



Australian School of Business

Working Paper

Never Stand Still

Australian School of Business

Australian School of Business Research Paper No. 2014 ECON 04

On Ricardo and Cambridge

G.C. Harcourt
Peter Kriesler

This paper can be downloaded without charge from
The Social Science Research Network Electronic Paper Collection:
<http://ssrn.com/abstract=2393691>

ON RICARDO AND CAMBRIDGE¹

G. C. Harcourt and Peter Kriesler (University of New South Wales)

Abstract

David Ricardo's key place in the history of economic thought is well established. However, both the understanding of his *Principles of Political Economy and Taxation* and its role in the development of economic analysis is much more controversial. Cambridge economists have contributed significantly to both of these issues. They have played an important part in two extremely divergent interpretations of Ricardo's place in the development of economic thought. Understanding how Ricardo has been viewed in Cambridge does not result in homogeneity, but in a spectrum of interpretations. In this paper, we focus on the role of Ricardo's *Principles* in the development of economics as seen by Cambridge economists.

JEL Codes: B12, B20, B41, E10

Keywords: Ricardo, Cambridge School, History of economic thought, short period, long period

Introduction

John King's contributions to the history of economic thought are numerous and profound; they take in a wide range of subjects. While his last two decades of work on the history of economic thought has focused "on the history of more recent economic ideas" (King 2013, vii) with a strong emphasis on Cambridge economics, he recently returned to "nineteenth-century political economy" with his interesting volume on David Ricardo in Tony Thirwall's

¹ This paper is based on a lecture given by Geoff Harcourt to the Ricardo Society of Japan at the International Conference on Post Keynesian Economics, September 2011

“Great Thinkers in Economics” series (King 2013). Given John’s interest in these themes, this paper on Cambridge interpretations of Ricardo’s work institutes, we hope, an appropriate tribute to him, as a long-time friend and much admired colleague and scholar.

David Ricardo’s key place in the history of economic thought is well established. However, both the understanding of his *Principles of Political Economy and Taxation* and its role in the development of economic analysis is much more controversial. Cambridge economists have contributed significantly to both of these issues. In particular, they have played an important part in two extremely divergent interpretations of Ricardo’s place in the development of economic thought. Understanding how Ricardo has been viewed in Cambridge does not result in homogeneity, but in a spectrum of interpretations. In this paper, we focus on the role of Ricardo’s *Principles* in the development of economics as seen by Cambridge economists. At one end of the spectrum is the interpretation by Piero Sraffa and Maurice Dobb, which located Ricardo’s work in the surplus approach which they see as being a quite distinct approach from that of modern neoclassical economics. They argue that the development of neoclassical theory, from the 1870s on, represented an important change in both emphasis and analytical tools used from that of the classical political economists and Marx. In contrast, they argue, the analytical methods of the

classical political economists formed the basis of an alternative economic tradition associated with many schools of heterodox economics.

At the other end of the spectrum is Alfred Marshall's interpretation. He argued for continuity from Adam Smith and Ricardo to his own contributions set within the supply and demand approach,. Within this view, he argued that Ricardo's theory of value provided some of the essential ingredients of the supply blade of the supply and demand scissors. Together, they mutually determined, he argued, long-period competitive normal prices (and quantities).

The other Cambridge economists whom we consider and who have contributed to the interpretation of Ricardo include William Whewell's "first mathematical formulation of Ricardo's theory" (Campanelli 1982 p. 249, Cochrane 1970), as well as Maynard Keynes, Joan Robinson, Nicholas Kaldor and Luigi Pasinetti.

In a sense, Malthus, Ricardo's contemporary, close friend and great debating partner could be seen as the first Cambridge economist to interpret Ricardo. However, since Malthus did not attempt to provide a systematic account of the Ricardian system, but rather responded to specific aspects of it, the starting point for our account of Cambridge interpretations of Ricardo will be with the much neglected William Whewell.

Whewell

William Whewell, who has been credited with providing the first mathematical statement of Ricardo's model (Cochrane 1970), was the Master of Trinity College, Cambridge and a University Lecturer in Mathematics, Mineralogy and Moral Philosophy. The question of continuity, which was important for later Cambridge economists, was not relevant for Whewell, as no alternative to classical Political Economy had yet been fully developed.

His early attempts to provide a mathematical formulation of the Ricardian system were specifically aimed at providing a systematic analysis of Political Economy in order to avoid errors in logic, arguing that a systematic mathematical formulation would avoid such errors². In particular, he likened the principles of Political Economy to those of mechanics in the importance of mathematics for both:

“It appears I think that the sciences of Mechanics and Political Economy are so far analogous, that something of the same advantage may be looked for from the application of mathematics in the case of Political Economy.”
(Whewell 1829, 5)

Whewell argued that while mathematics allowed the logical consequences of postulates to be correctly deduced, and it was this process that he applied to Ricardo's analysis, nevertheless, the more important task was:

² In particular, he argued that Ricardo had erred in his belief that “a tax on wages would fall on labourers” (Whewell 1829 p. 2, 1831 27-30) because he had not investigated the proposition mathematically.

not in reasoning *from* principles, but *to* them: in extracting from a wide and patient survey of facts the laws according to which circumstances and conditions determine the progress of wealth, and the fortunes of men.” Whewell 1829, 43³

Whewell provided a mathematical version of Ricardo’s system, arguing that “Ricardian distribution theory was insufficiently supported by empirical evidence.” (Cochrane 1970, 419). In particular, he took issue with Ricardo’s analysis of wages and of rent. (Campanelli 1982, 254) With respect to wages, he rejected Ricardo’s assumption of the iron law of wages, arguing that “The habitual necessities and comforts of the labourer may, and do, undergo changes simultaneous and co-ordinate with those of the population.” (Whewell 1831, 7) He also argued that Ricardo’s theory of rent was not a good explanation of the determination of rent owing to the increased importance of “*Auxiliary Capital*” which substantially increases the productivity of agricultural labour (Whewell 1862, 65-72). Rent, according to Whewell, increases not only for the Ricardian reason of extending the margin of cultivation of soil, but also “by the improvements of methods of culture” and the latter is of much greater empirical significance. (Whewell 1862, 71).

As a result, he also questioned the validity of the conclusion of Ricardo’s model, namely, the tendency towards a stationary state due to the “extension of

³ These comments are reminiscent of Keynes’ description of Malthus’ method (Keynes 1933, 107)

agricultural labour to less productive soils”⁴ (15). This, he argues, is “clearly and demonstrably false” (ibid) due to the “increase in the power of agriculture” as a result of which “it is evident that the whole of his assumption of the nature of economic progress of this country, and the views of distribution of wealth arising from this assumption, must fall to the ground.” (15)

Whewell also modified Ricardo’s analysis of prices to incorporate the influence of fixed capital. In doing so, he developed expressions for price which allowed for fixed capital and pre-date the important work in this area by Dmitriev 1904, representing a major breakthrough of the analysis of “the reduction of fixed labour to dated quantities of labour.” (Campanelli 1982, 257). Campanelli (1982) emphasises Whewell analysis of fixed capital in Ricardo’s model, which used the device of reduction to dated labour.

Whewell came neither to praise Ricardo, nor to bury him, but nevertheless to criticise him, first, by criticising the unreality of the empirical generalisations on which Ricardo’s deductions were erected, and, secondly, by providing through mathematical analysis an internal critique of Ricardo’s propositions within Ricardo’s own system.

⁴ See Pasinetti 1960, Harcourt 2006, chapter 7 and below. Ricardo was aware of the point which Whewell was making, but abstracted from the influence of technical progress in order to bring out the long-term effects of diminishing returns on the distribution of income.

Marshall

Marshall stressed the continuity of economic ideas, with his own analysis being “a direct linear descent from the classical economists.” (Petridis 1998, 79) To do so, Marshall had to provide a very generous reading of Ricardo (from his point of view and given his agenda) to justify his interpretation of Ricardo and other classical political economists, including Smith and also Marx. In particular, Marshall defended Ricardo from the criticisms of Walras, Jevons and others, by arguing that his contribution can be seen as part of a continuum in the development of economics, with the ultimate emergence of the scissors of supply and demand. In this picture, Ricardo is seen as contributing to the analysis of the supply blade, via his emphasis on cost of production, because, although he understood the demand blade, he did not spend time analysing it as it was intuitively obvious.

Ricardo's theory of cost of production in relation to value occupies so important a place in the history of economics that any misunderstanding as to its real character must necessarily be very mischievous; and unfortunately it is so expressed as almost to invite misunderstanding. In consequence there is a widely spread belief that it has needed to be reconstructed by the present generation of economists. Cause is shown in Appendix I for not accepting this opinion; and for holding on the contrary that the foundations of the theory as they were left by Ricardo remain intact; that much has been added to them, and that very much has been built upon them, but that little has been taken from them. It is there argued that he knew that demand played an essential part in governing value, but that he regarded its action as less obscure than that of cost of production, and therefore passed it lightly over in the notes which he made for the use

of his friends, and himself; for he never essayed to write a formal treatise: Marshall 1961, 403

Ricardo and the able business men who followed in his wake took the operation of demand too much for granted as a thing which did not need to be explained: they did not emphasize it, nor study it with sufficient care; and this neglect has caused much confusion, and has obscured important truths. 403 Marshall 1961, 525

The "cost of production principle" and the "final utility" principle are undoubtedly component parts of the one all-ruling law of supply and demand; each may be compared to one blade of a pair of scissors. When one blade is held still, and the cutting is effected by moving the other, we may say with careless brevity that the cutting is done by the second; but the statement is not one to be made formally, and defended deliberately. 403 Marshall 1961, 820

In order to demonstrate this position with respect to the idea of continuity in the history of economic analysis, Marshall had to interpret Ricardo in an idiosyncratic way, as has been clearly shown in Bharadwaj 1978a, 1978c and Groenewegen 2003, 2006:

Irrespective of the interpretation the reader may hold of Ricardo on value, Marshall's views on the subject can be criticised on several grounds. Above all, he can be charged with an anachronistic reading of Ricardo's text, which transforms Ricardo's notions into Marshallian terminology and thereby induces the resemblances Marshall desires his readers to find. Groenewegen 2003, 37

The basic thrust of Marshall's comments on Ricardo cannot therefore be accepted as accurate Hence Marshall's lengthy, scattered and not very detailed commentary on Ricardo is a good illustration of 'the fact that each generation rewrites its own history of economics [and that] from this perspective an evaluation often tells us more about the commentator than the subject' (Hollander 1979: 4) Groenewegen 2003, 43

Most modern commentators accept the argument that “Marshall read much more into Ricardo’s theory of value than any modern reader can now find.” (Petridis 1998, 82) In particular, Marshall’s argument that Ricardo understood the importance of final and marginal utility in determining the demand curve, which played an important role in determining value “stretche[d] the interpretation of Ricardo Either Marshall’s imagination or his generosity of interpretation ran out of control” (Petridis 1998, 82)

In other words, Marshall’s idiosyncratic interpretation of Ricardo served an ulterior purpose in its role of providing evidence for his thesis about the continuity of economics: “there is something wrong with Marshall’s own account. He made astonishing claims for continuity, and he persisted in these claims in the face of contemporary criticism, despite his acute personal sensitivity to criticism.” (O’Brien 1990, 136)

Keynes

Close to Marshall’s interpretation but putting his main emphasis on the superiority of Thomas Robert Malthus’s understanding of the overall workings of the economy relative to Ricardo’s, especially in the short period, is Maynard Keynes’s interpretation. As he himself admits, he had only with difficulty

included Ricardo under the rubric of the classical economists⁵ who were represented in his time by Marshall and especially by A.C. Pigou (he also included F.Y. Edgeworth and John Stuart Mill in his examples), in the fundamental debates about the roles of aggregate and effective demand at the heart of Keynes's greatest contribution⁶. As Keynes tell us, *C.W.*, vol. VII, xxiii, he had "a long struggle of escape" from the ways of thinking on which he was brought up.

In the Preface to *A Treatise on Money* (1930), he locates one of his most significant contributions in the book in his analysis of the dynamic processes associated with the transition from one position of long-period equilibrium to another⁷. He sees the origins of the characteristics of the long-period equilibrium position in Ricardo's work, but, of course, translated in Keynes's analysis into the Marshallian mode of thinking. Ricardo provides evidence both for this interpretation and of why he and Malthus were often at cross purposes,

⁵ Having credited Marx with the invention of the name, "The classical economists", to cover Ricardo and James Mill and their *predecessors*", Keynes adds: "I have become accustomed, perhaps perpetrating a solecism, to include ... the *followers* of Ricardo, those ... who adopted and perfected the theory of Ricardian economics", Keynes 1936; *C.W.*, vol VII, 1973, n3, emphasis in original.

⁶ That is why Keynes found Pigou's 1933 book on unemployment such a Godsend, because Pigou spelt out explicitly what Keynes previously had deduced what the classical system must be, see Ambrosi (2003).

⁷ "My object has been to find a method which is useful in describing, not merely the characteristics of static equilibrium, but also those of disequilibrium, and to discover the dynamical laws governing the passage of a monetary system from one position of equilibrium to another." Keynes 1930; *C.W.*, vol V, 1971, xvii.

with his well known explanation of this lasting gap in their ability to agree or even communicate with one another⁸.

Later, for Keynes the distinguishing features for his label of the “classical economics” or the “Ricardian tradition” is, first, a lack of concern with the determination of total output (Keynes 1936, 4-5), and, secondly, an adherence to Say’s Law “that supply creates its own demand” (Keynes 1936, 18), as a result of which “there is no obstacle to full employment. (Keynes 1936, 26). “The idea that we can safely neglect the aggregate demand function is fundamental to the Ricardian economics, which underlie what we have been taught for more than a century.The great puzzle of effective demand with which Malthus had wrestled vanished from economic literature. You will not find it mentioned even once in the whole works of Marshall, Edgeworth and Professor Pigou.” (Keynes 1936, 32, see also Davis 1998) In other words, Keynes’s discussion of Ricardo, and his analysis of what constitutes “classical economics”, is quite different from that of any of the other Cambridge economists, all of whom concentrate on Ricardo’s theories of value, distribution and growth as providing the main basis for differentiation. For Keynes, in contrast, the focus moves to macroeconomic analysis, particularly the analysis

⁸ “It appears to me that one great cause of our differences in opinion ... is that you have always in your mind the immediate and temporary effects of particular changes – whereas I put these immediate and temporary effects quite aside, and fix my intention on the permanent state of things which will result from them. Perhaps you estimate these temporary effects too high, whilst I am too much disposed to undervalue them. To manage the subject quite right they should be carefully distinguished, and the due effects ascribed to each”, Sraffa with Dobb, 1952, vol VII, 120.

of the determination of output and employment, in labelling schools of economic thought. In this case, all his predecessors in the mainstream of economic thought, with the exception of Malthus, are labelled as classical economists in the Ricardian tradition, and he often laments the dominance of Ricardo's ideas over those of Malthus: "If only Malthus, instead of Ricardo, had been the parent stem from which nineteenth-century economics proceeded, what a much wiser and richer place the world would be today!" (Keynes 1933, 100-101)

SRAFFA

Sraffa's role in the Cambridge interpretation of Ricardo is pivotal. His influence comes from his writings, particularly his editorship with the collaboration of Maurice Dobb of the *Works and Correspondence of David Ricardo*, his Preface and Appendix on "References to the literature" in *Production of Commodities by Means of Commodities*, and also through his lectures on "Advanced Theory of Value" in Cambridge at the end of the 1920s⁹ and his discussions with colleagues.

Under Sraffa's influence, there were significant changes in the way Ricardo's work was interpreted. Particularly important was his editorship of the

⁹ For a discussion of the role of the lectures in shaping Sraffa's views on Ricardo and the classical economists and his shifting view of Marshall, see Signorino (2008)

Works and Correspondence, and his editorial introduction to Volume 1, *The Principles of Political Economy and Taxation*. It was the introduction which clearly illustrated the unchanging nature of Ricardo's analysis of value while, at the same time, it illuminated the differences in method and theory between Ricardo and the classical political economists on the one hand and the marginalist school on the other, restoring the classical notion of the surplus as a key, indeed the core analytical category.

Sraffa's view of the role of Ricardo and of the development of economic thought represented an important alternative view to that of Marshall, and came to dominate Cambridge thinking. According to Sraffa there was a fundamental divergence of paths in the development of economic theory as it came out of classical political economy. One path went from the work of the classical political economists into Marx, who he regarded as the legitimate heir of classical insights, and who criticised, added to and fundamentally transformed this legacy. The other path he identified resulted in the emasculation of the classical insights and approach¹⁰. "This standpoint, which is that of the old classical political economists from Adam Smith to Ricardo, has been

¹⁰ A case made convincingly by Krishna Bharadwaj in her wonderful 1976 Dutt Lectures, published in 1978. In them she follows the same intellectual pilgrim's progress as Sraffa, and she arrived at the same end point. This is witnessed to, first, by her remarkable review article of Sraffa 1960, "Value through exogenous distribution", Bharadwaj 1963. This article first brought her to Sraffa's attention and resulted in the start of their close friendship and subsequent collaboration.

submerged and forgotten since the advent of the ‘marginal’ method.” (Sraffa 1960, v)

Such a reading is becoming more and more clear as the riches of the Sraffa archives are brought into the public domain by his hard working, patient and thorough editors, especially the late Krishna Bharadwaj, Heinz Kurz and Giancarlo de Vivo, all overseen (until, sadly, his death in 2011) by a most demanding and strict Pierangelo Garegnani.

Garegnani (2008) argues that Sraffa’s early interpretation of the development of economics was consistent with Marshall’s, but, that, in developing his own theoretical ideas, he came to reject the Marshallian interpretation around 1927, while Signorino (2008) traces the change in Sraffa’s views from his “lectures on the advanced theory of value” at Cambridge.

Pasinetti summarises the content of Sraffa’s lectures:

Sraffa is convinced, since the beginning, that an aberrant distortion has taken place in economic theory in the second part of the nineteenth century. From 1870 onwards, dominant (marginalist) economics has caused a change in the contents of the whole subject, with respect to what it used to be previously. ... There is an ‘abysmal gulf’ [Sraffa papers] between the marginal economists’ writings since 1870 and those of the economists of the beginning of the nineteenth century. The change of name itself – from classical ‘political economy’ to Marshall’s ‘economics’ – is there to ‘mark the cleavage’ and ‘Marshall’s attempt to bridge over the cleavage and establish a continuity in the tradition is futile and misguided’ [Sraffa papers]. Pasinetti 2007, 179-180

Sraffa's view of the place of Ricardo's work in the history of economic thought, as well as his restoration of many of Ricardo's key concepts, became an important foundation for much of heterodox economics, particularly for post-Keynesian and Sraffian economics.

DOBB¹¹

Dobb's interpretation of Ricardo's role in the history of economic analysis is illustrative of the major shift that underwent Cambridge's view as a result of the influence of Sraffa. Bharadwaj has argued that the early Dobb was very much under the influence of Marshall in his interpretation of the history of economic thought¹²:

Dobb ..was persuaded by the view that Marshall had continued the Ricardo-Mill tradition, rendering their doctrines vigorous and divesting them of some of their obvious 'oddities". Bharadwaj 1978c, 164 n

This acceptance of the Marshallian version of the development of economics is apparent from any of Dobb's early writings on the subject. For example, in 1924, he wrote:

what the Cambridge school has done is to divest classical political economy of its more obvious crudities, to sever its connection with the philosophy of natural law , and to restate it in terms of the differential calculus. The line of descent is fairly direct from Smith, Malthus, and

¹¹ This section is very much influenced by McFarlane and Kriesler 1993

¹² See also Holt 1998.

Ricardo; and Cambridge has remained relatively untouched by the anti-classical doctrines of the German semi-socialists and the Austrian school. Dobb 1924, 6

In *Wages*, a Cambridge Economic Handbook, originally published in 1927, he clearly accepts Marshall's demand and supply stream¹³:

the traditional theories can be broadly classified into two main types, according to the type of determining factor on which their emphasis has rested. On the one hand are those theories which have explained wages predominantly in terms of factors which influence the *supply* of labour-power - virtually, costs of production theories of wages. On the other hand are those theories which have treated wages as being determined primarily by certain factors which influence employers' *demand* for labour..... Some economists (most notable, Marshall) have tried to erect a synthesis of the two types of explanation and to hold a balance between the two sets of determining influences; and so have produced a theory of a hybrid type. Dobb 1959, 91-92

In 1931, Dobb, in his entry on "the Cambridge School" for the *Encyclopaedia of the Social Sciences*, argued that "Marshall imbibed the Ricardian tradition through the medium of J.S. Mill", and that "he laid the foundations for his theory on the rock of Ricardian conceptions - real cost as the basis of values, the distinctiveness of rent, the concept of a normal rate of profit". The entry also emphasised Marshall's eclecticism and the incompleteness of his equilibrium analysis.

Throughout these early writings there is a fairly uncritical acceptance of Marshall's view of the classical political economists as providing the

¹³. This acceptance is kept throughout the various editions of the Handbook, even though the 6th edition was published as late as 1959. See Bharadwaj 1978, 164-165

explanation of the supply side, and the neoclassical economists, the demand side.

It was a little later, mainly as a result of Sraffa's influence, that Dobb became more critical of the essential nature of the Cambridge school and of Marshall's role in it. According to Brian Pollitt, Marshall's influence was only rejected in 1937, with the publication of *Political Economy and Capitalism* [Pollitt 1988, 57], despite the fact that intellectual relations between Dobb and Sraffa had begun much earlier, at least by 1926¹⁴.

In particular, he came to reject Marshall's view of continuity in the development of economic theory, a view which he had accepted before his discussions on the subject with Sraffa. His new interpretation of the development of economic analysis is most apparent in his *Theories of Value and Distribution since Adam Smith* (1973), the essential arguments of which were presented in his superb 1972-73 Alfred Marshall Memorial Lectures at Cambridge¹⁵.

In particular, the way in which Dobb's version of Ricardianism allowed a direct Ricardo - Marx - Sraffa connection to be drawn commands interest, and is

¹⁴. In a letter written in 1928 Dobb wrote: "I believe that I have gained more by intellectual contact with him in the last year than from any single person" [quoted in Pollitt 1988, 62n]

¹⁵ Dobb forbade Sraffa from attending the lectures. Piero asked me (GCH) to take notes and tell him what Maurice said, a daunting task, I can tell you.

indicated in a letter written on board a ship to India by Dobb (in late 1950) to

Theodore Prager in Vienna. Dobb wrote:

Sraffa's edition of Ricardo's works, (on which I think you know he has been engaged since 1930 and on which I have come in since 1948 to help him finish it) is I am glad to say nearing completion at last, at least so far as the first four volumes are concerned. ... I think we conclusively establish (in opposition to the traditional Hollander - Marshall - Cannan view) that there was no 'weakening' of Ricardo's enunciation of the labour theory of value as time went on: that in fact he reached at the end of his life a position rather close to that of Marx, so that the true line of descent is certainly from Ricardo to Marx and not from Ricardo to the cost -of-production theory au Mill to Marshall as the bourgeois tradition has it.

[quoted in Pollitt, 1988, 62-3 emphasis in original]

The idea of a "line of thought" from the *Tableau Economique's* emphasis on surplus to Ricardo, and on to Marx influenced Dobb's subsequent thinking profoundly. His review of Sraffa [Dobb 1961]; his decade of writings on the Cambridge controversies on capital theory and on Dmitriev; his research for the *Das Kapital* centenary of 1967; his preparations for the 1972-73 Marshall lectures at Cambridge and for his last major book, *Theories of Value and Distribution Since Adam Smith*, all bear witness to the insight expressed in his 1950 letter to Prager.

Dobb's new view was that there were *two* streams in the development of economics. One was that championed by Marshall; the second was brought out by Sraffa's reading of Ricardo. Dobb believed that this latter stream had been

"submerged" between 1870 and 1950. Ricardo's role in opposing Adam Smith on crucial issues (such as the dominating role for agricultural pricing in influencing income distribution and on the "adding up" problem) led directly to Marx and formed the foundation of this "second stream". A precondition of Dobb's acceptance of this two stream view was his acknowledgment of the strong links between Ricardo and Marx which formed the foundation of the "second stream". Similarly, Dobb placed great emphasis on the role of Jevons, not only because of his instrumental role in developing the analysis of "demand-determination by utility", but also because of his explicit rejection of the Ricardian tradition. For this reason, Dobb referred to the new tradition as the "Jevonian revolution". [Dobb 1975, 330, see also Dobb 1973, Chapter 7]¹⁶

JOAN ROBINSON

Joan Robinson was closer on the spectrum to Sraffa, Dobb and Pasinetti but was more concerned to integrate insights from both Ricardo and Keynes

¹⁶. It is interesting to note that in Dobb 1973 and in his Marshall Lectures, Dobb argues that Jevons misinterpreted Ricardo by levelling the accusation that, in his value theory, Ricardo was trying to determine two unknowns with one equation. That this charge, which originated with Walras, was not made by Jevons has been argued elsewhere (see Kriesler 1984). However, some related points should be noted. First, Dobb only seems to have made the charge in his 1973 book and Marshall Lectures, it is not referred to elsewhere (in particular, there is no reference to the charge in Dobb 1975). Secondly, in his Marshall Lectures, Dobb uses the argument to contend that Jevons's misunderstanding of Ricardo indicated that he had absorbed Ricardo through J.S.Mill rather than the original, a strong charge which is not made elsewhere. Finally, Dobb's error would seem to undermine his strong contention that Jevons intentionally changed the nature of economic analysis. If Jevons did not correctly comprehend Ricardo, as Dobb argues, then his "revolution" was against ideas which he did not fully understand.

(and, of course, Michal Kalecki) into ongoing developments in post-Keynesian economics. As had Keynes, she too started her analytical life steeped in Marshallian/Pigovian approaches. However, while increasingly over her lifetime, the approaches of Keynes and Kalecki and her interpretation of Marx came to the fore¹⁷, she never fully threw off the influence of Marshall's method in her own analysis. Nevertheless she made substantial positive contributions and the final results of her labour are to be found most clearly and consistently expressed in her 1980 article with Amit Bhaduri in the *Cambridge Journal of Economics*. Here, Sraffa's, and through him Ricardo's as well as Marx's, and Kalecki's insights and modes of analysis are integrated, each with tasks to perform concerning analysis, issues and aspects of issues.

Joan Robinson accepted most of Sraffa's interpretation of Ricardo and of the development of economic thought from an early stage, and her works are full of acknowledgements to this¹⁸. For her (unlike Sraffa), one of the key distinguishing characteristics of Ricardo, the classical political economists and Marx was their emphasis on growth and accumulation, compared with the neoclassical concern with pricing and distribution of a given output.(Robinson 1969, 58-62, 1970, 123-24, 1971, 1, 109, Robinson and Eatwell 1973, chapters

¹⁷ Her interpretation is limited and unsupportable as Prue Kerr has convincingly documented in her account of the debates between Dobb and Joan Robinson as she was writing her 1942 *Essay*, see Harcourt and Kerr 2009, chapter 4. (The book is a joint work but Prue wrote the first draft of chapter 4 drawing on her prior research on these issues.)

¹⁸ She calls Marshall's version of classical economics and of Ricardo a "travesty", Robinson 1978, 212. See also Robinson 1967,1972, 32-35, 1979a, 21-24

2 & 3) Given the emphasis over her lifetime on the dynamic implications of growth and accumulation, it is unsurprising that these were the main features that distinguished Ricardo from neoclassical economics: “Ricardo was observing a historical process of accumulation going on through time.” (Robinson 1978, 211) “The central concern of classical political economy was accumulation; the neoclassics substituted equilibrium in a stationary state.” (Robinson and Eatwell 1973, 37)

Kaldor

Kaldor’s position on Ricardo and the classical political economists is very different to that of any of the other Cambridge economists, although the diagram he developed to illustrate Ricardo’s analysis has been adopted by many subsequent writers in the area. (Kaldor 1950, 1956, King 2013, 64-65, Hicks 1972). In his major work on distribution theory, Kaldor (1955-6), he distinguishes “four main strands of thought” (209): “the Ricardian or Classical theory”, “the Marxian”, “the Neo-Classical or Marginalist Theory” and “the Keynesian”. When discussing Ricardo’s analysis, Kaldor distinguished two important principles, “the ‘marginal principle’ serves to explain the share of rent, and the ‘surplus principle’ the division of the residue between wages and

profits.”¹⁹ (211) Kaldor further argues that “neo-classical value and distribution theory derives from ... the Ricardian .. ‘marginal principle’”. (218), and that it represents generalization of this principle²⁰. In other words, Kaldor does not seem to distinguish the classical/ Ricardian approach from that of the marginalists in any major way. He also argues that “Marxian theory is essentially an adaption of Ricardo’s ‘surplus theory’” (215), while he develops a Keynesian theory based on the principle of the multiplier. His conclusion is of interest:

We have seen how the various “models” of distribution, the Ricardian-Marxian, the Keynesian and the Kaleckian are related to each other. I am not sure where “marginal productivity” comes in, in all this. Kaldor 1955-6, 236

Elsewhere, he distinguishes the classical school who “started with dynamics” from mainstream economists whose “static’ economics occupied most of the space in textbooks and in lecture courses.” (Kaldor 1996, 22)

In his later writings, when he emphasised the importance of increasing returns in the growth process, he in fact criticises Ricardo, classical political economists and neoclassical economists (though not Marx), treating them as part of the same tradition due to their reliance on constant or diminishing

¹⁹ See also King 2013, 182

²⁰ For a different view see King 2013, 182

returns, at the expense of increasing returns.. (see, for example, Kaldor 1981, Kaldor 1996 Fourth Lecture, King 2013, 182)

PASINETTI

Luigi Pasinetti accepted Sraffa's view of the two streams of the development of economic thought, and located his own contributions within the Ricardo/classical tradition on which he built and developed, first, in his mathematical model of Ricardo's theory of distribution and growth, Pasinetti (1960, also in his "A brief historical excursus" in Pasinetti 1977, 1981), and then as an integral part of the development of his own system of structural dynamics, Pasinetti (1981, 1993, 2007)²¹. In fact, in his important overview of what he calls the "Cambridge Keynesian School", he lists amongst the defining features of that school:

*Malthus and the Classics (not Walras and the marginalists) as the major inspiring source in the history of economic thought. ... a positive connotation has been the revival of classical economic thought (especially that of Smith, Malthus, Ricardo and Marx) It was then Sraffa, with his eleven-volume critical edition of the *Collected Works of David Ricardo*, that provided the crucial path to this revival of classical economics. .. The reappraisal of the ideas and methodology of the classical economists seems therefore central to understanding the core contributions of the Cambridge School and to framing them in a 'production' rather than in an 'exchange' paradigm. Pasinetti 2007, 222-23, emphasis in original*

²¹ There is a Cambridge irony here for Bob Rowthorn criticised Sraffa's interpretation in the Sraffa/Dobb Introduction to volume one of the Ricardo volumes, Sraffa with Dobb (1951), for being set too much in a static setting at the expense of Ricardo's own emphasis, Rowthorn argued, on the priority of accumulation, growth and development. The irony is that the emphasis in Pasinetti's model of production and expenditure interrelationships is ultimately also on the processes of growth. (Rowthorn 1974)

Passinetti's model of Ricardian distribution and growth theory tries to overcome the lacunae by providing a dynamic model of growth and accumulation. In a mathematical form, he captures the essence of the Ricardian system showing how the Malthusian principle of population will ensure convergence on the subsistence level of wages as each successive wave of accumulation by capitalists occurs, allowing the economy to grow over "time" but at a decreasing rate, leading inevitably *in the absence of technical progress* to the stationary state²².

According to Joan Robinson, Ricardo used the prospect of the stationary state as "an awful warning", not as a description of where society was actually going²³. Of course, Ricardo was well aware that technical advances in agriculture and industry would serve to stave off the approach of diminishing returns in actual historical time. His argument for free trade – repeal the Corn Laws – rested on the proposition that by letting comparative advantage have full play world-wide, it would be 'as if' technical progress caused the total output/input of equal doses of labour and capital relationships in all economies

²² Pasinetti's views are also to be found in Kaldor's account of Ricardo's theory of distribution in his 1955-56 *R.Econ Studs* article, "Alternative theories of distribution". It is my (GCH) understanding that Kaldor may have been influenced in his account by notes Sraffa lent him when Kaldor, though at the LSE, was in Cambridge with the LSE during the war. Kaldor gave the lecture on Ricardo in a 'circus' on great economists organised by Pigou. Pigou had asked Sraffa to do the lecture but because Sraffa loathed lecturing, he asked Kaldor to do it for him and gave him some background notes for the task.

²³ "[Ricardo's] stationary state was not an equilibrium, but an awful warning. If ... the Corn Laws [were not abolished] so as to reduce the real cost of wages, which were fixed in terms of bread, the rate of profit[s] would go on falling as employment in agriculture increased with 'diminishing returns' until ... accumulation would be brought to an end", Joan Robinson 1978; *CEP*, vol V, 1979, 213.

to move up over time. Diminishing returns were still present in the slopes of the total product curves, see Harcourt 2006, Ch. 7, 93, but the entire curves were raised over time both by the effects of free trade (but was that not a once-and-for-all effect?) and technical progress.

What was needed therefore was a theory of endogenous technical progress, which was first provided by Marx (and later by Joseph Schumpeter who, according to Joan Robinson, was “Marx with the adjectives changed”), then by a few mainstream economists, for example, Charles Kennedy, Paul Samuelson, and the post-Keynesians. Of the post-Keynesians, Pasinetti’s long-running research project on structural dynamics, e.g. Pasinetti 1981, 1993, 2007, stands out. (see also Arena and Porta 2012 and Kerr and Scazzieri 2013)

THE SHORT PERIOD AND THE LONG PERIOD IN ECONOMIC ANALYSIS

Behind these developments and interpretations is a major puzzle which has never been solved by the mainstream, nor fully by the Cambridge School. The puzzle is the lacunae between the short period and the long period in economic analysis, that same gap that led to Ricardo and Malthus not being able to get on the same wavelength in their discussions.

Joan Robinson was particularly aware of the relevance of this problem to both Keynes and Ricardo:

Keynes hardly ever peered over the edge of the short period to see the effect of investment in making addition to the stocks of productive equipment. ... Here it was Ricardo who could have helped him. Robinson 1978, 212

As long as economists argue that equilibrium positions are strong attractors, akin to magnetic attractors, then, even when path-dependence is taken into account, this incoherence will remain. If we take Ricardo at his word, he tried to overcome this by concentrating on ultimate positions, but he conceded that balance probably required a less extreme position (see footnote 4 above). Keynes on his own initiative and reinforced by Richard Kahn's views and contributions, see Harcourt 1994; 1995, made the short period a subject more than worthy of study in its own right, especially within the context of the trade cycle and historical periods of sustained slumps and high unemployment.

But when Joan Robinson, Nicky Kaldor and Kahn tackled "generalising *The General Theory* to the long period", they were still under the spell of Marshall and more especially Pigou as the interpreter of Marshall. As Neil Hart (Hart 2009, 2011) has shown, Marshall understood that economies and societies were evolving organisms, so that his supply and demand tools for tackling time (which were derived from classical physics) were unsuitable for a full analysis of such processes. Evolutionary theory was needed but was not available in a received form in his life time.

This leads us to the lacunae between the short period and the long period to which Robert Solow brought eloquent attention: “one major weakness in the core of macroeconomics as [he has] represented it is the lack of a real coupling between the short-run picture and the long-run picture. Since the long-run and the short-run merge into one another, one feels they cannot be completely independent” Solow 1997, 231-232, see also Solow, 2000.

So we have come full circle back to where Ricardo and Malthus, “the first of the Cambridge economists”, Keynes 1933, 71, started off their long debates.

REFERENCES

- Ambrosi, G.M. (2003), *Keynes, Pigou and Cambridge Keynesians. Authenticity and Analytical Perspective in the Keynes-Classics Debate*, Houndmills, Basingstoke, Hants: Palgrave Macmillan.
- Arena, R. and Porta, P. L. (2013) (eds) *Structural Dynamics and Economic Growth*, Cambridge : Cambridge University Press
- Arestis, Philip, Michelle Baddeley and John S.L. McCombie (eds) (2007), *Economic Growth. New Directions in Theory and Policy*, Cheltenham, UK, Northampton, MA, USA: Edward Elgar.
- Bhaduri, A. and Joan Robinson (1980), “Accumulation and exploitation: An analysis in the tradition of Marx, Sraffa and Kalecki”, *Cambridge Journal of Economics*, 4, 103-15.
- Bharadwaj, K. (1963), “Value through exogenous distribution”, *Economic Weekly*, 15, 1450-54.
- Bharadwaj, K. (1978a), *Classical Political Economy and Rise to Dominance of Supply and Demand Theories*, New Delhi: Orient Longman
- Bharadwaj K. (1978b), “Maurice Dobb's critique of theories of value and distribution” 2 153-174

- Bharadwaj K. (1978c), "The subversion of classical analysis: Alfred Marshall's early writing on value" *Cambridge Journal of Economics*, 2 253-271
- Blankenburg, Stephanie and G.C. Harcourt (2007), "The representative firm and increasing returns: then and now" in Arestis *et al* (eds) (2007), 44-64.
- Bortis, Heinrich (1986), "An essay on post-Keynesian economics", Fribourg, mimeo.
- Campanelli, G. (1982) "W. Whewell's contributions to economic analysis: the first mathematical formulation of fixed capital in Ricardo's system" *The Manchester School*, 50, 248-265
- Cochrane, J. (1970) "The First Mathematical Ricardian Model" *History of Political Economy Fall* 2(2): 419-431
- Davis, J. D. (1998) "Keynes, John Maynard, as an interpreter of the classical economists" in Kurz, H. and Salvadori, N. (eds) *The Elgar Companion to Classical Economics A –K*, Cheltenham, Edward Elgar 449-452
- Dmitriev, V. K. (1904) *Economic Essays on Value, Competition, and Utility*, translated into English and edited by Nuti, D. M. (1974) Cambridge, Cambridge University Press
- Dobb, M. (1924) "The entrepreneur myth" reprinted in his *On Economic Theory and Socialism* (1955) Routledge & Kegan Paul Ltd.
- Dobb, M. H. (1931) 'The Cambridge School', in E. R. A. Seligman (ed.) *Encyclopaedia of the Social Sciences*, vol. 5, New York: Macmillan, 368–71
- Dobb, M.H. (1959) (6th ed.) *Wages*, Cambridge: Cambridge University Press
- Dobb, M.H. (1961) An Epoch Making Book. *Labour Monthly*, 487–91
- Dobb, M.H. (1973), *Theories of Value and Distribution since Adam Smith. Ideology and Economic Theory*, Cambridge: Cambridge University Press.
- Dobb, M.H., (1975) "Ricardo and Adam Smith." in *Essays on Adam Smith* Skinner, A. S. and Wilson (T) (eds) Oxford: Clarendon Press, 324-35
- Feinstein, C.H. (ed.) (1967), *Socialism, Capitalism and Economic Growth. Essays presented to Maurice Dobb*, Cambridge: Cambridge University Press.
- Garegnani, P. (2008) "On a turning point in Sraffa's theoretical and interpretative position in the late 1920s" in Kurz, Pasinetti and Salvadori (2008) 79-118
- Goodwin, R.M. (1967), "A growth cycle" in Feinstein (ed.) (1967), 55-58.

- Goodwin, R.M. and L.F. Punzo (1987), *The Dynamics of a Capitalist Economy*, Oxford: Polity Press.
- Groenewegen, P. (2003) “Marshall on Ricardo” *Classics and Moderns in Economics: Essays on Nineteenth- and Twentieth-Century Thought Vol. 2*, London: Routledge 29-49
- Groenewegen, P. (2006) “Interpreter of the ‘classics’” in Raffaelli, T., Becattini, G. and Dardi, M. (eds) *The Elgar Companion to Marshall*, Cheltenham, Edward Elgar 111-115
- Harcourt, G.C. (1994), “Kahn and Keynes and the making of *The General Theory*”, *Cambridge Journal of Economics*, 18, 11-23 reprinted in Harcourt (1995), 47-62.
- Harcourt, G.C. (1995), *Capitalism, Socialism and Post-Keynesianism. Selected Essays of G.C. Harcourt*, Aldershot, Hants: Edward Elgar.
- Harcourt, G.C. (2006), *The Structure of Post-Keynesian Economics. The Core Contributions of the Pioneers*, Cambridge: Cambridge University Press.
- Harcourt, G.C. and Prue Kerr (2009), *Joan Robinson*, Houndmills, Basingstoke, Hants: Palgrave Macmillan.
- Harcourt, G. C. and Kriesler, P. (eds) *The Oxford Handbook of Post-Keynesian Economics, Volume 1: Theory and Origins*, Oxford: Oxford University Press
- Hart, Neil (2009), “Marshall’s equilibrium and evolution: then and now”, unpublished Ph.D Dissertation, School of Economics, UNSW.
- Hart, Neil (2011), *Equilibrium and Evolution: Alfred Marshall and the Marshallians* Houndmills, Basingstoke, Hants: Palgrave Macmillan
- Hicks, J. R. (1972) “Ricardo’s theory of distribution” in Peston, M. and Corry, B. A. (eds) *Essays on Honour of Lord Robbins*, London: Weidenfeld and Nicholas 160-7
- Hollander, Samuel (1979) *The Economics of David Ricardo*, London: Heinemann
- Holt, R. (1998) “Dobb, Maurice Herbert, as an interpreter of the classical economists” in Kurz, H. and Salvadori, N. (eds) *The Elgar Companion to Classical Economics A –K*, Cheltenham, Edward Elgar, 227- 229
- Kaldor, N. (1950) “Distribution, theory of” in *Chambers’ Encyclopaedia Sixth Edition*, Edinburgh: Chambers 359-82

- Kaldor, N. (1955-56), "Alternative theories of distribution", *Review of Economic Studies*, 23, 83-100 reprinted in his *Essays on Value and Distribution*, (2nd ed. 1980) , London: Gerald Duckworth & Co. Ltd., 209-236
- Kaldor, N. (1981) "The role of increasing returns, technical progress and cumulative causation in the theory of international trade and growth, *Economie Appliquée*, 4 reprinted in *Further Essays on Economic Theory and Policy*, Targetti, F. and Thirlwall, A. P. (eds) 1989, London: Gerald Duckworth & Co. Ltd., 201-223
- Kaldor, N. (1996), *Causes of Growth and Stagnation in the World Economy*, Cambridge: Cambridge University Press.
- Kalecki, M. (1968), "Trend and business cycles reconsidered", *Economic Journal*, 78, 263-76, reprinted in Kalecki (1991), 435-50.
- Kalecki, M. (1991), *Collected Works of Michal Kalecki*, vol II, *Capitalism, Economic Dynamics* edited by Jerzy Osiatynski. Oxford: Clarendon Press.
- Kerr, P. and Scazzieri, R. (2013) "Structural Economic Dynamics and the Cambridge Tradition" in Harcourt and Kriesler (2013) 257-287
- Keynes, J.M. (1930), *A Treatise on Money 1 The Pure Theory of Money*, London, Macmillan. C.W., vol V, 1971.
- Keynes, J. M. (1933) "Thomas Robert Malthus: The first of the Cambridge Economists" reprinted in Keynes, J. M. (1972), *Essays in Biography*, London: Macmillan. C.W., vol X, 71-103
- Keynes, J. M. (1936), *The General Theory of Employment, Interest and Money*, London: Macmillan. C.W., vol VII, 1973.
- King, John, E. (2013) *David Ricardo*, Houndmills, Basingstoke, Hants: Palgrave Macmillan
- Kriesler, P. (1984) "On Dobb's interpretation of Jevons on Ricardo" *Cambridge Journal of Economics*, 8, 403-5.
- Kurz, H. D., Pasinetti, L. L. and Salvadori, N. (2008) *Piero Sraffa: The Man and the Scholar*, Abingdon, Routledge
- Kurz, H. D. and Salvadori, N. (1995), *Theory of Production. A Long-Period Analysis*, Cambridge: Cambridge University Press
- McFarlane, B. and Kriesler, P. (1993) "Maurice Dobb's re-interpretation of Ricardo: critical notes" paper presented at the Seventh History of Economic Thought Society of Australia Conference (July 1993), Wollongong University

- Marshall, A. (1961) *Principles of Economics Ninth (variorum) Edition*, edited by Guillebaud, C.W. London, Macmillan and Co Limited (1st edition 1890)
- O'Brien, D. P. (1990) "Marshall's work in relation to classical economics" in Whitaker, J. K. (ed) *Centenary Essays on Alfred Marshall*, Cambridge, Cambridge University Press, 127-163
- Pasinetti, L.L. (1960), "A mathematical formulation of the Ricardian system", *Review of Economic Studies*, 27, 78-98.
- Pasinetti, L.L. (1977), *Lectures in the Theory of Production*, London: The MacMillan Press
- Pasinetti, L.L. (1981), *Structural Change and Economic Growth. A Theoretical Essay on the Dynamics of the Wealth of Nations*, Cambridge: Cambridge University Press.
- Pasinetti, L.L. (1993), *Structural Economic Dynamics. A Theory of the Economic Consequences of Human Learning*. Cambridge: Cambridge University Press.
- Pasinetti, L.L. (2007), *Keynes and the Cambridge Keynesians. A 'Revolution in Economics' to be Accomplished*, Cambridge: Cambridge University Press.
- Petridis, R. (1998) "Marshall, Alfred, as an interpreter of the classical economists" in Kurz, H. and Salvadori, N. (eds) *The Elgar Companion to Classical Economics L –Z*, Cheltenham, Edward Elgar 79-83
- Pigou, A.C. (1933), *Theory of Unemployment*, London: Macmillan.
- Pollitt, B.H. 1988, The Collaboration of Maurice Dobb in Sraffa's edition of Ricardo, *Cambridge Journal of Economics*.
- Robinson, J. (1942), *An Essay on Marxian Economics*, London: Macmillan, 2nd edⁿ 1966.
- Robinson, J. (1956), *The Accumulation of Capital*, London: Macmillan. 2nd edⁿ 1965, 3rd edⁿ 1969.
- Robinson, J. (1962a), "Review of H.G. Johnson, *Money, Trade and Economic Growth* (1962)", *Economic Journal*, 72, 690-2, reprinted in *C.E.P.*, vol III, 100-02.
- Robinson, J. (1962b), *Essays in the Theory of Economic Growth*, London: Macmillan, 2nd ed 1963.
- Robinson, J. (1967), "Growth and the theory of distribution", *Annals of Public and Cooperative Economy*, 38, 3-7 reprinted in *C.E.P.*, vol V, 1979, 71-75

- Robinson, J. (1969), "The theory of value reconsidered", *Australian Economic Papers*, 8, 13-19 reprinted in *C.E.P.*, vol IV, 1973, 59-66.
- Robinson, J. (1970), "Economics today", *Basel Wirtschaftswissenschaftliche Vortage*, 2, reprinted in *C.E.P.*, vol IV, 1973, 123-128.
- Robinson, Joan (1973), *Collected Economic Papers Vol. IV*, Oxford: Basil Blackwell
- Robinson, J. (1974), "The abdication of neo-classical economics", Mitra, A. (ed) *Economic Theory and Planning: Essays on Honour of A. K. Das Gupta*, Calcutta: Oxford reprinted in *C.E.P.*, vol V, 1979, 33-42
- Robinson, J. (1978), "Keynes and Ricardo", *Journal of Post-Keynesian Economics*, 1, 12-18 reprinted in *C.E.P.*, vol V, 1979, 210-16.
- Robinson, Joan (1979), *Collected Economic Papers Vol. V*, Oxford: Basil Blackwell.
- Robinson, Joan (1979a), *Aspects of Development and Underdevelopment*, Cambridge; Cambridge University Press
- Robinson, J. and Eatwell, J. (1973 revised edition) *An Introduction to Modern Economics*, Maidenhead: McGraw-Hill
- Rowthorn, Bob (1974) "Neo-Classicism, neo-Ricardianism and Marxism" *New Left Review* 86: 63-87 reprinted in his *Capitalism, Conflict and Inflation*, London: Lawrence and Wishart (1980)14-47
- Signorino, R. (2008) "Piero Sraffa's lectures on the advanced theory of value 1928-31 and the rediscovery of the classical approach" in Kurz, Pasinetti and Salvadori (2008) 195-216
- Solow, R. M. (1997), "Is there a core of usable macroeconomics we should all believe in?", *American Economic Review*, 87, Papers and Proceedings, 230-32.
- Solow, R. M. (2000), "The neoclassical theory of growth and distribution", *Banca Nazionale del Lavoro Quarterly Review*, No. 215, December, 349-81.
- Sraffa, P. in collaboration with M.H. Dobb (ed.) (1951), *The Works and Correspondence of David Ricardo, Vol. I, On the Principles of Political Economy and Taxation*, Cambridge: Cambridge University Press.
- Sraffa, P. with the collaboration of M.H. Dobb (ed.) (1952), *The Works and Correspondence of David Ricardo, Vol. VII, Letters 1816-1818*, Cambridge: Cambridge University Press.

- Sraffa, P. (1960) *Production of Commodities by Means of Commodities: Prelude to a Critique of Economic Theory*, Cambridge: Cambridge University Press
- Whewell, W. (1829) “Mathematical exposition of some doctrines of political economy” *Cambridge Philosophical Society Transactions* 3: 1 - 38 reprinted in Whewell (1968)
- Whewell, W. (1831) “Mathematical exposition of some of the leading doctrines on Mr. Ricardo’s *Principles of Political Economy and Taxation*”, *Cambridge Philosophical Society Transactions* 4, 1- 44 reprinted in Whewell (1968)
- Whewell, W. (1862) *Six Lectures on Political Economy*, Cambridge, Cambridge University Press, reprinted 1967, New York, Augustus M. Kelley
- Whewell, W. (1968) *On the Mathematical Exposition of Some Doctrines of Political Economy*, Gregg International Publishers Ltd.