowndes, Newton, Harris, and many less celebrated writers. But now it is the paper currency and the banking system which give rise to endless publications, while the gold and silver currencies are regarded as placed upon an indisputable foundation.

* This paper was read before the Statistical Society of London on the 17th of November, 1868, and was printed in the Journal of the Society for December, 1868, vol. xxxi. pp. 426–64. Part of the substance of this paper, especially of the first section, had been previously communicated to the Manchester Statistical Society, in a paper "On the International Monetary Convention, and the Introduction of an International Currency into this Kingdom." Read May 13th, 1868. Transactions, Session 1867-68, pp. 79–92. To prevent repetition, the Manchester paper is not reprinted in this volume.

† From a ballad of the sixteenth century (printed by Cornelis Woltrop, dwellyng at Saynt Anthonies); pointed out to me by [the late] William Langton. The next line runs—

> Onles that diversitie doth more good, it be true.

There can be no doubt that we are much indebted to the Act of Parliament 56 Geo. III. c. 68 (22nd June, 1816), which still contains the principal regulations for the issue of our coins,* and which was to a great extent based upon the recommendations of Lord Liverpool, in his admirable "Treatise on the Coins of the Realm; in a Letter to the King" (Oxford, 4to, 1805).† Since that Act came into operation both gold and silver coins have been issued, year after year, with hardly any intervention or change, excepting a very partial recoinage in 1841-43, so that we now have a circulation of coins extending in almost unbroken succession over more than fifty years.

I shall have, however, to point out that the present law concerning the gold currency does not really work so perfectly as is supposed. It may possess a certain theoretical perfection, but in practice it has broken down, and it now fails to prevent our gold coinage from becoming seriously worn and depreciated. Although the Mint has coined, since the beginning of 1850, the enormous sum of ninety-eight millions sterling, more than half of these coins have become a prey to bullion dealers and exporters; and these vast issues have not had the effect of driving out of use the worn coins of earlier years. Some changes of the law, or some very decided intervention of the State, can alone succeed in restoring to our standard of value its boasted perfection, or can prevent it from becoming gradually depreciated still further.

It happens, moreover, that while intrinsic motives are arising for some alteration of our Mint regulations, the project of an international money, now for the first time put forward in a feasible shape, affords the strongest reason why we should reconsider our position in an enlightened spirit. The Royal Commissioners lately

* The whole statute law relating to the Mint and the metallic currency has since been consolidated in the 33 & 34 Vict. c. 10, "An Act to consolidate and amend the Law relating to Coinage and Her Majesty's Mint" (Robert Lowe's Act), from which may be learnt in the clearest way the conditions under which our coins are made, issued, and withdrawn. All previous statutes on the subject are at the same time repealed.

† Since reprinted at the press of the Bank of England, 8vo., 1880, Effingham Wilson.

appointed for the purpose have allowed, in their somewhat ambiguous report,* the extreme utility of an international money, but have pointed out certain technical difficulties which must, in their opinion, prevent this country from taking any steps to promote this truly grand scheme, unless after much further deliberation. I do not hesitate to say that these difficulties are wholly imaginary, and arise either from a misapprehension of the theory of value, or from the difficulty of overcoming the prejudices of a state of things now likely to pass away. I feel sure that there is no obstacle that need prevent us from joining the international monetary convention. This step would at once place the realisation of a world-wide money beyond doubt; and it might be made without in the least disturbing the standard of value in this kingdom, or occasioning any breach of contracts or alteration of accounts. A concurrence of circumstances truly remarkable renders it almost indispensable that we should make the change required; and I undertake to show that, instead of occasioning cost and difficulty, the trifling alteration of the sovereign is the only mode by which we can impart practical as well as theoretical perfection to our system of metallic currency.

The change which is pressed upon us by so many considerations is of the simplest possible character, and consists merely in the Mint undertaking to coin gold sovereigns for the future nearly 1 per cent less heavy than at present, this quantity of gold to be appropriated as a mint charge in order to cover the cost of coinage and maintenance of the currency.† We should thus secure the following remarkable series of advantages:

1. Our sovereign being assimilated in value and weight

* Report from the Royal Commission on International Coinage; together with the Minutes of Evidence and Appendix. Presented to both Houses of Parliament, etc. London, 1868. Session 1867-68, No. [4073]. Report, p. vii.

† For the details of this scheme I must refer to the privately-printed pamphlet of Mr. Hendriks, in which it was, I believe, first advocated in this country, or to the very able evidence and memoranda of Mr. S. Brown, Mr. Hendriks, and Colonel J. T. Smith, printed in the recent report of the International Coinage Commission. See Questions 266-361, 840-1117, 2173-2290, and pp. 142-53.

to a 25-franc piece, would at once become the current coin of the world, and being issued chiefly from British, American, and French mints, a world-wide gold currency of unimpeachable fidelity and excellence would be obtained.

2. As the sovereign would soon become current in all civilised countries, it would no longer be necessary, in making remittances, to melt the coin and have it recoined at considerable charge in a foreign mint. The foreign exchanges would then be more quickly and accurately adjusted than at present, and our standard of value, instead of being impaired, would really become more perfect.

3. The questionable practice of picking the heavy sovereigns for remittance or for melting, which is now universally practised, would be almost entirely prevented, and we should no longer stand in the absurd position of coining many millions of sovereigns which pass almost immediately to the melting-pot.

4. The Government being relieved, without cost to anyone, of the expense of coinage, might very properly take upon themselves the cost of withdrawing improperly light coins, the circulation of which is liable to occasion most unjust loss and inconveniences under the present law.

As the Royal Commissioners do not deny the advantages of an international currency, I shall confine myself mostly to meeting the supposed difficulties and the real prejudices which stand in the way of the realisation of this scheme.

The most formidable of these prejudices, I conceive, arises from our national pride in the fact that the sovereign is known and respected in almost all parts of the world, and is the actual currency of some foreign countries, such as Portugal, Brazil, and Egypt. Our present system of free coinage tends, it is supposed, to promote this diffusion of British coin, and the cost of coinage is regarded as a trifle compared with the dignity of this position. We overlook the fact, indeed, that we probably bear the expense of the wear of sovereigns in all parts of the world; for about a million and a-half sterling of British coin is reimported every year on an average, according to the Custom House returns. This coin will include at least

an average proportion of light coins, while it is certain that the coins exported consist almost entirely of heavy coins. The home circulation thus becomes the sink into which all light coins readily find their way, to our cost.

Supposing, however, that the diffusion of the greatest quantity of British coin over the world is a worthy object, shall we not best attain it by entering the convention? Surely it is we who will become by this step the great producers and distributors of the coinage of the world. As we strive, by opening our ports and accommodating our productions to foreign use, to render this island the great depôt and manufactory of the world, so we shall, by rendering our coinage fit for foreign circulation, acquire a nearly complete ascendency in the specie and currency trade. In Australia, in New Zealand, and probably in South Africa, we hold the most productive gold-mines of the world, and of what is produced elsewhere a large part passes directly to London, the monetary centre of the world. We shall therefore become, without doubt, the greatest coiners. The possessors of California, it is true, will be our partners in this monopoly, but they are friends whom we can trust to coin as faithfully as ourselves. British mints, therefore, in company with Anglo-American mints, will become to the gold currency of future years even more than the mints of Spain, and Peru, and Mexico have been in past years to the silver currency. The Spanish dollar has long been the most esteemed of all coins, and has even circulated in this country within the present century.* But gold is now definitively taking the place of silver, and some kind of gold coin must take the place of the dollar. If we are not misled by foolish pride, we shall take, while we can yet do it with a good grace, the step of adapting our sovereign to become the new gold currency of the world.

I may add, that if we place any opposition or obstruction in the way of the International Monetary Convention, they have a most justifiable and powerful weapon ready to

* Spanish dollars were issued from the Bank of England, March 10th, 1797, the value being 4*s.* 9*d.* each. They were recalled in October of the same year.

ensure our defeat.* It is only necessary for the continental nations and the United States to issue, as is already proposed, a piece of 25 francs in order to supplant the sovereign. As the new coin would have the value of a well-worn sovereign, it would soon be accepted in place of the sovereign in all foreign countries and in our colonies, if not at home. At the same time, the difference of value, being about 2*d.* in the pound, would ensure the melting of all new sovereigns in preference. Thus, however many sovereigns are coined, we should never succeed in dislodging the 25-franc piece from circulation. More even than at present, our British mints would perform the labours of the Danaïdes—ever pouring forth new and beautiful coin, to disappear at once into the bullion dealer's crucible. The sovereign would be an evanescent coin, constantly liable to be recoined with the permanent impress of a foreign mint. Common sense, as well as invariable experience, tell us that we must be worsted in this contest of the heavier and the lighter coins.

But the great bugbear which appears to have deterred the Royal Commission from recommending the slightest change in our currency laws, is the supposed injury to the theoretical perfection of our standard of value. If, on the one hand, we lower the sovereign without imposing an equivalent mint charge, we violate all contracts, and degrade the old standard to the extent of 2*d.* I need hardly stay to point out how easily all home contracts, of any considerable amount, could be readjusted by law, the alteration of accounts being no more difficult than that performed frequently in the case of the income-tax. As regards smaller payments, which cannot be so readjusted,

* The German Imperial Government has since cut the ground from under the scheme of international money by the method here indicated. The new gold mark was so defined that the 20-mark piece contains 7.17 grammes of pure gold, of the value of 19*s.* 7*d.* in our money. The following comparison shows the quantity of pure gold contained by the principal gold coins:

| | Grammes. |
|---|---|
| American 5-dollar piece, or half-eagle | 7.58 |
| English sovereign | 7.32 |
| Proposed 25-franc piece | 7.26 |
| German 20-mark piece | 7.17 |

it might surely have been noticed, that an exact adjustment of price is hardly ever attempted in such cases, the nearest round number of shillings or pence being arbitrarily chosen. Tolls, cab fares, many railway fares, entrance fees, etc.—in short, almost all small customary charges of a fixed character, are never calculated so as to meet the exact average cost, which, indeed, could seldom be done. An approximate round number is chosen with a view to convenience, and profit and loss are left to adjust themselves. To the same natural adjustment might be equitably left the very small arbitrary change of 2*d.* in the pound.

But all inconvenience or injustice arising from the change of the sovereign might be entirely avoided by the imposition of a seignorage, or mint charge, equal in amount to the value of the gold subtracted. This seignorage is really desirable on several other distinct grounds, but it is condemned by the Commission, as tending to destroy the theoretical perfection of our standard of value. With all respect to the eminent members of this Commission, I must hold that some of them have lost their way in the intricacies of the theory of value. Questions were even asked which implied that value was something inherent in a coin, like its colour or its weight, so that the value must be reduced with the weight.* This is a radical misapprehension, which must prevent any clear or sound conclusions on the subject.

To understand the point in dispute, we must remember that there is no such thing as value intrinsic in any commodity, but that, in an economic sense, the values of two things merely express the ratio in which they do as a fact exchange for each other.† Thus if, *de facto*, 100 ounces of gold are taken to the Mint every day, and 99 ounces of coin received back in exchange, this would actually establish the fact that 99 ounces of coin have the same value, at the time and place in question, as 100 ounces of gold. Since the facilities of transit render the values of bullion and coin sensibly the same all over the

* Questions 2091–95, and elsewhere.

† See "The Theory of Political Economy," as before cited, p. 82; 3rd ed., p. 78.

country, it follows that as long as there is any demand for coin at the Mint, the relative values of gold and coin are defined by the Mint ratio of exchange. The value of the coin, compared with bullion, cannot be raised above this rate without the Mint being set to work to restore equilibrium. On the other hand, the value of coin cannot fall unless there be already a superabundance of it, so that the Mint is stopped working. In this case the value of the coin may undoubtedly decline more or less, provided that there are persons who wish to have gold in the form of bullion rather than in that of coin. If the comparative values were altered more than 1 per cent, it would become profitable to make the reverse exchange by melting the coin into bullion. But why should bullion be wanted and not coin? At present bullion is wanted because our coins cannot be used to make payments in foreign countries where they are not current, and they therefore lose, on passing our shores, whatever value may attach to them as coins. But the proposition of an international money altogether alters the conditions of the argument. Should our coins be current abroad, and should foreign mints charge a seignorage exactly equal to ours, as is proposed, then it must happen that when we have to make a payment abroad, or, in other words, to add to the currency of that country, our coins will bear there the same premium over bullion for that purpose which they have here. The reduction of coin into bullion would then necessarily produce a loss, and would only be resorted to for exceptional purposes.

So imbued are we with the prejudices and imperfections of our present system, that we cannot easily conceive the natural result of introducing an universal money, namely, that gold and silver would be almost wholly held in the form of coin. Certain small supplies of bullion would, no doubt, be convenient for goldsmiths and silversmiths, gilders, and other artisans who consume the precious metals; but in respect to its main employment, it would be found almost always advantageous to convert gold into coin at the first opportunity, since its value is thereby exactly ascertained, and all future expenses for melting and assay would be avoided.

It is now apparent that our standard of value will be improved instead of being injured by the proposed arrangements. For at present, when the exchanges are against us, our currency must always be liable to fall in value to the extent of the mint charge in foreign countries, in addition to the costs of transit. But in the proposed international system, the coins having already paid the mint charge, will effect payments abroad without any depreciation.

One paragraph in the report of the Commissioners betrays confusion of thought, for they say: "If the new sovereign, containing only 112 grains of fine gold, retains, in consequence of the imposition of a seignorage, the value of the old sovereign, it would retain its superiority in value over 25 francs. If it is equal in value to 25 francs of the present French currency, it would not be equal in value to the existing sovereign." *

But it is apparent that at present, in the absence of international currency, we measure only the gold in our sovereign against the gold in 25 francs, and, in calculating the par, no account is taken of the mint charge in France, which is an uncertain quantity. The fact has even come out during the controversy, that the true pars of exchange are not accurately ascertainable in the absence of precise information concerning the mint charges in different countries.† No exact comparison can at present be made between the value of the franc *plus* a mint charge, with the sovereign without a mint charge. But it is indisputable that if both coins and mint charges are exactly assimilated, there will be no difference in value possible between the currencies of France and England, except such as may arise from the natural variation of the exchanges; and this will be restricted within the very small cost incurred by the transmission of specie.

* Report, etc., p. xiii.

† See a statement by Mr. Hendriks, who throws great light upon this subject in the "Report of the International Coinage Commission," p. 142. Mr. E. Seyd, in a pamphlet published since this paper was written, attempts to show that the cost of converting gold bullion into coin is usually higher in London than in Paris. Much new technical information concerning the bullion trade is contained in Mr. Seyd's work on "Bullion and Foreign Exchanges."

The grounds on which a mint charge has been hitherto opposed in England, are stated in the clearest manner in Lord Liverpool's treatise, and are four in number:

1. Because the principal measure of value would not in such case be perfect.

2. Because merchants in exporting the coins would lose the mint charge, and would raise the price of foreign goods in order to transfer the loss to consumers.

3. Because a reduction in the weight of the sovereign would be necessary; and, consequently,

4. A recoinage would be requisite.

But when Lord Liverpool set forth the above objections he had no thought of an international money, which is a condition changing the whole grounds of the question. It is apparent that merchants will not lose the mint charge if they send abroad coins which are equally current there as here; that, therefore, the whole necessity for the reduction of coin to bullion, will disappear, and the coin, minted under uniform conditions, will form as perfect a measure of value for the future as bullion or freely-coined gold has been in past confusion of currencies. I may say, with confidence, of Lord Liverpool, what he has said of Locke:* "The state of the coins of the kingdom is wholly changed from what it was when he considered this subject: it is probable that, if this great man had lived to the present times, he would have been sensible of the change: he would have applied his principles to the facts as they now exist, and would have drawn his conclusions in conformity to them."

It will be noticed that, in addition to theoretical reasons, which operated against the expediency of imposing a mint charge in Lord Liverpool's days, but which will vanish when coins are of international currency, there were in those days two strong practical difficulties—namely, that a reduction of the weight of the sovereign and a recoinage would be requisite. But it so happens that this reduction of the sovereign is the very thing we now want to effect,

* "Treatise on the Coins of the Realm," p. 172; Bank of England reprint, chap. xx. p. 191.

and the mint charge is recommended as a mode of effecting it without trouble. The first three of Lord Liverpool's objections having been completely reversed, it is truly strange to find that the fourth has suffered the same fortune by the lapse of time. The expense of recoinage is not incurred, but is positively saved by our accepting the proposal to assimilate our sovereign to a 25-franc piece.

The free mintage system and the other provisions of our present currency law are gradually landing us in a position of much difficulty. The law at present holds that the sovereign is not legal tender unless it weighs at least 122½ grains; and as a kind of legal fiction, every person is supposed to have by him, whenever he receives gold coin, a pair of scales capable of detecting light gold. Every person must bear the loss if he receives a coin which is afterwards rejected as too light, and the Government declines all responsibility concerning the weight of gold coin when once in the hands of the public. But the weighing of coin is so generally troublesome, if not impracticable, and even the refusal, much more the cutting of a light coin, would so often be considered a discourteous act, that the practice is almost entirely abandoned by the public. Such banks and railway companies as cannot altogether avoid loss on this account, prefer to bear it rather than cause inconvenience to their customers; but almost everybody manages to put off the loss by passing on the light coins. The Bank of England and its branches and a few Irish banks alone observe the law with rigour. The natural consequence is, that all experienced persons, in making payments to the Bank of England, keep back worn sovereigns with great care, and the Bank is rendered powerless to withdraw an adequate quantity of light money. Thus it arises that there is a mass of about 20,000,000 light sovereigns and £5,000,000 or £6,000,000 in value of half-sovereigns circulating in defiance of the law. This light coin forms almost a third part of the sovereign circulation, and nearly a moiety of the half-sovereign circulation; but, being unequally distributed, we find that in some of the agricultural districts the proportion of light sovereigns rises to 44 per cent. The average deficiency of weight

of the sovereigns, as I shall show, is fully 0.53 per cent, or more than 10*s.* in £100, while the half-sovereigns are depreciated more than twice as much, or by about 22*s.* in £100.

Much evil and injustice arise from this discreditable state of our metallic currency. The public having universally abandoned the weighing of coins, the burden of the light gold is most unequally borne, and falls chiefly upon the districts where coin tends to accumulate. I shall give evidence tending to show that new coin is mostly distributed in the manufacturing districts, where there is always a want of coin for the payment of wages. In such parts little or no loss from light gold is encountered. But there is a strong tendency for the coinage to migrate into the agricultural districts, and a plethora of gold presses upon the banks which serve such districts. The loss incurred in remitting this surplus of gold to London would be of a serious amount, were not the practice universally adopted, in such circumstances, of picking out the new Victorias for remittance, the old worn coin being put into circulation again as soon as possible. This process of sieving and picking, through which the gold coin is perpetually passing, is not only a source of labour and trouble, but is of questionable legality and expedience. And though most bankers may thus succeed in escaping loss, the weight falls all the more unfairly upon those who happen to have too great a plethora of coin. Thus, I have unquestionable information that one large banking establishment lost in this way, during the year ending 30th September, 1868, the large sum of £6716, and this, I am assured, is in addition to "a large loss in interest on the stock we keep, so as to avail ourselves of any opportunity of placing the coin in circulation." As the average loss upon the light gold sold as bullion by this bank was 1.363 per cent, it would evidently be better to keep the coin on hand for many months at the present rate of interest, provided it could be ultimately pushed off into circulation. I apprehend, too, that the lightness of the coin must restrict the use of Bank of England notes in some districts; for the loss of interest on a bank reserve will be the same

whether it be held in notes or coin. Thus many banks which have a surplus of gold will hold it for the chance of being able to pay it away to the public rather than bear the loss on the light coin in replacing it by notes, as might otherwise have been done to the convenience of every one.

This is a weak statement of the evils which follow from the worn condition of our gold currency. I feel sure that as soon as public attention is called to the subject, it will be found impossible to deny the necessity for a recoinage, similar to that of 1841-43, but on a more extensive scale, which shall restore to our circulating medium its due weight and perfection. Twenty-five years have elapsed since the Government last undertook the charge of withdrawing light coin; and, though the Bank of England has continued to withdraw annually about half a million, or in the last few years rather more, this is wholly inadequate to repair the accumulated wear of a great currency. Assuming, then, that the Government must, before long, undertake the charge of a recoinage, let us consider the comparative cost under the old law and under the proposed new system.

The sovereigns in circulation amount, as I shall show, to 64,500,000 at the most, of which $31\frac{1}{2}$ per cent are below the legally current weight. In short, about 20,000,000 of sovereigns require to be withdrawn if we desire to maintain the credit of our currency on its present footing, together with 11,500,000 of half-sovereigns, or in all 31,500,000 coins. The cost of this recoinage, as afterwards shown, may be estimated at £348,000. Regard it how we will, this is a sum which, if we maintain our present law, must be paid either by individuals in an arbitrary and unjust method of taxation, or by the Government in a more equitable manner.

But now let us see how legitimately and easily we may make use of the present circumstances of our circulation to assist in the beneficent scheme of an universal money.

Judging from the age of the present circulation of sovereigns, which is a pretty sure guide to the weight, as

subsequently shown, I estimate their relation to the weight of the 25-franc piece as follows:*

| | Per cent |
|---|---|
| Too heavy to pass as 25-franc pieces | 70 |
| Of proper weight | 25 |
| Too light | 5 |
| | 100 |

In introducing the new sovereign, the 25 per cent of the old ones which are of proper weight would, of course, be left untouched for the present. The 5 per cent of lighter ones might also be left; they would, by degrees, fall into the Bank of England in the ordinary course of business, because the practice of picking the coins would doubtless be abandoned. The remainder of the sovereigns in the hands of the public, with all the new coin in the Bank, might be recoined at a convenient rate, and the quantity being 48,500,000 at the most, could be reissued, if necessary, in three years, at a cost of about £65,000. The excess of weight of the old sovereign over the new coin would yield a sum of £280,000, which, if secured in the form of a mint charge, would constitute a net profit to the Government of £215,000. This recoinage might be carried out by the Mint buying up each sovereign with a new 25-franc piece, appropriating the difference of weight as a part of the intended mint charge of 1 per cent. The full charge would, of course, be imposed on any bullion brought for coinage, so that the new coin would at once have, for home circulation, exactly the same value as the old sovereign. There would be no necessity, indeed, for the Mint to make any unusual recoinage at all, except for the purpose of securing the profit, and only just such coins

* The standard weight of the 25-franc piece of gold, eleven-twelfths fine, is taken at 7.9179 grms. (122.19 grains), with a mint allowance of + or − 2 per mille, and an allowance for wear in addition of − ½ per cent. The higher and lower limits of currency are thus 7.9337 and 7.8625 grms. In the "Transactions of the Manchester Statistical Society," 1868, p. 88, I have given a somewhat different statement, on the supposition that ½ per cent deviation from the standard, in excess or defect, might be allowed.

as would return an adequate profit need be withdrawn at first. For years to come the exporters and melters of the coinage will doubtless operate as they have been accustomed to do, and the real establishment of an universal money must take many years to effect. To them it might be left to clear off such sovereigns as the Mint could not recoin with advantage. In fact, as the whole change of weight lies well within the limits of weight of the money now in familiar use, the public need never feel that any change is being made at all, except by noting the improved appearance of the new coins.

The half-sovereigns might for a time be left untouched, as they would, to a great extent, be of a proper weight to pass as 12½-franc pieces, and would be required only for home use.

The total difference, then, of the two modes of effecting a recoinage is a possible profit of £215,000, instead of a certain loss of £348,000; in all a difference of more than half a million. In imposing a mint charge, however, the Government might most properly prevent the coinage falling again into its present discreditable state by undertaking to withdraw constantly, at its own cost, a certain amount of light gold. The loss would be more than covered by the mint charge on an average of years; and, as British mints would coin for other countries more than they would coin for us—as we, in fact, should levy considerably more revenue at our mint than they at theirs, we need not fear being improperly burdened with loss on worn coin. Some international agreement might become necessary as to the equitable distribution of this loss; but it is certain that we need no longer pay out of our own pockets, as we at present do, both the cost of coinage and the cost of the wear of coin circulating in several foreign countries and many of our own colonies.

Whatever it may have formerly been, our free coinage system will for the future be reduced to a complete absurdity, and can be supported only by unreasonable prejudices. It was long ago described by Sir Dudley North as "a perpetual motion found out, whereby to melt and coin without ceasing, and so to feed goldsmiths and

coyners at the publick charge;" and such it continues to the present day. It is condemned by the experience of all foreign governments which have tried it, nor is at all defended by our greatest economists. Adam Smith, Ricardo, Tooke, J. S. Mill, and many others agree in regarding a small mintage as a sound and desirable imposition. Not only is the present Master of the Mint* clearly in favour of a mint charge, but I learn from correspondence of the year 1852, published in the Report of the International Coinage Commission,† that Sir John Herschel, while Master of the Mint, had formed a strong opinion against the present system, and had most clearly and forcibly pointed out the evils and absurdities into which it leads us.

The time is come, then, for us to make that slight alteration in the law of 1816 which shall both remedy the technical imperfections in our currency and secure to ourselves and to the world a boon which we could hardly have conceived to be possible a few years ago. Our main object should be to aid in the establishment of an universal money, which shall furnish every nation with a sure standard of value and an uniform medium of exchange. Had we, in pursuit of so great an end, endured some inconvenience at home, we should find ourselves amply repaid by gain abroad. Our interests are in every part of the world; our traffic is with every country both civilised and uncivilised. With far-sighted policy we have promoted free exchange of commodities with all the world; but our financiers are unable to perceive that a similar policy in regard to money is a natural and necessary corollary. It is well to have good currency at home, but to our foreign trade it is equally important that there should be good currency abroad. The calculations of profit must be based upon one as much as upon the other. At present the calculations of the foreign exchanges require great skill and experience, and foreign merchants are generally superior to our own in the mysteries of commercial

* The late Professor Thomas Graham. See Report of the Commission on International Coinage.

† Appendix No. XXIII. Report, pp. 324–38.

arithmetic. It was given in evidence* that shippers of goods, even to some parts of the Continent, have to charge a small advance of price to cover their uncertain knowledge of the foreign money, and in other parts of the world the confusion and imperfections of the currency are far worse.

All this will be gradually changed if we join the Monetary Convention, and adapt our sovereign for foreign circulation; for we shall bring with us our great system of trade, our many colonies, and in time the currency of our Indian dependency. The United States will decide the question as regards North America; and the new "sovereign," as we might continue to call it, becoming current in all civilised countries, would soon find its way to every part of the globe. It will form an accurate term of comparison, and might eventually compose the mass of the currency; at the same time our home circulation will be improved without the least trouble or cost, and no prejudice will be done to the future introduction of a decimal system. It would be an act of the greatest folly in us to make any radical alteration in our fractional money before the future unit of the Monetary Convention should have been chosen. This unit will certainly be in a simple ratio with the franc, so that the assimilation of the sovereign to the 25-franc piece will be the first and most judicious step towards obtaining decimal money.

In the following parts of this paper I shall give the details of an investigation into the quantity and condition of our gold currency, upon which many of the preceding estimates and arguments are founded.

## II.—*An Inquiry into the Amount and Age of the Gold Currency.*

In order to ascertain as precisely as possible the amount and condition of the gold currency, I have lately carried out an inquiry into the composition of that currency as

* Report, Questions 89–107, 275–84, 433–35; Bagehot, 1977–80; and elsewhere.

regards age. It occurred to me that if the comparative numbers of sovereigns of different years' coinage now in circulation were determined by a kind of partial census, not only might some new facts come to light, but data would be obtained for solving several important problems. The amount of the currency might thus, as it seemed to me, be estimated with more certainty than has hitherto been possible; for it necessarily happens that the coinages of recent years are less diminished by exportation, melting, or loss than those of earlier years; and as there are no reliable data for estimating the great quantities of coin thus subtracted from our circulation, the only resource is to eliminate these quantities, as far as possible, from our calculations. Now this can be done by taking the coinages of recent years as a measure to apply to the whole currency; for just as we estimate the length of a room by trying how many paces are required to compass it, although we do not know with perfect accuracy the length of a pace, so I thought that the number of coins of a few recent years now in circulation, although not known with much precision, would yet be the best standard of measurement. This is no new method of estimation in statistics, but it has not hitherto been applied to this subject with care.

To carry out this notion, I distributed copies of a circular letter and a blank form to many bankers and other gentlemen, requesting them to take one or two hundred pounds in sovereigns, and half the amount in half-sovereigns, from gold received in the ordinary course of business, and to cause the numbers of coins of each date to be counted and stated in the form. The aid thus requested was furnished with a readiness which I had no right to expect, and which I cannot sufficiently acknowledge. Not a few gentlemen, on becoming acquainted with my purpose, procured very extensive returns,* and the final result was that this kind

* I am especially indebted to the Governor of the Bank of Scotland for an enumeration of 48,647 coins at the various branches of that bank. The general manager of the London and Westminster Bank most kindly forwarded me a similarly complete return for his district. Messrs. Biddulph and Wood, of Swansea, procured me many valuable returns from the banks and large works in that neighbourhood. To the following gentlemen I am indebted for special

of census of the gold coinage was extended over one-sixth of a million of coins thus composed:

| | |
|---|---|
| Number of sovereigns enumerated - - | 90,474 |
| „ of half-sovereigns enumerated - | 75,036 |
| Total number - - | 165,510 |

At least one gold coin in every six hundred now existing in this country was, on the average, enumerated; and as there were 321 separate returns received from 213 distinct towns or localities, including almost every place of commercial importance, it may be allowed, I think, that sufficient data were acquired for determining the average character of the circulation.

A complete reduction of these returns yields the following table of the comparative numbers of sovereigns and half-sovereigns of each year's coinage found in 100,000 coins; for sake of comparison, the actual number of coins issued in each year is added. Some real and some apparent inaccuracies in the table are explained farther on in this paper (pp. 255-6, 271):

I will describe, firstly, the results to which this census leads as regards the magnitude of the circulation. We observe in the following table that out of every 100,000 sovereigns now in circulation, 18,671 sovereigns are found on an average to bear the dates 1863 or 1864. Though the proportion of such coins undoubtedly varies in different localities, I feel certain, after drawing up many averages, that this proportion must be very near the truth. We may say, therefore, with confidence, that the whole circulation of sovereigns is $\frac{100,000}{18,671}$, or 5.356 times ($5\frac{1}{3}$) as great as the number of sovereigns of 1863-64 now in the hands of the people. But the whole number of sovereigns coined in those years, as stated in the table, amounts to £14,578,000.

aid in procuring the larger enumerations: Mr. Walliker, postmaster of Hull; Professor J. E. T. Rogers; Mr. John Mills and Mr. Thomas Browning, of Manchester; Sir John Lubbock; Mr. J. L. Sargant, Messrs. Chance Brothers, and Mr. Joseph Chamberlain, of Birmingham; Mr. J. Pilling, of Stafford; Mr. Eugene Bean, of York; Mr. J. H. Barber, of Sheffield; and Mr. Henry Haley, of Halifax.

*Census of the Gold Coinage.*

| Year of Coinage. | Sovereigns. | | Half-Sovereigns. | |
|---|---|---|---|---|
| | Number Issued from the Mint. [000's omitted.] | Number now existing in 100,000 Sovereigns circulating. | Number Issued from the Mint. [000's omitted.] | Number now existing in 100,000 Half-Sovereigns circulating. |
| 1817 - | 3,235, | 198 | 2,080, | 384 |
| 1818 - | 2,347, | 8 | 1,030, | 136 |
| 1819 - | 4, | 1 | — | 3 |
| 1820 - | 932, | 308 | 35, | 43 |
| 1821 - | 9,405, | 738 | 231, | 8 |
| 1822 - | 5,357, | 485 | — | 8 |
| 1823 - | 617, | 87 | 224, | 35 |
| 1824 - | 3,768, | 334 | 592, | 167 |
| 1825 - | 4,200, | 1,239 | 761, | 247 |
| 1826 - | 5,724, | 2,201 | 345, | 181 |
| 1827 - | 2,267, | 915 | 492, | 172 |
| 1828 - | 386, | 38 | 1,245, | 430 |
| 1829 - | 2,445, | 1,057 | 4, | 12 |
| 1830 - | 2,388, | 843 | — | 11 |
| 1831 - | 599, | 428 | — | 1 |
| 1832 - | 3,737, | 1,718 | — | 8 |
| 1833 - | 1,225, | 645 | — | 16 |
| 1834 - | — | 15 | 134, | 4 |
| 1835 - | 723, | 340 | 773, | 542 |
| 1836 - | 1,714, | 937 | 147, | 113 |
| 1837 - | 1,173, | 1,080 | 160, | 148 |
| 1838 - | 2,719, | 750 | 273, | 250 |
| 1839 - | 504, | 223 | 1, | 53 |
| 1840 - | — | 8 | — | 67 |
| 1841 - | 124, | 109 | 509, | 774 |
| 1842 - | 4,865, | 3,057 | 2,223, | 4,654 |
| 1843 - | 5,982, | 3,298 | 1,252, | 1,277 |
| 1844 - | 3,000, | 1,918 | 1,127, | 2,796 |
| 1845 - | 3,801, | 2,178 | 888, | 645 |
| 1846 - | 3,803, | 1,987 | 1,064, | 2,395 |
| 1847 - | 4,667, | 2,797 | 983, | 897 |
| 1848 - | 2,247, | 685 | 411, | 885 |
| 1849 - | 1,755, | 898 | 845, | 1,912 |
| 1850 - | 1,402, | 1,285 | 180, | 438 |
| 1851 - | 4,014, | 1,756 | 774, | 1,649 |
| 1852 - | 8,053, | 4,082 | 1,378, | 2,559 |
| 1853 - | 10,598, | 6,536 | 2,709, | 8,400 |
| 1854 - | 3,590, | 2,277 | 1,125, | 253 |
| 1855 - | 8,448, | 4,020 | 1,120, | 7,606 |
| 1856 - | 4,806, | 2,831 | 2,392, | 4,374 |
| 1857 - | 4,496, | 3,200 | 728, | 2,804 |
| 1858 - | 803, | 1,060 | 856, | 2,412 |
| 1859 - | 1,548, | 1,565 | 2,204, | 9,560 |
| 1860 - | 2,556, | 3,070 | 1,131, | 4,185 |
| 1861 - | 7,625, | 5,226 | 1,131, | 4,438 |
| 1862 - | 7,836, | 7,005 | — | 550 |
| 1863 - | 5,922, | 8,202 | 1,372, | 5,281 |
| 1864 - | 8,656, | 10,469 | 1,758, | 7,538 |
| 1865 - | 1,450, | 1,437 | 1,835, | 9,005 |
| 1866 - | 4,047, | 2,774 | 2,059, | 7,542 |
| 1867 - | — | 63 | 993, | 1,054 |
| Australian | — | 1,619 | — | 1,078 |
| Totals - | 171,563, | 100,000 | 41,574, | 100,000 |

The whole of this sum had not indeed passed into circulation in March last, when the enumerations were for the most part made; for according to information furnished to me by the Governor of the Bank of England, through the kind aid of Mr. Alfred Latham, one of the Directors, it appears that the Bank held the following quantities of sovereigns:

| | £ |
|---|---|
| Sovereigns coined in 1864 | 600,000 |
| „ „ 1865 | 500,000 |
| „ „ 1866 | 2,300,000 |
| Australian Gold | 100,000 |
| Total unmixed coin | 3,500,000 |
| Mixed sovereigns received from circulation | 2,600,000 |
| | £6,100,000 |

Inasmuch as 600,000 sovereigns of the coinage of 1864 were thus lying in bags as received from the Mint, they cannot have contributed anything to the proportions shown in my census. The quantity of sovereigns of 1863-64 in the hands of the public cannot, therefore, exceed £14,578,000 minus £600,000, or just about 14,000,000, and as the whole of the mixed circulation of sovereigns is 5⅓ times this quantity, it is thus ascertained not to exceed 75,000,000. In this quantity are included all masses of sovereigns which do not greatly differ in age and composition from the general average as shown in my census. I have no reason to suppose that bags of unmixed coin as issued by the Mint, or other peculiar parcels of coin, exist anywhere in considerable quantities, except in the Bank of England, where they amounted in March last, as already stated, to 3,500,000. Adding in this sum, we find that the total stock of sovereigns in this country cannot exceed:

| | £ |
|---|---|
| Mixed coin of various age | 75,000,000 |
| Undistributed coin | 3,500,000 |
| Total | £78,500,000 |

By a similar calculation, I have determined that the number of half-sovereigns cannot be supposed to exceed 24,000,000, or £12,000,000 in value; for it will be learned, from the enumeration of 75,036 half-sovereigns, that 12,819 out of every 100,000 in circulation are found to be of the coinage of 1863 and 1864. In other words, the whole circulation of half-sovereigns cannot exceed $\frac{100,000}{12,819}$, or about eight times the whole coinage of half-sovereigns in 1863-64. Now, as the coinage of these years amounted to £1,565,000 (3,130,000 pieces, see table, p. 241), we have only to multiply this by 7.8, and we then ascertain that the total number of half-sovereigns cannot exceed about £12,000,000.

The whole circulation of gold in the United Kingdom cannot, therefore, exceed:

| | £ |
|---|---|
| Sovereigns | 78,500,000 |
| Half-sovereigns | 12,000,000 |
| | £90,500,000 |

This sum, however, is *not the probable amount* of the circulation, but the *maximum limit* within which it must lie; for it is certain that some portions of the coinage of 1863-64 have already been exported or melted, and for every million sovereigns thus withdrawn, 5⅓ millions must be subtracted from our estimate. In attempting to make some allowance of this kind, we shall commit no appreciable error, and shall be, in fact, on the safe side in supposing that the whole exportation has fallen on the sovereigns. This we are obliged to do, as the Custom House returns do not discriminate sovereigns and half-sovereigns. The quantities of British gold coin registered for export since 1864 are as follow:

| | £ |
|---|---|
| Registered exports in 1865 | 3,390,910 |
| ,, ,, 1866 | 4,007,089 |
| ,, ,, 1867 | 1,266,654 |
| | £8,664,653 |

There are no means of determining from the above, with accuracy, how much of the coinage of 1863-64 has been exported; but as exporters prefer the newest and heaviest coin, we are probably within the truth in assuming that the sovereigns of 1863-64, which form about one-fifth of the sovereign currency, also form one-fifth of the above exports. We may then subtract £1,750,000 from the coinage of 1863-64, which formed the basis of our calculation. Our estimate will then stand as follows:

| | £ | £ |
|---|---|---|
| Sovereigns coined in 1863-64 - - | | 14,600,000 |
| Subtract: in Bank - - | £600,000 | |
| „ exported (say) - | 1,750,000 | |
| | | 2,350,000 |
| | | 12,250,000 |
| Multiply by - - - - | | 5·356 |
| | | £65,600,000 |

Reducing this result a little for the sake of getting round numbers, we may state our estimate finally as follows:

| | £ |
|---|---|
| Sovereigns in circulation - - - | 64,500,000 |
| Unmixed sovereigns - - - - | 3,500,000 |
| Half-sovereigns - - - - - | 12,000,000 |
| Total gold circulation - - | £80,000,000 |

Since I commenced this inquiry, however, facts have come to my knowledge which prevent me from supposing that the gold coinage is as much as the above. Any pretensions to rigid accuracy, which the preceding calculations might otherwise possess, are removed by the selection and melting of newly-issued coins, which is believed to be extensively carried on by the largest and most respectable firms of capitalists and bullion dealers. No precise information can be procured as to the amount of the newest and heaviest coins thus destroyed, but they may be asserted to amount to millions in the course of the few last years.

Reference is made to this practice in the report of the British representatives at the recent Paris conference, in the following terms:*

"There is reason to believe that large masses of new British sovereigns are occasionally treated so as to separate out the heavy pieces, and these are disposed of as bullion; while the lighter pieces, which may still be all of legal weight, are preserved and put into circulation. This fact will not surprise those persons who are aware of the small margin of profit upon which bullion transactions are often conducted."

Now if, in the prosecution of this peculiar trade, a million sovereigns of 1863-64 have been melted up, we must reduce the estimate by £5,000,000, and in a similar ratio for larger quantities. All, therefore, that I can assert to be shown by my calculations is, not that the gold circulation amounts to £80,000,000, but that *it is under eighty millions, and probably lies somewhere between seventy and eighty millions.* But I shall regard £80,000,000 as the safest estimate to employ in all the other calculations of this paper.

Let us compare this estimate with others lately put forward. Messrs. Graham and Wilson, in their official report on the Paris Conference, speak of the whole gold currency as "variously estimated at from £80,000,000 to £120,000,000." The International Coinage Commission adopt the same limits, remarking that "it is impossible to ascertain the actual amount of sovereigns and half-sovereigns in circulation, the estimates varying from £80,000,000 to £120,000,000." Yet, as will be seen, my method of calculation *demonstrates* that the amount cannot exceed about £90,000,000, and shows that it probably falls below £80,000,000, the lower limit named by the Commissioners.†

The late Mr. Miller, of the Bank of England, gave much

* Report of the International Coinage Commission, Appendix IV. p. 192. The British representatives at the Paris International Monetary Conference of 1867 were the late Professor Graham, then Master of the Mint, and Mr. (now Sir) C. Rivers Wilson.

† See Report, pp. xiii, 192.

attention to this subject, and is stated * to have considered that there could not have been less than £80,000,000 sterling of gold in the country; but there is still the difference between our estimates that he regarded £80,000,000 as the lower limit, while I am confident that it is above the truth. Mr. Weguelin, when Governor of the Bank, stated it to be his opinion that the gold coin was between £40,000,000 and £50,000,000, which is clearly too low; and Mr. Hankey, in his work on Banking, adopts a medium amount, "somewhat less than the calculation of Mr. Miller, still considerably nearer to his statement than to that of Mr. Weguelin." This medium amount would thus, in my opinion, be close to the truth.

By far the most important estimate, however, which we have to consider, is that of Mr. Newmarch, who has, in one of his appendices to Tooke's "History of Prices," † published an excellent inquiry into this subject. Mr. Newmarch has employed, indeed, the old method of estimation, which consists in assuming, on necessarily feeble evidence, a certain amount of coin as in use in a given year, adding the issues of new coin from the Mint or the Bank, subtracting the known amounts of light gold withdrawn, and also the amounts exported, according to the most probable estimate. Thus, Mr. Newmarch takes £46,000,000 as the probable circulation at the close of 1844, adds £64,000,000 coined and issued since, making £110,000,000, and then subtracts £25,000,000 for exports to Australia, etc., £6,000,000 of coin cancelled for deficiency of weight during the years 1844-56. This would give £79,000,000; but he makes a further arbitrary reduction on account of unknown exports to various parts of the world, and sums up as follows:

"I am disposed to think, that if the amount of the gold coin circulation was £46,000,000 in 1844, we may suppose it to be, say, *seventy millions* in 1856 (that is to say, 50 or 60 per cent more) without any extreme departure from the probabilities of the case when they are carefully examined. And considering the general tenor of former estimates of

* "Hankey on Banking," p. 67.

† Appendix XXII. vol. vi. pp. 696-711.

the quantity of gold coin in circulation in the United Kingdom, it does not appear that a supposition of even *seventy-five millions sterling*, as the quantity at the close of 1856, would be unduly exaggerated."

To bring this estimate into comparison with my own, it is necessary to make allowances for the large quantities of coin since issued, as well as for the export and withdrawal of sovereigns. This is done in the following statement:

| | | £ |
|---|---|---|
| Assumed circulation at close of 1856 - - | | 75,000,000 |
| Add reimports of British coin, 1858–66 - - | | 14,000,000 |
| „ issues from Mint - - - - - | | 52,000,000 |
| | | 141,000,000 |
| Subtract light gold cancelled at the Bank, £500,000 per annum | £5,500,000 | |
| Gold coin exported, 1857–66 - | 41,500,000 | |
| | | 47,000,000 |
| Total - - - - | | £94,000,000 |

The above exceeds my estimate by at least £14,000,000, but a considerable part of this discrepancy may be fairly attributed to the incomplete registration of exports of gold coin at the Custom House. It is thus apparent that if we took Mr. Newmarch's lower estimate of £70,000,000, there would remain but little discrepancy between that result and my estimate of £80,000,000. But if even my own estimate of £80,000,000 is above the truth, owing to the extensive practice of melting new coin, in the same degree we must consider that Mr. Newmarch's estimate of £70,000,000 is in excess of the truth. If any one could determine the circulation correctly in the old manner, it would be Mr. Newmarch; but there are such inherent inaccuracies in all accounts of the export of coin, that we can rely upon no calculation in which they play an important part. I have satisfied myself, by working from my own maximum estimate of £80,000,000 backwards to the year 1852, that there is from £20,000,000 to £25,000,000 of the coinage which is not to be accounted for by the Custom House returns, and which must have

disappeared by melting, secret exportation, or accidental loss during that interval.

It will be interesting now to form a notion of the complete aggregate of the circulating medium of the United Kingdom, by which I mean the whole standing stock of gold, or of the immediate representatives of gold, consisting of banknotes convertible at will. By a very limited and rough investigation of the dates of shillings in circulation, I have estimated that out of a total silver coinage of £19,500,000 issued since 1816, there remains in use about £14,000,000. The Master of the Mint, indeed, in his evidence before the Decimal Coinage Commission in 1857, stated the quantity of silver coinage *presumed to be* in circulation at £14,167,000, since which time nearly £4,000,000 of new coin has been issued, and rather more than £1,000,000 has been withdrawn, which would leave £17,000,000 of silver coin in use; but no allowance is made in this for the loss, destruction, and exportation of the silver coinage which in the course of fifty years must have amounted to a large sum. Therefore, I think £14,000,000 not an improbable amount to assign. Owing to the recent issue of the bronze coin, we know its amount to be almost exactly £1,000,000 sterling in nominal value. Thus the metallic currency will consist of—

| | £ |
|---|---|
| Sovereigns | 68,000,000 |
| Half-sovereigns | 12,000,000 |
| Silver coin | 14,000,000 |
| Bronze coin | 1,000,000 |
| | £95,000,000 |

The bullion in the Bank of England must be regarded as a portion of the circulating medium, since it is represented by notes. The whole metallic basis of our currency will then be at the present time*:

| | £ |
|---|---|
| Coin | 95,000,000 |
| Bullion (say) | 15,000,000 |
| | £110,000,000 |

* That is, about the year 1868.

We ought to add such variable quantities of bullion as may be in the hands of bullion brokers, refiners, and others, which may occasionally amount to some millions.*

As regards paper equivalents of gold, we must take the whole issues of the United Kingdom and subtract such part as merely represents an equal quantity of coin employed in guaranteeing the notes. The amount of the coin reserves of the English banks is quite unknown, but we may suppose that the issues of English notes, amounting to £5,000,000, are backed by £1,500,000 of coin. The Scotch and Irish issues may be taken at £10,000,000, with a set-off of £4,500,000 of coin and bullion, ascertained from the monthly official returns. Accordingly, the circulating medium may be stated as follows:

| | | £ |
|---|---|---|
| Coin | | 95,000,000 |
| Bullion | | 15,000,000 |
| Notes issued by Bank of England on security | | 15,000,000 |
| English bank issues | £5,000,000 | |
| Specie to be subtracted | 1,500,000 | |
| | | 3,500,000 |
| Scotch and Irish issues | £10,000,000 | |
| Specie to be subtracted | 4,500,000 | |
| | | 5,500.000 |
| Total | | £134,000,000 |

It appears, then, that after all the interminable discussions on the paper currency, and the vast power attributed to the Bank of England in creating or preventing oscillations of prices and credit, our currency is metallic to the extent of £110,000,000, or four-fifths (80 per cent), and that only £24,000,000, or one-fifth part, can be considered to rest on credit.

* A later estimate of the gold circulation, partly based on the calculations given above, will be found in Mr. R. H. Inglis Palgrave's "Notes on Banking in the United Kingdom, Sweden, Denmark, and Hamburg;" "Statistical Journal," March, 1873, vol. xxxvi. p. 79. Reprint, p. 49.

### III.—*The Age of the Gold Circulation.*

An examination of the comparative age of the sovereigns current in different parts of the country has revealed some facts of interest. These will be detected in the following table, which exhibits the average composition of the sovereign currency in a number of towns and districts, the counties of England being grouped as in the Reports of the Registrar-General. A similar table is added, showing the comparative age of the half-sovereigns in different districts; but though considerable variations are proved to exist, they do not seem to admit of any simple explanation, and my remarks will be chiefly confined to the more important case of the sovereign circulation.

| Name of Town or District. | Proportion of Current Sovereigns coined in the Period. | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1817–19 | 1820–29 | 1830–39 | 1840–49 | 1850–59 | 1860–67 | Australian. |
| London | .1 | 6.5 | 5 6 | 17.1 | 28.7 | 40.0 | 2.0 |
| ,, further returns | .1 | 6.2 | 6.4 | 16.9 | 28.3 | 40.1 | 2.0 |
| Manchester | .1 | 4.4 | 4.9 | 13.1 | 29.4 | 46.8 | 1.3 |
| ,, (Mr. Ross) | .2 | 4.3 | 4.6 | 11.8 | 27.7 | 49.7 | 1.7 |
| Birmingham | .2 | 6.9 | 6.4 | 17.1 | 28.6 | 39.6 | 1.2 |
| Swansea | .2 | 8.4 | 7.4 | 15.7 | 28.4 | 37.0 | 2.9 |
| Hull and Bridlington | .4 | 9.3 | 8.1 | 20.3 | 30.8 | 30.4 | .7 |
| Ormskirk | .1 | 6.8 | 5.7 | 17.2 | 31.1 | 38.2 | .9 |
| Glasgow | .3 | 10.6 | 8.0 | 12.1 | 28.3 | 38.0 | 2.7 |
| Edinburgh | 1.1 | 8.6 | 5.5 | 18.9 | 25.8 | 39.0 | 1.1 |
| Eastern counties | .2 | 10.5 | 11.5 | 22.0 | 28.5 | 25.7 | 1.6 |
| South-Eastern counties | .2 | 7.0 | 7.8 | 17.7 | 29.9 | 35.7 | 1.7 |
| South-Western ,, | .4 | 7.8 | 8.2 | 17.2 | 32.1 | 32.9 | 1.4 |
| South Midland ,, | .1 | 7.8 | 8.1 | 19.6 | 27.6 | 35.6 | 1.2 |
| West ,, ,, | .4 | 9.2 | 8.2 | 15.9 | 27.1 | 38.3 | .9 |
| North ,, ,, | .4 | 9.2 | 7.9 | 16.6 | 26.6 | 38.2 | 1.1 |
| Lancashire and Cheshire | .2 | 7.1 | 6.3 | 16.1 | 26.6 | 42.5 | 1.2 |
| Yorkshire | .3 | 7.3 | 6.9 | 14.9 | 27.0 | 42.6 | 1.0 |
| Northern counties | .2 | 6.4 | 6.6 | 16.5 | 26.6 | 42.7 | 1.0 |
| North Wales | .2 | 8.5 | 7.5 | 17.4 | 27.5 | 38.1 | .8 |
| South ,, | .3 | 7.7 | 9.5 | 18.9 | 26.9 | 35.6 | 1.1 |
| North Ireland | .2 | 5.9 | 6.6 | 17.5 | 31.8 | 36.8 | 1.2 |
| South ,, | .2 | 9.3 | 7.3 | 19.9 | 29.8 | 32.2 | 1.3 |
| Scotch Highlands | .2 | 6.6 | 6.9 | 17.2 | 27.5 | 40.7 | .9 |
| Scotch Lowlands, Bank of Scotland | .1 | 7.3 | 6.2 | 14.8 | 28.7 | 40.6 | 2.3 |
| General average* | .2 | 7.4 | 7.0 | 16.9 | 28.6 | 38.3 | 1.6 |

* Calculated from the general aggregate, see table, p. 241.

| Name of Town or District. | Proportion of Current Half-Sovereigns coined in the Peri d. | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1817–19 | 1820–29 | 1830–39 | 1340–49 | 1850–59 | 1860–67 | Australian. |
| London | .7 | 1.1 | 1.0 | 14.1 | 33.7 | 48.4 | 1.0 |
| Manchester | .5 | 1.7 | 1.1 | 17.3 | 41.7 | 37.2 | .5 |
| Birmingham | .5 | 1.5 | 1.4 | 21.7 | 39.2 | 35.4 | .3 |
| Swansea | .6 | 1.9 | 1.9 | 17.8 | 40.5 | 36.4 | .9 |
| Hull and Bridlington | .7 | 1.4 | 1.3 | 20.3 | 41.9 | 33.9 | .5 |
| Glasgow | .5 | 1.4 | 1.8 | 13.1 | 33.7 | 47.7 | 1.8 |
| Edinburgh | .6 | 1.1 | .9 | 16.1 | 39.1 | 41.2 | 1.0 |
| Eastern counties | .9 | 2.0 | 1.1 | 18.9 | 38.7 | 37.3 | 1.1 |
| South-Eastern counties | .7 | 1.4 | .7 | 17.9 | 38.2 | 39.5 | 1.6 |
| South-Western ,, | .4 | 1.5 | 1.7 | 17.9 | 41.8 | 35.4 | 1.3 |
| South Midland ,, | .4 | 2.2 | 2.8 | 21.2 | 36.6 | 36.5 | .3 |
| West ,, ,, | .4 | 1.9 | 1.2 | 19.8 | 43.8 | 32.4 | .5 |
| North ,, ,, | 1.8 | 2.9 | .8 | 18.4 | 44.3 | 31.0 | .8 |
| Lancashire and Cheshire | .3 | 1.3 | 1.2 | 20.0 | 44.5 | 32.3 | .4 |
| Yorkshire | .5 | 1.5 | 1.3 | 18.5 | 42.5 | 35.1 | .6 |
| Northern counties | .2 | .8 | 1.0 | 17.7 | 37.7 | 40.8 | 1.8 |
| North Wales | 1.1 | .5 | 1.8 | 20.0 | 47.2 | 28.7 | .7 |
| South ,, | .2 | 1.1 | 1.6 | 18.6 | 37.0 | 41.0 | .5 |
| North Ireland | .2 | 1.0 | .9 | 20.7 | 44.6 | 32.2 | .4 |
| South ,, | .5 | .8 | 1.4 | 21.1 | 47.2 | 28.3 | .5 |
| Scotch Lowlands | .5 | 1.3 | 1.5 | 17.8 | 38.7 | 39.1 | 1.1 |
| ,, Highlands | .4 | 1.1 | .8 | 13 5 | 43 5 | 39.6 | 1.1 |
| General average | .5 | 1.3 | 1.1 | 16.3 | 40.1 | 39.6 | 1.1 |

*Note.*—EASTERN COUNTIES: Essex, Suffolk, Norfolk.
SOUTH-EASTERN: Surrey, Kent, Sussex, Hants, Berks.
SOUTH-WESTERN: Wilts, Dorset, Devon, Cornwall, Somerset.
SOUTH MIDLAND: Middlesex, Herts, Bucks, Oxford, Northampton, Huntingdon, Bedford, Cambridge.
WEST MIDLAND: Gloucester, Hereford, Salop, Stafford, Worcester, Warwick.
NORTH MIDLAND: Leicester, Rutland, Lincoln, Nottingham, Derby.
NORTHERN: Durham, Northumberland, Cumberland, Westmoreland.
NORTH IRELAND: Ulster, Connaught.
SOUTH ,, Leinster, Munster.

As a general result, it may be stated that the coin is newer in the manufacturing and mining districts, and that the proportion of old coin increases as we pass into purely agricultural counties.* Thus, the greatest proportion of

* When the West of England Bank failed the whole of the gold coin remaining in the bank coffers was removed to the Bank of England, with the startling result that nearly 50 per cent of the coin was found to be below the least current weight. See *The Times* of 20th December, 1879, p. 11, *d*.

old coin occurs in the eastern counties (Norfolk, Suffolk, Essex), and in the south-eastern counties (Surrey, Kent, Sussex, Hampshire, and Berkshire), although all these counties are in the vicinity of the metropolis. Of all towns for which I have sufficient data, Manchester seems to have the newest currency; this fact being confirmed by an excellent enumeration of 3358 sovereigns, procured for me by Mr. Ross, of the Manchester and Liverpool District Banking Company. It will be seen that nearly half the sovereigns current in Manchester have been coined since the beginning of 1860. Birmingham, Swansea, Hull, Ormskirk, for which I have also adequate information, do not show such extreme newness, and the coinage in Hull is considerably older than the average, although the town possesses a branch of the Bank of England. London, it will be seen, approaches very closely to the general average of the kingdom, except that there is an unusual infusion of Australian coins. Nearly 3 per cent of the sovereigns current in Swansea and the neighbourhood are from the Sydney Mint, and there is also a percentage of 2.3 per cent in the Scotch Lowlands, as shown in the returns of the Bank of Scotland. It is remarkable that the whole of Scotland, as well as the northern counties of England, stand high as regards the proportion of new coin; but the same peculiarity does not attach either to Wales or to Ireland.

A little inquiry has enabled me, with the aid of the above numbers, to detect the general course of circulation through which the gold currency seems to pass. To a great extent, indeed, the motion of the currency is altogether indiscriminate, and coins may be conveyed by travellers, by railway remittances, or in other ways, from any one place to any other. Thus is produced the general similarity shown, with few exceptions, in the returns from all places. But there will yet be almost sure to arise prevailing currents of coin passing in determinate directions, arising from the outward and inward trade of a district being conducted in different modes. Thus, a considerable quantity of gold must be carried by tourists every summer into North Wales and Scotland. In Wales it adds to the

superfluity of gold, which is very marked there; in Scotland it often furnishes the branch banks with the only gold they possess, so general is the use of notes in most parts of Scotland. But the chief movement of gold coin seems to go on in the pockets of dealers in cattle, horses, farm produce, etc., who avoid bank commission by carrying actual cash, and a portion of it, at least, in gold. It is certain that agricultural produce must move in general from the purely agricultural counties towards the manufacturing districts and great towns. Coin will often be carried back in payment for it, whereas the goods purchased by the agricultural counties from the manufacturing towns will usually be paid for in drafts and cheques.

In North Wales, as has been kindly explained to me by Mr. Hugh Roberts, manager of the Holyhead branch of the North and South Wales Bank, there is a constant plethora of gold coin, partly brought by tourists and temporary residents at watering-places, but mainly perhaps by farmers and dealers, who sell their cattle, horses, sheep, wool, butter, and other agricultural produce, and prefer payment in cash. The greater exports of Wales, such as slates, paving-stones, ores, etc., will always be paid for in paper remittances, but then almost the whole of the imports of draperies, flour, groceries, liquors, ironmongery, coals, etc., will be paid for without the use of specie. Even commercial travellers, when they receive cash payments from the smaller shopkeepers and dealers, will often deposit the cash in a local bank and make a remittance by draft.

It thus falls upon the local country banks to restore the equilibrium of the currency by making frequent remittances of specie to London, or to the head offices in a neighbouring large town, in order to meet drafts. But in the manufacturing towns and districts the current is in the opposite direction, as also in the seats of the Government dockyards: vast sums are here drawn in actual coin for the payment of wages, most of which, indeed, circulates in the neighbourhood, and sooner or later returns to the local banks, but the remainder passes out of the district. As the manufactured exports will almost always be paid for by bills, drafts, and cheques, there is no compensating

current of coin, and the town banks have to draw coin either from their branches, from the nearer country banks, or from the Bank of England and its branches. It is through the bank that new coins are distributed to the public; for the branches never, in ordinary circumstances, send good coin to Threadneedle Street,* whereas the bank, in addition to what it pays out in London, remits £2,375,000 annually on the average of the years 1855-64 to the branch banks, chiefly in the dividend months.

I have entered into these particulars concerning the one-sided movements of coin, because the effect upon the character of the circulation is important. It is obvious that somebody must return to the Bank of England, or must export a certain quantity of coin annually, and it falls to the lot of the country banks in certain districts, especially those banks which have many country branches, to return this surplus coin to London. These banks, then, would have to bear the whole loss on light gold, did they not take the precaution of remitting only new heavy Victorias. In the course of these inquiries I have received overwhelming evidence that this *picking and culling* of the coinage, as it used to be called, is practised as an ordinary business transaction by all banks which need to make remittances or to pay gold into the Bank of England. Thus a gentleman in the eastern counties writes to me: "It is customary for our branches to pick their surplus gold for remittance to head office, which yields on an average about twenty per cent of bright or heavy gold; otherwise there would be a charge made for short weight, arising from wear and tear, when taken to the bank of England." †

*The aggregate amount thus remitted was only £298,751 in the course of the ten years 1855-64, and this arose, as I am told, from peculiar circumstances.

†In France in former years the practice of "culling" out the weightiest pieces and selling them at a premium was a capital offence. I am not aware that the practice is illegal in England at present, except so far as it is against the 7th section of "The Coinage Act" (33 Vict. c. 10), which directs that "where any gold coin of the realm is below the current weight as provided by this Act, or where any coin is called in by any proclamation, every person shall, by himself or others, cut, break, or deface any such coin tendered to him in payment, and the person tendering the same shall bear the loss." Apparently it is a perfectly legal act to tender a light gold sovereign, but it is illegal to accept it without defacing it; this misdemeanour having been committed, it is legal to pay the coin away again.

It will thus be apparent that there exists a regular system, whereby the older coins are continually returned into the hands of the public, and the new heavy coins alone are remitted to the Bank of England, and to those who would melt or export them. The lightness of a coin is so far from being a reason why it should be withdrawn from circulation, that it is the very reason why it is retained in it.* The public in general manage to avoid any loss from the wear of the currency, and it is only particular banks and companies or ignorant individuals who incur unjust loss. Thus, I have heard of an unfortunate person who received several hundred pounds—probably his whole property—from a London bullion broker, and, without apprehending the result, took them to the Bank of England, where the larger part were cut, as being light, and a heavy commission charged.

### IV.—*Proportions of Coinage surviving.*

It is of some interest to examine closely the contents of the table, p. 241, showing the composition of the present gold circulation, in order to detect the effects which have been produced upon the coinage in the course of half a century by exportation, destruction, loss, or reimportation of coins. What we want to learn is the degree in which the coinage of earlier years has been withdrawn from use, compared with that of later years, and this may be inferred from the fraction which the coins actually enumerated for me under the date of each year form of the total issue of coins in that year. This comparison, however, cannot be made year by year, because, until very lately, it was the

*The following are questions, addressed by a "practical" Member of Parliament to the Deputy Master of the Mint, with his answers: "With regard to the melting up of sovereigns, is it not the fact that the lighter sovereigns are melted up to a much greater extent than the heavier sovereigns?"—"No; the heavier sovereigns are, for obvious reasons, those that are exported and used for commerce, because light sovereigns would not be received." "So that, in any case, the chances are that if sovereigns disappear absolutely, they are more likely to be light sovereigns than heavy sovereigns?"—"No; they are more likely to be heavy sovereigns than light sovereigns."—"Report on London City Lands Bill," Questions 389 and 394.

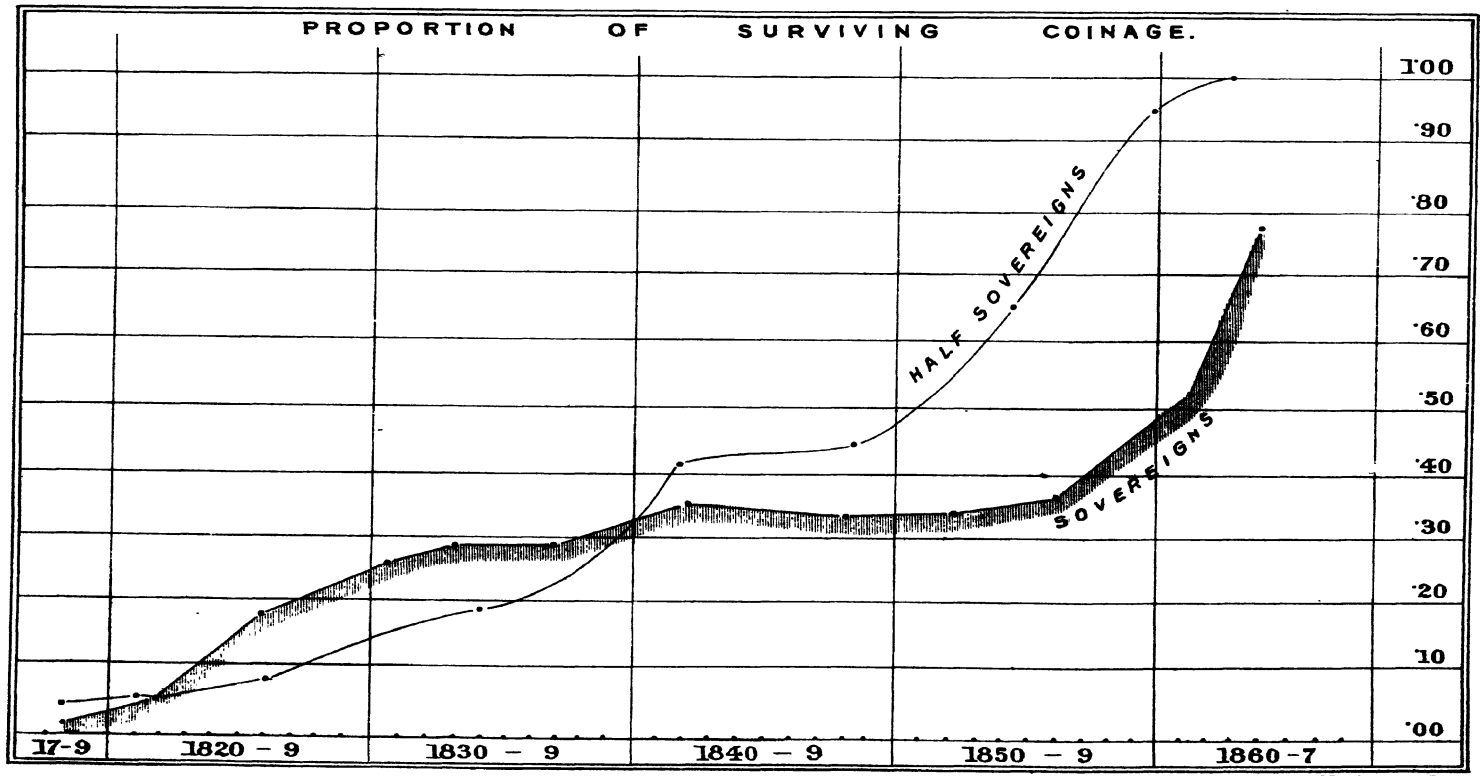
occasional practice at the Mint to use up the surplus stock of dated dies of one year in the following year; and it has even happened, during years of small coinage, that the whole of the coins issued during the year bore the date of the preceding year. These facts, for which I am indebted to the Master of the Mint, take away all accuracy from a comparison year by year; but if we aggregate several years together, taking care to commence and end with years of small coinage, we shall avoid any appreciable error. Since Mr. John Graham became Superintendent of the Coining Department of the Mint, a better system has been introduced, and a new series of dies with the proper date has been brought into use at the beginning of each new year. This practice began with the year 1864; thus it is possible that some coins struck in 1863 bear the date of 1862; but it is not possible that any coined in 1865 bear the date of 1864. The only effect of these irregularities upon my estimate of the circulation is to strengthen the probability of my assertion, that *the true amount of the gold currency lies under rather than over eighty millions.*

Aggregating the numbers of sovereigns and half-sovereigns shown in the table, p. 241, in the most convenient groups of years, and calculating from the same table the proportions which appear to have survived, on the assumption that the present mixed circulation of sovereigns amounts to £64,500,000, and of half-sovereigns to £12,000,000, we have the following results:

| Intervals of Years. | Proportions of Sovereigns coined now in use. | Intervals of Years. | Proportions of Half-Sovereigns coined now in use. |
|---|---|---|---|
| 1817–19 | .02 | 1817–19 | .04 |
| 1820–23 | .06 | 1820–22 | .05 |
| 1824–28 | .17 | 1823–29 | .08 |
| 1829–31 | .26 | 1830–39 | .19 |
| 1832–33 | .29 | 1840–45 | .41 |
| 1835–39 | .29 | 1846–50 | .45 |
| 1840–45 | .36 | 1851–57 | .65 |
| 1846–50 | .33 | 1858–62 | .95 |
| 1851–54 | .34 | 1863–64 | (1.00)* |
| 1855–58 | .36 | | |
| 1859–62 | .52 | | |
| 1863–64 | .77 | | |

* Assumed.

*Plate XVII*




*To face p. 256*

It appears that of the sovereigns coined in 1817-19, not more than one-fiftieth part remain in circulation, and the proportion rises until between the years 1840 and 1858 it is about one-third. When exhibited graphically the numbers produce two curious curves, which are at once similar and different. In both cases there is an elevation in the period (1840-45), arising probably from the recoinage of the years 1841-43, when 12,000,000 or 14,000,000 sterling of gold coins were recoined and distributed again in an unusual manner, so that more than a common proportion became fixed in the circulation. The most important peculiarity of these numbers, however, is the very small increase which takes place in the proportion of sovereigns preserved between the years 1832 and 1854. This indicates that there is a residuum of coin which is no longer subject to be exported or withdrawn like the rest of the circulation. For if the coins exported were taken indifferently from the mixed mass in circulation, we can readily see that the curve would have the form arising from a geometrical series, and would tend constantly upwards, without any contrary flexures.* The curve of half-sovereigns, were it not for the interruptions of 1840-45, would represent pretty nearly this normal form, and the deviation of the sovereign curve indicates the care with which exporters and melters of sovereigns have avoided taking any old or light coins.†

## V.—*On the Deficiency of Weight of the Gold Coinage.*

It appeared likely that the accurate information which I had acquired concerning the age of the gold currency would become more valuable if joined with a determination of the average rate of wear of the coins. For there was

* Suppose $a$ be the quantity of coin issued in any given year, and that $\frac{1}{m}$th part of the circulation be indifferently withdrawn every year; then at the end of $n$ years, the quantity $a$ will evidently be reduced to $a \cdot \left(1 - \frac{1}{m}\right)^n$.

† See accompanying diagram.

reason to suppose that the wear of a sovereign would be approximately uniform and proportional to its age, so that the average age of a number of coins would become a sure indication of their amount of depreciation. Coins of different age, being indifferently used in the ordinary course of circulation, would suffer equal friction, so that any difference in the amount rubbed away could only arise from the different character of the metal or from the varying prominence of the impression. It might, perhaps, have been expected that sharp, new coins would wear more rapidly than those old coins which have already been rendered smooth by wear; but my own weighings, as afterwards described, do not give much evidence of this, and the elaborate experiments of Cavendish and Hatchett seem to establish the contrary. It is true that when Hatchett rubbed stamped and unstamped pieces of gold against each other, with sand or other hard powder between them, the stamped pieces were much the more worn, but when he caused a number of such pieces to be shaken against each other in a revolving box, without any powder, during 71,720 revolutions, no essential difference was observed in the loss of weight of smooth and stamped pieces.* It is the latter experiment which seems to me to represent most truly the kind of friction to which coins are exposed in the purse, the pocket, the till, or the bullion scales.

To determine the wear of the currency, I thought that a very accurate weighing of a moderate number of coins of different ages would be better than the ordinary rough weighings of larger quantities of coin as conducted in bank scales. I have, therefore, at several times during the present year drawn gold from the ordinary circulation at Manchester, amounting in all to 434 sovereigns and 178 half-sovereigns, and after a careful cleansing have weighed them upon a delicate chemical balance placed at my disposal for the purpose by Dr. Roscoe in his laboratory at Owens College. All the half-sovereigns and 280 of the sovereigns were weighed individually.

* "Philosophical Transactions" (1803), vol. xciii. p. 172.

The sovereigns of 1860-67 are, with a single exception, of legal currency, but lie almost entirely between the standard weight 123.274 grains (7.9879 grms.) and the lowest weight of legal currency 122.5 grains (7.9379 grms.), the average being 123.04 grains (7.9728 grms.); of the sovereigns of 1850-59, only one was up to the correct standard, and many were not legal tender. Even the average weight of those coined in 1840-49 fell below the legal limit, and coins of greater age descend, on the average, in proportion to age, but with greater individual divergencies. Thus, while the sovereigns of 1817-29 are, on an average, more than one grain below the legal limit, one of them descends as low as 119½ grains.

The following table shows the average rate of wear of sovereigns of different ages in decennial groups. The deficiency is calculated from the average weight of sovereigns issued from the Mint, as determined by a weighing of 1000 new sovereigns executed at the Bank of England, in March, 1868, at the desire of the International Coinage Commission (Report, p. 94). Thus, while the standard weight is 123.274 grains, the weight of those issued is slightly less, namely, 123.264 grains.

| Years of Issue. | Number of Sovereigns Weighed. | Average Weight of the Sovereigns. | Deficiency from Mint Weight. | Average Date of Coinage. | Average Annual Loss of Weight. |
|---|---|---|---|---|---|
| | | Grains. | Grains. | | Grains. |
| 1817–29 - | 31 | 121.40 | 1.86 | 1824.7 | .043 |
| 1830–39 - | 22 | 121.92 | 1.34 | 1834.3 | .040 |
| 1840–49 - | 44 | 122.16 | 1.10 | 1845.8 | .051 |
| 1850–59 - | 129 | 122.72 | .54 | 1854.6 | .042 |
| 1860–67 - | 208 | 123.04 | .22 | 1863.1 | .050 |
| Mint weight | — | 123.26 | — | (1867-5) | — |

In order to ascertain the complete average rate of wear of the whole, I have calculated the average weight of the sovereigns to be 7.9515 grms. (122.71 grains), and the average date of issue to be 1854.6. The weight as issued from the Mint being 7.9871 grms. (123.26 grains), we have

a deficiency of .0356 grm. (.55 grain), caused by 12.9 years' wear, counting up to the middle of the year 1867, and $.0356 \div 12.9 = .00276$ grm. (.043 grain), the required result.*

As the coins when issued weigh 7.9871 grms., and they cease to be legal tender when they fall below 7.9379 grms. (122.5 grains), it is easily calculated that just about eighteen years' wear will reduce a sovereign below its point of legal currency. Of course it is not meant that every sovereign will be light after eighteen years' wear, for some are coined heavier than others, or undergo less wear owing to accidental circumstances; but these will be balanced by others coined lighter, or subject to more severe wear. But it would be hard to name a subject in which reasoning by averages may be more safely trusted than the present, because the coinage consists of an immense number of pieces which are constantly circulating through every part of the country and in every kind of business. A little reflection will show, I think, that though the age of any individual coin is but a poor criterion of its weight, the age of 1,000,000, or 1000, or even 100 coins drawn from the ordinary mixture in circulation, must be a very sure criterion, as it is in the highest degree unlikely that even in 100 coins the accidental peculiarities of the history of any of those coins should influence appreciably the general average.

My results are strongly corroborated by experiments made at the Mint in the year 1833, by weighing parcels of 300 sovereigns, coined in each of the years 1817, 1821,

*In his elaborate report to the International Statistical Congress of 1869, Dr. Farr said, p. 30: "Professor Jevons makes the annual rate of waste only .00035, by estimating it from the weight of *circulating sovereigns*; thus not allowing for the waste in light sovereigns withdrawn by the Bank. By using this factor he makes the mean time in which average sovereigns remain of legal weight 18 years $= .00628 \div .00035 = 18$. They really wear below the legal standard in $.00628 \div .0004 = 15.7$ years, as Professor Jevons would have found had no light sovereigns been withdrawn. It is the only oversight I have discovered. . . . The waste by his table is .0004 in the first four years."

The error is an obvious one as soon as it is pointed out. As a consequence of this error some of the results of the inquiry are below the truth, instead of above the truth.

1825, and 1829.* The average annual wear calculated from these data is as follows:

| | | | |
|---|---|---|---|
| Sovereigns of | 1817 | .034 | grain per annum. |
| „ | 1821 | .047 | „ |
| „ | 1825 | .051 | „ |
| „ | 1829 | .054 | „ |

The average of the whole is .047 grain per annum.

The specimen of sovereigns for 1817 was evidently not properly chosen, as the wear was actually less for sixteen years than in the coins of 1821 for twelve years.

I may assume, therefore, with great confidence, that the proportion of sovereigns in circulation of a greater age than eighteen years is equivalent to the proportion of illegally light sovereigns; and as the coinages of the years 1848-50 were not large, it would influence the result but little if we took twenty years instead of eighteen. Assuming, then, that sovereigns coined since the beginning of 1850 are of legal weight and the others light, we readily determine, from the table on p. 241, that 31.5 *per cent of the whole of the sovereigns in the kingdom are no longer of legal currency.*†

From the table on p. 250 we can also readily ascertain the varying proportion of light sovereigns in different parts

* See G. R. Porter's "Tables of Revenue, etc. of the United Kingdom," part iii. (1834), p. 16. Similar experiments made in 1826 gave a like result. See "Jacob on the Precious Metals," vol. ii. p. 380.

† In the report from the Select Committee on the London City Lands Bill (June, 1881, No. 304), it is stated by Mr. Grenfell (Questions 1127 and 1131), that the Bank of England, in 1868, weighed 1000 sovereigns obtained from various railway companies, and found the average proportion of light sovereigns to be 28.8 per cent. Considering all circumstances, this result does not differ very much from my average of 31.5 per cent. The percentage of light sovereigns paid into the Bank by the Post Office rose from 17.67 per cent in 1876 to 30.04 in 1880, no less than 44.63 per cent of the half-sovereigns being light in the last year (Questions 1108–1133). Statements, sometimes obviously erroneous, will be found in the answers to the following questions: 254–58, 373–410, 547–51, 822–30, 903–4, 915, 918, 1045–48, 1147–77. In spite of its title this Report consists of an inquiry into the recent condition of the Royal Mint and the state of currency. It resulted in the reconstruction of the present Mint workshops, now nearly completed.

In *The Times* of March 8th, 1882, Mr. John B. Martin states that the result of

of the country, as in the following statement—arranged in order of magnitude:

| | Per cent. | | Per cent. |
|---|---|---|---|
| Eastern counties | 44 | North Scotland | 31 |
| Hull | 38 | Birmingham | 31 |
| South Wales | 36 | Glasgow | 31 |
| „ Midland counties | 36 | North Ireland | 30 |
| Edinburgh | 34 | Lancashire and Cheshire | 30 |
| South-western counties | 34 | Ormskirk | 30 |
| North Wales | 34 | Northern counties | 30 |
| West Midland | 34 | London | 29 |
| North „ | 34 | Yorkshire | 29 |
| South-eastern counties | 33 | South Scotland | 28 |
| Swansea | 32 | Manchester | 22 |
| General average | 31.5 | „ second enumeration | 21 |

It would seem that the proportion of light gold is now as great or greater than at previous times when a recoinage was being contemplated or carried out. Thus in the years 1840 and 1841, when light gold was freely received by the bank, for recoinage at the public expense, the proportion did not rise above 25 or 28 per cent.* Of the old guineas current in 1807, 31.4 per cent were under the least current weight, according to one experiment, and 46 per cent according to another;† but the proportion of light half-guineas was greater, namely, 77 per cent.

The preceding statements concerning the lightness of the coin are of a somewhat startling character, and I might hesitate to put them forward had I not strong collateral

his census of the gold coinage just completed, comprising 105,364 sovereigns and 145,743 half-sovereigns, is as follows:

| | Full Weight per 1000. | Light Weight per 1000. | Standard Weight. | Average Actual Weight of F. W. Coin. | Average Actual Weight of L. W. Coin. |
|---|---|---|---|---|---|
| | | | Grains. | | |
| Sovereigns | 495.6 | 504.4 | 123.274 | 123.203 | 121.759 |
| Half-sovereigns | 412.5 | 587.5 | 61.637 | 61.412 | 59.651 |

* Newmarch, "Tooke's History of Prices," vol. vi. p. 701.

† "Jacob on the Precious Metals," vol. ii. p. 382.

evidence of their trustworthiness. One very convincing fact consists in the extraordinary difference of age between the sovereigns in the Bank of England and those outside it. Of this I am enabled to judge by a return of 1000 sovereigns, carefully prepared for me by Mr. Robinson, the Principal of the Issue Department, at the desire of the Governor. The composition of this return is shown below, the results of a like return from the branches of the London and Westminster Bank being given for the sake of comparison:

| | Bank of England. | London and Westminster Bank. |
|---|---|---|
| | Per cent. | Per cent. |
| Coined in 1817–19 - - - | 0.0 | .2 |
| ,, 1820–29 - - - | .4 | 6.9 |
| ,, 1830–39 - - - | .2 | 7.7 |
| ,, 1840–49 - - - | 2.3 | 18.7 |
| ,, 1850–59 - - - | 23.5 | 30 3 |
| ,, 1860–67 - - - | 69.1 | 33.6 |
| ,, Australia - - - | 4.5 | 2.6 |
| | 100.0 | 100.0 |

The sovereigns enumerated for me at the Bank were intentionally selected by Mr. Robinson as a fair specimen, and were taken, as I presume, from coin paid in by the public and purged of light coin by the weighing-machines. Only 2.9 per cent of coins older than 1850 remain in such a sample, this small proportion consisting, no doubt, of those coins which were originally rather heavy, or have by some accident escaped the usual wear. The fact that some of the older coins are still of legal weight does not prevent the age from serving as a criterion of *average* weight, because such old and heavy coins are balanced by an equivalent of new coins which by some accident are light. My own weighings show that 10 per cent of the sovereigns of 1850-67 are below the limit of legal currency.

The return from the London and Westminster Bank

shows the result of an enumeration of 1600 sovereigns at all the branches of that bank, which was kindly procured for me by the general manager. The reader cannot fail to notice the extraordinary discrepancies existing between the gold currencies of the two great banks in question.

I have calculated that the average age of the sovereigns in the Bank of England (Threadneedle Street) is 7.14 years, whereas the average age of the whole circulation of sovereigns in the United Kingdom is 15.35 years, or more than twice as much.*

Almost as great a contrast exists between the coinage in the branch Banks of England, so far as I can judge from returns with which I have been favoured by the agents at Newcastle and Plymouth.

*Proportional Number of Coins per Cent of different Dates.*

| Interval of Years. | Plymouth Branch of Bank of England. | Average of South-Western Counties. | Newcastle Branch of Bank of England. | Average of Northern Counties. |
|---|---|---|---|---|
| 1817-19 - | 0.0 | .4 | 0.0 | .2 |
| 1820-29 - | 0.0 | 7.8 | 0.0 | 6.4 |
| 1830-39 - | 2.0 | 8.2 | 0.0 | 6.6 |
| 1840-49 - | 13.0 | 17.2 | 5.0 | 16.5 |
| 1850-59 - | 35.0 | 32.1 | 38.5 | 26.6 |
| 1860-67 - | 49.0 | 32.9 | 55·5 | 42.7 |
| Australian - | 1.0 | 1.4 | 1.0 | 1.0 |
| | 100.0 | 100.0 | 100.0 | 100.0 |

I have additional confirmatory evidence concerning the quantity of light coin in circulation, derived from notes appended to the returns of sovereigns by the bankers or other gentlemen sending them. The following is a brief tabular statement of the percentage of light coin named as circulating in the respective places:

* By an entirely different and independent method of inquiry, Dr. Farr calculated the mean age of sovereigns in circulation to be 15.46 years.—"Report to the International Statistical Congress, held at the Hague in 1869," p. 31.

| | Sovereigns. | Half-Sovereigns. |
|---|---|---|
| | Per cent. | Per cent. |
| *Ballyshannon | 25 | 50 |
| Birkenhead | 63 | 66 |
| Buckingham | 57 | 48 |
| Dartford | 65 | 48 |
| Dublin | 47 | 48 |
| *Dundalk | 25 | — |
| * ,, | 20 | — |
| Farnham | 56 | 74 |
| *Halifax | 25 | — |
| Lampeter | 15 | 87 |
| Leominster | 29 | 58 |
| Liskeard | 38 | 30 |
| *London | 62 | 70 |
| ,, | 66 | 88 |
| *Liverpool | 50 | 50 |
| Nenagh | 23 | 49 |
| *Norwich | 70 | 70 |
| *Ramsgate | — | 66 |
| Wells | 75 | 94 |

In the cases marked with an asterisk only a rough estimate has been given, but in all other cases the percentage of light coin was determined by weighing with the usual bank scales. These statements show a serious depreciation of the currency in many places where old gold happens to have accumulated. The average percentage of light coins would be, according to the above, about 45 per cent of sovereigns and 62 per cent of half-sovereigns; but, though these statements seem to show that my estimate is not overdrawn, they evidently cannot be considered as furnishing a general average.

Strong remarks on the lightness of the coinage were added by many gentlemen. Thus, the manager of a bank at Birkenhead says: "I have taken the two hundred of each sort above enumerated out of a considerable quantity which was paid in by various customers, and think they will give a very fair average of our coinage here. I subjoin the numbers of light and heavy gold respectively, hoping that something may be done to call attention and rectify the very unsatisfactory nature of our circulating medium." The result is stated in the table above.

From Cambridge I have the remark that, "the half-sovereign coinage is much worse than the sovereign; two

or three years back it being found on trial that not more than 10 per cent of this circulation was weight."

Halifax. "Half-sovereigns are extremely light, and many should be called in."

Rochdale. "The greater portion of the gold in circulation here is light."

Ramsgate. "Few sovereigns, after two or three years' circulation, are now safe to send into the Bank of England without careful weighing."

Saint Helens. "Gold generally light."

It is right to add that, among a number of other remarks too numerous to give at length, were five or six expressing more or less satisfaction with the coinage.

The enumerations of coins which I have received from Ireland present far wider differences than those from Great Britain. This doubtless arises from the practice of weighing and charging a commission on light gold being strictly maintained in some Irish banks, although most of the banks have abandoned this precaution. Two of my returns exhibit the following extraordinary contrast:

| | Carlow. | Bandon. |
|---|---|---|
| Sovereigns of 1817–19 | — | — |
| ,, 1820–29 | — | 37 |
| ,, 1830–39 | — | 25 |
| ,, 1840–49 | 14 | 10 |
| ,, 1850–59 | 42 | 13 |
| ,, 1860–67 | 44 | 15 |
| ,, Australian | — | — |
| | 100 | 100 |

The correspondent who kindly furnished me with the second return has not been able to give any decisive explanation of its exceptional character, but suggests that it may arise from some old deposits of gold coin in the banks having been brought forth during the run on the banks in the neighbourhood of Cork, occasioned by the Fenian alarm.

There will be no difficulty now in calculating the actual deficiency of weight and value of the currency. One mode is to multiply 15.35 years, the average age of the

sovereigns, by .00276 grm. (.043 grain), the ascertained average annual wear. *The average deficiency of each sovereign therefore is* .0424 grm. (two-thirds of a grain, or .66 grain), *amounting to* .53 *per cent or quite* 10*s. in* £100. On the total assumed quantity of 64,500,000 sovereigns, this deficiency would be £340,000. The whole of this, however, would be covered by the allowance for wear of .63 per cent (.050 grm. or .774 grain), if it were spread evenly over the currency. To detect the illegal deficiency, we must consider the old and new coins apart. In a sum of 100,000 of the sovereigns as in ordinary circulation, the deficiency will be as follows:

| Years of Coinage. | Number of Sovereigns in 100,000. | Average Deficiency of each Piece. | Value of Deficiency in £100,000. |
|---|---|---|---|
| | | Grains. | £ |
| 1817–19 | 207 | 1.874 | 116 |
| 1820–29 | 7,402 | | |
| 1830–39 | 6,979 | 1.354 | 77 |
| 1840–49 | 16,935 | .829 | 114 |
| 1850–59 | 28,612 | .554 | 128 |
| 1860–67 | 38,246 | .234 | 71 |
| Australian | 1,619 | .214 | 2 |
| | 100,000 | — | 508 |

The whole of the deficiency upon sovereigns coined since the beginning of 1850 may be considered as covered by the allowance of .774 grain for wear; so that only the deficiency on earlier coins, amounting to £307 in £100,000, or nearly one-third per cent, would require to be made good in a recoinage. On a total quantity of 64,500,000 this deficiency would be almost exactly £200,000.

The weighings of 178 half-sovereigns, drawn from the ordinary circulation at Manchester, give the following average wear:

| Years of Issue. | Number of Half-Sovereigns weighed. | Average Weight of Half-Sovereigns. | Deficiency of Weight. | Average Date of Coinage. | Average Annual Loss of Weight. |
|---|---|---|---|---|---|
| | | Grains. | Grains. | | Grains. |
| 1817–49 | 32 | 60.199 | 1.468 | 1844.5 | .064 |
| 1850–59 | 86 | 60.857 | .780 | 1855.7 | .066 |
| 1860–67 | 60 | 61.298 | .339 | 1863.2 | .079 |

The wear thus indicated is considerably greater than that ascertained in the Mint experiments of 1833, which was as follows:

| | | | | |
|---|---|---|---|---|
| Half-sovereigns of | 1817 | wear | .032 | grain per annum. |
| „ | 1821 | „ | .036 | „ |
| „ | 1825 | „ | .052 | „ |
| „ | 1829 | „ | .048 | „ |

I cannot account for the difference, unless it is owing to the fact noticed by Jacob,* that the gold money was not properly in circulation between 1817 and 1821. Not only does the worn appearance of old half-sovereigns now in use lead us to suppose that they have suffered much loss, but the fact that they offer more than three-quarters of the surface of sovereigns, and are much more actively used in circulation, would lead us to expect rapid wear.

Taking the average annual wear of the half-sovereigns at .069 grain, we find the length of time during which it will remain of legally current weight as follows:

| | Grains. | Grammes. |
|---|---|---|
| Standard weight of Half-sovereigns - | 61.637 | 3.9938 |
| Least current „ „ - | 61.125 | 3.9609 |
| | .512 | .0329 |
| Hence $\frac{.512}{.069} = 7\frac{1}{2}$ years. | | |

As we cannot be sure that the half-sovereigns get into circulation for the first year or two of their existence, it will be well to take ten years so as to be on the safe side, and say that the number of light half-sovereigns is represented by the number coined before 1858. From the table on p. 241 we then learn that the proportion of light half-sovereigns is about 47 per cent on the average of the whole country. On a total quantity of £12,000,000 of half-sovereigns, this will amount to just $5\frac{2}{3}$ millions

* "Precious Metals," vol. ii. p. 172.

sterling, and the annual cost of the wear will be at least £13,000, being about three times as great in proportion to the value of the coin as in the case of sovereigns.

The aggregate deficiency of value of the half-sovereign circulation may be calculated as follows:

| Years of Issue. | Number of Half-Sovereigns in 100,000. | Average Deficiency of each Piece. | Value of Deficiency in £100,000. |
|---|---|---|---|
| | | Grains. | £ |
| 1817-49 - - - | 19,270 | 1.468 | 458 |
| 1850-57 - - - | 28,080 | .780 | 356 |
| 1858-67 - - - | 51,570 | .339 | 284 |
| Australian - - | 1,080 | — | — |
| | 100,000 | — | 1,098 |

Thus there is a deficiency in the half-sovereign circulation of just 1.1 per cent in value; but as .83 per cent is covered by the allowance for wear, there remains an average illegal deficiency of .27, or quite 5*s.* in £100. But if we pay regard only to the coin which is no longer legally current, the deficiency required to be made good in a recoinage amounts to £814 for each £100,000 of the present half-sovereign circulation, or in an assumed total quantity of £12,000,000, to about £100,000.

The deficiency of value of the whole of the light gold in circulation at present may now be calculated as follows:

| | Value. | Number of Pieces. | Deficiency in Value. |
|---|---|---|---|
| | £ | | £ |
| Sovereigns - - | 20,300,000 | 20,300,000 | 200,000 |
| Half-sovereigns - | 5,700,000 | 11,400,000 | 100,000 |
| | 26,000,000 | 31,700,000 | 300,000 |

The recoinage thus shown to be required is fully twice as great as that carried out in 1841-43, when £12,000,000 of coin were withdrawn at the cost of the State. The Mint authorities estimate the cost of striking a large number of sovereigns at about a third of a penny (.311 penny)

each,* so that we can calculate the complete cost of the recoinage now contemplated as in the following statement:

*Cost of Recoining 31½ Millions of Gold Coins.*

| | £ |
|---|---|
| To make up deficiency of weight - - - | 300,000 |
| „ „ fineness - - | 7,000 |
| Cost of coinage (Mint expenses) - - - | 41,000 |
| Total cost - - - - | £348,000 |

The second item arises from the assaying of the gold having been inaccurately performed previously to the year 1850, so that the older coins are not reported as of standard fineness.

The total cost to the nation of the metallic instrument of circulation can be estimated with sufficient accuracy as in the following statement:

| | £ |
|---|---|
| Annual wear of 64,500,000 sovereigns - - | 22,000 |
| „ 24,000,000 half-sovereigns - | 13,000 |
| Expenses of the Mint, including wear of silver coin - - - - - - - | 42,000 |
| | 77,000 |
| Interest on 95,000,000 of gold, silver, and copper coin at 3 per cent - - | 2,850,000 |
| | £2,927,000 |

The only source of cost not included in this estimate arises from the accidental loss of coins, the amount of which is quite unknown. The cost of coining and replacing the currency is seen to be quite inconsiderable, compared with the loss of interest upon it.

Should a recoinage be carried out, it is much to be desired that some improvement should be made in the design of the sovereign. Although only two or three gold

* "Report of the International Coinage Commission," p. 94.

coins have been recorded as undecipherable in date, I have myself found it to be almost impossible to distinguish 3 from 5 and 0 from 6 upon many sovereigns of no great age. It is to the mistaken reading of numbers that I attribute the small number of coins enumerated in the table, p. 241, in years when no such coins were issued from the Mint. These mistakes were quite insufficient to affect the accuracy of my inferences, but they could hardly have happened had the gold coins borne old-faced figures somewhat similar to those upon the new bronze coins.

# X

## AN IDEALLY PERFECT SYSTEM OF CURRENCY*

I PROPOSE to conclude this brief treatise by sketching out a scheme for an ideally perfect monetary system, to which the investigations and discussions contained in the preceding pages lead me. I do not for a moment suppose that such a scheme is ever likely to be realised as a whole. It is only a convenient mode of summing up conclusions, and selecting from the principal existing monetary systems those features which appear to be the best in each.

The separation of the functions of money is indispensable. Gold must be employed as the common denominator and temporary standard of value, in terms of which all prices will be expressed. It should cease to be the permanent standard of value, because, as I have explained in Chapter XXV, long-enduring debts and transactions will be regulated by the Tabular Standard of Value, the amounts of debts, although expressed in gold, being varied inversely, as gold varies in terms of other commodities.† To a great extent, moreover, gold will cease to be the medium of exchange. A portion of the currency may consist of ten and twenty franc, or two and five dollar

*A fragment written to form the conclusion of the book on "Money, etc." (published in the International Scientific Series), but omitted therefrom.

†See above, p. 115. I find, however, that David Ricardo, in his pamphlet, "Proposals for an Economical and Secure Currency, 1816," pp. 14, 15, makes some allusions to a proposal for judging of the value of currency by reference to a mass of commodities. Owing to the absence of any precise references, it is impossible to ascertain exactly what he is discussing.

pieces in gold; but the main body of the currency will consist, as in Scotland, of representative notes of various denominations, from sums of ten, twenty, or twenty-five francs upwards. Even representative money will be employed in a comparatively small part of the aggregate transactions of the country, since the Cheque and Clearing System must gradually extend and perfect itself, by the increased adoption on the part of all classes of the facilities of a banking account. The Cheque Bank, or institution of a somewhat similar class, will extend the use of cheques to the poorer classes; and it is not beyond hope that private enterprise might so improve and simplify the methods of Banking as ultimately to enable all thrifty men and women to have their banking accounts and their cheque-books.

There must, however, be some material basis for so widespread a system of paper, and this basis must be gold, which will long continue to be the true international currency, by which the indebtedness of nations can be discharged. Though paper documents will in highly-civilised countries perform the mechanism of exchange, coin will long circulate in Eastern and other less advanced communities. Regarding an international currency as a perfectly feasible scheme, at which we are bound in the interests of civilisation to aim, we must select the unit of account. In an abstract point of view, as I have explained,* the exact amount of this unit seems to be a matter of indifference, except as regards the smallest subdivisions. The choice evidently lies between the pound, dollar, franc, and ten-franc piece. The franc is much too small, giving a needlessly minute centime. The pound is convenient as being the largest unit; but its hundredth part is too large, and its thousandth part is too small to make the lowest submultiple. The dollar is unexceptionable in this respect, and having regard to its wide adoption in extra-European countries, might be very properly accepted as the ultimate unit, provided that it be made exactly equivalent to the five-franc piece in gold. But the ten-franc piece, or double dollar, is equally good

* "Money, etc.," chap. viii. p. 68.

in most respects, and superior in some. All that can be said is that either the five or the ten franc piece ought to be selected as the world's unit of account.

In any case, the gold coins to be issued should be equivalent in size to ten and twenty-five francs—that is, two and five dollars, weighing .32258 grm. for each franc, the alloy containing nine parts of fine gold and one part of copper. All mints issuing such coin should make a uniform charge of (say) 1 per cent, and, in consideration of such charge, should covenant to receive back the coin, when worn by legitimate usage, at the nominal value, delivering back the exact quantity of fine gold which was given for the coin when first issued. To the extent of 1 per cent, then, the gold coinage would be a token coinage, convertible into bullion, and the charge made would cover the cost of coinage and produce a fund which, multiplying at compound interest, would indemnify the State for the liability of withdrawing and recoining the worn coin after twenty years or more of use, as shown by Colonel J. T. Smith and the late Professor Graham.*

The subdivision of the unit, whether dollar or ten-franc piece, should of course be decimal, and a seignorage of 10 or 12 per cent ought to be levied upon all silver coins which should be legal tender to the amount of only five dollars or twenty-five francs. It is a point of minor importance whether such silver coin should have international currency; but, in any case, the mint issuing the coin should be bound to take it back at the nominal value when worn. In choosing the series of multiples, the French system should be preferred, so that the minor coins would be one, two, five, ten, twenty, fifty cent pieces; but if the principal unit should be the ten-franc piece, a half-cent piece, equal to a halfpenny, would have to be coined. The smaller coins should be made of nickel-silver, nickel-steel, or some alloy, perhaps to be yet invented, which would be superior to the present bronze, and in size they should resemble the new ten and five pfennig pieces of the German Empire.

* See "Report from the Royal Commission on International Coinage, 1868." Memorandum by Col. Smith, pp. 148–53.

Such being the constitution of the metallic money to be employed in the smallest retail transactions, the main body of the currency will consist, as already stated, of paper representative notes, the smallest note representing twenty francs (or perhaps even ten francs). All the notes should be issued on the system of the present Issue Department of the Bank of England, which I have called the Partial Deposit System. The amount to be issued on securities instead of coin or bullion would be greater or less according to the whole amount of the issue, and the profit would of course be secured for the public revenue, after payment of the costs of issue.

In mechanical execution these notes should resemble the American issues more nearly than those of the Bank of England. By combining the water-marked paper with the mechanically-engraved designs of the American notes, it might be possible to render counterfeiting hopeless.* In an artistic point of view, the notes of the Bank of France are the best yet issued, but it ought not to be difficult, in a time of improving taste, to obtain far better designs. The notes should be re-issued until they are too much worn.

I have adopted the opinion that one-pound notes might be used with great advantage in England, as they are in Scotland, Ireland, and some of the colonies, if only they be issued on the firm basis of the Bank Charter Act and the Deposit System. But the question arises, at what point shall we stop? If one-pound notes, why not ten-shilling or even five-shilling notes? I do not share the prejudice which commonly exists against small paper-money, and regard the question as one to be decided only on the ground of experience. We must have regard to the relative cost and convenience of notes of each denomination, and stop at that point where economy or convenience is overbalanced by more important considerations.

The French, during the Great Revolution, set the example of issuing very small notes, as low as ten sous.

* Mr. Fowler has lately proved, by statistics of the counterfeit notes in the United States, that it is notes of large value which are there counterfeited for the most part.

Such was the depreciation ultimately reached that the value of some of the smaller notes could hardly have exceeded that of the paper on which they were printed. The United States, in the early periods of the Great War, went almost as far, printing fractional currency of ten, five, or even three cents. Italy at the present time * is inundated with small notes, the one lira notes, value about eight pence, being very abundant, and local notes of fifty or even twenty-five centesimi serving as smaller change.

There is little to be said in favour of such very small fractional issues except that they are light to carry. Such small notes can hardly be economical, as they must be frequently renewed, whereas well-coined pence need not cost one quarter of their nominal value, and will circulate for thirty or forty years. Small paper money, too, is far more difficult to count than coins, care being requisite to separate the bits of paper. This is not a matter of importance in large notes which may represent ten, or twenty, or one hundred coins, but is a serious objection to small notes. These bits of paper, too, soon become torn, dirty, and obliterated. Disputes arise as to their genuineness or validity, and time is lost in exchanging them. Small notes, too, circulate so freely among the poorer classes that they may become the means of propagating infectious diseases.

The lowest limit of a paper currency should in any case be five francs, which is the lowest point to which the French recently descended.† But I am unable to see any very serious objections to the pretty five-franc notes of the Bank of France, now being withdrawn. The main part of the currency of Norway consists of one speciedaler notes, in value about 4*s*. 5*d*. each.‡ The Government are

* That is, in 1875.

† This is true, I believe, as regards the Bank of France; but in November, 1871, "Bons de Monnaie," or small notes of the value of one franc, were issued by the Société Générale. They were payable in notes of the Bank of France.

‡ Owing to the reform of the currency in the Scandinavian kingdoms, these notes have been replaced by a very similar currency of five and ten kroner notes, together with notes of larger value, excellently engraved in the American

desirous of replacing them by gold coin, apparently inferring that because richer countries have gold currencies, therefore, Norway will become more rich by possessing a similar money. Provided, however, that such notes are rendered strictly convertible and supported by an adequate deposit of specie, I see little or no use in a country of limited capital like Norway sinking a large sum in a gold currency.

manner, and in all respects convenient. Each note is about 5 inches long by 3 broad, and weighs about 0.76 grm. or 11.7 grains. In regard to weight, therefore, this currency is about 3.42 times as convenient as our gold coinage. The five-kroner note is worth about 5*s.* 6¼*d.* The attempt to introduce a gold currency into Norway has proved a failure, the notes being generally preferred.

# XI

## GOLD AND SILVER*

I AM very far from being desirous of taking any decided position about the *double* or *single standard*. It seems to me a question of excessive difficulty, in which there are many facts and quantities of unknown amount to be taken into account. It is a question partly of theory, but partly also of practice.

As regards the theory, I feel strongly in what an admirable manner you have set forth the principles of the so-called *double standard*, and the danger we might run of a rise in the value of gold were silver entirely demonetised.

It has been usual for economic writers on this side of the Channel to assert that the joint system of gold and silver exposes the country to the extreme fluctuations of both the metals. [Thus, if gold falls in value, the standard falls with it; if silver falls, then the standard again falls with it, always following the metal which sinks below the legal ratio.] The *compensatory action* of which you speak has been overlooked. The celebrated law of the year XI renders gold and silver mutually replaceable by each other

*A letter addressed on 12th December, 1868, to the late M. Wolowski, in answer to a request for an opinion upon the position of the monetary question as then set forth in Wolowski's tract, "L'Or et l'Argent: Question Monétaire;" Paris, 1868, 8vo, 32 pp. A part of the letter is translated and published in Wolowski's "L'Or et l'Argent;" Paris, 1870, pp. 62–64. The author remarks of the letter: "Le doute méthodique de M. Stanley Jevons se trouve déjà partagé par beaucoup d'autres professeurs d'économie politique, qui, d'abord surpris de l'attaque dirigée contre ce qu'ils regardaient comme un axiome passé en force de chose jugée, étudient la question à nouveau."

at a fixed ratio, and, as I now see the matter, I think this must have the effect of preventing extreme fluctuations in either metal. It is like opening a connecting channel between two reservoirs, which now assist to keep each other level at a medium point, instead of rising and falling independently.* The French Currency law has thus no doubt assisted to keep gold and silver at a nearly invariable price as compared one with the other. Thus I find that the ounce of English standard silver, which was worth 59*d.* in London in 1845, did not, on the average, rise higher than to 62*d.* (1859) after the gold discoveries, and it has since fallen again, being in 1867, 60¾*d.* Although both gold and silver have, I believe, suffered considerable depreciation, yet relatively they have not varied more than 5 per cent. Some persons anticipated that the fall in the value of gold would be indicated by a rise in the price of silver; but they overlooked the fact that gold would spread itself into the channels previously occupied by silver. Gold and silver thus influence each other's value † [somewhat as wheat, barley, and oats tend to rise or fall in price together, because they are to some extent capable of mutual substitution. Mr. J. E. Cairnes is the first author from whom I got any clear idea on this subject. He could hardly resist the argument that the double standard acts somewhat like a compensating pendulum by compensating the variations of one metal by those of the other.

But it is another matter when we come to look at the subject in a particular point of view. Is there any means of showing that gold would rise in value 25 per cent in consequence of the demonetisation of silver? Might not the currencies of the world still absorb a large quantity of silver so as nearly to produce the same equability of value as is artificially produced by the law of the year XI? Would not the Eastern nations continue to act for

* Wolowski adds the following footnote: "M. le docteur Wolfgang Eras s'était servi d'une image analogue au Handelstag de Berlin." I had, however, introduced the simile of a reservoir in a somewhat different way in 1863. See above, p. 57.

† The portion of the letter from this bracket to that on p. 281 is not published in Wolowski's work.

a very long time, as they have already acted for many centuries, as a great reservoir of the precious metals, tending to prevent and to compensate extreme variations?

Again, is not gold becoming, by the progress of industry, the most suitable medium of exchange? Could we in this country ever replace our gold currency by a silver currency fifteen times as heavy? Yet it is only by a more or less complete replacement of this kind that a rise in the value of gold would be prevented. It seems to me that as nations become more and more wealthy, they naturally pass from a silver to a gold currency. Such is now the progress of wealth in many parts of the world that this change is becoming natural and inevitable to them. Rather than use silver coins to any large extent, I feel sure that we should prefer a currency of small notes, like the Scotch or Irish one-pound notes, and the exclusive use of a paper currency opens the way to evils exceeding any which are to be anticipated from the demonetisation of silver.

Then again, I cannot see any prospect of a serious rise in the value of the precious metals. Australia, California, New Zealand, and other countries will continue for a long time to send considerable supplies from the quartz veins. From British Columbia we may expect increased supplies. In South Africa there are prospects of a great gold-field, and should the United States or other nation succeed in restoring good government to Mexico or to some of the South American republics, we might expect extraordinary supplies, both of gold and silver. The danger, therefore, that the value of gold would rise, and the burdens of nations become increased, is of an uncertain nature, depending upon many events, the probability of which we cannot estimate.

On the other hand, the conveniences of a single gold standard are of a tangible and certain nature. The weight of the money is decreased to the least possible amount, without the use of paper representative money. There is a simplicity and convenience about the system which has recommended it to the English during the half century which has passed since our new sovereigns were issued.

The operation of our law of 1816 has, in fact, been so successful in most respects that I should despair altogether of the English people or Government ever being brought to adopt the double standard in place of it. I was glad, therefore, to see that the monetary convention had decided in favour of a single gold standard. This decision seemed to render possible our entry into the continental monetary scheme. Even the 2*d*. by which our pound exceeds the 25 francs is at present an obstacle in the way of international money. You may easily judge how far the somewhat theoretical advantages of the double standard would be duly estimated on this side of the Channel.] *

Though far from feeling confident in anything which I say on this subject, I must acknowledge that *in theory* you and the other defenders of what may be called *the alternative standard* are right. But in *the practical aspect* the subject looks very different, and I am inclined to hope for the extension of *the single gold standard.*

* Not published in Wolowski's work. The author, however, thus alludes to the unprinted paragraphs: "M. W. Stanley Jevons croit à une augmentation rapide des approvisionnements d'or; cette pensée domine la solution pratique qu'il entrevoit."

# XII

## THE SILVER QUESTION

IT is evidently impossible to discuss the innumerable facts of the silver question in a brief paper like the present. My purpose must be restricted to expressing the conclusions which force themselves upon an English reader of the recent controversies.

In several official publications—in the excellent minority report of Professor Bowen, or the works of Mr. Blake †, M. Cernuschi, Mr. S. Dana Horton, in Mr. W. L. Fawcett's useful "American Handbook of Finance," and in numerous minor books or articles—we have abundance of facts. We are not likely at present to get more information of importance, and our task, therefore, is to digest what we have and to interpret its outcome wisely.

The general result, as it appears to an Englishman, is, that the United States should not, or rather cannot, adopt the double standard. If the attempt be made, it must be made either with or without the similar action of other nations. But the first supposition is easily disposed of. The notion of M. Cernuschi, that there might be a congress of nations, and that the leading commercial States

* This paper was read at the meeting of the American Social Science Association at Saratoga, 5th September, 1877, by Mr. Hamilton A. Hill of Boston. It was published for the Association in conjunction with a paper on the same subject by Mr. B. F. Nourse of Boston, by Messrs. A. Williams & Co., Boston, 1877. It was reprinted in the (London) "Bankers' Magazine" for December, 1877, vol. xxxvii. pp. 989-96.

† "Report upon the Precious Metals: Paris Universal Exposition, 1867." "Reports of the United States Commissioners. Washington, 1869."

might be induced to unite in adopting bi-metallic money, is chimerical. Several of the more important European nations have for the present no hope of using coin, whether gold or silver. Germany is only now establishing an excellent currency on a gold basis, and is most unlikely to abandon it without further trial. The Scandinavian kingdoms have no reason for retracting their late adoption of gold, which has done no harm. Even France, which has still the law of the double standard in nominal existence, shows no desire to put it into operation again, having experienced the trouble of an alternating standard and a heavy silver currency.

As to England, there is not the most remote chance that the proposal would be accepted or even entertained here. The present English system of metallic money has now existed almost unchanged since 1816, and it has worked so satisfactorily in most respects that it would require very strong reasons for making a fundamental change. Even were there a considerable weight of evidence in favour of the double standard, it would probably be found impossible to persuade the House of Commons to accept it. In nothing is the English nation so conservative as in matters of currency.

To prove this statement by some instances, I may mention, firstly, the question of decimal money. Nothing is more apparent than the superiority of a decimal system, like that of the United States, or that of France, over our £ *s.* *d.* The subject has been discussed *ad nauseam* for forty or fifty years, and some of the ablest men, such as the late Professor De Morgan, wasted great labour in advocating the obvious reform; but nothing has been done, and we are, perhaps, farther from success than ever. Again, there is absolutely no sensible reason against the use of one-pound notes, which have been in constant circulation in Scotland from the origin of the Scotch banks. But an English Chancellor of the Exchequer would not venture to propose their use in England. When it was shown, a few years ago, that the alteration of the pound sterling to the extent of twopence would probably lead to the establishment of international money, our financial

wiseacres decided that it could not be done. What, then, would be the reception in England of a proposal to subvert our standard altogether? So long, too, as the mother-country retains the gold standard, there would be no chance of the Australian and South African colonies abandoning it. Consequently, if the United States were to adopt the double standard, they would throw into confusion the monetary relations of the foremost commercial nations, while the universal bimetallism essential to the success of M. Cernuschi's schemes would be as far distant as ever.

If, indeed, the adopted legal ratio of gold and silver were such as to enable gold to circulate in the United States, then no effect on the value of silver would be produced, and all discussions would end in nothing. If the legal ratio were $15\frac{1}{2}$ to 1, as proposed, then full-weight gold coins could not circulate, and the currency and the standard of value would consist of silver only. American trade would be hampered by a money fifteen and a-half times as heavy as it need be. Americans would be loading themselves with silver fetters, and for what purpose? In order that the rest of the world might enjoy the superior convenience of gold money. While other advanced nations are passing, one after another, from the silver age of currency to the golden age, America, and probably America alone, would be stepping back from the gold age into the silver age. This seems to me about as wise as if the men of the bronze age had solemnly decided to reject bronze, and to go back into the stone age. In a matter of this sort, we must take account of general and long-continued tendencies, and the tendency now appears to be inevitably toward the general adoption of gold as the standard money.*

During the last six centuries the precious metals, gold and silver, have both become greatly depreciated. An agricultural labourer can now earn in England by a day's labour about *ten times* as much silver as he could six centuries ago (about three hundred and fifty grains of standard silver as compared with thirty-four grains).

* See above, pp. 65-72, 95-98, 107-111.

Silver, too, is depreciated more than gold; in the middle ages the ratio was 10 or 12 to 1; now it is 16, or even 20 to 1.

To attempt to arrest progressive changes of this kind is blind and vain striving against Providence. Why should we try to keep silver dear? If the mines of America yield so beautiful a metal in sufficient abundance, why should we not enjoy the use of it for ornamental and useful purposes, for which it is at present too expensive? Why should we wilfully employ it in the very way in which it is not useful, but simply inconvenient? When we see pictures of Indian women loaded with silver bangles and anklets, it is difficult to help wondering how such a weight of ornaments can add to the enjoyment of life. Vanity can explain a good deal; but what can explain the wish of the Americans to load themselves with silver coins, from which they will derive no gratification whatever? The benefit, if any, will fall to other nations, which can use gold in greater abundance, and no Americans will be better off, unless, indeed, it be the few proprietors of silver mines, who, being rich already, will become richer still.

I might go on to show that, even if America could establish the double standard, and succeed in inducing other nations to do so likewise, the advantages of so great and so difficult a measure are of a very speculative and doubtful kind. I quite concede to MM. Wolowski and Cernuschi that the bimetallic system does spread fluctuations of supply and demand over a wider area. I have tried to explain in my book on "Money and the Mechanism of Exchange," * that gold and silver, free from the action of a legal ratio, are like two unconnected reservoirs of water, each liable to be raised and lowered in level by various accidents. Establish a communication between these reservoirs, and then each new supply spreads itself over a double area, and each new demand is supplied

* International Scientific Series: chapter xii on "The Battle of the Standards." This chapter, extracted from the French edition, is reprinted as an appendix to M. H. Gravez' French version of the "Primer of Political Economy"—"L'Economie Politique." Bibliothèque Utile, tome xliv. Germer Baillière, Paris.

with less effect upon the general level. The legal currency ratio of 15½ to 1 actually does establish a communication of this sort between the reservoirs of gold and silver in the world; but it does not, therefore, follow that it is desirable to establish the communication.

To say the least, it is quite open to argument that silver is now a metal less steady in value than gold. If one mine like the Comstock lode produces so serious an alteration in the supply, what may we not apprehend when the mineral treasures of Peru and Mexico are opened up by Anglo-Saxon miners? Both Humboldt and Murchison were of opinion that enormous supplies of silver would some day be obtained from South America, and what has occurred in Nevada lends probability to their predictions. Moreover, silver is drawn almost exclusively from regular mines, and it is extracted from ores, so that the advance of mechanical and metallurgical science tends to cheapen it in the same way (though not in so great a degree) as it has cheapened iron and steel. This is much less true of gold, which is found to a considerable extent in the native state in surface deposits. Gold is a widely diffused metal, and there are large tracts of auriferous deposits which might be worked if an increased demand for gold should make it profitable to do so.

Under these circumstances, it is probable that the double standard, or, as it ought to be called, the *alternative standard,* will be really less steady in value than the gold standard alone. Indeed, it is difficult to help looking upon the adoption of a silver standard now (and the double standard would not differ much in practice from a single silver standard) as approximating indirectly to an act of partial repudiation. I take it for granted that, if the United States were to adopt silver money, the Federal and State governments would make provision for the payment of past obligations, including the whole national debt, State and city debts, railway bonds, etc., in the gold money in terms of which they were contracted. I am sorry to see, indeed, that M. Cernuschi, if I read him rightly, proposes that "all existing debts, stipulated in dollars of whatever denomination, shall, without exception,

be payable in the new bimetallic currency." Such a measure would verge closely upon a breach of faith, for the change would be made on the ground that silver is depreciated. And if, as is probable, the bimetallic system would not restore silver to its original value, then creditors would plainly lose, to the advantage of debtors.

One of the most powerful arguments in favour of the double standard is founded on the idea that there will not be gold enough to meet alone the advancing needs of commerce. Prices, it is said, will fall, and the burden of debts will thus be increased by the demonetisation of silver. But there is no proof, nor even probability, that such results will follow. In the past thirty years the supply of gold has certainly been excessive, as shown by the progressive rise in the cost of living in almost all parts of the world. The same tendency, the progressive depreciation of the precious metals, has been going on, as I have already remarked, for centuries. Should the adoption of a gold metallic currency in America and elsewhere tend to slacken this continual fall of value for a time, there would be nothing to regret in the result; but I doubt if it would even do this.

On the one hand, there is no good evidence of any considerable falling off in the excessive supplies of gold yielded by California and Australia. Elaborate calculations have been made to show the inadequacy of the gold supply. I am much inclined to agree with the late Walter Bagehot, who, in the course of his excellent evidence concerning the depreciation of silver, said that the estimates of the stock of gold and silver were not worth the paper they were written on.* Even the apparently precise returns of produce and amounts transmitted are probably most inaccurate. But, even taking these returns, Mr. S. Dana Horton, in his ingenious work on Silver and Gold,† comes to the conclusion that the net annual supply of

* "Report from the Select Committee on the Depreciation of Silver, 1876," Question 1391; "Some Articles on the Depreciation of Silver," p. 126; by the late Walter Bagehot.

† "Silver and Gold, and their relation to the Problem of Resumption," p. 28. New Edition. 1877.

gold for the use of money is twice that of silver; namely, sixty millions of dollars, as compared with thirty millions. Now, if we remember that of the whole population of the world probably two-thirds use silver coin exclusively, and are in the habit of melting it up and burying it in the earth, whereas those who use gold use silver also for subsidiary currency, I cannot see that there is any evidence of gold becoming comparatively deficient. Mr. Horton concludes, too, that the present annual addition of new gold is $1\frac{2}{3}$ per cent of the total stock of gold money, while that of new silver is only about 1 per cent of the silver money. So far as such calculations have any weight, they are strongly in favour of a gold standard. I may add that Mr. Hollingberry, after an elaborate inquiry carried out for the information of the Indian Government,* comes to the conclusion that the production of gold is much underestimated; that there has been little falling off in the aggregate yield, and that there is little prospect of any further falling off. It should be remembered, too, that the product of the Comstock lode consists of gold to the extent of 45 per cent in value.

On the other hand, I see no probability that any great nation except the United States will soon want a considerable supply of gold. Russia, Italy,† Austria, Turkey, and other States with depreciated currencies, are not likely to coin much gold at present. France already has the largest stock of gold ever accumulated in one place, and can hardly want more. The Scandinavian kingdoms have already exchanged their small bank reserves of silver for gold, and their gold currency makes no progress. England already has a currency mainly composed of gold coins, and cannot want more than the usual annual addition, which is probably not the half in reality of what it seems to be by the statement of coinage at the Mint. Germany, no doubt, is still absorbing gold, but the quantity retained is really

* "The Production of Gold and Silver," etc. Selections from the Records of the Government of India. Calcutta. 1876, *passim.*

† As regards Italy, this has turned out to be incorrect; Austria also has accumulated a certain stock of gold. The Bank of France has had great difficulty in preventing its gold reserve from running low.

much less than what is coined.* In looking round in this way, it is difficult to see where any very great demand is likely to arise simultaneously with the American demand. No doubt, as I have said, the use of gold money will gradually progress, but a costly change of this kind will take decades or even centuries of years to carry into complete effect.

Nor will the United States require any very great quantity of gold when they resume specie payments upon a gold basis. It is quite a mistake to suppose that, because a currency is *convertible* into gold at will, it is therefore *actually converted* into gold. In England we have a great quantity of gold coin, because there is an absurd prejudice against the use of one-pound notes, so that sovereigns must be used as change for five-pound notes. In Scotland it is just the reverse, and it is not an uncommon incident for a beautiful gold sovereign to be actually refused, and a one-pound note demanded instead. In Sweden and Norway there has long been in use a well-regulated paper currency, and, so far as my own observation goes, there is little prospect of the new gold coin beating out the notes.

So, in the United States, the resumption of specie payments does not mean necessarily that all the notes shall be replaced by gold coins. Gold is not really requisite except for making international payments, and the stock kept need not be very much larger than will meet any conceivable demand for exportation. Provided that the amount of notes afloat is made to rise or fall by the exact amount of gold added to or drawn from the reserve, in the manner of the Issue Department of the Bank of England, and the present German Bank system, it is possible to have a currency conforming exactly to the variations of a gold currency, and yet consisting mainly of paper.

The resumption of specie payments seems to me to need no heroic measure whatever. Already the premium on gold is so low that, if the dollar were made coincident with

* This is due to the large amounts of coin which are melted, carried abroad by travellers, or exported without proper declaration at the custom-houses, so that they are not entered in any returns.

the five-franc piece, the paper dollar would be almost at par. The difference of about 2 per cent would disappear of its own accord as trade became brisk again. The par having been once established, it would be possible to begin making specie payments in gold in a partial manner, as is actually done at present by the Bank of France. Payments might at first be limited to small sums, or fenced round with such conditions and precautions as would prevent any sudden run for gold. After the novelty of specie payments was worn off, these precautions might be gradually abandoned, and convertibility would be achieved without any violent change whatever. Nor does there seem to me to be any need to make national bank notes convertible to any amount at the bank issuing them. They might continue to be convertible into Treasury legal-tender notes, which would become convertible into gold at Washington or such other few spots as might be selected for the deposit of the reserve. As gold is only needed really for international transactions, the reserve should be concentrated, and not dispersed over a great many local and minor banks.

Finally, as regards the future American dollar, I agree nearly but not entirely with Professor Francis Bowen.* Excepting in a few minor points, I believe his report to be true and wise from beginning to end, and I trust that his recommendations will for the most part be adopted. He proposes that the dollar shall contain 22.6 grains of gold, so that the five-dollar piece may be the exact equivalent of the pound sterling. The choice ought, doubtless, to lie between this and the 25-franc piece, and those who do not yet quite despair of international currency would prefer the latter. In this case the dollar would contain 22.40 grains of pure gold, and the American five-dollar piece, containing about a grain less gold than the sovereign, would be preserved in this way from being melted wherever it came into competition with the sovereign. It is a law of currency that the lighter coin lives and the heavier one goes to the melting-pot. In this way the American five-dollar piece would probably become the predominant

*"Report of the Monetary Commission constituted in pursuance of Act of Congress, August 14th, 1876."

gold coin, until such times as the English people would see the wisdom of reducing their sovereign by twopence, and thus establishing a simple ratio between the Latin, American, and English currencies.

But this is a matter only of detail. My principal purpose is accomplished if I have adequately expressed the strength of my conviction that, in trying to establish a bimetallic money, the American nation would be setting themselves against irresistible natural tendencies so as to ensure defeat. For the sake of making those richer who are rich already, they would be loading themselves with heavy metal, which, if it is to be abundant, had better be left to other uses, or to those Eastern nations who are too poor and ignorant to employ gold. It is the general rule in commerce to take care of "number one," but in the bimetallic scheme the rule is reversed, and "number one" is asked to carry silver coin in order to benefit "number two" and "number three."

## XIII

## BIMETALLISM *

IT may be safely said that the question of bimetallism is one which does not admit of any precise and simple answer. It is essentially an indeterminate problem. It involves several variable quantities and many constant quantities, the latter being either inaccurately known or, in many cases, altogether unknown. The present annual supplies of gold and silver are ascertained with fair approach to certainty, but the future supplies are matter of doubt. The demand for the metals again involves wholly unknown quantities, depending partly upon the course of trade, but partly also upon the action of foreign peoples and governments, about which we can only form surmises.

The question is much complicated, again, by presenting a double problem—that regarding the next decade of years, and that involving the more remote future. Possibly, a step which might be convenient during the course of the next five, ten, or fifteen years would prove subsequently to be the mere postponement of a real and inevitable difficulty. When we pursue an inquiry of this complex and indeterminate kind, it resolves itself into endless hypotheses as to what will or will not happen if something else happens or does not happen. Nevertheless, it does not follow that, because statistical science fails us, we can come to no practical conclusion; on the contrary, from the very vagueness and uncertainty of the subject may emerge a conviction that it is best to do nothing at all. A party

* "Contemporary Review," May, 1881, vol. xxxix. pp. 750-57.

of travellers lost in a fog will probably indulge in a great many speculations and arguments as to the possible paths and turnings they might take; but the wisest course may, nevertheless, be to stay where they are until the air becomes clear.

Looking at the question, in the first place, as a *chronic* one, that is, as regarding the constitution of monetary systems during centuries, it is indispensable to remember the fact, too much overlooked by disputants, that the values of gold and silver are ultimately governed, like those of all other commodities, by the cost of production. Unless clear reasons, then, can be shown why silver should be more constant in its circumstances of production than gold, there is no ground for thinking that a bimetallic gold and silver money will afford a more steady standard of value than gold alone. The common argument that there will not be enough gold to carry on the trade of the world with, does not stand a moment's examination in this aspect. In the first place, if the value of gold rises, more gold will be produced, and the great number of gold-mining enterprises now being put forth may have some connection with this principle. In the second place, so long as sudden changes of supply and demand can be avoided, it is almost a matter of indifference, within certain limits, whether there is much gold or little. Prices having once settled themselves, it is only a question of carrying a little more metal or a little less in your pocket. As Cantillon,* and subsequently, but independently, Hume,† remarked, if the money in the world were suddenly doubled or halved trade would go on as before, all prices being approximately doubled or halved. But, of course, the

* "Essai sur la Nature du Commerce en Général." Part ii. pp. 235–39. Cantillon's remarks are, however, exceedingly cautious and profound. He says: "Je conclus de tout cela que par l'introduction d'une double quantité d'argent dans un état, on ne double pas toujours les prix des denrées et des marchandises. Une rivière qui coule et serpente dans son lit, ne coulera pas avec le double de rapidité, en doublant la quantité de ses eaux."

† What Hume says, is: "Suppose four-fifths of all the money in Britain to be annihilated in one night. . . . Must not the price of all labour and commodities sink in proportion. . . . ?"—"Political Discourses (V.) on the Balance of Trade," p. 82. Second Edit. 1752; "Essays," 1777, vol. i. p. 329.

interests of creditors and debtors would be affected while the change was in progress.

Now, as regards the *chronic* question, it is probable, though not certain, that the establishment of the bimetallic ratio of 15½ to 1 would give a worse rather than a better standard of value, because the momentary standard is always the over-estimated metal. The double standard system gives an option to the debtor, so that if either gold or silver were in future years discovered in large quantities, the debtor would have the benefit. In the monometallic system there is no option, and all parties stake their interests on the single metal. To these considerations must be added the historical fact that silver has during the last thousand years fallen in value more than gold. The ratio of values in the middle ages was about 10 to 1, fluctuating at times to 12 to 1. Later on silver became comparatively cheaper, and in the latter part of the last century, 15½ to 1 correctly represented the natural ratio. For some fifty years it was held pretty steadily at this point by the action of the French Currency law. The unprecedented discoveries of gold in California, Australia, New Zealand, and elsewhere reversed the course of prices for a time, but more lately the tendency to a preponderating fall of silver has reasserted itself. No doubt the events here so briefly recapitulated admit of endless discussion, and it would be impossible even to mention the volumes which have been written since the time of Locke upon the comparative steadiness of value of gold and silver. There emerges a certain degree of probability that silver is more subject to depreciation than gold, although both have, in the course of a thousand years, been very greatly depreciated in comparison with corn and the chief kinds of raw materials.

If this may be assumed to be the case, it follows that an attempt to re-establish the ratio 15½ to 1 would tend to discourage the production of the dearer metal, gold, and to encourage the production of the more depreciated silver. We should be filling our pockets and our strong boxes with a metal 15½ times as heavy and 28½ times as bulky as gold, proportionally to value, in order to get

a worse medium of exchange, and a probably worse standard of value. Nor should we be approximating towards a better state of things. If gold is destined ultimately to be the general standard of value of all civilised nations, we must let it take its own natural value, and must allow the appreciation, if any, to tell upon the profits of mining. But the arbitrary reduction in the value of gold, involved in the present bimetallic project, would tend constantly to replace gold by silver; and unless it were desired actually to take silver as the medium of exchange, the last state of things would be worse than the first. It thus becomes plain that a bimetallic *régime* is not the means of approximating to a gold *régime*. On the contrary, it must either be a permanent *régime*, or it will, sooner or later, leave us with a vast stock of silver, liable to sudden depreciation, and a diminished stock of gold. In short, the project of M. Cernuschi is not a real panacea for our present troubles; it is only a mode of postponement leading to eventual aggravation.

When we turn to the *temporary* view of the subject, by which I mean the circumstances and interests of the next ten or fifteen years, the difficulties increase, chiefly because the data become wholly uncertain and contingent. The great principle of the cost of production fails us, because in the case of such durable commodities as gold and silver, the accumulated stock in hand is immensely greater than the annual production or consumption. It stands to reason, of course, that if several great nations suddenly decide that they will at all cost have gold currencies to be coined in the next few years, the annual production cannot meet the demand, which must be mainly supplied, if at all, out of stock. The result would, doubtless, be a tendency to a fall of prices. M. de Laveleye, in one of the able articles which he is contributing to the *Indépendance Belge*,* as an advocate of Cernuschi-ism, points to a fall of 30 per cent, which he thinks has already been occasioned by the demand for gold currency. He excites our imagination as to what may be expected to

* Since reprinted: "La Question Monétaire en 1881," par Émile de Laveleye (Bruxelles et Paris); III., p. 9.

happen should Italy and other countries need gold for coining. But he omits to observe that the fall of 30 per cent is probably due for the most part to the collapse of credit and speculation, a periodic event of which we have had many prior instances. The period of 1833 to 1844 especially was one when no great wars and monetary operations were in progress; it was a period of active industrial and commercial progress. Yet the tables of prices given by Tooke, in his "History of Prices," and reduced in my paper on the Variation of Prices,* show that on the average prices rose by 22½ per cent between 1833 and 1839, and fell 25 per cent between this last year and 1844. So far as I have been able to discover, this great oscillation was entirely due to the general expansion of trade and credit, and to its subsequent collapse. Like causes have certainly been in operation in the last ten or twelve years; and if, as seems probable, we are now getting round by the lapse of time to the period when trade naturally revives, experience would prevent us from imagining that the late fall of values will be continued or repeated without an intervening rise. I am far from denying that if the Italian Government decide to carry into effect M. Luzzatti's threat of buying gold at all hazards, and if the like course be taken by the United States and France, not to speak of Germany, then there might be a considerable disturbance of values for a time. But is it likely that such proceedings will be taken by rational statesmen and rational parliaments? It is really too absurd to suppose that any country will insist upon immediately having a gold currency at any cost, regardless of the fact that it will thereby injure its own trade and commerce in the getting. The position is simply this. We have had for fifty years or more an abundant currency of gold. Italy and some other countries have a paper currency. Suddenly becoming disgusted with paper, they say that unless we consent immediately to abandon our gold to a great extent, and take silver instead, they will insist upon buying our gold from us at whatever price we like to ask for it. We have so good a currency that,

* See above, pp. 136 *et seq.*

unless we consent to give it up willingly, they will insist on borrowing it from us. But surely, in this case, possession is nine points of the law. The largest stock of gold in the world is to be found in England, and many of the great gold-producing districts are to be found in the English colonies or dependencies. If these foreign nations insist upon having gold currencies, they must pay our price for gold, and they must, in raising the price, benefit us and our colonies, comparatively speaking.

When we consider what are the difficulties put forward as the ground of this bimetallic crotchet, we find that they arise either out of the sudden issue and withdrawal of paper money, or else out of the efforts of certain governments to get rid of silver. If the Italians suddenly want fifteen or twenty millions of specie, it is because they allowed their specie to be replaced by paper in former years, and they now discover the evils of a variable paper currency. Germany wants gold, because Prince Bismarck and his economists recognised the soundness of the principles on which Lord Liverpool fashioned our metallic currency. But because Germany has met with a temporary check in striving after a gold standard, is there any reason that we, who have had a gold standard with little interruption since the time of Sir Isaac Newton, should throw it up at the demand of M. Cernuschi? The difficulties of France simply consist in the fact that, having had the law of the double standard previously in operation, she suspended the action of the law as soon as it began to occasion a return of silver. If all civilised countries were to adopt the double standard, they would just be inviting the growth of a silver currency, which France, with full experience of the use of silver, has practically decided to avoid.

Much which has recently been published on this subject, including the official text of the draft resolution to be submitted to the Conference in Paris, implies that the French law establishing the double standard was intended to act as a regulator of the values of the metals according to the ratio of $15\frac{1}{2}$ to 1. The fact, however, is that no such idea seems to have prompted the law. Gaudin, who

in the ninth year of the Revolution proposed the ratio of $15\frac{1}{2}$ to 1, did so upon the ground that this ratio was sufficiently near to that of the market values to allow coins of gold and silver to circulate side by side indifferently. In case the market ratio should alter after a time, he thought that the gold pieces could be melted and re-issued. Sir Isaac Newton, again, when in 1717 he fixed the guinea at 21*s.*, did so upon the ground that this was the closest convenient approximation to market rates. Only five months ago I quoted* ("Contemporary Review") the remarks of Cantillon upon the decision of Newton. Cantillon says: "It is the market price which decides the proportion of the value of gold to that of silver. On this is based the proportion which we give to pieces of gold and silver money. If the market price varies considerably, it is necessary to alter the proportion of the coins. If we neglect to do this, the circulation is thrown into confusion and disorder, etc." There is, in fact, no precedent for the views now pressed upon us. It is not even proposed to accept the prevailing ratio of the markets, but by an arbitrary convention to raise up silver to the place it held in the markets before, which involves bringing down gold so as to meet it about half way. I do not undertake to deny that if a convention were agreed upon, and carried into formal effect, it might possibly raise silver to its former price of 59*d.* per ounce. The measure is one of so novel a character that it is almost impossible to say what would or would not happen. The attempt to force silver dollars into use in the United States has entirely failed, and it might fail even under a convention. It is quite conceivable that in the United Kingdom and the colonies the scheme would be defeated by the tacit refusal of the people to accept silver legal tender. A bank or a tradesman might try to stand upon his legal rights, but the result would be a kind of commercial "boycotting." Some formula would probably be discovered for contracting affairs out of the Double Legal Tender Law. At present there is no law to prevent people from making contracts in terms of gold or silver bullion, or tin or copper

* See below, No. XIV., p. 312.

or corn, or whatever else they like, which is capable of precise definition. Even if the law were not thus circumvented, it might still be possible to make payments in gold a point of honour.

Then, again, the perpetual maintenance of this supposed convention is the only safeguard against the most serious inconvenience to some of the parties to it. The convention would resemble a chain, the breaking of each link of which would throw an increased strain upon the other links. There exist, indeed, a good many international conventions relating to postal intercourse, extradition of criminals, copyright, and so forth; but in none of these cases would the breaking or suspension of the convention result in any ruinous consequences. There would be suspension of benefits rather than occasion of evil. But should war break out among some of the countries involved in the monetary convention, the probable effect would be to throw the mass of silver coin upon neutral nations. This might be done without any express breach of the convention, simply by the issue of paper money, a measure which we cannot pretend to consider unlikely, seeing that the chief difficulties of the present monetary situation arise out of efforts for the withdrawal of recent paper-money issues. It is true that the 8th Article of the proposed convention enacts that "the fact of issuing or allowing to be issued paper money, convertible or otherwise, shall not relieve the state issuing it, or allowing it to be issued, from the above stipulated obligation of keeping its mints always open for the free mintage of the two metals at the ratio of 1 to 15½." But, as far as I can understand this "keeping of the mints open," it seems probable that this article would be quite nugatory in time of war. If silver were depreciated 5 or 10 per cent, paper legal tender might easily be depreciated 20 or 30 per cent, and no one would think of coining silver to pay their debts when they could pay them so much more cheaply with paper. The issue of paper legal tender forms then, to the best of my belief, an indirect mode of abrogating the convention without a distinct breach of faith. No government has ever yet resisted the temptation of resorting to paper under serious

stress of war; and therefore, until a wiser and better state of things is brought about in the long course of time, it would seem impossible to fulfil the first condition of the bimetallic project—the making of an indefeasible convention.

When a measure is so clearly undesirable, it is hardly needful to point out the many difficulties which would arise in its operation. But there is one which presents itself to my mind as almost insuperable—namely, the confusion which would be produced in the masses of national and other debts contracted in terms of gold money. Silver is now about 13 per cent below its old customary value, compared with gold. If, then, debts contracted formerly in gold could be paid in silver by the option of the bimetallic system, the claims of all creditors would be endangered to this extent, and in all probability would be depreciated to half that extent. Nor would the matter be much improved by enacting that old debts should be paid in gold as contracted, because gold being forced into a fixed par with silver, would be depreciated, say 6 per cent. The adoption of the bimetallic *régime* would be a *coup d'état* affecting the value of all past monetary contracts in a degree incapable of estimation; and although such a *coup*, or almost any other *coup*, might be advisable under certain circumstances, according to the maxim, *salus populi suprema lex*, yet it would be clearly impossible to unsettle the whole monetary contracts of the British nation and the British race, to the extent of some 6 per cent or more, for the sake of the exceedingly problematic, if not visionary, advantages to be derived from this proposed convention.

Though it thus appears to be altogether out of the question that the English Government should contemplate the abandonment of the gold standard, there are two or three minor measures of a temporary nature which might perhaps be adopted to relieve the disturbed relations of the precious metals. There would probably be little or no inconvenience in raising the limit of legal currency of silver coin in the United Kingdom to five pounds instead of two pounds, as at present. This change would probably

prove to be a merely nominal one, unless bankers and others could be induced to pay out silver coin more largely than at present. The Mint gains so handsome a profit upon the coinage of silver money at present that the opportunity might well be taken to throw as much silver into circulation as possible; but unless the habits of the people be changed it would not stop in circulation. There is, in fact, at present a very clear disinclination on the part of the public to take any larger amount of silver money than is necessary. It is almost an unknown thing in England for any tradesman to give as much as two pounds in silver change. No customer is expected to take more than ten, or at the most twenty shillings in silver, and any surplus of silver receipts is paid into the banking account, and the general balance of the district is eventually returned to the Bank of England. It is very doubtful whether Mr. Seyd's scheme of a four-shilling piece or any other scheme would overcome this fixed habit, which is moreover a reasonable habit." *

A good deal has been said about the expediency of bringing into operation the third clause of the Bank Charter Act, which is supposed to authorise the issue of notes upon a reserve of silver bullion to a certain extent. That clause reads as follows:

"And whereas it is necessary to limit the amount of silver bullion on which it shall be lawful for the same department of the Bank of England to issue Bank of England notes; be it therefore enacted, that it shall not be lawful for the Bank of England to retain in the Issue Department of the said Bank at any one time an amount of silver bullion exceeding one-fourth part of the gold coin and bullion at such time held by the Bank of England in the Issue Department."

It is obvious that this clause is solely a restrictive one;

* "Let there be coined in England and in India a new silver piece of suitable fineness, containing 350⅝ (350.625) grains troy of fine silver. This coin is to be added to the present English silver coinage, as a four-shilling piece. It is to be coined only at the option of the Government, and remain under the limited tender."—"The Monetary Conferences in Paris, etc. 1881," p. 6, by Ernest Seyd—his last pamphlet. Let me add a word of regret at his untimely death.

that which authorises the holding of silver bullion is the preceding clause, far too long for quotation. It states, however, that it shall not be lawful to issue notes in excess of the securities allowed to be transferred to the Issue Department, "save in exchange for other Bank of England notes, or for gold coin, or for gold or silver bullion received or purchased for the said Issue Department under the provisions of this Act," etc. It is curious that, although the second clause thus seems to speak of silver bullion being "received or purchased under the provisions of this Act," there are no provisions in the rest of the Act relating to the purchase of silver. The fourth clause defines the price at which all persons may demand notes for gold bullion, but there is no like definition as regards silver. The result seems to be that the Bank of England buys and sells silver bullion as an ordinary dealer or speculator. If, then, the Bank Directors think that it will conduce to the interests of their shareholders that they should lay in a stock of three, four, or five millions of pounds' worth of silver, as the case may be, let them do so. They will gain or lose according as the value of that stock rises or falls; but who can say how that will be? In any case, the effect of such an operation upon the silver markets of the world must be inappreciable.

There is one further measure which might well be adopted at the present conjuncture, namely, the alteration of the Bank Act so as to allow of the issue from the Bank of one-pound notes. Now that Parliament has authorised the circulation in England, under very questionable conditions, of a fractional paper currency, the last shadow of reason has disappeared why one-pound notes, so long current in Scotland and Ireland, should be unknown in England. If we could suppose that thirty millions of such notes were put into circulation eventually, about twenty millions might be issued on Securities, giving a profit to the Government of nearly half a million a year. The margin of ten millions more or less of gold added to the specie reserve of the Issue Department would be ample to meet any conceivable demand for payment of such notes, the circulation of which would probably be more constant

than that of the larger notes. Thus a supply of twenty millions of sovereigns would be opportunely thrown upon the markets of the world, which might be scrambled for by the various nations now wanting gold currencies.

It will easily be seen that in this article I do not pretend to enter into the complexities of the subject, nor to answer the numerous arguments adduced in favour of the bimetallic project. The literature and statistics of the subject are of an almost interminable extent. If any reader wishes to learn what he has to read before he can be considered to have mastered this subject, let him refer to "A Partial List of Modern Publications on the Subject of Money," prepared by Mr. Horton, and printed among the Appendices to the Official American Report on the International Monetary Conference, held in Paris, in August, 1878. This volume is replete with information on the subject.* But my contention is, that to wade through the interminable discussions on bimetallism is about as useful as to wander through a forest in a mist, the happiest result of which is usually to find yourself back again at the point you started from.

*[Since the above lines were written, Mr. Jevons determined to publish a more complete bibliography of the subject, which will be found at the end of the first edition of his "Investigations in Currency and Finance" (1884), but is omitted in this reprint.

# XIV

## SIR ISAAC NEWTON AND BIMETALLISM

NOTE.—In all cases where, either in the text or notes of this paper, it has been necessary to make any additions to the unfinished MS. of the Author, the additions are enclosed between square brackets [ ].

THE name of Sir Isaac Newton is naturally a good one to conjure by. It would, in fact, be impossible to find a better. The bimetallists have discovered this fact, and when in want of a good, strong argument, fall back upon their favourite idea that Sir Isaac Newton was the inventor of bimetallism. We all know how scientific myths attach themselves to great names, such as those of Geber or Roger Bacon. Something of the same sort of myth creation seems now to be taking place as regards the honoured name of Newton. As to the accuracy of the assertions made, we shall inquire in the course of this article. About the making of the assertions there can be no doubt. Thus quite recently M. Emile de Laveleye, in a most interesting note upon the historical origin of some arguments, mono- and bi-metallic,* has said (translation of French): "Newton had perfectly perceived the cause of the phenomenon of the alternation of two metals, and he had indicated the method of putting an end to it. For that purpose it sufficed, according to him, to establish between gold and silver the same relation of value (*rapport de valeur*) in all countries. Newton is then really the inventor of bimetallism. Here is the important passage in which he expresses this great economic discovery."

* "Jahrbüchern für Nationalökonomie und Statistik." Von Professor Joh. Conrad. Miscellen. pp. 114–119.

He then quotes a few lines from the celebrated Report of Newton, in 1717, to be presently cited.

As M. de Laveleye, indeed, points out, he is not the first to treat Newton as a great economic discoverer. M. Cernuschi has this great merit. Michel Chevalier was perhaps the first Continental writer to notice the interest attaching to this Report, and in his well-known treatise * quotes it, and adds some slight but sensible remarks. But then, Chevalier was one of the obnoxious sect now described in a new-fangled nomenclature as mono-metallists, or, in other words, a supporter of the single gold standard.

It is to M. Cernuschi that is due the discovery of Newton's great discovery. Michel Chevalier, according to Cernuschi, speaks of Newton "in a way so obliquely eulogic, that in listening we might believe that Newton was a monometallist, whereas he has given to England a bimetallic law in unison with that of France." Before, however, I proceed to combat the ideas now known as Cernuschi-ism, I should like to offer a slight tribute of respect, not only to the great ability of the author of this doctrine, but also to the high and disinterested public spirit which has led him to rush into the strife. On previous occasions he has not hesitated to risk a fortune on economic experiments † which he conceived to be for the public good. Even those who deride his crotchets, or overturn his arguments, can well afford to honour the high and pure spirit in which he has acted throughout.

* "Cours d'Économie Politique, etc.," 3me vol. "La Monnaie" (1866), pp. 145-7.

† [See "Illusions des Sociétés Co-opératives," par Henri Cernuschi; 12mo.; (Paris) 1866; esp., pp. 12-22.

M. Cernuschi was the victim of his conscientious devotion to a venerable but not too logical maxim. In a note to p. 65, he observes: "Il n'y a rien de tel que de pratiquer soi-même ce qu'on prêche aux autres. Avant de parler de co-opération, j'en ai fait. (Je m'y ruinais. Des amis m'ont soutenu aux moments critiques, mais jamais aucune organisation de crédit ne m'eût tiré d'affaire.)"

The experiment which led to this unfortunate result was an attempt to sell meat by retail on the plan of division of profits with the customer. M. Cernuschi persisted very pluckily in his enterprise, but lost 100,000 francs in three years (p. 17). Co-operators and butchers will probably agree in holding that nothing more was proved by its failure than that the butcher's trade is a skilled one, not rashly to be undertaken by amateurs.]

Returning to our theme, however, we find M. Cernuschi * citing Newton's Report more fully than Chevalier, and this is what he thinks of it:

"These words of Newton contain the whole bimetallic science."

"The bimetallism proposed by Newton was sanctioned by a law. But after some time the public officers, in spite of the law, began again to take and give in payment pieces of gold at a price superior to the legal rate; naturally the public did likewise in their transactions, and it is thus that, little by little, gold monometallism was implanted in England, in spite of Newton. The entirely gold monometallic law, proposed by Lord Liverpool in 1816, upon the eve of the resumption of cash payments, merely sanctioned an old abuse."

"Locke and Lord Liverpool have given two theories, very simple, but too simple—the silver monometallic theory, and the gold monometallic theory: Newton has given the *theory of reason and of experience*, the bimetallic theory. *Rule, Britannia!*"

These characteristic statements, in their original French at least as clear as crystal, and almost sparkling as the French language alone can sparkle, are true enough as regards Locke and Lord Liverpool, and the origin of our gold standard system.

It is not, however, French economists alone who believe in Newton as the inventor of bimetallism. Newton's own countrymen seem to care very little about the matter. But when in a previous number of the "Contemporary" † I incidentally brought forward some passages from the remarkable *Essai* of Richard Cantillon, as explaining Newton's views, or even reporting his words, Mr. Dana Horton, the learned American economist, did me the honour to publish an elaborate reply,‡ to be further dis-

* "M. Michel Chevalier et le Bimétallisme," par Henri Cernuschi. Articles publiés dans "Le Siècle," (Paris), en Avril et Mai, 1876, pp. 65–69.

† "Contemporary Review," January, 1881, art. Richard Cantillon and the Nationality of Political Economy, pp. 73–75.

‡ "Sir Isaac Newton and England's Prohibitive Tariff upon Silver Money:" An Open Letter to Prof. W. Stanley Jevons, LL.D. (Edinb.), M.A. (Lond.), F.R.S., Professor of Political Economy in University College, London, etc., etc.; by S. Dana Horton, M.A., etc. Robert Clarke & Co., Cincinnati, 1881.

cussed in the sequel. He even brought forward Newton and Richard Cantillon, making them supporters of bimetallic ideas in the way that Cernuschi describes as "obliquely eulogic," at the International Monetary Conference of 1881.*

Even apart from the great controversy still raging, which is beyond doubt the most active and widely extended controversy which has ever taken place on monetary affairs, Newton's Report is, in any case, a matter of high interest. It is probably the most important document in monetary history, because, whether or not it is a bimetallic testament, it certainly led to the creation and triumph of the opposite doctrine. Hence it marks the turning point when the ancient silver standard began to give place to the present and the future gold standard. Sir Thomas Gresham's quaint "Information touching the Fall of the Exchange," or Sir Robert Cotton's remarkable Speech at the Council Table, are doubtless documents of extreme ability and interest, but they have not the critical importance of Sir Isaac Newton's brief and enigmatic Report.

The text of this Report has been frequently printed and reprinted.† [McCulloch mentions a quarto edition in 1717, probably the original one.]

It was reprinted in the second volume of the tracts edited by MacCulloch for the Political Economy Club, which have now, however, become so scarce as to be practically non-existent. It was a most happy thought of Mr. Dana Horton to reprint this Report, together with

* "Procés Verbaux," Imprimerie Nationale, Paris, 1881, p. 280.

† See also "Political State of Great Britain," vol. xiv., Dec., 1717; and the continuation of "Rapin's History of England," for that year. [The Report does not appear in the "Commons' Journals," nor in the quarto (Horsley's) edition of Newton's works. It is prefixed to "Short Essay on Coin," Dublin, 1737, (by Bryan Robinson), and is to be found at p. 62 in the enlarged edition of this essay, published in 1758. It was also reprinted in "Lawson's History of Banking," 2nd edition, 1855, appendix xiii., p. 481, etc.

There is a passage in Bryan Robinson's essay which is of interest, as confirming the view of Newton's action taken in this paper. On p. 20, the writer remarks, and claims the sanction of Newton's advice in regard to Ireland for the assertion: "The true interest of a Nation with regard to its Coin, consists in having the same proportion observed in its Coin as obtains in the Nation with which it has the greatest Commerce."]

a considerable body of other currency documents, admirably selected and edited by him, in the "Appendix to the American Official Report on the International Monetary Conference of 1878,"* pp. 317-322.

The Report is an answer to an "Order of the Lords of the Treasury," dated August 12th, 1717, to the effect that Newton, as Master of the Mint, should lay before them "A State of the Gold and Silver Coins of this Kingdom, in Weight and Fineness, and the Value of Gold in Proportion to Silver," together with Newton's own observations and opinions, and his idea as to the best means of preventing the melting down of the silver coin. The greater part of the document is a somewhat dry and official statement of the weights and values of coins, both British and foreign, the particulars being of little or no present interest. It emerges that a pound of gold bullion is, at the Mint ratio, worth 15.5717 pounds of silver, but at the market price is worth only 14.9682 pounds. Gold was thus overvalued by the Mint indentures, to the extent of 4.0316 per cent. After some statements concerning foreign currencies, Newton makes the following highly interesting remarks:

"So then, by the course of Trade and Exchange between Nation and Nation, in all *Europe*, fine Gold is to fine Silver as $14\frac{4}{5}$, or 15 to one; and a Guinea at the same rate is worth between 20*s*. 5*d*. and 20*s*. 8*d*. Halfpenny, except in extraordinary Cases, as when a *Plate-Fleet* is just arrived in *Spain* or ships are lading here for the *East Indies*, which Cases I do not here consider. And it appears by Experience, as well as by Reason, that Silver flows from those Places where its Value is lowest in Proportion to Gold—as from *Spain* to all *Europe*, and from all *Europe* to the *East Indies*, *China*, and *Japan*; *and that Gold is most plentiful in those Places in which its Value is highest in Proportion to Silver, as in Spain and England.*

"It is the Demand for Exportation which hath raised the Price of exportable Silver about 2*d*. or 3*d*. in the

* "Senate Executive Document," No. 58; Forty-fifth Congress, Third Session. Washington: Government Printing Office, 1879, 8vo.

Ounce above that of Silver in Coin, and hath thereby created a *Temptation to export or melt down the Silver Coin rather than give 2d. or 3d. more for Foreign Silver*; and the Demand for Exportation arises from the higher Price of Silver in other Places than in *England*, in Proportion to Gold—that is, from the higher Price of Gold in *England* than in other Places, in Proportion to Silver, and therefore may be diminished by lowering the Value of Gold in Proportion to Silver.

"If Gold in *England*, or Silver in *East India*, could be brought down so low as to bear the same Proportion to one another in both Places, there would be here no greater Demand for Silver than for Gold to be exported to *India*; and if Gold were lowered only so as to have the same Proportion to the Silver Money in *England* which it hath to Silver in the rest of *Europe*, there would be no *Temptation to export Silver rather than Gold to any other part of Europe*. And to compass this last there seems nothing more requisite than to take off about 10*d*. or 12*d*. from the Guinea, so that Gold may bear the same Proportion to the Silver Money in *England* which it ought to do by the *Course of Trade and Exchange in Europe*. But, if only 6*d*. were taken off at present, it would diminish the Temptation to *export or melt down the Silver Coin, and, by the Effects, would show hereafter better than can appear at present, what further Reduction would be most convenient for the Publick*.

"In the last year of King *William* the *Dollars of Scotland*, worth about 4*s*. 6*d*. Halfpenny, were put away in the North of *England* for 5*s*., and at this price began to flow in upon us. I gave Notice thereof to the *Lords Commissioners of the Treasury*, and they ordered the *Collectors of Taxes* to forbear taking them, and thereby put a Stop to the Mischief.

"At the same time the *Lewidors* of *France*, which were worth but 17*s*. and 3 Farthings a Piece, passed in *England* for 17*s*. 6*d*. I gave Notice thereof to the *Lords Commissioners of the Treasury*, and his late Majesty put out a Proclamation, that they should go but at 17*s*., and thereupon they came to the Mint, and 1,400,000£s were

coined out of them; and if the Advantage of 5*d.* 1 Farthing a *Lewidor* sufficed at that Time to bring into *England* so great a quantity of *French* Money, and the Advantage of 3 Farthings in a *Lewidor* to bring it to the Mint, the Advantage of 9*d.* Halfpenny in a Guinea, or above, may have been sufficient to bring the great Quantity of Gold which hath been coined in these last 15 years without any Foreign Silver.

"Some years ago the *Portugal* Moydores were received in the West of *England* at 28*s.* a Piece; upon Notice from the Mint *that they were worth only about* 27*s.* 7*d.*, *the Lords Commissioners of the Treasury ordered their Receivers of Taxes to take them at no more than* 27*s.* 6*d.* Afterwards many Gentlemen in the West sent up to the Treasury a Petition *that the Receivers might take them again at* 28*s.*, *and promised to get Returns for this Money at that rate, alledging that when they went at* 28*s. their Country was full of Gold, which they wanted very much.* But the *Commissioners of the Treasury,* considering that at 28*s.* the Nation would lose 5*d.* a Piece, rejected the Petition. And if an Advantage to the Merchant of 5*d.* in 28*s.* did pour that money in upon us, much more hath an Advantage to the Merchant of 9*d.* Halfpenny in a Guinea, or above, been able to bring into the Mint great Quantities of Gold without any Foreign Silver, and may be able to do still, till the Cause be removed.

"If Things be let alone till Silver Money be a little scarcer, the Gold will fall of itself, for People are already backward to give Silver for Gold, and will in a little Time refuse to make Payment in Silver without a Premium, as they do in *Spain*; and this Premium will be an Abatement in the Value of Gold. And so the Question is, Whether Gold shall be lowered by the Government, or let alone till it falls of itself by the Want of Silver Money? It may be said, that there are great Quantities of Silver in Plate, and if the Plate were coined there would be no want of Silver Money. But I reckon that Silver is safer from Exportation in the Form of Plate than in the Form of Money, because of the greater Value of the Silver and Fashion together; and therefore I am not for coining the

Plate till the Temptation to export the Silver Money, (which is a Profit of 2*d.* or 3*d.* an Ounce) be diminished: For as often as Men are necessitated to send away Money for answering Debts Abroad, there will be a Temptation to send away Silver rather than Gold, because of the Profit, which is almost 4 *per Cent.* And for the same Reason Foreigners will choose to send hither their Gold rather than their Silver."

The task now before us is to decide what relation this proposal of Newton bears to modern bimetallism. Newton's remarks commit him to the least possible amount of theory. "By experience as well as by reason," he thinks it is known that silver flows from those places where it is undervalued to those places where it is overvalued, and to stop this flow we must do away with the differences of value. Is this the whole science of bimetallism, and is it Newton's science? Such are the questions which we must try to decide. I cannot pretend, indeed, to be in any doubt about the answers. After very careful consideration of Newton's own words, the inferential results of his scheme, and the light thrown upon it by other documents, I come to a negative conclusion regarding both questions. Newton's scheme is not bimetallism; it would be more nearly correct to say that it is anti-bimetallism; moreover, it is not Newton's scheme, is not Newton's in any special way. It was probably the common property of debaters on the currency at the time, and, in any case, is traceable to the celebrated speech of Sir Robert Cotton at the Council Table, of which several editions had been published. (See below, p. 320).

I have already quoted in another place* the opinion of Richard Cantillon, written within a few years after the date of Newton's Report, that it is the market price which must decide the proportion to be given to the coins. If the market price varies considerably, we must, in Cantillon's opinion, alter the coins, in order to follow the course of the market. Of this need a recent example had occurred at the Tower of London; and then Cantillon goes

* "Contemporary Review," Jan., 1881; article on Richard Cantillon and the Nationality of Political Economy.

on to describe the circumstances of the English currency at the time of Newton's Report, and to discuss his policy. Incidentally he quotes the words which Newton appears to have addressed to him in a personal discussion of this subject:

"Monsieur Newton m'a dit pour réponse à cette objection, que suivant les loix fondamentales du Royaume, l'argent blanc était la vraie et seule monnoie, et que comme telle, il ne la falloit pas altérer." *

Now here, if Cantillon is to be trusted, Newton expressly declares himself to be a silver monometallist. There is, indeed, as before, a singular absence of theory in Newton's treatment of this subject; as if afraid of being betrayed into the intricacies of currency, he takes his stand dogmatically upon the fundamental laws of the kingdom, that is to say, the traditional legal currency of silver coin, and declares that it must not be altered. It is impossible to imagine anything further from the over-ingenious arguments of a Cernuschi, or a Dana Horton, than this *nolumus leges Angliæ mutari* of the great philosopher, who had laid down the laws of the Universe. Before Cantillon leaves the subject, however, he gives a still more explicit statement that it is by the market price that the relative weights of gold and silver coins must be regulated.

"Il n'y a que le prix du Marché qui puisse trouver la proportion de la valeur de l'or à l'argent de même que toutes les proportions des valeurs. La réduction de M. Newton de la guinée à vingt-un schellings n'a été calculée que pour empêcher qu'on n'enlevât les espèces d'argent foibles et usées qui restent dans la circulation: elle n'étoit pas calculée pour fixer dans les monnoies d'or et d'argent la véritable proportion de leur prix, je veux dire par leur véritable proportion, celle qui est fixée par les prix du Marché. Ce prix est toujours la pierre de touche dans ces matières; les variations en sont assez lentes, pour donner le tems de règler les monnoies et empêcher les désordres dans la circulation."—pp. 380-1.

Here, then, we are told in the most explicit manner, by one who had debated the question with Newton, that

*["Essai sur la Nature du Commerce en Général, 1755," p. 377.]

his scheme was not calculated to fix in gold and silver the veritable proportions of their price. The market-price, we are told, is always the touchstone in these matters. How far is this doctrine of the acute banker-economist from the theory now upheld by the new society [for the Establishment of an International Monetary Standard]!

Mr. Dana Horton, indeed, denies that the bimetallic programme involves the finality and perpetuity of a fixed ratio which I have ascribed to it. But of this more anon.

As, however, Mr. Horton was not satisfied with Cantillon's anti-bimetallic statements and arguments, I have sought among the economic literature of the period for further evidence of Newton's ideas. I have had the good fortune to discover a tract, the existence of which was well known, though the value of its contents had never been appraised. This tract has the following title-page, which explains a good deal. "Observations upon the Present State of our Gold and Silver Coins, 1730. By the late John Conduitt, Esq., Member for Southampton, and Master of His Majesty's Mint. From an Original Manuscript, formerly in the possession of the late Dr. Jonathan Swift. London: Printed for T. Beckett, corner of the Adelphi in the Strand. 1774." Were a writer's space unlimited, here are many pegs to hang tales upon. How came Dr. Jonathan Swift to possess such a dry document as "A Present State of our Gold and Silver Coins"?* How came the document to be published so long after the date of writing? Who was Conduitt, and how came he to be the successor of so great a man as Newton? To some extent these questions admit of plausible answers. John Conduitt married the niece of Newton, the celebrated Miss Barton. If we may accept the result of the late Professor De Morgan's learned inquiries, Miss Barton was a "professional beauty" of those days, and though for a long time she was Newton's affectionate and dutiful

* Swift was much concerned in the opposition to Wood's notorious halfpence. "Ruding's Annals of the Coinage," ii. 71.

[This reference to the natural explanation of the difficulty raised in the text was found among the author's MSS., and would, presumably, have been inserted here.]

housekeeper, we read at other times that Dr. Swift called upon her "at her lodgings." Passing over, however, all the delicate questions which may be here involved, there is no doubt whatever that Conduitt was the great friend and support of Newton in his old age. He was a very superior kind of Boswell, recording Newton's conversations, helping him in business complications, attending him in his rare illnesses with the affection of a son. We are especially told that "after Newton in his eightieth year was seized with painful maladies, he was obliged to rely upon Conduitt for the discharge of his office in the Mint."* After Newton's death Conduitt drew up a memorial of his life, which served as the basis of Fontenelle's celebrated *éloge* of Newton, the original notes being printed by Edmund Turnor.† Conduitt also endeavoured to write the life of Newton, and for this purpose collected information from Newton's correspondents; but he broke down in the execution of this scheme, and the life of Newton has never been written except by Sir David Brewster, whose unskilful and inadequate book does not so much as mention Newton's Currency Report, let alone his bimetallic science. As to Conduitt, his personality has been almost lost in the shadow of his illustrious relative. It is true there is a handsome monument to him in Westminster Abbey, erected in 1738 by his widow, and so placed as to face Newton's tomb. The biographers, indeed, have entirely overlooked Conduitt, who does not appear in any of the dictionaries. But a few particulars have been gleaned by Brewster, as that he was born in 1688 and died in 1737.‡

It is of more interest to us, however, that he married Newton's beautiful niece and housekeeper on August 24th, 1717, about a month before Newton's Monetary Report was sent into the Treasury. If not at that time a zealous assistant, Conduitt must, under the circumstances, have

* Hutton's "Mathematical Dictionary," vol. ii. p. 152.

† "Collections for the History of the Town and Soke of Grantham." [1806. 4to. p. 158.]

‡ "Memoirs of Life, Writings, and Discoveries of Sir Isaac Newton"; 2 vols. 8vo. 1855; vol. ii. p. 397 and note.

been a very apt disciple. To come to the point, it is impossible to imagine any better interpreter of Newton's monetary theory than his nephew—his almost adopted son, his successor in the Mint office, his biographer and literary executor.

Now Conduitt's tract is well worthy of all this preface. It is a masterly paper, and possesses the high interest of being an exposition of Newton's views. The tract is probably a rare one; it is not to be found in most libraries, but there are two copies in the British Museum, and one in the Bodleian Library. MacCulloch appears to have had a copy, the title of which he enters in his "Literature of Political Economy" (p. 164), without comment. I fortunately possess a copy, which I purchased for a mere trifle, with a quantity of other pamphlets of more or less interest, at Salisbury a few years ago. The text of the tract fills fifty-nine small octavo pages, but the passages which are of interest for us go into a small compass. Conduitt commences with the following very clear and sound passage:

"When we cannot pay in goods what we owe abroad, on account of the balance of trade, or for the sale or interest of stocks belonging to foreigners, or for foreign national services, our debts must be paid in gold or silver, coined or uncoined; and when bullion is more scarce or more dear than English coin, English coin will be exported, either melted or in specie, in spite of any laws to the contrary. All that can be done in such cases is to take care, from time to time, that a pound weight of fine silver be worth as much fine gold in our monies as it is in the gold coins of the neighbouring nations with whom we have the greatest dealings, that it may turn equally to the merchant's account to pay any balance he owes abroad, or to have any balance that is due to him sent hither, either in gold or silver; for if gold be valued here higher than in other parts, and silver lower, any debts due to us from abroad will be paid only in gold, and any debts we owe abroad will be paid only in silver; and over and above the balance to be paid or received it will be a profitable trade to import gold which is overvalued,

and export silver which is undervalued. The value of gold and silver in respect of each other has constantly varied in all nations, and must vary according to the plenty and scarcity of either. In Europe, for many years, twelve pounds weight of fine silver were equal to one pound weight of fine gold. By the discovery of the silver mines in America, silver fell gradually, from the proportion of 12 to 1, to 16 to 1. In England, by the high price of guineas, it has been at all rates, from 12 to above 21 to 1. By the discovery of the new gold mines in Brazil, and an increase of the demand for silver, gold has for some years been falling, and silver rising all over Europe. If the importation of gold should still increase, and that of silver decrease, or a greater demand arise for it, a pound of gold may again be worth no more than twelve pounds of silver, as it was formerly in Europe, or than 9, as it is now in China; and whatever nation will not alter the proportion, between gold and silver, according to the general want or abundance of either, only exposes itself to be the dupe of those who do, and to be bought and sold with its own money" (p. 3).

*To be bought and sold with its own money* is the fate of those nations, according to Conduitt's strong expression, who will not alter the proportion between gold and silver according *to the general want or abundance of either.* Far, then, was the writer from looking upon Newton's settlement of the guinea as intended to be fixed. Like Cantillon, Conduitt evidently looked upon the market price, "the general want or abundance of either," as the guide. The value of Conduitt's opinions will be more apparent, however, when we learn how perfectly he comprehended the action of the double standard. The following passages are perfectly to the point (p. 19):

"Necessity and Convenience will make that coin the measure which is in greatest plenty: it was for this reason that silver, and not gold, was the first measure. Wherever the silver coin of any country is bought at a premium, with the gold coin of the same country, there gold is the measure, and silver the merchandise; and wherever gold is a legal tender, at a certain rate, it is as much a measure

as silver. . . . In Portugal, gold is now the only measure, and in Spain too; for no payments are made there in any silver, but what is base, without a premium, even for bills that run payable in dollars. Gold in France is as much a measure as silver; and, whatever it was formerly, is at present as much a measure as silver here, and as legal a tender; being so established by his late Majesty's proclamation, bearing date the 22nd of December, 1717, which was grounded on an address from the House of Commons; the title of which is 'a proclamation declaring the rates at which gold shall be current in payment;' and in the body of it, after specifying that a guinea shall be current for no more than 21*s.*, and broad pieces for no more than 25*s.* and 23*s.*, there are these words: 'At which rates and values we do hereby declare the said respective pieces of coined gold to be current.' "

It will be seen, then, that Conduitt explicitly allows the equal legal currency of gold and silver as established by the proclamation which followed the Parliamentary debates on Newton's Report. Probably the passage quoted above is one of the earliest in which the existence and action of the double standard is clearly stated and explained. At the same time, he points out that in practice, necessity and convenience make that coin the measure which is in greatest plenty; by inference he recognises gold as the practical measure of value prevailing at the date of his writing. And he had previously stated that those who do not alter the proportion of their coins according to the general abundance of gold or silver, become the dupe of those who do. Now, these views are in complete conflict with the bimetallic doctrines now advocated. The whole purpose of the new society for the establishment of an International Monetary Standard is "the promotion of the Stability of Values." This important object is to be accomplished by establishing the free coinage of silver, and its use as money, under the same conditions as gold, under the conditions of an International Agreement "whereby a fixed relative value between gold and silver may be established."

This is a brief but, I believe, a correct statement of the

views of the people who call themselves bimetallists. But, whether we look to Newton's own Report, or to the commentaries on it afforded by Cantillon or Conduitt, there is not the faintest ground for identifying Newton's views as bimetallism. Cantillon expressly tells us that Newton's action was not calculated to fix the proportion of values, and Conduitt explains that any nation which does not alter its values, will become the dupe of those who do. The idea of an international agreement on the subject had not then been mooted. Before entering, however, on a more thorough discussion of these points, I will complete the review of Conduitt's tract, many pages of which, filled with details of his weighings of coins and other practical inquiries into its state, prove the care which he took to acquire exact knowledge, but do not further interest us. On p. 23 is a sentence worthy of note, as follows: "If it were a fundamental and unalterable maxim that silver should be the bushel, and the only and invariable measure always, and a pound weight never cut into more or less pieces, it would not have been raised in other countries, nor here. . . ."

Comparing these words with those which Cantillon reports Newton to have used, it will be found that there is coincidence of expression, leading to the supposition that Newton had used the same words in debates with his nephew. The argument may seem a little far-fetched, but it tends to support the veracity of Cantillon's statements, to the effect that Newton was a silver monometallist, in spite of a report which legally established the double standard. The fact is we cannot readily in the present day conceive the fixity of the idea entertained in former times that silver was the only true money. The idea was, however, constantly maintained, the respect due to Locke's writings contributing to uphold the tradition. As late, for instance, as the year 1790 I find in a book of much authority* the following remark: "Silver ever has and probably ever will hold, the prerogative of being the fixed standard; gold being always valued by silver, but not silver by gold." Even yet the tradition survives in

* Anderson's "Origin of Commerce," 6 vols., 8vo., Dublin, 1790; vol. iii., p. 299.

language, all moderate sums of money being described in shillings rather than in pounds and fractions; a defendant, for instance, is fined "forty shillings," not two pounds. This interminable bimetallic discussion forms the final throes of the revolution from silver to gold, which by the wisdom of Lord Liverpool was mainly accomplished in this country more than half a century ago, but was delayed in France by the excessive ingenuity of the French revolutionary philosophers. Probably Conduitt was one of the first to accept the idea that gold might be the measure of value, and under the Proclamation of 1717 was practically the standard. Returning, however, to his tract, he winds up by deducing from his computations, the prevailing proportion of silver to gold; in Portugal it was 14.2222 to 1 of gold; in Spain, 15.1578; in France, 14.4578; in Holland, 14.7981. At a medium, 14.6588 of fine silver is equal in his opinion to one pound of fine gold (pp. 53-4).

Then he comes to the very sensible conclusion that the silver coins should be cut at such a rate to the pound that silver will be lower here than it is at a medium of the proportions in the countries above mentioned. That which Newton aimed at by the reduction of the nominal value of the guinea he would carry farther by a reduction of the weight of silver coins, adding that no recoinage of the existing silver circulation would be needed, because it was light enough already. Finally, he sums up in the following passage:

"When Gold and Silver bear the same proportion to each other here as in the neighbouring countries, the Mint is the pulse of the trade of the nation in general, as the constant course of exchange is of that with any particular country. If our imports exceed our exports, we spend more than our income, and must consequently grow poorer; and whatever Expedients may be thought of, neither gold nor silver can naturally come to the Mint; but what is already in the nation, near the just weight, must, by degrees, be exported, in spite of any laws to the contrary. The only effectual methods to increase the coinage, and keep what is coined in the nation, is to follow the examples of other nations, in encouraging our own manu-

factures, and retrenching our luxury, especially such part of it as is bought of foreigners, who take nothing of us in exchange but Gold and Silver.

"All which is most humbly submitted.

"JOHN CONDUITT."

(Pp. 58-59).

It is a pity that Conduitt, in thus winding up so luminous and sound a discussion of the intricacies of currency, betrays some taint of the mercantile heresy. The expression about the Mint being the pulse of the trade of the nation is very interesting, because it is repeated in various currency pamphlets of the time, and is easily traced to the celebrated "Speech made by Sir Robert Cotton." *

The greater part of this speech is an able and learned argument against an alteration, that is to say, a depreciation, or, as the expression was, "enfeebling of coyn." Only the last paragraph requires notice, which it does not seem hitherto to have received. It is as follows:

"I cannot but then conclude (My honourable Lords), that if the proportion of gold and silver to each other be wrought to that parity, by the advice of Artists, that neither may be too rich for the other, that the mintage may be reduced to some proportion of neighbour parts, and that the issue of our native commodities may be brought to overburthen the entrance of the forreign, we need not seek any way of shift, but shall again see our trade to flourish, the Mint (as the pulse of the Commonwealth) again to beat, and our materials, by industry, to be a mine of Gold and Silver to us, and the honour, justice, and profit of his Majestie (which we all wish and work for) approved."

In a later edition of this speech printed in 1679, the word *parity* is by mischance or misapprehension printed as "purity," [p. 294] a change which entirely obscures the

* "A Speech made by Sir Robert Cotton, Knt. and Baronet, before the Lords of His Majesty's Most Honourable Privy Council, at the Council Table: being thither called to deliver his Opinion touching the Alteration of Coin. September 2. Annoque Regni Regis Caroli, 2. (1626.) London: Printed in the year 1651."

meaning. Obviously we here have the theory of parity of proportions of gold and silver in neighbour parts, which in Newton's Report was discovered to be full-blown bimetallism. Conduitt's final paragraph is but a paraphrase of Cotton's exordium. Having regard to the intimate friendship which so long prevailed between Conduitt and his great relative, we cannot believe that Cotton's well-known speech was unknown to Newton in 1717. Certainly if the doctrine of parity of values be bimetallism, we must antedate this great economic discovery by nearly a hundred years, namely, to the 2nd September, 1626, when Cotton's speech was delivered. It is, however, so obvious a fact that profit will accrue from the exportation and importation of the precious metals unless they be coined and current at parity of values, that I should decline to regard the theory of parity as any discovery at all. We have, indeed, only to turn to Vaughan's admirable "Discourse of Coins and Coinage" to find the whole theory of the thing deliberately explained. Though published in 1675, twenty-one years before Newton became connected with the Mint,* this little treatise was, according to MacCulloch,† written between 1630 and 1635, or soon after Cotton's speech. Chapter iv. treats "Of the Proportions held between Gold and Silver, Antient and Modern," and a very instructive chapter it is, to those, at least, who imagine that our ancestors were ignorant of these matters. The chapter most to the point, however, is the eighth, treating "Of the Low Price of our Silver," which contains a luminous discussion of the proper method of regulating the proportion of gold and silver coins. Vaughan reviews the various opinions and theories current at the time. The following passage will show what full hints were furnished

*[Newton was appointed Warden of the Mint in 1696, and rendered signal service in the great recoinage. In 1699 he was made Master of the Mint. Conduitt succeeded him in the latter office on his death in 1727.

See Brewster, ii. p. 193, etc., and Turnor's "Collections," pp. 162, 167. Conduitt's Indenture, a copy of which is in the present editor's possession, was signed in 1732.]

†"A Select Collection of Scarce and Valuable Tracts on Money, etc." Political Economy Club. 1856. Preface, p. vi.

to Newton towards his invention of bimetallism. Speaking of those who wished the ratio to remain as it was, *i.e.* above 13 to 1, Vaughan says:*

"But they that give this reason do not consider that in this manner, although our Silver will remain still in use amongst us as long as it lasteth by reason of the lightness of it, yet of all that is new coined, according to this ordinance, the weightiest and loyallest will be continually culled out, and transported, or melted; and, therefore, since the Experience of the scarcity which we have of Silver doth sufficiently prove unto us the inconvenience of the proportion, it ought to be altered. Others would have the proportion to be eleven, or thereabouts, because that was the ancient proportion, both amongst us here in England and amongst our neighbours. But since that proportion is under that of all our neighbours at this present, it would in time fall out thereupon that we should suffer as much scarcity of Gold as we do now of Silver. But the most, and the most judicious, propositions that I have seen, both at home and in other parts, do agree upon twelve for one, as the most equal proportion; and it agrees with the proportion of Spain, upon which, in this subject, we ought principally to have our eye fixed."

Vaughan goes on to explain that he the more inclines to this ratio of 12 to 1, because 12 is a number so readily divisible and most proper for accounts. But it seems that there were other people who wished to maintain this ratio for ever, because it squared with the conceipt of the alchemists who call Gold *Sol* and Silver *Luna*, "whose motions do come near upon the point of 12 to 1." It is pretty plain, indeed, that these people were the bimetallists of those days, for Vaughan says of them "The conceipt of many men hath run so strongly upon the proposition of 12 to 1, that they'd have it hold as well in money wrought as in Gold or Silver fine." This is the nearest thing to bimetallism which I have been able to discover in these old writings, and it must be allowed in favour of our ancestors that they selected a ratio 12 to 1, which has some

*["A Treatise of Money; or, A Discourse of Coin and Coinage, etc." By Rice Vaughan, late of Gray's Inn, Esq.; London, 1675; pp. 73-5.]

advantages over the awkward fraction 15½ to 1, on which the conceipt of our modern bimetallists runs so strongly.

In any case, then, there is an end of the idea that Newton discovered bimetallism; whether it be bimetallism or not, there is nothing in his recommendation of lowering gold "so as to have the same proportion to the silver money in England which it hath to silver in the rest of Europe," which is not contained in the quaint language of Cotton. It still remains, however, to be more carefully decided whether this doctrine is bimetallism or not. Plainly, there was wanting the idea of international agreement. But, if this be now possible, it only carries out more perfectly the doctrine of parity of values. In this point, therefore, circumstances rather than the theory have been changed. In trying to follow out the consequences of the doctrine, we soon fall into intricacies. Cotton, Newton, and Conduitt, all refer only to neighbouring parts or neighbouring countries; they could not contemplate embracing the Eastern nations, for Newton himself cites the fact that in China and Japan one pound weight of fine gold was worth but nine or ten pounds of fine silver. Even the most advanced bimetallists only contemplate interfering with "the currency of civilised nations." Whether among civilised nations we may include China and Japan, Africa, South America, the Pacific Archipelago, not to speak of Russia, Siberia, etc., does not clearly appear. Probably not; in fact, many bimetallists have expressed themselves quite satisfied if certain "preponderating nations" could be got to accept the bimetallic gospel. But I venture to think that important issues would depend upon the extent of the proposed convention. Obviously, if a few nations only agree to maintain a fixed artificial ratio, they will bear the brunt of all inconvenient results. Hence the awkward position in which France has lately been, and is now placed. The greater the extent over which the bimetallic convention was arranged, the less, for a time at least, would be the apparent inconveniences. If the monetary ratio were fixed at 15½ to 1, and the cost of production ratio were 18 to 1, the longer would the owners of silver mines enjoy the advantage of this con-

siderable margin. There would be a premium of [16.13] per cent on the production of silver in preference to gold. Consequently there would be a long-enduring tendency for the replacement of gold by silver money, greatly to the inconvenience of those who dislike a heavily-weighted pocket, and to the more serious injury of those who, having contracted for payment in gold, would find themselves put off with depreciated silver.

Those who take Newton's doctrine of parity of value to be bimetallism, overlook the fact that nations must for our purpose be divided into two classes, according as they are or are not producers of the precious metals. A nation which, like Australia or the United States, produces a permanent stream of precious metals, cannot have the same ratios * * *

[Here unfortunately the MS. abruptly ends, just as the Author was leaving the historical question at issue to consider the most recent arguments in favour of bimetallism, and to confront them with his own views. Those views, no doubt, are already pretty fully stated in Papers X to XIII inclusive, of this volume. But the subject is so important, and Mr. Jevons' opinions upon it are entitled to so much attention, that it was thought desirable to examine all the MS. notes left among his papers, with a view to discover his latest conclusions. It will be seen from the extracts which follow that these conclusions are substantially the same as those contained in the articles previously published. But greater stress is laid on the difficulties incident to an international convention, and on the dominating importance of paper issues in regard to the whole question of the stability of values. It is also contended that the existing glut of silver is largely due to temporary causes, and must probably be relieved by the natural demand for currency and the arts, more especially in connection with the Eastern trade.

It will be observed that Mr. Jevons draws a distinction between Cernuschi-ism, or the bimetallism of the fixed ratio, and the bimetallism of the variable ratio advocated by Mr Dana Horton and others; and that his arguments

are principally (though not exclusively) directed against the former proposal. He had a high opinion of Mr. Horton's ability, and frequently remarked in conversation that he ranked him "quite apart from ordinary bimetallists."

Many of the notes consisted of references to statistics of the production of the precious metals. These are not here inserted, because they contained no attempt at a new estimate, and Mr. Jevons has (on p. 287) endorsed Mr. Bagehot's opinion that such estimates are in general not worth the paper they are written on. Those who wish to form a rough idea of the figures in question may be referred for one of the best of these estimates to Mr. Dana Horton's "Silver and Gold," Cincinnati, 1877.

Of the fragments which are inserted, the first group seem to have been intended to form part of the reply to Mr. Dana Horton's "Open Letter," which is promised on p. 306. The second group, following after the heading "Common Sense Ideas about Money," evidently bear a similar relation to the articles of M. de Laveleye on "Commonplace Fallacies concerning Money," published in the "Contemporary Review" for Nov. and Dec., 1881.]

"Mr. Dana Horton (p. 7) protests (and reasonably) against [the application to his proposals of the] name bimetallism. But it is not I that have done it. It is M. Cernuschi and M. Emile de Laveleye.

"It is not to be assumed that I am answering simply the arguments and propositions of Dana Horton. They may be more sensible and practicable, but if so they are not the bimetallism which I am answering. . . . I was not necessarily arguing against Horton's phase of bimetallism. The Society [for the Establishment of an International Monetary Standard] advocates a fixed relative value. . . . Cernuschi says ('Compte,' 279), 'Le jeton jaune compte pour $15\frac{1}{2}$ jetons blancs. Le bimetallisme n'est autre chose.' . . . Firmez says that the fixed ratio is the sole point dominating the whole debate. ('Procès Verbaux,' 286.) . . . Cernuschi says everything in money is arbitrary. ('Procès Verbaux,' 90.) . . . The early French

bimetallists contemplated a variation of ratio and recoinage . . . so apparently did Cantillon . . . but practically it would be impossible—extremely inconvenient. . . . A ratio, if adopted widely, would practically become fixed, but with the inconvenience that the cheaper metal would be always growing upon the other. . . . Fixedness is essential to a bimetallic system. The coins are actually adjusted to a certain ratio. If, then, several great nations were to decide to change, the whole coinage must be recoined, or, what is almost worse, the legal equivalence must be fractionally altered. . . . Silver is not an outlaw, as Dana Horton says (p. 8). The English have as much silver as they will use. Everybody who wants silver coin can get it in unlimited quantity. . . . No doubt a certain temporary convenience might possibly be experienced by the introduction [into circulation] of the stores of silver in the Bank of France. But the agitation practically received its death-blow on the day of the celebrated Mansion House Meeting. Had the Governor of the Bank of England been [in a position to report] that the rate of discount was up to seven per cent, the gold still draining away, and higher rates in prospect, the bimetallists might (perhaps) have had their opportunity (of trying to throw our currency into confusion). But on that very day the rate dropped to three per cent, a measure necessitated by the flood of gold from America, and all the alarmist predictions completely collapsed.

"We only need a little patience and a little common sense to surmount the practical difficulties. It was impatience and want of foresight, joined to a remarkable conjunction of events, which led to the great disturbance of values. On a memorable occasion President Lincoln protested against swopping horses while crossing a stream. Two or three great Governments insisted simultaneously on swopping silver for gold just when the suspension of the Indian drain and one or two other events rendered it most perilous to attempt the change. Within the next few years good harvests in India will, in all probability, enable that country to buy up all our surplus silver, as it has been in the habit of doing, with rare exceptions, since the time

of Pliny. If the German Government can carry out the proposal to utilise the stock of silver by the withdrawal of the minor gold coins and notes, it will facilitate [matters]. In future years any amount of silver can be got rid of without loss, if only it be sold gradually and cautiously.

"As to the equilibrating action of the double standard, no one who has inquired into the matter can doubt it, any more than he can doubt that one scale of a balance will go up when the other goes down. But the refinements of bimetallic theory have little practical importance, in view of the fact that the greatest variations of monetary standards are due, not to gold and silver, but to paper. When several great countries simultaneously replace their metallic money by a forced currency of paper, a rise of prices naturally follows. When the same countries subsequently abolish the paper, the vacuum thus produced as naturally occasions a scramble for bullion and a fall of prices. It is to this cause that I confidently attribute the fall of prices pointed out by Mr. Giffen, and triumphantly quoted by the bimetallists in the 'Procès Verbaux.' Now if the Governments which are so anxious that we should buy their cheap silver would begin by promising for the future to play no tricks with paper money, it might be worth while to listen to their further proposals. But so far is this from being the case, that the terms of a proposed convention actually recognise the possibility that the contracting Governments will resort to paper issues. As I pointed out in my article in the 'Contemporary Review' the substitution of paper money presents a means by which any Government may practically absolve itself from the inconvenient consequences of the convention; and there can be no reasonable doubt that in the event of a great war the power of paper money would be brought largely into play.

"In view of these considerations, the questions of bimetallists and anti-bimetallists, however interesting and perplexing they may be from a scientific point of view, lose all practical importance.

"It is with grave regret that I noticed the remarks of Sir J. Lubbock and other speakers in the debate on the

£1 note question. It was treated as a matter of course that a forced paper currency would be resorted to in time of war. . . . Above all must I insist upon the importance of establishing a rule against the sudden replacement of masses of metal by paper currencies. As several great nations may join in a war, this means an immense sudden supply of bullion and a decreased demand. . . . I can only repeat that these excessive rises or falls of value are not due to silver or gold, but to paper. . . . The real evil comes from paper. If nations could be got to contract not to issue [forced] paper money, the effect would be excellent."

* * * *

*Common Sense Ideas about Money.*

"I do not propose to follow M. de Laveleye through the various commonplace fallacies into which he thinks several professors have fallen, especially Mr. Bonamy Price. The Oxford Professor is very well able to answer for himself, and doubtless will do so.

"I do not find anything to retract. The equilibrating action, no doubt, does go on; but it does not therefore conclusively follow that we are to adopt that action in [regard to] our pocket money. With equal reason we might be called upon to eat oat-cake or rye-bread when the price of wheat is high, in order that the equilibrating action of our private consumption might equalise the price of grain. Nobody who has carefully studied the subject would venture to deny that there is a certain advantage in the double standard, as indeed there is in almost all things. As a subject of study it is most interesting, and this action of replacement described as the Law of Gresham undoubtedly lies at the basis of the science of money. But it is entirely a different matter to decide in practice whether . . .

"Practical action in legislative and in ordinary matters almost always depends upon a balance of a great many advantages and disadvantages; and this subject of bi-

metallic money is especially a case of this kind. There may be much to be gained, but I venture to think there is far more to be lost. The Americans have tried the experiment for us, and have failed. . . . As regards the use of silver coin, the experiment has been tried for us in the United States. The monetary system of the Americans is more similar to our own than is that of any Continental country. It furnishes therefore the best guide; and we find that the banking classes have unanimously refused to handle silver. . . . As to the state of things in the United States, it is impossible to feel the smallest amount of surprise. Anyone who comprehends the intense common sense of Americans in the real conduct of their own affairs, apart from the lobbies of Washington, must know that they would not consent to carry silver about for the mere profit of Nevada miners. . . . Of course it would be possible to depress silver to 30 pence per ounce, if the United States Government, having accumulated [a large] stock of silver should out of mere spite determine to sell it at any cost. The profit to those who buy wisely would then be very large. This is practically what the German Government did not long ago, until experience taught them what a mistake they were making. Any quantity of silver which even Nevada can produce can be readily disposed of, I will not say at 60d., but at 52d. or 50d., if only reasonable time be allowed for the operation. . . . What I maintain is that when the demand of India for silver regains its normal amount, it will be able to absorb all supplies which are thrown upon the market with common sense regard to commercial profit. But I further maintain that if the ancient demand [for silver] for India cannot absorb the supplies from Nevada, it must be an outrageous act of folly to endeavour to create a factitious demand for silver in order to keep up the profits of American miners, already the richest individuals in the world. . . . As M. de Laveleye has explained (p. 802), there is no fear of the silver of the East finding its way back. What has been going on with slight temporary checks since the time of Pliny is not likely to be suddenly reversed now. . . . Just as it is impracticable to introduce a silver medium in the United

States, so it is impossible to carry out a gold one in India. . . . All that we need in this subject is to avoid panic. Let all keep their seats. Of course it stands to reason that if the United States Government, having occupied themselves in collecting a great mass of silver, insist on selling it off suddenly, they will run down the price, and incur a grave loss. In that case it would only be reasonable of other people to take advantage of the opportunity to buy up a commodity which is sure to recover from any panic depression. . . . The general conclusion which we should draw from a review of the values of gold and silver is that they have both progressively decreased in purchasing power . . . but that silver has decreased in value more than gold in the ratio of about 16 to 10, and on the whole there is reason to believe that the course of silver will be much the same in the future as in the past. If so, gold will be the most equitable metal to retain as the standard; but those nations which retain silver as the standard will receive in the course of time the greatest relief from their obligations. . . . It is not impossible that before the inevitable change to the gold standard is achieved, some troubles may be in store for us. They are not due to our own mistakes, for we have so far made no mistakes. They are due partly to physical circumstances over which we have no control, partly to the tricks which foreign Governments have been playing, tricks which a [bimetallic convention] would not really preserve us from in the event of war. . . . Curiously enough,* money is the only thing about which traders unanimously agree in deprecating a high price (*i.e.* interest). But it ought, surely, to be obvious that . . . there are two sides to the question. A steady rate of interest of 4 to 5 per cent is a healthy state of things. The recent low rates of 2 or 2½ per cent, or any less, are not healthy; they were

* [The reason is clear enough, and certainly could not have escaped the Author. In the first place, all traders, except the few who deal in money, are in the position of buyers of loans, and naturally desire their loans cheap. Secondly, the trade in money is for the most part of the nature of a commission trade, and its profits depend rather on the quantity of business than on the price at which it is done. And lastly, when the price of money rises beyond a certain point, the whole system of trade is disorganised, and all classes of the community suffer.]

the signs of revulsion and distrust of investment. . . . I do not believe that a convention to establish the ratio 15½ [to 1] would remedy the most serious part of the matter. Governments would still preserve the power to contract or expand their paper currencies. When the next great war occurred, we should again have metallic stores poured forth, with the additional inconvenience that it might be silver which would be poured into our circulation as well as gold. What we really want is a convention between nations to the effect that they will not suddenly pour out their stores of precious metal in one year, and then as suddenly wish to draw them back another year. . . . Even if silver is to be accepted, there would be a disturbance of values by these abnormal actions. It is not a question of silver or gold; it is a question of paper and metal."

* * * *

[Mr. Jevons seems at one time to have intended to reprint in this volume an extract from his article on Cantillon in the "Contemporary Review," Jan., 1881, consisting of three pages (73-75), in which Cantillon's views on bimetallism are discussed. On p. 75 of this article the following passage occurs: "Not only bimetallism, but a thousand other beneficent measures would become possible if all the nations of the world could agree about them." In transcribing this passage for the press, Mr. Jevons had appended the following note, which seems to contain his final judgment on the matter, and may therefore be fitly inserted here:]

"Although bimetallism might, under the conditions alluded to, become possible, it is another question whether it would even then be beneficial. In the papers which follow, especially No. [XIII., p. 294 of the present volume], it is shown that, however convenient bimetallism might be at a particular time, it would lead to an exceedingly inconvenient surplus of silver coin, and to [other] evils there described."

## [APPENDIX ON THE THEORY OF CYCLES

THE following notice of recent investigations on the sun-spot period, for which I am indebted to Professor Arthur Schuster, of the Victoria University and Owens College, Manchester, is of obvious interest in relation to the speculations contained in the sixth, seventh, and eighth papers of this volume.

I have also thought that the extract from Sir William Petty, which, so far as I know, is the first distinct recognition of the harvest cycle from a theoretic point of view, deserves notice here. I find, on referring to Mr. Jevons' copy of Petty, that he had doubly scored this passage. The chapter in which it occurs is one of the most remarkable in a most remarkable work, containing amongst other things a clear statement of the theory of Cost of Production. The Treatise itself is the first great work on economic theory, which it may fairly be said to have founded.

H. S. F.

### WOLF ON THE SUN-SPOT PERIOD

"MANCHESTER, *Jan.* 9, 1883.

MY DEAR FOXWELL,

The paper on the sun-spot period, to which I referred when I saw you last, is contained in No. 57 of the "Astronomische Nachrichten." I have not seen the original, but what appears to be a full abstract is given by Faye in the "Comptes Rendus," vol. 95, p. 1245. Wolf has come to the conclusion that the behaviour of sun-spots since 1751 is best explained by the assumption of two periods, one of 9 years 11 months, and the other of 11 years 3 months. I must confess that the method by which he arrives at

this result does not appear to me to be quite conclusive, though there seems to be a presumption in favour of the double period.

. . . . . .

ARTHUR SCHUSTER."

## SIR WILLIAM PETTY ON THE CYCLE

(*From his Treatise on Taxes and Contributions*, 1662.)

"Suppose a man could with his own hands plant a certain scope of Land with Corn, that is, could Digg, or Plough, Harrow, Weed, Reap, carry home, Thresh, and Winnow so much as the Husbandry of this Land requires; and had withal Seed wherewith to sowe the same, I say, that when this man had subducted his seed out of the proceed of his Harvest, and also what himself hath both eaten and given to others in exchange for Clothes and other Natural necessaries; that the Remainder of Corn is the natural and true Rent of the Land for that year; and the *medium* of seven years, or rather of so many years as makes up the Cycle, within which Dearths and Plenties make their revolution, doth give the ordinary Rent of the Land in Corn." Ch. IV., § 13, pp. 24, 25.]

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