THE THEORY
OF
POLITICAL ECONOMY

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WITH PREFACE AND NOTES AND AN EXTENSION OF THE
BIBLIOGRAPHY OF MATHEMATICAL ECONOMIC WRITINGS

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FIFTH EDITION

PREFACE TO THE FIFTH EDITION

In writing the Preface to the fourth edition of the Theory of Political Economy I ventured to predict that it would be the last. That edition was in fact exhausted a few years ago; but Messrs. Macmillan were unable to see their way to reprint the book. I was glad therefore to have an offer from the representative of an American firm to bring out a new edition, for there is a continuing demand for the Theory, which has found a place amongst the economic classics of the nineteenth century.

Its appeal lies not merely in the Author’s clarity and freshness of diction, but in its combination of two previously separate schools of thought—those favoring respectively the psychological and the mathematical methods in economics. It is still a matter of controversy whether economics should be regarded as a calculus of pleasure and pain or, more correctly, of positive and negative feeling, or whether it should be treated as the science of preferences in the satisfaction of human wants. For myself, I believe that those who refuse or neglect to study the psychological basis of economics as one branch of the science of human behavior are less likely than those who do so to arrive at sound conclusions tending in their applications to maximise human happiness.

In the preface to the fourth edition I explained that it had been my intention to continue my father’s bibliography
PREFACE TO THE FIRST EDITION
(1871)

The contents of the following pages can hardly meet with ready acceptance among those who regard the Science of Political Economy as having already acquired a nearly perfect form. I believe it is generally supposed that Adam Smith laid the foundations of this science; that Malthus, Anderson, and Senior added important doctrines; that Ricardo systematised the whole; and, finally, that Mr. J. S. Mill filled in the details and completely expounded this branch of knowledge. Mr. Mill appears to have had a similar notion; for he distinctly asserts that there was nothing in the Laws of Value which remained for himself or any future writer to clear up. Doubtless it is difficult to help feeling that opinions adopted and confirmed by such eminent men have much weight of probability in their favour. Yet, in the other sciences this weight of authority has not been allowed to restrict the free examination of new opinions and theories; and it has often been
ultimately proved that authority was on the wrong side.

There are many portions of Economical doctrine which appear to me as scientific in form as they are consonant with facts. I would especially mention the Theories of Population and Rent, the latter a theory of a distinctly mathematical character, which seems to give a clue to the correct mode of treating the whole science. Had Mr. Mill contented himself with asserting the unquestionable truth of the Laws of Supply and Demand, I should have agreed with him. As founded upon facts, those laws cannot be shaken by any theory; but it does not therefore follow that our conception of Value is perfect and final. Other generally accepted doctrines have always appeared to me purely delusive, especially the so-called Wage Fund Theory. This theory pretends to give a solution of the main problem of the science—to determine the wages of labour; yet, on close examination, its conclusion is found to be a mere truism, namely, that the average rate of wages is found by dividing the whole amount appropriated to the payment of wages by the number of those between whom it is divided. Some other supposed conclusions of the science are of a less harmless character, as, for instance, those regarding the advantage of exchange (see the section on "The Gain by Exchange," p. 142).

In this work I have attempted to treat Economy as a Calculus of Pleasure and Pain, and have sketched out, almost irrespective of previous opinions, the form which the science, as it seems to me, must ultimately take. I have long thought that as it deals throughout with quantities, it must be a mathematical science in matter if not in language. I have endeavoured to arrive at accurate quantitative notions concerning Utility, Value, Labour, Capital, etc., and I have often been surprised to find how clearly some of the most difficult notions, especially that most puzzling of notions Value, admit of mathematical analysis and expression. The Theory of Economy thus treated presents a close analogy to the science of Statical Mechanics, and the Laws of Exchange are found to resemble the Laws of Equilibrium of a lever as determined by the principle of virtual velocities. The nature of Wealth and Value is explained by the consideration of indefinitely small amounts of pleasure and pain, just as the Theory of Statics is made to rest upon the equality of indefinitely small amounts of energy. But I believe that dynamical branches of the Science of Economy may remain to be developed, on the consideration of which I have not at all entered.

Mathematical readers may perhaps think that I have explained some elementary notions, that of the Degree of Utility for instance, with unnecessary prolixity. But it is to the neglect of Economists to obtain clear and accurate notions of quantity and degree of utility that I venture to attribute the present difficulties and imperfections of the science;
and I have purposely dwelt upon the point at full length. Other readers will perhaps think that the occasional introduction of mathematical symbols obscures instead of illustrating the subject. But I must request all readers to remember that, as Mathematicians and Political Economists have hitherto been two nearly distinct classes of persons, there is no slight difficulty in preparing a mathematical work on Economy with which both classes of readers may not have some grounds of complaint.

It is very likely that I have fallen into errors of more or less importance, which I shall be glad to have pointed out; and I may say that the cardinal difficulty of the whole theory is alluded to in the section of Chapter IV. upon the “Ratio of Exchange,” beginning at p. 91 (that on “the Law of Indifference,” p. 90 of this edition). So able a mathematician as my friend Professor Barker, of Owens College, has had the kindness to examine some of the proof sheets carefully; but he is not, therefore, to be held responsible for the correctness of any part of the work.

My enumeration of the previous attempts to apply mathematical language to Political Economy does not pretend to completeness even as regards English writers; and I find that I forgot to mention a remarkable pamphlet “On Currency” published anonymously in 1840 (London, Charles Knight and Co.) in which a mathematical analysis of the operations of the Money Market is attempted. The method of treatment is not unlike that adopted by Dr. Whewell, to whose Memoirs a reference is made; but finite or occasionally infinitesimal differences are introduced. On the success of this anonymous theory I have not formed an opinion; but the subject is one which must some day be solved by mathematical analysis. Garnier, in his treatise on Political Economy, mentions several continental mathematicians who have written on the subject of Political Economy; but I have not been able to discover even the titles of their Memoirs.
PREFACE TO THE SECOND EDITION

(1879)

In preparing this second edition certain new sections have been added, the most important of which are those treating of the dimensions of economic quantities (pp. 61-69, 83-84, 178-179, 233-235). The subject, of course, is one which lies at the basis of all clear thought about economic science. It cannot be surprising that many debates end in logomachy, when it is still uncertain how many meanings the word value has, or what kind of a quantity utility itself is. Imagine the mental state of astronomers if they could not agree among themselves whether Right Ascension was the name of a heavenly body, or a force or an angular magnitude. Yet this would not be worse than failing to ascertain clearly whether by value we mean a numerical ratio, or a mental state, or a mass of commodity. John Stuart Mill tells us explicitly¹ that “The value of a thing means the quantity of some other thing, or

¹ Principles of Political Economy, book iii. chap. vi. sec. i. 1. This definition occurs at the beginning of a carefully prepared summary of the principles of the theory of value.
of things in general, which it exchanges for.” It might of course be explained that Mill did not intend what he said; but as the statement stands it makes value into a thing, and is just as philosophic as if one were to say, “Right Ascension means the planet Mars, or planets in general.”

These sections upon the dimensions of economic quantities have caused me great perplexity, especially as regards the relation between utility and time (pp. 64-69). The theory of capital and interest also involves some subtleties. I hope that my solutions of the questions raised will be found generally correct; but where they do not settle a question, they may sometimes suggest one which other writers may answer. A correspondent, Captain Charles Christie, R.E., to whom I have shown these sections after they were printed, objects reasonably enough that commodity should not have been represented by M, or Mass, but by some symbol, for instance Q, which would include quantity of space or time or force, in fact almost any kind of quantity. Services often involve time, or force exerted, or space passed over, as well as mass. In this objection I quite concur, and I must therefore request the reader either to interpret M with a wider meaning than is given to it in p. 64, or else mentally to substitute another symbol.

In treating the dimensions of interest, I point out the curious fact that so profound a mathematician as the late Dean Peacock went quite astray upon the subject (pp. 250-253). Other new sections are those in which I introduce the idea of negative and approximately zero value, showing that negative value may be brought under the forms of the equations of exchange without any important modification. Readers of Mr. Macleod’s works are of course familiar with the idea of negative value; but it was desirable for me to show how important it really is, and how naturally it falls in with the principles of the theory. I may also draw attention to the section (pp. 102-106) in which I illustrate the mathematical character of the equations of exchange by drawing an exact analogy between them and the equations applying to the equilibrium of the lever.

Two or three correspondents, especially Herr Harald Westergaard of Copenhagen, have pointed out that a little manipulation of the symbols, in accordance with the simple rules of the differential calculus, would often give results which I have laboriously argued out. The whole question is one of maxima and minima, the mathematical conditions of which are familiar to mathematicians. But, even if I were capable of presenting the subject in the concise symbolic style satisfactory to the taste of a practised mathematician, I should prefer in an essay of this kind to attain my results by a course of argument which is not only fundamentally true, but is clear and convincing to many readers who, like myself, are not skilful and professional mathematicians. In short, I do not write for mathematicians, nor as a mathematician, but as an economist wishing to convince
other economists that their science can only be satisfactorily treated on an explicitly mathematical basis. When mathematicians recognise the subject as one with which they may usefully deal, I shall gladly resign it into their hands. I have expressed a feeling in more than one place that the whole theory might probably have been put in a more general form by treating labour as a negative utility, and thus bringing it under the ordinary equations of exchange. But the fact is there is endless occupation for an economist in developing and improving his science, and I have found it requisite to reissue this essay, as the bibliopoles say, “with all faults.” I have, however, carefully revised every page of the book, and have reason to hope that little or no real error remains in the doctrines stated. The faults are in the form rather than the matter.

Among minor alterations, I may mention the substitution for the name Political Economy of the single convenient term Economics. I cannot help thinking that it would be well to discard, as quickly as possible, the old troublesome double-worded name of our Science. Several authors have tried to introduce totally new names, such as Plutology, Chromatistics, Catallactics, etc. But why do we need anything better than Economics? This term, besides being more familiar and closely related to the old term, is perfectly analogous in form to Mathematics, Ethics, Esthetics, and the names of various other branches of knowledge, and it has moreover the authority of usage from the time of Aristotle. Mr. Macleod is, so far as I know, the re-introducer of the name in recent years, but it appears to have been adopted also by Mr. Alfred Marshall at Cambridge. It is thus to be hoped that Economics will become the recognised name of a science, which nearly a century ago was known to the French Economists as la science économique. Though employing the new name in the text, it was obviously undesirable to alter the title-page of the book.

When publishing a new edition of this work, eight years after its first appearance, it seems natural that I should make some remarks upon the changes of opinion about economic science which have taken place in the interval. A remarkable discussion has been lately going on in the reviews and journals concerning the logical method of the science, touching even the question whether there exists any such science at all. Attention was drawn to the matter by Mr. T. E. Cliffe Leslie’s remarkable article¹ “On the Philosophical Method of Political Economy,” in which he endeavours to dissipate altogether the deductive science of Ricardo. Mr. W. T. Thornton’s writings have a somewhat similar tendency. The question has been further stirred up by the admirable criticism to which it was subjected in the masterly address of Professor J. K. Ingram, at the last meeting.

of the British Association. This Address has been reprinted in several publications\(^1\) in England, and has been translated into the chief languages of Western Europe. It is evident, then, that a spirit of very active criticism is spreading, which can hardly fail to overcome in the end the prestige of the false old doctrines. But what is to be put in place of them? At the best it must be allowed that the fall of the old orthodox creed will leave a chaos of diverse opinions. Many would be glad if the supposed science collapsed altogether, and became a matter of history, like astrology, alchemy, and the occult sciences generally. Mr. Cliffe Leslie would not go quite so far as this, but would reconstruct the science in a purely inductive or empirical manner. Either it would then be a congeries of miscellaneous disconnected facts, or else it must fall in as one branch of Mr. Spencer’s Sociology. In any case, I hold that there must arise a science of the development of economic forms and relations.

But as regards the fate of the deductive method, I disagree altogether with my friend Mr. Leslie; he is in favour of simple deletion; I am for thorough reform and reconstruction. As I have previously explained,\(^2\) the present chaotic state of Economics arises from the confusing together of several branches of knowledge. Subdivision is the remedy. We must distinguish the empirical element from the abstract theory, from the applied theory, and from the more detailed art of finance and administration. Thus will arise various sciences, such as commercial statistics, the mathematical theory of economics, systematic and descriptive economics, economic sociology, and fiscal science. There may even be a kind of cross subdivision of the sciences; that is to say, there will be division into branches as regards the subject, and division according to the manner of treating the branch of the subject. The manner may be theoretical, empirical, historical, or practical; the subject may be capital and labour, currency, banking, taxation, land tenure, etc.—not to speak of the more fundamental division of the science as it treats of consumption, production, exchange, and distribution of wealth. In fact, the whole subject is so extensive, intricate, and diverse, that it is absurd to suppose it can be treated in any single book or in any single manner. It is no more one science than statics, dynamics, the theory of heat, optics, magnetoelectricity, telegraphy, navigation, and photographic chemistry are one science. But as all the physical sciences have their basis more or less obviously in the general principles of mechanics, so all branches and divisions of economic science must be pervaded by certain general principles. It is to the investigation of such principles—to the tracing out of the mechanics

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of self-interest and utility, that this essay has been
devoted. The establishment of such a theory is a
necessary preliminary to any definite drafting of
the superstructure of the aggregate science.

Turning now to the theory itself, the question is
not so much whether the theory given in this volume
is true, but whether there is really any novelty in it.
The exclusive importance attributed in England to
the Ricardian School of Economists, has prevented
almost all English readers from learning the existence
of a series of French, as well as a few English,
German, or Italian economists, who had from time
to time treated the science in a more or less strictly
mathematical manner. In the first edition (pp.
14-18), I gave a brief account of such writings of the
kind as I was then acquainted with; it is from the
works there mentioned, if from any, that I derived
the idea of investigating Economics mathematically.
To Lardner's *Railway Economy* I was probably most
indebted, having been well acquainted with that
work since the year 1857. Lardner's book has always
struck me as containing a very able investigation,
the scientific value of which has not been sufficiently
estimated; and in chapter xiii. (pp. 286-296, etc.) we
find the Laws of Supply and Demand treated
mathematically and illustrated graphically.

In the preface to the first edition (p. xi), I
remarked that in his treatise on Political Economy,
M. Joseph Garnier mentioned several continental

1 See p. ix of this edition.

mathematicians who had written on the subject of
Economics, and I added that I had not been able to
discover even the titles of their memoirs. This, how-
ever, must have been the result of careless reading
or faulty memory, for it will be found that Garnier
himself\(^1\) mentions the titles of several books and
memoirs. The fact is that, writing as I did then at a
distance from any large library, I made no attempt to
acquaint myself with the literature of the subject,
little thinking that it was so copious and in some
cases so excellent as is now found to be the case.
With the progress of years, however, my knowledge
of the literature of political economy has been much
widened, and the hints of friends and correspondents
have made me aware of the existence of many remark-
able works which more or less anticipate the views
stated in this book. While preparing this new
edition, it occurred to me to attempt the discovery of
all existing writings of the kind. With this view I
drew up a chronological list of all the mathematico-
economic works known to me, already about seventy
in number, which list, by the kindness of the editor,
Mr. Giffen, was printed in the *Journal of the London
Statistical Society* for June 1878 (vol. xli. pp. 398-
401), separate copies being forwarded to the leading
economists, with a request for additions and correc-
tions. My friend, M. Léon Walras, Rector of the
Academy of Lausanne, after himself making con-
siderable additions to the list, communicated it to

the *Journal des Économistes* (December 1878), to the editor of which we are much indebted for its publication. Copies of the list were also sent to German and Italian economical journals. For the completion of the bibliographical list I am under obligations to Professor W. B. Hodgson, Professor Adamson, Mr. W. H. Brewer, M.A., H.M. Inspector of Schools, the Baron d'Aulnis de Bourouill, Professor of Political Economy at Utrecht, M. N. G. Pierson of Amsterdam, M. Vissering of Leiden, Professor Luigi Cossa of Pavia, and others.

All reasonable exertions have thus been made to render complete and exhaustive the list of mathematico-economic works and papers, which is now printed in the first [now fifth] Appendix to this book (pp. 322-339). It is hardly likely that many additions can be made to the earlier parts of the lists, but I shall be much obliged to any readers who can suggest corrections or additions. I shall also be glad to be informed of any new publications suitable for insertion in the list. On the other hand, it is possible that some of the books mentioned in the list ought not to be there. I have not been able in all cases to examine the publications myself, so that some works inserted at the suggestion of correspondents may have been named under misconception of the precise purpose of the list. Economic works, for instance, containing numerical illustrations and statistical facts numerically expressed, however abundantly, have not been intentionally included, unless there was also mathematic method in the reasoning. Without this condition the whole literature of numerical commercial statistics would have been imported into my list. In other cases only a small portion of a book named can be called mathematico-economic; but this fact is generally noted by the quotation of the chapters or pages in question. The tendency, however, has been to include rather than to exclude, so that the reader might have before him the whole field of literature requiring investigation.

To avoid misapprehension it may be well to explain that the ground for inserting any publication or part of a publication in this list, is its containing *an explicit recognition of the mathematical character of economics, or the advantage to be attained by its symbolical treatment*. I contend that all economic writers must be mathematical so far as they are scientific at all, because they treat of economic quantities, and the relations of such quantities, and all quantities and relations of quantities come within the scope of the mathematics. Even those who have most strongly and clearly protested against the recognition of their own method, continually betray in their language the quantitative character of their reasonings. What, for instance, can be more clearly mathematical in matter than the following quotation from Cairnes's chief work: ¹—"We can have no difficulty in seeing how cost in its principal

elements is to be computed. In the case of labour, the cost of producing a given commodity will be represented by the number of average labourers employed in its production—regard at the same time being had to the severity of the work and the degree of risk it involves—multiplied by the duration of their labours. In that of abstinence, the principle is analogous: the sacrifice will be measured by the quantity of wealth abstained from, taken in connection with the risk incurred, and multiplied by the duration of the abstinence.” Here we deal with computation, multiplication, degree of severity, degree of risk, quantity of wealth, duration, etc., all essentially mathematical things, ideas, or operations. Although my esteemed friend and predecessor has in his preliminary chapter expressly abjured my doctrines, he has unconsciously adopted the mathematical method in all but appearance.

We might easily go further back, and discover that even the father of the science, as he is often considered, is thoroughly mathematical. In the fifth chapter of the First Book of the Wealth of Nations, for instance, we find Adam Smith continually arguing about “quantities of labour,” “measures of value,” “measures of hardship,” “proportion,” “equality,” etc.; the whole of the ideas in fact are mathematical. The same might be said of almost any other passages from the scientific parts of the treatise, as distinguished from the historical parts. In the first chapter of the Second Book (29th paragraph), we read—“The produc of land, mines, and fisheries, when their natural fertility is equal, is in proportion to the extent and proper application of the capitals employed about them. When the capitals are equal, and equally well applied, it is in proportion to their natural fertility.” Now every use of the word equal or equality implies the existence of a mathematical equation; an equation is simply an equality; and every use of the word proportion implies a ratio expressible in the form of an equation.

I hold, then, that to argue mathematically, whether correctly or incorrectly, constitutes no real differentia as regards writers on the theory of economics. But it is one thing to argue and another thing to understand and to recognise explicitly the method of the argument. As there are so many who talk prose without knowing it, or, again, who syllogise without having the least idea what a syllogism is, so economists have long been mathematicians without being aware of the fact. The unfortunate result is that they have generally been bad mathematicians, and their works must fall. Hence the explicit recognition of the mathematical character of the science was an almost necessary condition of any real improvement of the theory. It does not follow, of course, that to be explicitly mathematical is to ensure the attainment of truth, and in such writings as those of Canard and Whewell, we find plenty of symbols and equations with no result of value, owing to the fact that they simply translated into symbols the doctrines obtained, and
erroneously obtained, without their use. Such writers misunderstood and inverted altogether the function of mathematical symbols, which is to guide our thoughts in the slippery and complicated processes of reasoning. Ordinary language can usually express the first axioms of a science, and often also the matured results; but only in the most lame, obscure, and tedious way can it lead us through the mazes of inference.

The bibliographical list, of which I am speaking, is no doubt a very heterogeneous one, and may readily be decomposed into several distinct classes of economic works. In a first class may be placed the writings of those economists who have not at all attempted mathematical treatment in an express or systematic manner, but who have only incidentally acknowledged its value by introducing symbolic or graphical statements. Among such writers may be mentioned especially Ran (1868), Hagen (1844), J. S. Mill (1848), and Courcelle-Seneuil (1867). Many readers may be surprised to hear that John Stuart Mill has used mathematical symbols; but, on turning to Book III., chapters xvii. and xviii., of the Principles of Political Economy, those difficult and tedious chapters in which Mill leads the reader through the Theory of International Trade and International Values, by means of yards of linen and cloth, the reader will find that Mill at last yields, and expresses himself concisely and clearly by means of equations between \( m, n, p, \) and \( q \). His mathematics are very crude; still there is some approach to a correct mathematical treatment, and the result is that these chapters, however tedious and difficult, will probably be found the truest and most enduring parts of the whole treatise.

A second class of economists contains those who have abundantly employed mathematical apparatus, but, misunderstanding its true use, or being otherwise diverted from a true theory, have built upon the sand. Misfortunes of this kind are not confined to the science of economics, and in the most exact branches of physical science, such as mechanics, molecular physics, astronomy, etc., it would be possible to adduce almost innumerable mathematical treatises, which must be pronounced nonsense. In the same category must be placed the mathematical writings of such economists as Canard (1801), Whewell (1829, 1831, and 1850), Esmenard du Mazet (1849 and 1851), and perhaps Du Mesnil-Marigny (1860).

The third class forms an antithesis with the second, for it contains those authors who, without any parade of mathematical language or method, have nevertheless carefully attempted to reach precision in their treatment of quantitative ideas, and have thus been led to a more or less complete comprehension of the true theory of utility and wealth. Among such writers Francis H Hutcheson, the Irish founder of the great Scotch School, and the predecessor of Adam Smith at Glasgow, probably stands first. His

\[ \text{Book iii. chap. xviii. sec. 7.} \]
employment of mathematical symbols\(^1\) seems rather crude and premature, but the precision of his ideas about the estimation of quantities of good and evil is beyond praise. He thoroughly anticipates the foundations of Bentham’s moral system, showing that the Moment of Good or Evil is, in a compound proportion of the Duration and Intenseness, affected also by the Hazard or uncertainty of our existence.\(^2\) As to Bentham’s ideas, they are adopted as the starting-point of the theory given in this work, and are quoted at the beginning of chapter ii. (pp. 28-9). Bentham has repeated his statement as to the mode of measuring happiness in several different works and pamphlets, as for instance in that remarkable one called “A Table of the Springs of Action” (London, 1817, p. 3); and also in the “Codification Proposal, addressed by Jeremy Bentham to all Nations professing Liberal Opinions” (London, 1822, pp. 7-11). He here speaks explicitly of the application of arithmetic to questions of utility, meaning no doubt the application of mathematical methods. He even describes (p. 11) the four circumstances governing the value of a pleasure or pain as the dimensions of its value, though he is incorrect in treating propinquity and certainty as dimensions.

It is worthy of notice that Destutt de Tracy, one of the most philosophic of all economists, has in a few words recognised the true method of treatment, though he has not followed up his own idea. Referring to the circumstances which, in his opinion, render all economic and moral calculations very delicate, he says,\(^3\) “On ne peut guère employer dans ces matières que des considérations tirées de la théorie des limites.” So well known an English economist as Malthus has also shown in a few lines his complete appreciation of the mathematical nature of economic questions. In one of his excellent pamphlets\(^4\) he remarks, “Many of the questions, both in morals and politics, seem to be of the nature of the problems de maximis et minimis in Fluxions; in which there is always a point where a certain effect is the greatest, while on either side of this point it gradually diminishes.” But I have not thought it desirable to swell the bibliographical list by including all the works in which there are to be found brief or casual remarks of the kind.

I may here remark that all the writings of Mr. Henry Dunning Macleod exhibit a strong tendency to mathematical treatment. Some of his works or papers in which this mathematical spirit is most strongly manifested have been placed in the list. It is not my business to criticise his ingenious views, or

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to determine how far he really has created a mathematical system. While I certainly differ from him on many important points, I am bound to acknowledge the assistance which I derive from the use of several of his works.

In the fourth and most important class of mathematico-economic writers must be placed those who have consciously and avowedly attempted to frame a mathematical theory of the subject, and have, if my judgment is correct, succeeded in reaching a true view of the Science. In this class certain distinguished French philosophers take precedence and priority. One might perhaps go back with propriety to Condillac’s work, *Le Commerce et le Gouvernement*, first published in the year 1776, the same year in which the *Wealth of Nations* appeared. In the first few chapters of this charming philosophic work we meet perhaps the earliest distinct statement of the true connection between value and utility. The book, however, is not included in the list because there is no explicit attempt at mathematical treatment. It is the French engineer Dupuit who must probably be credited with the earliest perfect comprehension of the theory of utility. In attempting to frame a precise measure of the utility of public works, he observed that the utility of a commodity not only varies immensely from one individual to another, but that it is also widely different for the same person according to circumstances. He says, “nous verrions que l’utilité du morceau de pain peut croître pour le même individu depuis zéro jusqu’au chiffre de sa fortune entière” (1849, Dupuit, *De l’influence des Fées*, etc., p. 185). He establishes, in fact, a theory of the gradation of utility, beautifully and perfectly expounded by means of geometrical diagrams, and this theory is undoubtedly coincident in essence with that contained in this book. He does not, however, follow his ideas out in an algebraic form. Dupuit’s theory was the subject of some controversy in the pages of the *Annales des Ponts et Chaussées*, but did not receive much attention elsewhere, and I am not aware that any English economist ever knew anything about these remarkable memoirs.

The earlier treatise of Cournot, his admirable *Recherches sur les principes mathématiques de la théorie des richesses* (Paris, 1838), resembles Dupuit’s memoirs in being, until within the last few years, quite unknown to English economists. In other respects Cournot’s method is contrasted to Dupuit’s. Cournot did not frame any ultimate theory of the ground and nature of utility and value, but, taking the palpable facts known concerning the relations of price, production and consumption of commodities, he investigated these relations analytically and diagnostically with a power and felicity which leaves little to be desired. This work must occupy a remarkable position in the history of the subject. It is strange that it should have remained for me among Englishmen to discover its value. Some years since (1875) Mr. Todhunter wrote to me
as follows: "I have sometimes wondered whether there is anything of importance in a book published many years since by M. A. A. Cournot, entitled *Recherches sur les principes mathématiques de la théorie des richesses*. I never saw it, and when I have mentioned the title, I never found any person who had read the book. Yet Cournot was eminent for mathematics and metaphysics, and so there may be some merit in this book." I procured a copy of the work as far back as 1872, but have only recently studied it with sufficient care to form any definite opinion upon its value. Even now I have by no means mastered all parts of it, my mathematical power being insufficient to enable me to follow Cournot in all parts of his analysis. My impression is that the first chapter of the work is not remarkable; that the second chapter contains an important anticipation of discussions concerning the proper method of treating prices, including an anticipation (p. 21) of my logarithmic method of ascertaining variations in the value of gold; that the third chapter, treating of the conditions of the foreign exchanges, is highly ingenious if not particularly useful; but that by far the most important part of the book commences with the fourth chapter upon the "Loi du débit." The remainder of the book, in fact, contains a wonderful analysis of the laws of supply and demand, and of the relations of prices, production, consumption, expenses and profits. Cournot starts from the assumption that the débit or demand for a commodity is a function of the price, or $D = F(p)$; and then, after laying down empirically a few conditions of this function, he proceeds to work out with surprising power the consequences which follow from those conditions. Even apart from its economic importance, this investigation, so far as I can venture to judge it, presents a beautiful example of mathematical reasoning, in which knowledge is apparently evolved out of ignorance. In reality the method consists in assuming certain simple conditions of the functions as conformable to experience, and then disclosing by symbolic inference the implicit results of these conditions. But I am quite convinced that the investigation is of high economic importance, and that, when the parts of political economy to which the theory relates come to be adequately treated, as they never have yet been, the treatment must be based upon the analysis of Cournot, or at least must follow his general method. It should be added that his investigation has little relation to the contents of this work, because Cournot does not recede to any theory of utility, but commences with the phenomenal laws of supply and demand.

Discouraged apparently by the small amount of attention paid to his mathematical treatise, Cournot in a later year (1863) produced a more popular nonsymbolic work on Economics; but this later work does not compare favourably in interest and importance with his first treatise.

English economists can hardly be blamed for their
ignorance of Cournot's economic works when we find French writers equally bad. Thus the authors of Guillaumin's excellent *Dictionnaire de l'Économie Politique*, which is on the whole the best work of reference in the literature of the science, ignore Cournot and his works altogether, and so likewise does Sandelin in his copious *Répertoire Général d'Économie Politique*. M. Joseph Garnier in his otherwise admirable text-book¹ mixes up Cournot with far inferior mathematicians, saying: "Dans ces derniers temps M. Esmenard du Mazet, et M. du Mesnil-Marigny ont aussi fait abus, ce nous semble, des formules algériques; les Recherches sur les Principes Mathématiques des Richesses de M. Cournot, ne nous ont fourni aucun moyen d'élucidation." Mac-Culloch of course knows nothing of Cournot. Mr. H. D. Macleod has the merit at least of mentioning Cournot's work, but he misspells the name of the author, and gives only the title of the book, which he had probably never seen.

We now come to a truly remarkable discovery in the history of this branch of literature. Some years since my friend Professor Adamson had noticed in one of Kautz's works on Political Economy ² a brief reference to a book said to contain a theory of pleasure and pain, written by a German author named Hermann Heinrich Gossen. Although he had advertised for it, Professor Adamson was unable to

¹ *Traité d'Économie Politique*, cinquième édition, p. 701.

obtain a sight of this book until August 1878, when he fortunately discovered it in a German bookseller's catalogue, and succeeded in purchasing it. The book was published at Brunswick in 1854; it consists of 278 well-filled pages, and is entitled, *Entwicklung der Gesetze des menschlichen Verkehrs, und der daraus fließenden Regeln für menschliches Handeln*, which may be translated—"Development of the laws of Human Commerce, and of the consequent Rules of Human Action." I will describe the contents of this remarkable volume as they are reported to me by Professor Adamson.

Gossen evidently held the highest possible opinion of the importance of his own theory, for he commences by claiming honours in economic science equal to those of Copernicus in astronomy. He then at once insists that mathematical treatment, being the only sound one, must be applied throughout; but, out of consideration for the reader, the higher analysis will be explicitly introduced only when it is requisite to determine maxima and minima. The treatise then opens with the consideration of Economics as the theory of pleasure and pain, that is as the theory of the procedure by which the individual and the aggregate of individuals constituting society, may realise the maximum of pleasure with the minimum of painful effort. The natural law of pleasure is then clearly stated, somewhat as follows: Increase of the same kind of consumption yields pleasure continuously diminishing
up to the point of satiety. This law he illustrates geometrically, and then proceeds to investigate the conditions under which the total pleasure from one or more objects may be raised to a maximum.

The term Werth is next introduced, which may, Professor Adamson thinks, be rendered with strict accuracy as utility, and Gossen points out that the quantity of utility, material or immaterial, is measured by the quantity of pleasure which it affords. He classifies useful objects as: (1) those which possess pleasure-giving powers in themselves; (2) those which only possess such powers when in combination with other objects; (3) those which only serve as means towards the production of pleasure-giving objects. He is careful to point out that there is no such thing as absolute utility, utility being purely a relation between a thing and a person. He next proceeds to give the derivative laws of utility somewhat in the following manner:—That separate portions of the same pleasure-giving object have very different degrees of utility, and that in general for each person only a limited number of such portions has utility; any addition beyond this limit is useless, but the point of uselessness is only reached after the utility has gone through all the stages or degrees of intensity. Hence he draws the practical conclusion that each person should so distribute his resources as to render the final increments of each pleasure-giving commodity of equal utility for him.

In the next place Gossen deals with labour, starting from the proposition that the utility of any product must be estimated after deduction of the pains of labour required to produce it. He describes the variation of the pain of labour much as I have done, exhibiting it graphically, and inferring that we must carry on labour to the point at which the utility of the product equals the pain of production. In treating the theory of exchange he shows how barter gives rise to an immense increase of utility, and he infers that exchange will proceed up to the point at which the utilities of the portions next to be given and received are equal. A complicated geometrical representation of the theory of exchange is given. The theory of rent is investigated in a most general manner, and the work concludes with somewhat vague social speculations, which, in Professor Adamson's opinion, are of inferior merit compared with the earlier portions of the treatise.

From this statement it is quite apparent that Gossen has completely anticipated me as regards the general principles and method of the theory of Economics. So far as I can gather, his treatment of the fundamental theory is even more general and thorough than what I was able to scheme out. In discussing the book, I lie under the serious difficulty of not being able to read it; but, judging from what Professor Adamson has written or read to me, and from an examination of the diagrams and symbolic parts of the work, I should infer that Gossen has been unfortunate in the development of his theory.
read a German book. I once managed to spell out with assistance part of the logical lecture notes of Kant; but that is my sole achievement in German literature. Now this work of Gossen has remained unknown even to most of the great readers of Germany. Professor Adamson remarks that the work seems to have attracted no attention in Germany. The eminent and learned economist of Amsterdam, Professor N. G. Pierson, writes to me: “Gossen’s book is totally unknown to me. Roscher does not mention it in his very laborious History of Political Economy in Germany. I never saw it quoted; but I will try to get it. It is very curious that such a remarkable work has remained totally unknown even to a man like Professor Roscher, who has read everything.” Mr. Cliffe Leslie, also, who has made the German Economists his special study, informs me that he was quite unaware of the existence of the book.\footnote{A copy of Gossen’s book will be found in the Library of the British Museum (Press mark 8408. cc. 16). It was not acquired by that institution until May 24, 1865, as shown by the date stamped upon the copy.}

Under such circumstances it would have been far more probable that I should discover the theory of pleasure and pain, than that I should discover Gossen’s book, and I have carefully pointed out, both in the first edition and in this, certain passages of Bentham, Senior, Jennings, and other authors, from which my system was, more or less consciously, developed. I cannot claim to be
totally indifferent to the rights of priority; and from the year 1862, when my theory was first published in brief outline, I have often pleased myself with the thought that it was at once a novel and an important theory. From what I have now stated in this preface it is evident that novelty can no longer be attributed to the leading features of the theory. Much is clearly due to Dupuit, and of the rest a great share must be assigned to Gossen. Regret may easily be swallowed up in satisfaction if I succeed eventually in making that understood and valued which has been so sadly neglected.

Almost nothing is known to me concerning Gossen; it is uncertain whether he is living or not. On the title-page he describes himself as “königlich preussischem Regierungs-Assessor ausser Dienst,” which may be translated “Royal Prussian Govern-ment Assessor, retired”; but the tone of his remarks here and there seems to indicate that he was a disappointed if not an injured man. The reception of his one work can have lent no relief to these feelings; rather it must much have deepened them. The book seems to have contained his one cherished theory; for I can find under the name of Gossen no trace of any other publication or scientific memoir whatever. The history of these forgotten works is, indeed, a strange and discouraging one; but the day must come when the eyes of those who cannot see will be opened. Then will due honour be given to all who like Cournot and Gossen have laboured in a thankless field of human knowledge, and have met with the neglect or ridicule they might well have expected. Not indeed that such men do really work for the sake of honour; they bring forth a theory as the tree brings forth its fruit.

It remains for me to refer to the mathematico-economic writings of M. Léon Walras, the Rector of the Academy of Lausanne. It is curious that Lausanne, already distinguished by the early work of Isnard (1781), should recently have furnished such important additions to the science as the Memoirs of Walras. For important they are, not only because they complete and prove that which was before published elsewhere in the works described above, but because they contain a third or fourth independent discovery of the principles of the theory. If we are to trace out “the filiation of ideas” by which M. Walras was led to his theory, we should naturally look back to the work of his father, Auguste Walras, published at Paris in 1831, and entitled De la nature de la richesse, et de l'origine de la valeur. In this work we find, it is true, no distinct recognition of the mathematical method, but the analysis of value is often acute and philosophic. The principal point of the work moreover is true, that value depends upon rarity—“La valeur,” says Auguste Walras, “dérive de la rareté.” Now it is precisely upon this idea of the degree of rarity of commodities that Léon Walras bases his system. The fact that some four or more
independent writers such as Dupuit, Gossen, Walras, and myself should in such different ways have reached substantially the same views of the fundamental ideas of economic science, cannot but lend great probability, not to say approximate certainty, to those views. I am glad to hear that M. Walras intends to bring out a new edition of his Mathématique-Economique Memoirs, to which the attention of my readers is invited. The titles of his publications will be found in the Appendix I. [V. of this edition].

The works of Von Thünen and of several other German economists contain mathematical investigations of much interest and importance. A considerable number of such works will be found noted in the list, which, however, is especially defective as regards German literature. I regret that I am not able to treat this branch of the subject in an adequate manner.

My bibliographical list shows that in recent years, that is to say since the year 1873, there has been a great increase in the number of mathematico-economic writings. The names of Fontaneau, Walras, Avigdo, Lefèvre, Petersen, Boccardo, recur time after time. In such periodicals as the Journal des Actuaires français, or the National-Oekonomisk Tidsskrift—a journal so creditable to the energy and talent of the Danish Economic School—the mathematical theory of Economics is treated as one of established interest and truth, with which readers would naturally be acquainted. In England we have absolutely no periodical in which such discussions could be conducted. The reader will not fail to remark that it is into the hands of French, Italian, Danish, or Dutch writers that this most important subject is rapidly passing. They will develop that science which only excites ridicule and incredulity among the followers of Mill and Ricardo. There are just a few English mathematicians, such as Fleeming Jenkin, George Darwin, Alfred Marshall, or H. D. Macleod, and one or two Americans like Professor Simon Newcomb, who venture to write upon the obnoxious subject of mathematico-economic science. I ought to add, however, that at Cambridge (England) the mathematical treatment of Economics is becoming gradually recognised owing to the former influence of Mr. Alfred Marshall, now the Principal of University College, Bristol, whose ingenious mathematico-economic problems, expounded more geometrico, have just been privately printed at Cambridge.

If we overlook Hutcheson, who did not expressly write on Economics, the earliest mathematico-economic author seems to be the Italian Ceva, whose works have just been brought to notice in the Giornale degli Economisti (see 1878, Nicolini). Ceva wrote in the early part of the eighteenth century, but I have as yet no further information about him. The next author in the list is the celebrated Beccaria, who printed a very small, but distinctly mathematical, tract on Taxation as early as 1765. Italians were
thus first in the field. The earliest English work of
the kind yet discovered is an anonymous Essay on
the Theory of Money, published in London in 1771,
five years before the era of the Wealth of Nations.
Though crude and absurd in some parts, it is not
devoid of interest and ability, and contains a distinct
and partially valid attempt to establish a mathema-
tical theory of currency. This remarkable Essay
is, so far as I know, wholly forgotten and almost lost
in England. Neither MacCulloch nor any other
English economist known to me, mentions the work.
I discovered its existence a few months ago by acci-
dentally finding a copy on a bookseller’s stall. But
it shames an Englishman to learn that English
works thus unknown in their own country are known
abroad, and I owe to Professor Luigi Cossa, of the
University of Pavia, the information that the Essay
was written by Major-General Henry Lloyd, an author
of some merit in other branches of literature. Signor
Cossa’s excellent Guido alla studio di Economia
Politica, a concise but judiciously written text-book,
is well qualified to open our eyes as to the insular
narrowness of our economic learning. It is a book
of a kind much needed by our students of Econ-
omics, and I wish that it could be published in
an English dress.

From this bibliographical survey emerges the
wholly unexpected result, that the mathematical
treatment of Economics is coeval with the science
itself. The notion that there is any novelty or

originality in the application of mathematical
methods or symbols must be dismissed altogether.
While there have been political economists there
has always been a certain number who with various
success have struck into the unpopular but right
path. The unfortunate and discouraging aspect of
the matter is the complete oblivion into which this
part of the literature of Economics has always fallen,
oblivion so complete that each mathematico-economic
writer has been obliged to begin almost de novo. It
is with the purpose of preventing for the future as far
as I can such ignorance of previous exertions, that I
have spent so much pains upon this list of books.

I should add that in arranging the list I have
followed, very imperfectly, the excellent example set
by Professor Mansfield Merriman, of the Sheffield
Scientific School of Yale College, in his “List of
Writings relating to the Method of Least Squares.”

Such bibliographies are of immense utility, and I
hope that the time is nearly come when each student
of a special branch of science or literature will feel
bound to work out its bibliography, unless, of course,
the task shall have been already accomplished. The
reader will see that, in Appendix II. [IV. of this
edition], I have taken the liberty of working out also
a part of the bibliography of my own writings.

Looking now to the eventual results of the theory,
I must beg the reader to bear in mind that this book
was never put forward as containing a systemat

view of Economics. It treats only of the theory, and is but an elementary sketch of elementary principles. The working out of a complete system based on these lines must be a matter of time and labour, and I know not when, if ever, I shall be able to attempt it. In the last chapter, I have, however, indicated the manner in which the theory of wages will be affected. This chapter is reprinted almost as it was written in 1871; since then the wage-fund theory has been abandoned by most English Economists, owing to the attacks of Mr. Cliffe Leslie, Mr. Shadwell, Professor Cairnes, Professor Francis Walker, and some others. Quite recently more extensive reading and more careful cogitation have led to a certain change in my ideas concerning the superstructure of Economics—in this wise:

Firstly, I am convinced that the doctrine of wages, which I adopted in 1871, under the impression that it was somewhat novel, is not really novel at all, except to those whose view is bounded by the maze of the Ricardian Economics. The true doctrine may be more or less clearly traced through the writings of a succession of great French Economists, from Condillac, Baudeau, and Le Trosne, through J.-B. Say, Destutt de Tracy, Storch, and others, down to Bastiat and Courcelle-Seneuil. The conclusion to which I am ever more clearly coming is that the only hope of attaining a true system of Economics is to fling aside, once and for ever, the mazy and preposterous assumptions of the Ricardian School. Our English Economists have been living in a fool's paradise. The truth is with the French School, and the sooner we recognise the fact, the better it will be for all the world, except perhaps the few writers who are too far committed to the old erroneous doctrines to allow of renunciation.

Although, as I have said, the true theory of wages is not new as regards the French School, it is new, or at any rate renewed, as regards our English Schools of Economics. One of the first to treat the subject from the right point of view was Mr. Cliffe Leslie, in an article first published in Fraser's Magazine for July 1868, and subsequently reprinted in a collection of Essays.¹ Some years afterwards Mr. J. L. Shadwell independently worked out the same theory of wages which he has fully expounded in his admirable System of Political Economy.² In Hearn's Plutology, however, as pointed out in the text of this book (pp. 271-273), we find the same general idea that wages are the share of the produce which the laws of supply and demand enable the labourer to secure. It is probable that like ideas might be traced in other works were this the place to attempt a history of the subject.

Secondly, I feel sure that when, casting ourselves free from the Wage-Fund Theory, the Cost of Production doctrine of Value, the Natural Rate of

² London, 1877, Trübner.
Wages, and other misleading or false Ricardian doctrines, we begin to trace out clearly and simply the results of a correct theory, it will not be difficult to arrive at a true doctrine of wages. This will probably be reached somewhat in the following way:—We must regard labour, land, knowledge, and capital as conjoint conditions of the whole produce, not as causes each of a certain portion of the produce. Thus in an elementary state of society, when each labourer owns all the three or four requisites of production, there would really be no such thing as wages, rent, or interest at all. Distribution does not arise even in idea, and the produce is simply the aggregate effect of the aggregate conditions. It is only when separate owners of the elements of production join their properties, and traffic with each other, that distribution begins, and then it is entirely subject to the principles of value and the laws of supply and demand. Each labourer must be regarded, like each landowner and each capitalist, as bringing into the common stock one part of the component elements, bargaining for the best share of the produce which the conditions of the market allow him to claim successfully. In theory the labourer has a monopoly of labour of each particular kind, as much as the landowner of land, and the capitalist of other requisite articles. Property is only another name for monopoly. But when different persons own property of exactly the same kind, they become subject to the important Law of Indifference, as I have called it (pp. 90-93), namely, that in the same open market, at any one moment, there cannot be two prices for the same kind of article. Thus monopoly is limited by competition, and no owner, whether of labour, land, or capital, can, theoretically speaking, obtain a larger share of produce for it than what other owners of exactly the same kind of property are willing to accept.

So far there may seem to be nothing novel in this view; it is hardly more than will be found stated in a good many economic works. But as soon as we begin to follow out this simple view, the consequences are rather startling. We are forced, for instance, to admit that rates of wages are governed by the same formal laws as rents. This view is not new to the readers of Storch, who in the third book of his excellent Cours d'Economie Politique has a chapter "De la Rente des talens et des qualités morales." But it is a very new doctrine to one whose economic horizon is formed by Mill and Fawcett, Ricardo and Adam Smith. Even Storch has not followed out the doctrine thoroughly; for he applies the idea of rent only to cases of eminent talent. It must be evident, however, that talent and capacity of all kinds are only a question of degree, so that, according to the Law of Continuity, the same principle must apply to all labourers.

A still more startling result is that, so far as cost of production regulates the values of commodities, wages must enter into the calculation on exactly the

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1 Chap. v. vol. i. p. 304.
same footing as rent. Now it is a prime point of the Ricardo doctrines that rent does not enter into cost of production. As J. S. Mill says, \(^1\) "Rent, therefore, forms no part of the cost of production which determines the value of agricultural produce." And again, \(^2\) "Rent is not an element in the cost of production of the commodity which yields it; except in the cases," etc. Rent in fact is represented as the effect not the cause of high value; wages on the contrary are treated as the cause, not the effect. But if rent and wages be really phenomena subject to the same formal laws, this opposite relation to value must involve error. The way out of the difficulty is furnished by the second sentence of the paragraph from which the last quotation was taken. Mill goes on to say: "But when land capable of yielding rent in agriculture is applied to some other purpose, the rent which it would have yielded is an element in the cost of production of the commodity which it is employed to produce." Here Mill edges in as an exceptional case that which proves to be the rule, reminding one of other exceptional cases described as "Some peculiar cases of value" (see p. 197 below), which I have shown to include almost all commodities.

Now Mill allows that when land capable of yielding rent in agriculture is applied to some other purpose, the rent which would have been produced

\(^1\) Principles of Political Economy, book iii. chap. v. sec. 2, paragraph 3.

\(^2\) Ibid. book iii. chap. vi. sec. 1, article 9.

in agriculture is an element in the cost of production of other commodities. But wherefore this distinction between agriculture and other branches of industry? Why does not the same principle apply between two different modes of agricultural employment? If land which has been yielding £2 per acre rent as pasture be ploughed up and used for raising wheat, must not the £2 per acre be debited against the expenses of the production of wheat? Suppose that somebody introduced the beetroot culture into England with a view to making sugar; this new branch of industry could not be said to pay unless it yielded, besides all other expenses, the full rents of the lands turned from other kinds of culture. But if this be conceded, the same principle must apply generally; a potato-field should pay as well as a clover-field, and a clover-field as a turnip-field; and so on. The market prices of the produce must adjust themselves so that this shall in the long run be possible. The rotation of crops, no doubt, introduces complication into the matter, but does not modify the general reasoning. The principle which emerges is that each portion of land should be applied to that culture or use which yields the largest total of utility, as measured by the value of the produce; if otherwise applied there will be loss. Thus the rent of land is determined by the excess of produce in the most profitable employment.

But when the matter is fully thought out, it will be seen that exactly the same principle applies to
wages. A man who can earn six shillings a day in one employment will not turn to another kind of work unless he expects to get six shillings a day or more from it. There is no such thing as absolute cost of labour; it is all matter of comparison. Every one gets the most which he can for his exertions; some can get little or nothing, because they have not sufficient strength, knowledge, or ingenuity; others get much, because they have, comparatively speaking, a monopoly of certain powers. Each seeks the work in which his peculiar faculties are most productive of utility, as measured by what other people are willing to pay for the produce. Thus wages are clearly the effect not the cause of the value of the produce. But when labour is turned from one employment to another, the wages it would otherwise have yielded must be debited to the expenses of the new product. Thus the parallelism between the theories of rent and wages is seen to be perfect in theory, however different it may appear to be in the details of application. Precisely the same view may be applied, mutatis mutandis, to the rent yielded by fixed capital, and to the interest of free capital. In the last case, the Law of Indifference peculiarly applies, because free capital, loanable for a certain interval, is equally available for all branches of industry; hence, at any moment and place, the interest of such capital must be the same in all branches of trade.

I ought to say that Mill, as pointed out to me by Professor Adamson, has a remarkable section at the end of chapter v. of Book III. of the Principles, in which he explains that all inequalities, artificial or natural, give rise to extra gains of the nature of Rent. This section is a very satisfactory one inasmuch as it tends to support the view on which I am now insisting, a view, however, which, when properly followed out, will overthrow many of the principal doctrines of the Ricardo-Mill Economics. Those who have studied Mill's philosophic character as long and minutely as I have done, will not for a moment suppose that the occurrence of this section in Mill's book tends to establish its consistency with other portions of the same treatise.

But of course I cannot follow out the discussion of this matter in a mere preface. The results to be expected are partly indicated in my Primer of Political Economy, but in that little treatise my remarks upon the Origin of Rent (p. 94), as originally printed in the first edition, were erroneous, and the section altogether needs to be rewritten. When at length a true system of Economics comes to be established, it will be seen that that able but wrong-headed man, David Ricardo, shunted the car of Economic science on to a wrong line—a line, however, on which it was further urged towards confusion by his equally able and wrong-headed admirer, John Stuart Mill. There were Economists, such as Malthus and Senior, who had a far better comprehension of the true doctrines (though not free from the Ricardian errors), but they were driven out of the field by the unity and influence of the Ricardo-
Mill school. It will be a work of labour to pick up the fragments of a shattered science and to start anew, but it is a work from which they must not shrink who wish to see any advance of Economic Science.

The Chestnuts,
Hampstead Heath, N.W.
May, 1879.

PREFACE TO THE THIRD EDITION

(1888)

The present edition of the Theory of Political Economy is an exact reprint of the second edition, with the exception of the first Appendix containing the bibliographical list of mathematico-economic books. I desired to add to that list several books which it had been my husband's intention to include in the next edition, and when I consulted my friend, Mr. H. S. Foxwell, he advised me to continue it up to the present date. I am greatly indebted to the kindness of those friends who have enabled me to accomplish this; and amongst others my thanks are especially due to the Rev. P. H. Wicksteed, Professor F. Y. Edgeworth, and Professor Harald Westergaard of Copenhagen, for the trouble they have taken in revising proofs for me, as well as in supplying me with the titles of those books which ought to be included. We have endeavoured to follow the rules which Mr. Jevons has laid down in the preface to the second edition, and though the list is probably not