

# WORKING PAPERS IN ECONOMICS

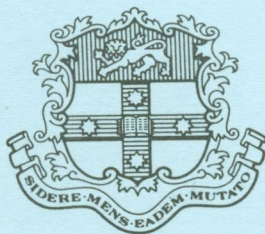
NEO-CLASSICAL VALUE AND DISTRIBUTION THEORY:  
THE ENGLISH SPEAKING PIONEERS

BY Peter Groenewegen

No. 112

September, 1988.

DEPARTMENT OF ECONOMICS



The University of Sydney  
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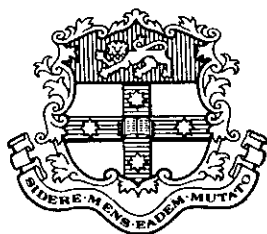
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1. INTRODUCTION

A new economics of market prices and resource allocation was developed in several countries from the early 1870s. It is well known that, in England, that development was initiated by Jevons, consolidated by Marshall from the 1890s and reinforced through the work of their colleagues, followers or students: Wicksteed, Edgeworth and Pigou in England, J.B. Clark and Irving Fisher in that other vast English speaking world across the Atlantic. As Schumpeter (1954) pointed out, the key English figures in these developments are Jevons and Marshall, but this does not mean that the theoretical contributions to the new economics by the other leading figures in these developments on both sides of the Atlantic can be ignored. This is clearly demonstrated by the pioneering literature of this epoch in the history of economic thought. Stigler (1941), in his account of the formative period of the new production and distribution theory, only omits Pigou from his study while Fisher, though not given a chapter of his own in the book, is mentioned as a prominent exponent of the new economics in the United States on a par with J.B. Clark. The other important specialist in early history of this period (Hutchison, 1953) likewise acknowledges these economists as the great English speaking contributors to this new, more rigorous form of economics which based itself on the application of a marginalist method to problems of choice and generalised price determination theory. The views expressed in these authoritative sources combined with Stigler's (1950) equally authoritative account of the development of utility theory form the point of departure from which to review more recent work on these 'English speaking' marginalist pioneers.

By way of further introduction, an adaptation of the table with which Stigler (1941, p. 11) introduced his subject matter, is useful as a preliminary "review of the troops". This puts the *dramatis personae* of this chapter immediately into chronological perspective and in addition, allows some initial generalisations and comment on their respective backgrounds.

With the exception of Wicksteed, the writers here included were academic economists for the greater part of their working life. For Jevons this only eventuated after practice of a number of other quite distinct professions and even then was combined with the teaching of other moral sciences and logic. All, however, had received a good university education, but only two had formally studied political economy at university. Jevons had done so for his B.A. degree; Pigou while taking the second part of the Moral Sciences Tripos after completing Part I of the History Tripos. Two (Marshall and Fisher) had concentrated on mathematics in their university studies, two (Wicksteed and Edgeworth) on languages and classics and one followed up his first general degree with postgraduate studies in Germany in historical economics (Clark). These pioneers conform therefore to the pattern of professionalisation in economics which Schumpeter (1954) and other scholars have associated with this period, and which is mentioned later in this chapter.

It may be noted at the outset that none of these seven authors specialised narrowly on topics in value and distribution, and that few (Marshall being the major exception)<sup>1</sup> concentrated exclusively on economics. Jevons, it is well known, published widely both within theoretical and applied economics, in logic and scientific method. Particularly during his early years, Jevons wrote on subjects as diverse as meteorology, statistics of Shakespearean literature, astronomy and wider social issues (the social cesspools of Sydney, New South Wales; new facts concerning the interior of Australia, amusements of the people; cruelty to animals) some of which reveal his lasting interest in matters Australian.<sup>2</sup> Edgeworth wrote on ethics and utilitarianism in addition to his very substantial contributions to mathematical and economic statistics and economic theory (Creedy, 1986a, esp. pp. 9-11, 153-4). Wicksteed, as Steedman (1987a, p. 915) indicates, was an accomplished linguist, philosopher

TABLE I

| Name            | Born | Died | Education                      | Major Occupation           | Appearance of Major Relevant Work (a) |
|-----------------|------|------|--------------------------------|----------------------------|---------------------------------------|
| JEVONS, W.S.    | 1835 | 1882 | University College London      | Teaching Manchester London | 1871                                  |
| MARSHALL, A.    | 1842 | 1924 | Cambridge                      | Teaching Cambridge Bristol | 1890                                  |
| WICKSTEED, P.H. | 1844 | 1927 | University College London      | Ministry Lecturing         | 1894                                  |
| EDGEWORTH, F.Y. | 1845 | 1926 | Trinity College Dublin, Oxford | Teaching Oxford            | 1881                                  |
| CLARK, J.B.     | 1847 | 1938 | Brown Amherst                  | Teaching Carleton Amherst  | 1886                                  |
| FISHER, I.      | 1867 | 1947 | Yale                           | Teaching Columbia Yale     | 1892                                  |
| PIGOU, A.C.     | 1877 | 1959 | Cambridge                      | Teaching Cambridge         | 1912                                  |

(a) These works are

- Theory of Political Economy (1871)*
- Principles of Economics (1890)*
- An Essay on the Co-ordination of the Laws of Distribution (1894)*
- Mathematical Psychics - An Essay on the Application of Mathematics to the Moral Sciences (1881)*
- The Philosophy of Wealth. Economic Principles Newly Formulated (1886)*
- Mathematical Investigation in the Theory of Value and Price (1892)*
- Wealth and Welfare (1912)*

and classical scholar. He produced work on Dante, Aquinas, Ibsen and many theological pieces in addition to his work on economics which concentrated on value and distribution theory. The two Americans also contributed to areas outside economics. J.B. Clark followed his work on value and distribution with applied studies on the control of trusts and monopolies before devoting his energies to the international peace movement and studies of war and militarism in an international setting (J.M. Clark, 1952, pp. 396-7). Irving Fisher's massive bibliography of nearly 2,500 entries (Fisher, 1961) covers many economic topics combined with writings on health, peace and prohibition, mathematics, mechanics, astronomy and mathematical statistics. Last but not least, Pigou contributed not only to the "whole field of economics" but his books include studies on theism and Robert Browning (Datta, 1959, p. 4 and n.1) while like Clark and Fisher he had also been an active pacifist during the First World War (Collard, 1981, p. 108).

The degree of commentary which has been published on these authors varies enormously. Marshall, in this respect followed by Jevons, has undoubtedly received the most extensive treatment in the literature. Papers devoted to their work have been collected in the series devoted to important economists edited by John Wood (1982, 1988). On the other hand, what post-1950 material there is on Pigou, Fisher and J.B. Clark is largely directed to issues not immediately concerned with their contributions to value and distribution theory, though it may also be noted here that some work of these two Americans was criticised during the Cambridge controversies in capital theory of the 1950s and 1960s. Finally, Edgeworth and Wicksteed have been virtually ignored in the literature and only recently has their economics been re-examined, in both cases largely through the work of one person: John Creedy and Ian Steedman respectively. Finally, Stigler's quantitative study of citations (Stigler, 1979, esp. pp. 181-184) for 1886-1925 and 1925-1969 may also be usefully mentioned in this context. Fisher, Clark, Marshall and Edgeworth were frequently cited during the first period; Fisher, Marshall and Pigou during the second. Hence only Marshall as an economist whose major work was done before 1900 survived the second citation test. Fisher, on the other hand, was the only economist of the seven who published major work in both centuries.

The framework for surveying this substantial quantity of material on early English-American neoclassical economics is as follows. First, biographical and bibliographical material is discussed in order to highlight the new work done in these areas, especially with respect to Jevons and Marshall. This is followed by more specific, and selective, evaluations of the more important commentary on their economics essentially to emphasise changes in and the dynamics of interpretation of these neoclassical pioneers. A final section provides conclusions largely devoted to more general perspectives on this period in the history of economics in the English speaking world.

## 2. BIOGRAPHICAL FOUNDATIONS

Despite controversy over the role of biography in the history of economic thought (see, for example, Jaffe 1965, Stigler, 1976), considerable biographical work continues to be done on economists, in varying ways illuminating the development of theory. Hence biographical material needs to be considered an important part of the literature on the economists of the early neoclassical period, particularly since it has been used for interpreting various aspects of their work and its development. Some examples of this are given subsequently. First, however, it may be noted that three of the economists featured in this chapter had their lives essayed by J.M. Keynes (1972): Marshall in 1924, Edgeworth in 1926 (both initially as obituaries) and Jevons in 1936 as a centenary allocution. Furthermore, Schumpeter (1952) sketched Marshall and Fisher with equal acumen as samples of his ten great economists. Secondly, while biographies have appeared of Wicksteed (Herford, 1931), Fisher (Fisher, 1956) and Jevons (Konekamp, 1972), Marshall, Edgeworth, Clark and Pigou still await their biographers.<sup>3</sup> In addition, only Jevons's correspondence has been systematically collected and published (Black, 1972-81, II-V) though it may be noted with pleasure that Marshall's collected correspondence, edited by John Whitaker, is well on the way to publication and like the Jevons project, supported by the Royal Economic Society.

In the context of this chapter, detailed biographical material is particularly relevant to settling disputes about the origins of the marginal revolution, hence enhancing understanding of the precise nature of changes in economic thinking at the end of the nineteenth century which transformed economic theory in the opening of the next. Jaffe (1965, pp. 229-31) for example, has illuminated aspects of Walras's economics by his biographical discoveries. The wealth of biographical data unearthed for Jevons and increasingly, Marshall, has done the same for those English pioneers. Examples include the usefulness of such data for assessing the validity of a recent hypothesis (Mirowski, 1984) on the association between a branch of energy physics and some key propositions of the new marginalist economics. Similarly, publication of Jevons' private journal, diaries and correspondence has sparked renewed, and continuing, controversy about the early influences on Jevons's economics (see, for example, White 1982, 1984; Hutchison, 1982) and the manner in which he came to develop his reconstruction of political economy on marginalist and mathematical lines. Similar work can still be fruitfully done on Marshall. Apart from Keynes' account (1972, pp. 165-74) and its critical development by Whitaker (1975, pp. 5-10), very little is available on the details of, and reasons for, Marshall's shift to the study of economics in the late 1860s. An intriguing aspect of this shift is the role therein of Cournot's work, more widely available and known than histories of the marginal revolution often assume. Biographical data on Marshall discloses his familiarity with Cournot almost a decade before Jevons claimed to have become familiar with it, while Todhunter's query to which Jevons referred in this context, raises intriguing questions about the degree of conversational intercourse on such matters at Cambridge.<sup>4</sup> Marshall's early acquaintance with Cournot helps to explain how easy it was for a mathematician to convert Mill's view on the subject into a geometrical supply and demand analysis, without necessarily using 'utility' underpinnings.

With two exceptions, the role of biography in illuminating aspects of the marginal revolution cannot be further pursued here. Where relevant, it is raised in the individual treatments of the various authors. The first exception to this is that biography reminds of the close personal ties that existed between the seven

authors here considered, despite the geographical distances involved. Marshall, for example, was acquainted either personally or through correspondence with all of the other six ; the same can be said of Edgeworth, and only Jevons's early death prevented him from forming contacts with the younger generation of Pigou, Fisher and Clark. The enormous correspondence of Walras supports the view of the tightknit nature of the intercourse among the economic academic community at the time. Secondly, it may be noted that all longer studies of the economists studied here present some biographical material of their subjects, an indication that for their authors this remains either a useful aspect of their subject matter or, sometimes more strongly, an indispensable aid to understanding their subject's views.

WILLIAM STANLEY JEVONS (1835-1882)

Jevons research has greatly benefited from the symposia organised for a number of important anniversaries associated with his life and work and frequently published in the *Manchester School*. The more important were the centenary of the publication of his *Theory of Political Economy* and the earlier anniversary of *A Brief Account of a General Mathematical Theory of Political Economy*. In addition, the centenary of his death, as had earlier been the case with that of his birth, induced significant contributions. These have tended to concentrate on assessments of Jevons's work in general and have less frequently focussed on more detailed aspects of his theoretical work. The theory of capital is one such instance, aspects of his theory of demand another and it is on these that this section largely concentrates.<sup>5</sup>

Unlike the treatment of Jevons's capital theory by Keynes (1972, p. 132), Robbins (1936, pp. 317-20) and Stigler (1941, pp. 26-29), Steedman (1972) concentrated on analysing the internal coherence of Jevons's theory on the basis of its final presentation in the second edition of the *Theory*. Four issues are raised, all concerning criticisms associated with the Cambridge controversies in the theory of capital. The first concerns definitions of the "amount of capital" and the "amount of investment" where reminders are given

that "neither the physical composition of free capital nor the amount of investment can be known independently of relative prices and hence of the interest rate" (Steedman, 1972, pp. 33, 35). The second part shows, as earlier demonstrated in Garegnani (1960, pp. 38-9, 61-5), that the average period of production depends for its meaning on the amount of capital and the amount of investment and has little operational use apart from situations of simple interest (cf Lutz, 1967, esp. pp. 18-21) and when no fixed capital considerations are involved. Fixedness is defined for this purpose in terms of the continuous output case and not in terms of construction periods and durability. The third section then demonstrates that Jevons's theory is a very special case, not only because it deals with the point input-point output case but more importantly because it unwittingly assumes a one-commodity world. In short, "Jevons's theory provides no explanation of the level of the rate of interest; it follows that it fails to determine wages, prices or quantities" and from the fact this theory has been called the point of departure for Bohm-Bawerk and Wicksell, that it is "Jevons rather than Ricardo who shunted the car of Economic Science onto a wrong line". (Steedman, 1972, pp. 48, cf. 51) Hence the capital theory hailed as innovative by Robbins is now shown to be wrong and the "most interesting of the later chapters" (Hutchison, 1953, p.45), has turned out to be the one most logically unsound. Such are the paradoxes of intellectual history.<sup>6</sup>

Just as devastating, but in some ways more intensive, has been the debate about Jevons's contributions to demand theory. It is well known that this was never fully developed in his *Theory of Political Economy* (see Stigler, 1950, pp. 88-9, 90) and it seems not unfair to argue that it was not really developed very far at all (Blaug, 1964, p. 283). Claims, dating back to Keynes's (1912) review of the fourth edition of Jevons's *Theory*, that Jevons had used demand functions in his lecture notes, have been shown to be misleading (Black, VI, pp. x, 15-17, 84-89. cf. Keynes, 1972, p. 138, n.2). A recent paper by Bostaph and Shieh (1987) criticises this proposition while Creedy (1986b) has shown that Jevons did attempt to specify a functional demand form based on the famous King-Davenant "law of demand". Associated with this debate has been controversy about the precise origins of Jevons's demand and utility theory. These have often been attributed to debates on railway economy in which Jevons had become

interested during his Australian sojourn (1854-59).

The matter of Jevons's use of demand curves in his lectures can be examined first. It is clear that the lecture note discussion (Black VI pp. 14-17) to which Bostaph and Shieh (1987, pp. 109-11) refer, derives largely from discussion in the *Theory of Political Economy* (Jevons, 1910, pp. 146-59) on numerical determination of the laws of utility and the usefulness for that purpose of the King-Davenant law of demand. The curves presented in the lectures do not have their axes marked but one is described explicitly as expressing utility while the other is designed to show the influence on price of variations in supply when price is the dependent variable. However, the second curve, although explicitly drawn to express utility, can be implicitly linked to demand from Jevons's statement contrasting sugar with corn where people "will take a greater quantity of it if they can get it at a moderate price" (Black, VI, p. 16). The context of the lecture, starting as it does with an examination of Banfield's hierarchy of wants, suggests that Jevon's concern in it was to illustrate the different nature of wants by contrasting luxuries (sugar) with necessities (corn).

From their association with Jevons's discussion of numerical estimates of utility and the King-Davenant law of demand, can these functions be interpreted as empirical determinations of demand functions as Creedy (1986b, p. 198) and Bostaph and Shieh (1987, pp. 117-19) suggest? The ingeniousness of Jevons's attempts in this direction were already noted by Stigler (1950, pp. 88-9) and there can be no doubt that Jevons made such attempts at empirical estimation of price laws. In the posthumous *Principles*, Jevons (1905, chapter XXXV) himself drew attention to the importance of this type of work, though he also recognised its many difficulties, in particular the inevitable changes of tastes over the long periods for which in the early 1860s he had gathered his price data. In addition, Jevons (1905, pp. 147-8) commented on the complexities of the interactions of prices on demand which made empirical investigation of price laws even more difficult.<sup>7</sup>

Not unrelated to this renewed interest in Jevons's demand and utility theory is a current debate on its origins. Hutchison (1953,

pp. 35-6), perhaps following La Nauze (1949, 1953), saw 1857 as the crucial year in Jevons's economic development. It was then he first started devoting a substantial part of his time to the study of the subject, that he read Lardner's *Railway Economy* and wrote his first articles and letters critical of New South Wales land development and railway policy. His interest in utility economics and supply and demand theory, Hutchison infers, derived from a direct interest in real world problems, in common with other pioneers of marginalism like Dupuit, Lardner, Ellet and Launhardt (Hutchison, 1982, pp. 367-8). In a reassessment of Jevons in Australia, White (1982, pp. 32-3) casts the net wider. White suggests that Jevons's basic premises for the study of political economy were also influenced by Pell and Woolley, two foundation professors of the University of Sydney and, on particular matters, by reading Whateley's lectures on political economy which was also part of his 1857 study of the subject. This has induced debate on the significance for Jevon's economics of his Antipodean interlude in which some have defended the role of Lardner (Bostaph and Shieh, 1986) while Hutchison (1982, pp. 376-7) has criticised the wider inferences White derived from additional influences on Jevons he identified during Jevons's Australian sojourn. Needless to say, investigations of this type have been greatly facilitated by the splendid collection of previously unpublished Jevons material in the edition of Black (and Konekamp, 1972-81).

White's contribution shows that much of the foundations of Jevons's theory of price determination, competition, and its application to social welfare and government intervention, basically originated in the context of the railway debates but that Pell's contributions may here have been more important than hitherto thought.<sup>8</sup> The Woolley and Whateley influence, on the other hand, White relates to Jevons's development of some utilitarian propositions. These concern competition's role in promoting the "greatest happiness" by "maximising wealth" and the perception of man as a pleasure maximising, pain-minimising, calculating machine. White's line of investigation contrasts with Black's (1972, p. 123) remark that while Jevons was beginning to read political economy in Australia, "he does not seem to have paid much attention to philosophy, and none at all to Bentham". This was undoubtedly a

useful inference for combatting the "half-truth" of making "simple hedonism" of Bentham the foundation of Jevons's work. However, it ignores the implications of Jevons's father's strong advice that Jevons seek the company of all three professors of the newly founded University of Sydney (1 April 1855, in Black, 1973, II p. 136 and n.2), while in addition it confounds the wider meaning the nineteenth century gave to philosophy.<sup>9</sup>

The Pell material has already been exhaustively discussed in the literature (White, 1982, Goodwin, 1966, pp. 286-91) and needs no further comment here. The case is different for Woolley's lectures. These dealt with moral philosophy intertwined with observations on political economy and its uses, a subject incidentally in which Woolley was very interested and "touched on ... in his university work on several occasions" (Goodwin, 1966, p. 546). Two of these lectures, given in 1855 and 1856, are particularly important. The first dealt with 'social difficulties', was originally published in the *Sydney University Magazine* for April 1855, and combined observations on Dickens's *Hard Times* with a discussion of the "drink question" and the master and servant's act. The second, entitled 'The Selfish Theory of Morals', was attended by Jevons and commented on in detail in his journal (Black and Konekamp, 1972, I pp. 27-28, 132-4). This provides the basis for White's conjecture of a Woolley influence on the formation of Jevons's 'hedonism', as earlier had been suggested by Konekamp (1972, pp. 27-8). Both the lecture and Jevons's comments thereon show that philosophical speculations on 'hedonism' were readily available in the colonial Sydney of the 1850s and that these had attracted the attention of the young Jevons.

The 1855 lecture has not been commented on before in connection with Jevons. In some respects it is more interesting because part of its contents emphasise the social utility of developing and diffusing sound principles of political economy, a subject in which Woolley had practical interests. Reasons advanced in support of this social role for political economy are two. First, economic principles and their diffusion were essential to social health because "unrighteous and obtrusive Government ... sooner or later violate the principles of Political Economy" and hence preservation of freedom requires their wide knowledge. Secondly, political economy can remove the

"jealousy" between rich and poor, by ascertaining and fixing "the relations of capital and labour upon a scientific basis" and in this way not only prevent the creation of "two antagonistic nations" but, at a more immediately useful level, prevent strikes and other "conflicts between employers and employed which still shake to its centre our manufacturing prosperity" by ensuring these "principles are properly understood and made known." (Woolley, 1862, pp. 128-131). There is no record that Jevons heard the delivery of this lecture but the fact that he later offered copies (for 1857 to 1859 only) of the *Sydney University Magazine* to the chief librarian of the British Museum (Black, 1973 II p. 449) shows he more than likely had had access to it at the time. In fact in his review of Hearn's *Plutology* Jevons praised Woolley's essays (Woolley, 1862) as "a collection of scholarly essays" (La Nauze, 1941, p.256). Other actions also show that the sentiments in these lectures - including its praises of free trade, harmony and the moral impossibility for the social existence of a "true separation of interests" (Woolley, 1862, pp. 102, 104, 114, 129) - would not have been uncongenial to him at the time, though his final publication, *The State in Relation to Labour*, is highly critical of *laissez faire*. They may also explain the subsequent interest in Whateley's introductory lectures with their similar sentiments (to which he may even have been referred by Woolley) and his advice on economics to his sister in letters from the first half of 1857 (Black, 1973, II pp. 276-7, 292). My reading of the evidence on Jevons's Australian interlude suggests he benefited from his acquaintance with the University of Sydney's three foundation professors in different ways and that his father's advice to seek their company, paid diverse dividends.

The matters associated with Jevons surveyed here show the enormous value of the Jevons material recently published (Black and Konekamp, 1972-1981) not only for raising and sometimes settling questions of origins but also for shedding new light on technical matters. Few final conclusions are as yet possible on issues raised here on the origins and practice of Jevons on demand and utility. It can however be safely asserted that some of the earlier suppositions on this can no longer be sustained. Likewise interpretations of Jevons's theory of capital have to be modified from the findings of the 1960s capital controversies. None of this detracts of course

from the accolade of genius so often bestowed on Jevons or from the conclusion offered by the Jevons scholar of the century that Jevons "made innovations which have proved of lasting significance" (Black, 1981, p. 29).

ALFRED MARSHALL 1842-1924

As befits the undoubted key figure in the development of the marginal revolution in the English speaking world, the economics of Alfred Marshall continues to attract extensive attention, despite the enormous literature available on this subject before the early 1950s. A number of strands in this voluminous Marshall literature of the period can be distinguished. The first relates to continuing controversy about key concepts in Marshall's economics, including its method. The second is associated with investigations of the wider significance of Marshall's work for the professionalisation and institutionalisation of economics from the end of the nineteenth century onwards. Thirdly, and in some respects the more important because it is the more novel, there have been re-evaluations of Marshall's work in the light of what has become known about activities of the "young Marshall"<sup>10</sup>, a task greatly facilitated by the publication of many of Marshall's early writings (Whitaker, 1975 and also Harrison, 1963; Stigler, 1969). This has induced some detailed investigation and subsequently, new light on the origins, sources and especially the contents of pre-*Principles* Marshall.

A recent survey of Marshall's economics (O'Brien, 1981, p. 63) concludes that "most of the literature on Marshall's economic writings concentrates upon minutiae", adding that this is inappropriate for the present generation of economists. These all can learn much from an overall perspective of the work of an economist who invariably attempted to "produce a balanced overall picture of the economic system with due weight given to historical and institutional factors". Reisman's (1986) study of the economics of Marshall provides an overall picture of the core of Marshallian economics - the system of determining normal prices in the long run by means of an apparatus of supply and demand - and which thereby

attempts that merging of the theory of value and growth which some (e.g. Whitaker, 1974, Dardi, 1984) have seen as characteristic of the work of the young Marshall. The implicit shift towards examination of Marshall's method which this implies, and its identification as the more important Marshall legacy for current generation economists, contrasts strongly with the examination of Marshall by Stigler (1941), with its emphasis on Marshall's theoretical contributions and Samuelson's (1967a) complaint that "the ambiguities of Alfred Marshall paralysed the best brains in the Anglo-Saxon branch of our profession for three decades" because of non-rigorous distinctions between perfect and less than perfect competition and an intentional fuzziness which is both confusing and confused. Hutchison's (1953, chapter 4) evaluation by contrast is more cautious, and considerably more balanced than his more recent evaluation of the Cambridge School Marshall helped to found (Hutchison, 1981, chapter 3, esp. pp. 51-6). Perhaps this is because Hutchison's stress on method is more in harmony with the times than Stigler's rigorous (and still very instructive) attempt to examine the marginalist credentials of one of his heroes by an intentional concentration on Marshall's theoretical lapses from this task (Stigler, 1941, pp. 61-2).

O'Brien's "minutiae", not to be taken pejoratively in this context, are reflected in a still very considerable literature devoted to specific aspects of Marshall's economics. Examples are the many articles on issues raised in Friedman's (1949) controversial interpretation of the Marshallian demand curve, particularly aspects associated with the meaning to be given to the constancy of marginal utility of money assumption and the role of income effects in Marshall's demand theory. More recently this has sparked renewed investigation of the origins of Giffen's "hint" in Marshall and its purposes (Dooley, 1985, White 1987a and 1987b). In addition, articles have been directed at elucidating other features of Marshall's system such as the labour supply curve, notions of competition, consumer surplus, the representative firm and the theory of the firm in general.<sup>11</sup> More wide-ranging are a series of classical reviews of Marshall's theory of value. These include Frisch's (1950) survey, and studies by Newman (1960) and Loasby (1978) questioning the proposition that modern micro-economics has appropriated all that is worthwhile from Marshall's economics,

leaving only the analytical errors. They also bemoan the fact that problems of time in the theory of value have been the major victim of this practice together with a neglect in analysing competitive processes. Loasby further illustrates this by showing the disappearance of a general link between value and growth and the neglect of the importance of expectations and information in modern theories of the competitive firm (within oligopolistic competition rather than perfect or imperfect competition). This implicit challenge has elicited various responses. Examples are Williams's (1978, 1986) analysis of Marshall's contribution to the emergence of a theory of the firm, and his reconstruction of Marshall's temporary equilibrium pricing process. Aspects of the laws of returns have been revisited by Levine (1980), Negishi's (1985) rehabilitation of Marshall's life cycle of firms theory and Sylos Labini's (1985) review of the Sraffian critique of Marshallian price theory. More generally, Boland (1982) has surveyed the difficulties Marshall raised through the element of time, so often ignored in modern economic discussion.

The reviews of Marshall's theory of value and the criticism of conventional views of Marshallian economics to which they have led, introduce the concern with methodological issues in the recent Marshall literature. Two aspects stand out. One is the transformation of Marshall's stylistic predilections for imprecision and qualification into a virtue because it highlights the fact that economics is essentially an imprecise subject (Shackle, introduction to Reisman, 1986). Another is a renewed interest in assessing the value of Marshall's pleas for economic biology in preference to the economic mechanics he so often practised in the *Principles* (Moss, 1982; Levine, 1983; Reisman, 1987, ch.7). These include some interesting observations on the mathematics of evolution in terms of Taylor's theorem as practised by Marshall (1961, mathematical note XI). Such methodological discussions are also presented in re-examinations of Marshall's classical antecedents (e.g. Levine, 1982), particularly noticeable in Marshall's early work with its emphasis on value and growth and not completely suppressed in the 'mature' Marshall (cf O'Brien, 1981, pp. 51-2).

A second type of Marshall studies which can be identified

concern his contributions to the professionalisation and institutionalisation of economics, which go a long way to explain the consolidation of the marginal revolution in its Marshallian variant in the English speaking world. Part of Marshall's contribution came from his role in establishing the Royal Economic Society and the *Economic Journal*, both vehicles for the dissemination of sound economic ideas (Coats, 1968), and perhaps some of the most significant events in the history of economics at the end of the nineteenth century. Another is Marshall's role in establishing the Cambridge Tripos and his direction and control of the Cambridge School in its formative period (Coats, 1967; Hutchison, 1981, chapter 3; Groenewegen, 1988), a theme which has been treated by Maloney (1985) and, from a different perspective, by Winch and Collini (1983). Maloney (1985, p. 3) in particular shows how Marshall's objectives for economics in the universities - that is, training in a specialised body of theory, a defined monopoly over a specialised function or functions and the development of a professional ethics - match his sociological notion of professionalisation, visible in the actual developments taking place in English economics at the turn of the century. Like Stigler (1986; p.372) I would give greater emphasis than Maloney to the move of economics into the universities during this period, as reflected in the career paths of the seven economists here surveyed. This aspect of the marginal revolution was rightly stressed by Schumpeter (1954, e.g. pp. 829-40) and partly studied by Hutchison (1953) with respect to Marshall.

The most interesting Marshall work since the 1950s has been associated with the rediscovery of the young Marshall, whose original envisage was invariably based on the rather selective picture<sup>12</sup> presented in Pigou's *Memorials* (1925) supplemented by the more daunting official papers edited by Keynes (1926). This rediscovery owes much to the publication by Whitaker (1975) of many of the early papers preserved in the Marshall Library and his detailed analytical work on their contents. Both have opened up a wide variety of new issues on the sources, origins and interpretation of Marshall's economics. Historical evaluation of the development of Marshall's economics was also assisted by publication of the variorum edition of Marshall's *Principles* (Guillebaud, 1961) with its painstaking,

though sadly incomplete and sometimes defective (see Stigler, 1962 pp. 233-4) analysis of textual changes from 1890 to 1920. The enormity of this task can only be appreciated by contemplating, for example, the massive changes in lay-out Marshall prepared for the fifth edition. Regrettably there is as yet no reprint of Marshall and Marshall (1879), the book A. Marshall suppressed and which now seems only readily available in an Italian translation (Robertson 1976, pp. 448-51).

The most important of Whitaker's interpretative studies published so far are his presentation of Marshall's 1881 system as a system of distribution and growth (Whitaker, 1974), his general analysis of the distribution theory in Marshall's *Principles* (Whitaker, 1987) and that of the emergence of Marshall's period analysis from the early 1870s (Whitaker, 1982). The first presents what Chakravarty (1982, pp. 8-12) has called the Millian foundations of Marshallian growth and distribution theory, based on the transformation into differential equations of Marshall's favourite book from Mill's *Principles* (Book IV on the influence of the progress of society on production and distribution) as he wrote later to J.B. Clark (2/7/1900 in Pigou, 1925, pp. 412-3). Marshall's growth and distribution theory, despite its seemingly classical antecedents, implied the abandonment of three classical perspectives, as Chakravarty has also shown (1982, p. 8). First, he abandoned the classical notion of surplus as the source of accumulation (only lip service is paid to it in the *Principles*, for example, Marshall, 1961, pp. 504-05). Secondly, he neglected the discontinuities and irreversibilities so crucial to understanding real growth processes (though aspects are preserved in Appendix H of the *Principles*). Finally, he replaced the classical theory of value by a fully-fledged relative price theory in terms of supply and demand analysis (cf. Bharadwaj, 1978a, pp. 32-35). This is unambiguously indicated in Whitaker's presentation (1974, pp. 3-6) which also illustrates the view that in 1881 Marshall advanced a marginal productivity theory of distribution for the first time since Longfield and Butt (Stigler, 1941, p. 344). The growth and distribution theory illustrates one aspect of Marshall's use of the Millian inheritance.

A second aspect of this Millian legacy is very clearly present

in Marshall's early manuscript on value dated around 1870, which makes Marshall's "radical and systematic departure from Ricardo" perfectly clear (Bharadwaj, 1978b, p. 601). The four value situations analysed by Marshall are all supply and demand oriented, thereby substantively altering the explanatory basis for natural prices presented in the classical literature (Bharadwaj, 1978b, p. 615). Bharadwaj's paper (1978b, pp. 619-20), and the perspectives given on Marshall's early work by Whitaker (1975, pp. 44-47) also allow a more or less definite conclusion that Marshall's basic ideas on value and distribution owed little to Jevons (cf. Walker, 1985, p. 171) while they emphasise the importance of Cournot and Mill in that development.<sup>13</sup>

An alternative reading points to the other type of inference which can be made from studying the young Marshall. This emphasises his antipathy to the marginalists' critique of the classics and his divergence from many purist marginalist perspectives. Such a reading is given in Dardi's (1984) important study, which places the origins of Marshall's economics firmly in the debates about the wages fund doctrine at their height during the late 1860s when Marshall resolved to become an economist. This wages fund controversy background meant that Marshall came to grips with problems of accumulation and distribution at the outset and that he had to find solutions to the difficulties in supply and demand analysis which that controversy disclosed. Hence, as Dardi (1984, p. 119) points out, Marshall considered his task as involving an integration of matters of pure theory (the analytical supply/demand apparatus he was developing with the aid of Cournot, Jenkin and his mathematics) and the classical theory, if he was to successfully remove conundra associated with Mill's eclectic treatment. As Whitaker (1982) has also demonstrated, time analysis in this context of value and distribution theory came therefore naturally to the young Marshall as a problem to be solved. The tools for this were developed at an early stage, and traces of these dynamic considerations never disappeared from the pages of the *Principles*, particularly those devoted to the treatment of distribution. Whether this is a strength in Marshall's economics (Reisman, 1986) or a weakness (Stigler, 1941, e.g. pp. 63, 83) remains debatable, if only because it relies on positions regarding the purpose of economic theory. It does, however, illustrate the

need to set Marshall apart in some way from marginalist economics, as Dobb (1931, pp. 368-71) had already done in his characterisation of the Cambridge school.

In this respect, as in some others, Marshall remains an enigma. A part of the "marginalist revolution" by virtue of his support of many of its fundamental principles, he also diverged from its aims in significant ways. Examples are the emphasis on dynamics even when inconsistent with the demands of rigorous static theory (for examples see Stigler, 1941, pp. 68-76), his distrust of simple equilibrium statements and above all, his growing awareness of the difficulties in applying the new doctrines, particularly his favourite, consumer surplus. Some of this is explicable in terms of the formative influences on Marshall's thought when he turned to economics during the second half of the 1860s. Whitaker (1977, p. 478) has summarised some of these as "a heady but turgid mixture of German Idealism, Spencerean evolutionism, and utilitarianism, the latter derived from a close reading of Bentham and Mill and from the personal influence of Sidgwick, a mixture to which he was introduced as a young graduate through his participation in the stimulating discussion at the Grote Club". When this is combined with the specific early influences on his economics - J.S. Mill, Cournot and the background to the wages fund controversy - then at least some of Marshall's peculiarities can be explained. Others derive from his insatiable urge to be realistic and understood by businessmen. Furthermore, the breadth of Marshall's concerns in economics as a moral science stand out starkly against more narrow perspectives of some of his English contemporaries and in some respects those of his immediate successor to the Cambridge chair.

PHILIP HENRY WICKSTEED (1844-1927)

Wicksteed's work is in sharp contrast with Marshall's ambiguous attitude to the new economics. Wicksteed's unwavering support of the validity of the marginalist principles as he had critically derived them from Jevons earned him the distinction of being described as the "purist" of marginalist theory (Sraffa, 1960, p.v). Basically independent of Marshall's economics, Wicksteed rejected much of what

Marshall viewed as crucial components of the theory of economics (for example, the supply curve) and greatly disliked the many "classical" trappings remaining in the Marshallian system (Wicksteed, 1913). There is another contrast between Marshall and Wicksteed relevant to this survey. Wicksteed has been substantially ignored in the literature. Schumpeter (1954, pp. 831-2), for example, pointed to the fact that only Stigler (1941, pp. 323-35) had realised the true worth of Wicksteed's (1894) seminal contribution to distribution theory, that few economists appreciated the originality of his *Common Sense* (Wicksteed, 1910, 1933) and even fewer the brilliance of his observations on Jevons (Wicksteed, 1889). Schumpeter would therefore have been delighted that Creedy (1986b) has repaired the third of these omissions, that Davidson and Meiners (1976) have rediscovered certain novel aspects of Wicksteed's *Common Sense* and finally, that Steedman (1987b) has not only fully reviewed the contents and context of Wicksteed's *Co-ordination* (1894), but that he has recovered the complete Wicksteed. He has even compensated for Schumpeter's regret at inability to do full justice to Wicksteed's personality as "it radiated upon" him in 1906 with its complex blend of qualified "repose", "benevolence", "simplicity" and "modesty" (Schumpeter, 1954, p. 831).<sup>14</sup>

Davidson and Meiners (1976) and Creedy (1986b) both deal with aspects of Wicksteed's price theory. The first suggest Wicksteed's analysis is "far closer to the position of many modern writers" because of his views on the unsatisfactory nature of a "dual-decision mechanism". Simultaneous determination by supply and demand made the price determination problem unduly complex in Wicksteed's view. Wicksteed's analysis based on fixed and inaugmentable supply, according to Davidson and Meiners, allows easier consideration of dynamic decision making processes, presents price makers as the market norm, while it resembles inventory-adjustment type models and anticipates current search and auction-market type analysis.

Creedy's (1986b) analysis of Wicksteed's critique of Jevons's use of the King-Davenant demand data reveals some general features of Wicksteed's economic approach amidst the technical details of this issue. It highlights Wicksteed's theoretical purity by emphasising

his rejection of Jevons's (and Marshall's) device of allowing alternative uses of corn to be operative over the range of price variations to which the observations extend. Secondly, Wicksteed's ingrained common sense is illustrated from his critique of Jevons's depiction of the demand curve at very high and low prices. In addition, Creedy (1986b) reveals much about the seriousness with which Wicksteed held mathematics as a tool for economic investigation and the limitations under which he worked in this respect.

Steedman's rich contributions to the meagre Wicksteed literature need to be savoured in themselves. Attention can be drawn to some highlights, largely from his introduction to Duckworth's proposed reissue of Wicksteed (1894). There he draws repeated attention to the fact that Wicksteed avoided arguments in terms of "artificial aggregate factors" or that he used an aggregate form of the production function as sometimes misleadingly claimed. In Wicksteed's attempts to include the rate of interest in the analysis, aggregate value capital is not necessary because the analysis is totally in terms of the individual maximising agent faced with given factor prices and a given rate of interest. However, this procedure induces some other slips. Wicksteed's presentation includes allocative peculiarities inherent in a thought experiment which uniformly applies doses of a variable factor to a fixed factor and thereby implies uneconomic use of the fixed factor over certain ranges of the analysis. Finally, Steedman stresses that Wicksteed shows no signs of "apologetic intent" in the development of his marginal productivity theory, a characteristic of his scientific probity also visible in his Jevonian critique of Marx (see Steedman, 1988).

A further matter of interest in Wicksteed's economics is emphasised in Steedman (1986). This illustrates Wicksteed's concern with the principle of choice as the unifying principle of economics, permitting his association with certain modern perspectives on the scope of economics of the Virginia school and undoubtedly explaining his great appeal to, and influence on, Robbins. Here is an important aspect of his Jevonian legacy, marking him as a true marginalist in his general economic philosophy. Steedman notes that taken to its logical conclusion, Wicksteed's position implies no possibility of

distinguishing between economic and non-economic behaviour, and that altruism therefore need not be reconciled with rational economic behaviour. In addition, his concessions to some lexical ordering makes the principle of equating diminishing marginal significance less general than Wicksteed's overall stance suggests. Recent work on Wicksteed, together with Schumpeter's and Stigler's earlier opinions, suggest that Wicksteed is an economist whose writings can still be studied with profit, if only because they reveal the foundations of the new economics in all their simplicity and generality.

FRANCIS YSIDRO EDGEWORTH (1834-1926)

Edgeworth, like Wicksteed, has been totally eclipsed by Marshall's work. Only part of this can be attributed to the fact that Edgeworth wrote few books, and these all early in his career, while of his many scientific papers and reviews, including no less than 131 entries in the *Palgrave Dictionary of Economics*, only a relatively small proportion were gathered in his collected papers (Edgeworth, 1925). Though containing interesting contributions to a wide variety of fields, this material is now virtually forgotten. His name is currently remembered from the Edgeworth box, his "invention" of indifference curves and his application of the "indeterminacy" properties of isolated exchange to wage bargaining. As the linguist in English economics of this period (no mean feat when contending with Wicksteed, or even Marshall) he was also a major bridge, and sometimes an obstruction<sup>15</sup>, between European developments in economic theory, particularly in France and Italy, and those in England.

Edgeworth's contributions as a whole have been interpreted with clarity and wit in Creedy (1986a; a shorter version is Creedy, 1981), which corrects past errors in interpretation and greatly expands knowledge about this fascinating economist. Stigler (1941) had already exhaustively discussed Edgeworth's contributions to production and distribution theory and justly praised his contributions to utility and competition theory in his well known

critical evaluations of the development of these concepts. The "modernity" of Edgeworth's *Mathematical Psychics* has since then been acknowledged by Samuelson (1974, p. 1279) in terms of his discussion of "indifference contours, recontracting, supply and demand, contract curves and (deepest of all) the core". As Edgeworth (1881, p. 1) explicitly indicates, much of this was inspired by Jevons's development of a calculus of pleasure and pain and consequent explorative application of mathematics to the social sciences. In this introduction, Edgeworth reveals the psychological, ethical and philosophical foundations of his work combined with an ambition to develop a social mechanics designed to rival celestial mechanics where maximum pleasure in the first, like maximum energy in the second, constitutes the general idea around which to build a mathematical psychics (Edgeworth, 1881, pp. 9-12). Edgeworth's work provides a particularly clear illustration of the early association in England between marginalism and applied utilitarian ethics, an aspect of Edgeworth's work which Hutchison (1953, ppp 108-14) singled out for evaluation and criticism.

Creedy (1986a) illuminates aspects of Edgeworth's work particularly relevant to the purpose of this survey. First, he (1986a, p. 23) stresses Edgeworth's early work on utilitarianism and argues its importance for "a proper understanding of the later contributions". Relevant for distinguishing him from Marshall,<sup>16</sup> Edgeworth strongly disliked Hegelian idealism (e.g. 1881, p. 97) but like Marshall, he embraced "evolutionism" and expressed a wish for its constructive merger with utilitarianism. Two further aspects of Creedy's discussion of this part of Edgeworth's thought need to be mentioned. His utilitarianism did not yield 'natural harmony' conclusions but stressed conflict; secondly, it was based on a considerable knowledge of experimental psychology and his generalised utility function derived directly from his knowledge of Fechner's work (Creedy, 1986a, pp. 27-9). Another feature of Creedy's evaluation (1986a, pp. 82-4) is an emphasis on the contractarian aspects in Edgeworth's utilitarianism. Distributive justice, Creedy argues, needs to be interpreted in this context. Such features of *Mathematical Psychics* were subsequently largely ignored, all the more surprising when they also featured in Edgeworth's taxation economics. There the *quid pro quo* view of taxation was rejected because public

expenditure and taxation decisions do not result from competitive exchange processes. A social contract between taxpayer and government is required to provide the necessary principle of tax justice.

Creedy's (1986a, pp. 123-6) emphasis on the continuity in Edgeworth's work from the foundations provided by *Mathematical Physics*<sup>17</sup> - with its contributions to the theory of contract, justice and distribution as a new justification for utilitarianism - allow him to remove a number of important misconceptions about the development and origins of marginalism in England. Most important is his argument on the fundamental role of utility and utilitarianism in early marginalism, contrary to the views of Schumpeter (1954, pp. 830-1) and Hutchison (1953) and, more heretical, on its continuing role in applications of economic theory to subjects like taxation policy (Creedy, 1986a, pp. 128-30; cf. Roy, 1984). Secondly, he points to criticism of dogmatic *laissez faire* positions as a characteristic of Edgeworth and other early English marginalists. Edgeworth's belief that in practice a widespread tendency to indeterminacy existed formed the basis for his sceptical views on this (pp. 127-8). Finally, Creedy argues (pp. 130-2) that despite Edgeworth's linguistic proclivities, or perhaps because of them, the effective international flow of ideas was not nearly as great as may be presumed from the immense personal contact between leaders in the early development of marginalism. Perhaps because of the overwhelming dominance of Marshall, English economics sank into a period of "unsplendid isolation" from the early twentieth century and even ignored relevant contributions from American economists. In brief, Creedy's general differentiation of late Victorian marginalism from its modern counterpart is an important service of his study of Edgeworth, though like him, I fear that too many economists will leave the study of major writers of this period to specialist historians of economic thought.

JOHN BATES CLARK (1847-1938)

As Stigler (1941, pp. 196-7) points out, "Clark independently discovered both the marginal utility and the marginal productivity

theories" and this is the basis for his claim to an important place in the history of economics. It is also the justification for his inclusion in this chapter. Stigler noted in addition that at least till the end of the 1930s, "continental economists" considered Clark's version "to be the marginal productivity theory" and that Clark's "naive productivity ethics" with its prescriptions combined with analysis was a major disservice to economics. Schumpeter (1954, pp. 868-70) is in substantial agreement with this view while Hutchison (1953, p. 253) in addition, emphasises the conversion in method which Clark is said to have experienced between publishing his first book (Clark, 1886) and his more important theoretical contribution on distribution (Clark, 1899). In his American Economic Association centenary paper on neo-classical theory in America, Tobin (1985, pp. 29, 31-2) also makes these points. Not surprisingly, the conversion in method and the marginal productivity ethics are the issues in Clark's economics to which most discussion has been devoted, with the debate on marginal productivity largely confined to Clark's theory of capital and interest.

Samuelson (1962, pp. 213-5, 233-4) brought J.B. Clark's capital and interest theory into the Cambridge controversies on capital theory with devastating results for the 'parables' derived from it. Their examination (Garegnani, 1970) led directly to the reswitching results and identification as an unobstrusive postulate of the widely held inverse relationship between interest rates and capital intensity (Pasinetti, 1969; Harcourt, 1969, esp. pp. 390-4). The simplified models derived from Clark's work, in terms of the aggregate production functions he perhaps unwittingly sponsored, were shown to be logically flawed, with similar consequences for their application to empirical work in analysing macro-growth. Tobin's (1985, pp. 31-2) appraisal of Clark mentions use of Clark's production model in macro-growth theory but omits any reference to weaknesses disclosed by the capital controversies. With quite specific reference to J.B. Clark, these have been evaluated by Moss (1980, esp. pp. 64-73) as marking the end of orthodox capital theory and similar to the destruction of much Austrian capital theory by these arguments. Tobin (1985) however, raises the important question of how much of this analysis is actually attributable to Clark but

this does not obviate the fact that Clarkian parables and the productivity ethics based thereon must now be relegated to errors from the past.

Clark's so-called methodological conversion, including its relationship with his marginal productivity views, has also been reviewed. Jalladeau (1975) investigated this precisely because of its association with the marginal revolution in America. By way of conclusion, Clark's aims are depicted as establishing "economic ideas on a moral basis" from analytical foundations so strong that they would be unchallengeable. This is also seen as a sign of the "gentle optimism" which fills the work "of this tormented humanitarian and liberal theoretician" in developing a deductive, scientific approach to economics from his earlier descriptive, historical and morally speculative work (pp. 225-6). Henry (1982, 1983) has challenged notions of methodological conversion in Clark's work and the associated view that he moved away from Ruskinian socialism and criticism of capitalism. A methodological change, he contends, allows separation of what is called the purely scientific part of Clark's work, the marginal productivity theory, from its ethical features. Such a view underlies Schumpeter's argument that the technical features of Clark's argument can be easily separated from the normative part, leaving a value free core of marginal productivity theory. Henry (1982, pp. 167-8) posits contrary propositions: first, Clark was always "pro-capitalist", the seemingly early criticism of capitalism being really a manifestation of "populism", and attacks on monopoly and ethics of the market in this vein are combined by the young Clark with criticisms of socialism. Second, Henry (1983) develops this theme by emphasising a connection between ethical and moral aspects of Clark's distribution theory with similar pro-capitalism motivation for Clark's early critique of classical economics and defence of marginalist principles. The foundation of Henry's argument - political preconception and *a priori* ethical positions are an indication of dubious theoretical pronouncements - cannot be sustained in my view; only logical argument and empirical data can indicate theoretical deficiency. As mentioned previously, some logical foundations of Clark's marginal productivity analysis as a theory of distribution were removed in the Cambridge capital controversies. However, for

those interested in the origins of marginalism, it is clear that the foundations of Clark's economics require further discussion and evaluation than they have received so far (for example, Goodwin's (1972) useful study of marginalism's spread to the New World, hardly deals with Clark's work). Such evaluations need also recall Clark's popularisation of the conception of a stationary economy, an important simplifying procedure for the new economics.

#### IRVING FISHER (1867-1947)

By birth, Irving Fisher is the first of the two "second generation" marginalist economists included in this chapter though, as shown in Table 1, his first book was produced within a decade from the publication of the major works of Marshall, Wicksteed, Edgeworth and Clark. He also was the only one of the seven who published major theoretical work in both the nineteenth and the twentieth centuries. Schumpeter (1954, pp. 871-2 and cf. 1952, pp. 224-7) rightly praised Fisher's first work (Fisher, 1892), as a great classic in the new marginalist tradition: "a masterly presentation of the Walrasian groundwork" with at least two important innovations. The first was Fisher's proposed method for measuring marginal utility; the second, similar to Edgeworth's work of a decade before, Fisher's independent development of a general utility function and his use of indifference curves. This affinity between the work of Fisher and Edgeworth undoubtedly explains why they got on so well together (Fisher, 1956, pp. 49-50, 92-94; cf. Creedy, 1986a, p. 100). In addition, he enriched the literature of the new economics with a theory of interest which in many respects remains influential. It is therefore still discussed in general works on the subject like Lutz (1967) and Conard (1963). Fisher's monetary theory, which has received the greatest amount of attention in the post-1950s literature is not discussed here. Space only allows brief treatment of some literature devoted to his capital and interest theory and his views on "operational utility". These topics were two of ten included among economic studies in the tradition of Irving Fisher published for the centenary of his birth, while emphasis on price theory and the analysis of capital and interest is likewise a feature of Tobin (1985).

Some of the recent interest in Fisher's capital theory can be explained by his apparent ability to sidestep the problem of defining a real capital magnitude through concentrating on "the terms of trade between today's and tomorrow's consumption as the objective counterpart of the rate of interest" (Samuelson, 1967b, p. 18). Fisher's development of the Austrian theory as it had been left by Bohm-Bawerk is then identified as an analysis of the interaction of an impatience to spend with opportunities to invest to produce, as Samuelson put it (1967b, pp. 29-30), a brilliant general equilibrium theory of interest in terms of supply and demand. In his concluding praise of the modernity of Fisher's theory, he makes a passing reference to reswitching with the implication that Fisher's theory is immune from its otherwise devastating consequences (ibid., p. 35 n 13). Samuelson's comment was effectively challenged by Pasinetti (1969) which showed that switches of technique did affect the Fisherine notion of the rate of return, not as a tool for allocation decisions when all prices were known but as a proxy underlying marginal productivity explanations on the "opportunities for investment" side (Pasinetti, 1969, pp. 525, 529). This view has never been challenged but it may be noted, *passé* Professor Samuelson, that Fisher (1907, pp. 252-3) had himself recognised the phenomenon of reswitching and like Joan Robinson fifty years later had described it as "perverse" (see Velupillai, 1975).

Another part of Fisher's economics which continues to draw attention is his theoretical work on utility measurement. Stigler (1950, pp. 117-21) shows that Fisher (1892) demonstrated that the general utility functions he there developed and which he preferred on theoretical grounds, made cardinal utility measurement virtually impossible. Fisher (1927) returned to the subject. By using independent utility functions, at least for important commodities like food and housing, he produced something concrete on utility measurement largely from a desire to apply such findings to arguments on the justice of the progressive income tax. Fellner (1967, esp. pp. 59-69) has since then demonstrated that the Fisher-Frisch method (Frisch applied Fisher's theoretical work to actual measurement) can produce some interesting results in utility measurement, even though these remain highly speculative. In addition, many of the obstacles

to developing an operational utility identified by Fisher (1927) remain to be solved by future investigators (Fellner, 1967, pp. 74).

ARTHUR CECIL PIGOU (1877-1959)

Pigou, the other second generation marginalist economist to be considered in this chapter, was also Marshall's student in the full sense of the word, succeeding him to the chair in Cambridge in 1908 and holding it for the next forty years. Pigou was first in the first class honours list of Part II of the Moral Sciences Tripos in 1900, after a first in the History Tripos of 1899.<sup>18</sup> He commenced lecturing in 1901, became Girdler lecturer in the new economics tripos at Cambridge in 1904 and Professor at 31 in 1908. Schumpeter (1954, pp. 833, 948) says relatively little about Pigou - describing him simply as the first major member of the Marshall school, as essentially an economic theorist but one who produced a detailed treatise on labour economics (Pigou, 1905) much of which he subsequently developed in *Wealth and Welfare* (Pigou, 1912), the foundation for all of Pigou's later economics. Johnson (1978, p. 177) in fact suggests that much of Pigou's working life can be seen as elaborating the superstructure of that book and strengthening its foundations, a position which Collard (1981) supports.

Apart from obituaries, little has been produced on Pigou's economics of relevance to this chapter. Post-1950s literature when it has discussed Pigou, has dealt with his monetary theory, the Pigou effect and other features of his "macro-economics". Exceptions are Collard's (1981) survey which now must be the starting point for all serious Pigou students, and some discussion related to his *Wealth and Welfare*. This includes Bharadwaj's (1972) reproduction and evaluation of Marshall's comments on that work, and the praise for Pigou's (1910) method of measuring price elasticities of demand (Deaton, 1975) in which Pigou's linear relationship between price and income elasticities under additivity is described as "Pigou's law". Like Edgeworth, Pigou's name is therefore unlikely to be forgotten. However his books are now largely unread and the absence of serious Pigou criticism can be generally ascribed to the bad reputation he

gained in accounts of the Keynesian revolution, particularly Keynes's own contemptuous dismissal of his work (cf. Collard, 1981, esp. pp. 107, 132-3 from which much of the argument in this and the next paragraph is taken).

Pigou (1905) on industrial peace is described by Collard (1981, p. 107) as a "rather discursive work based on Sidgwick and Edgeworth with a collaborative appendix, on bargaining diagrams, with J.M. Keynes - an astonishing early collaboration".<sup>19</sup> The book combines a basically utilitarian perspective in its analysis with an enormous amount of detail of the "nuts and bolts of industrial peace". This early work of Pigou is rarely discussed and sometimes not even included among his works (for example, Brahmanand, 1959, p. 469). However, it seems important to understanding Pigou's work for at least two reasons. It reminds of the strong applied utilitarian foundations of the Cambridge school (via Sidgwick but also Edgeworth) and reveals the strong practical interest at Cambridge in labour relations, particularly conciliation and arbitration as a means for settling industrial conflict. This is presumably why Hutchison (1953), after mentioning it, ignores it. As Johnson (1978, p. 177) also explains, this book forms the bridge via a growing interest in unemployment to Pigou's strong interest in developing welfare economics.

Pigou's *Wealth and Welfare* was respectfully dedicated to his master, Alfred Marshall. Collard (1981, p. 110) suggests a direct link with Marshall's *Principles* from Pigou's (1907) review of it which, among other things, emphasised the notion of the national dividend as the focus and kernel of economic theory. The national and social dividend definitely takes the centre stage in *Wealth and Welfare*. Pigou discusses its composition, growth, measurement and distribution as well as artificial impediments to its growth and its fluctuations. Collard also points to its Sidgwickian ancestry: both the distinction between social and private costs, and the associated externality concept, as well as its norms for distributive justice and identifying wealth with welfare came from Sidgwick's *Principles* (1883, Book III). Bharadwaj (1972) has shown that Marshall was not very impressed with Pigou's work in this area. Marshall's dissatisfaction came from its over-reliance on "statical method" and

more particularly, from deficiencies in Pigou's use of the marginal supply price. In his critical notes, Marshall also emphasised the problem of time. He admitted he had himself largely ignored this with respect to demand analysis but Pigou was now attempting to ignore it on the supply side as well, a far more unpardonable form of "violence", as Marshall put it. Pigou's approach in the book, Bharadwaj (1972, p. 218) suggests, appears to have transformed Marshall's "aberrations in the working of a competitive system" into Pigou's diagnosis of "a general failure of the competitive system to achieve maximum welfare", hence turning qualifications of *laissez faire* into a general critique. It can be said that with these developments marginalism and its implications for social welfare started to turn full circle because the hopes of early marginalists like Jevons of linking the new science with the benefits of competition for social welfare were beginning to be questioned more seriously by the subsequent generation of economists.

### 3. CONCLUSIONS

This survey of the literature on the early English marginalists suggests a number of conclusions. An obvious one is that on some of them much work remains to be done. As Creedy (1986b, pp. 132-3) argued, such work needs to deepen the limited understanding of the pioneers of neo-classical economics and highlight the width of their inquiry as compared with the more narrow focus of mainstream economics. Such differentiation of the pioneers from more modern views need also pay attention to Klaus Hennings's (1986, pp. 237-8) summary of the major differences between the conceptions of early marginalism and what he calls "neo-neo-classical economics". These relate to equilibrium versus processes of economic growth, statics versus dynamics, perfect competition versus competition in general, and, at a formal level, the different attitudes to maximisation and minimization between the first generations of marginalist and current practice. This survey suggests, as Hennings also did (1986, p. 226 n7), that on many issues, knowledge about specific aspects of work by these pioneers has advanced little beyond the investigations of Hutchison (1953), Stigler (1941, 1950) and Schumpeter (1954).

Three general exceptions can be noted to this last conclusion and these can be used to draw together various otherwise disjointed themes from the component parts of this survey devoted to specific economists. They alter at least part of the picture of English marginalism in the formative period as presented by these three foundation commentators. Recent work has allowed greater illumination of the diverse origins of marginalism in England, provides a number of significant reasons for differentiating between the views of the English speaking pioneers and, with respect to critiques of their doctrines, focusses on matters quite different from those raised previously.

Study of the origins of marginalism has been greatly assisted by the wider availability of important material on the young Jevons and young Marshall emphasised in this survey and by reinterpretations of key work of some of the later generation. The utilitarian connection, downgraded in the early 1950s by Schumpeter and Hutchison, can now be shown to be very important. For Jevons, this is visible even in the Australian interlude; for Edgeworth, from the early work and the aims of *Mathematical Psychics*; for Marshall, from the influence on his early economics of the Grote Club, Sidgwick and his own reading of Mill and Bentham, while it is also crucial to Pigou's early work. Sidgwick's influence on the Cambridge school in particular needs more work. One aspect of this applied social ethics seems dominant: its apparent usefulness to solving the growing labour question. This provided motivation and stimulus to the new marginalism from Jevons to Pigou. However, such an association does not mean reverting to crude Marxist explanations of the new economics. If there was an unambiguous "apologetic intent" in the new economics, it is only discernable in the work of J.B. Clark. In fact, the applied utilitarian features of the new doctrines were distinctly radical - their application, for example, to tax policy and particularly the progressive income tax, as seen in the work of Edgeworth, Fisher and, though not surveyed here, Pigou (1912, pp. 369-78). In addition, such concerns are revealed in the many, and largely unsuccessful attempts, to make utility a more operational concept. For reasons perhaps related to tax questions (Roy, 1984), the cardinal aspects of utility began to disappear from the English

research agenda during the 1930s.

Changing critical perspectives on marginalism have altered interpretations of its doctrines in a number of respects. The Cambridge controversy results in capital theory necessitate revaluations of the worth of the contributions in this area by Jevons, Clark and Fisher. They also open different perspectives on contributions like Wicksteed's generalised production function. More generally, in the wake of Sraffa's (1960) contribution there have been reassessments of the broader significance of the marginal revolution in England, particularly work by Dobb (1973) and Bharadwaj (1978a). As Steedman's work on Wicksteed shows, this does not mean a return to conspiracy theories; however, as his work on Jevons illustrates, it may lead to paradoxical results. Some of these wider issues were canvassed in Henning's (1986) evaluation of marginalism as an exchange theory.

The new work on the early English marginalists also permits their considerable dehomogenisation. Marshall's classical roots and their consequences for the more dynamic aspects of his theory and for his analysis of supply differentiated his work from that of Jevons, and, even more, from that of Wicksteed. Edgeworth and Pigou likewise exhibited their differences from Marshall, not only with respect to technical matters like the nature of the utility function and marginal supply price but also on the precise implications of the findings from the new economics for the welfare consequences of *laissez faire*. Although it is easy to concentrate on the shared features in the new doctrines, such a focus should not detract from the substantial differences between the early English marginalists.

Finally, new work discussed in this survey draws attention to the lessons which can still be learnt from the writings of this past generation of economic writers. Examples of this were given in the context of work on Marshall's theory of value, Edgeworth's contractarian economics, Wicksteed's price determination analysis and Fisher's theory of saving and operational utility, and much can still be learnt from Jevons, Clark and Pigou. This remains the most important reason for returning to the writings of past generations of economists. Unlike old soldiers who fade away, old economists,

provided they exhibit the talent and originality which characterises the work of all seven discussed here, continue to have something of value to offer to successive generations of economists. Revisiting English marginalism from 1870 to 1920 may produce dividends far beyond the interests of intellectual history and nowhere is this better illustrated than in some of the new work on Jevons, Marshall, Wicksteed, Edgeworth, Clark, Fisher and Pigou.<sup>20</sup>

FOOTNOTES

1. This is demonstrated in Keynes's bibliography, in whose compilation Mary Paley Marshall assisted, given in Pigou (1925, pp. 500-508). Apart from the 1874 articles in the *Beehive* (Harrison, 1963) and a substantial number of letters to the *Times* (see O'Brien, 1981, p. 37), this bibliography is virtually complete with respect to published work.
2. See the bibliography in Jevons (1910, Appendix IV) and Black (1972-81, VII 123-7). In addition to value and distribution, Jevons's economics covered money, economic fluctuations, labour economics, taxation, energy economics and the economics of public utilities. See Black (1981) for a full range survey of Jevons's economics contribution.
3. Full blown Marshall biographies are in preparation by Becattini and Groenewegen; detailed aspects of Marshall's life have been chronicled by Whitaker (1972, 1975), Coase (1986), Groenewegen (1985). There are good biographical sketches of Edgeworth, Clark and Pigou in Creedy (1986a, esp. chapters 1,2), and Hicks (1984) for Edgeworth; Homan (1928) and J.M. Clark (1952) for J.B. Clark and Johnson (1978), Saltmarsh and Wilkinson (1960) and Brahmanand (1959) for Pigou. Walker (1985) presents an interesting evaluation of these Keynes biographies. Reference should also be made to the biographies of the seven in the *New Palgrave Dictionary*.
4. Jevons (1910, 1879, pp. xxix-xxi), Black, V. p. 24; Pigou (1925, 413). The case of Todhunter remains mysterious. He was a Johnian mathematician and knew second wrangler, Marshall, for whom he wrote a testimonial in support of his application for Bristol. In addition, Todhunter was Whewell's biographer and although not mentioned in Todhunter's account, Whewell at least knew of Cournot's work by 1849 (Rashid, 1977, p. 388) via Graves, the Professor of Law at University College, London, who also claims to have recommended Cournot's work to Babbage. But in 1875 on Jevons's account, Todhunter had written that he was unfamiliar with Cournot's *Recherches*. Interestingly, John's College Library Cambridge, does not have a copy of the first edition. Marshall's copy of the first edition is in the Marshall Library, with his own extensive annotations. Marshall may in fact have become acquainted with it from his early reading of Roscher (1854, 22) which referred to Cournot's work as novel in a manner designed to attract the attention of someone like Marshall. See also Hutchison *et al.* (1955, esp. pp. 7-8).
5. This means ignoring contributions on Jevons's theory of labour (Kerton, 1971), on Jevons's law of indifference and competitive equilibrium (Negishi, 1982) and more generally some important work on Jevons's method and his conception of science (Mays, 1962, McLellan, 1972). The birth anniversary was celebrated in the pages of *Econometrica*, the 1962, 1971 and 1982 centenaries in the pages of the *Manchester School*.

6. Both Hutchison and Stigler in their written comments reminded me that Knight's criticism of the Austrian theory (of which Jevons was such a clear forerunner) anticipates, and in some respects, parallels Steedman's critique referred to in the text. Given the time period covered by this survey, a summary of Knight's perspective on the matter is inappropriate.
7. Such considerations seem to rule out Bostaph and Shieh's construction of figure 3 (1987, p. 118). It is surprising that Stigler (1954) who deals with empirical studies of consumer behaviour, does not mention these early attempts by Jevons as outlined in this posthumous publication. It may also be noted that Wicksteed (1889) had severely criticised Jevons's analysis of the King-Davenant law, largely on theoretical grounds (see Creedy, 1986b, pp. 201-6). For a full discussion see White (1989).
8. Pell's more important work on railways was given as a lecture in 1856 at a meeting of a Philosophical Society to which Jevons belonged (Black, 1973, II p.249 n.17). This was not published till 1858 (Pell, 1858). Jevons did not read Lardner till April/May 1857, not long after purchasing it, presumably because of his growing involvement in the railway debates of New South Wales. On internal evidence from *Theory of Political Economy*, there is good reason to believe that Lardner's precise influence on Jevons's theoretical formulations has been overstated, contrary to the position advanced by Bostaph and Shieh (1986), and earlier Hutchison (1953). Nothing of this of course negates Hutchison's hypothesis of an association between railway economics and Jevons's marginalism. Hutchison (1982) is partly inspired by his opposition to Dobb's (1973) interpretation of the Jevonian revolution and similar perspectives such as those presented by Bharadwaj (1978a, esp. pp. 26-32).
9. Personal diaries for the Australian period and later indicate that during this period Jevons was reading Whewell's *Philosophy of Inductive Sciences* (Black, 1982, VII p. 117 n.14) and that in May 1857 he contemplated, and in fact started, an introduction for a book on social anthropology combining political and social economy with moral philosophy. Whateley's lectures which he had been reading in the previous months are highly "philosophical" (Black, 1982, VII p.118) as were Woolley's lectures (Woolley, 1862), at least one of which he attended in 1856. Jevons was also reading Chalmers and Quetelet at the time. Black's 1972 conclusion cannot be sustained by the facts he himself later made available.
10. A description borrowed from the title of Dardi (1984) which is a product of the extensive Marshall scholarship practised in Italy under the encouragement and leadership of Giacomo Becattini who himself has invited a re-reading of Marshall in the light of an Italian translation of Marshall and Marshall (1879) published under his auspices.
11. Most of the articles referred to in the first part of this paragraph have been included in Wood (1982) Volume III together

- with a large number of others. On consumer surplus, reference should also be made to more recent articles such as Dooley (1983), Ekelund and Hebert (1985, pp. 433-39) and Roy (1984).
12. For some of the problems associated with this selectiveness in Pigou's editing, see Whitaker (1968, p. 144) who in this context also mentions its consequences for the selectiveness of the Marshall holdings in the Marshall Library at Cambridge. An outline of the contents of these holdings is given in McWilliams (1969).
  13. This is not to say that Marshall owed nothing to Jevons. The utility theory owed much to Jevons, as did the welfare theory based thereon in some of its details. Examples, of which I am reminded by Michael White, include in particular the specific formulation of the consumer surplus theory such as the practice of treating utility and price as the dependent variable in diagrammatic presentations and the simplifying assumption about normal distributions on the basis of which comparisons of utility in terms of groups may become permissible.
  14. Unfortunately, not all of Steedman's writings on Wicksteed are as yet in print, and I take this opportunity to thank him for his willingness to make them available to me in manuscript form. Klaus Hennings drew my attention to this work in correspondence when I suggested that Wicksteed and Edgeworth, together with Fisher and Clark, should be included in the chapter. It may also be noted that Lionel Robbins greatly admired Wicksteed's work and made it readily available in reprint during the 1930s. Alas, these reprints and Wicksteed's *Alphabet of Economic Science* (1888) have now become rare, hence Duckworth's reprinting of Wicksteed (1894) which unfortunately has still not been published.
  15. See, for example, the symposium on the transmission of ideas in the *American Economic Review* (Hutchison, et al., 1955, esp. pp. 10-11, 37-9) where reference is made to Edgeworth's suppression of Walras's work possibly at the instigation of Marshall. Similar sentiments were expressed by Schumpeter (1954, p. 831 n.3), and see also Creedy (1986a, pp. 130-2 and cf. 19, 21-1, 109). Creedy also provides examples of instances where Edgeworth was critical of Marshall (1986a, pp. 96-8).
  16. Creedy draws attention to many aspects of comparison with Marshall in Edgeworth's work, relating to issues like the theory of demand, the problem of indeterminacy, the nature of the utility function and even the use of Plato's expression, 'the one in the many and the many in the one'. In his interesting discussion of Edgeworth's mathematical training, Creedy seems to have underplayed the Marshall-Clifford connection (Creedy, 1986a, pp. 39-41) which Keynes described as a close and intimate friendship (Keynes, 1972, pp. 174 n3, 181 n2). John Whitaker suggests that Keynes probably overstated the Marshall-Clifford connection which he thinks would not have survived much beyond Marshall's philosophical period. However, an undated fragment, probably from late in Marshall's life time which survives in the Marshall Library, states "A[lfred Marshall] had a profound admiration for Clifford [who] cared

most for his ideas" (Large Brown Box, Item 26, in Mary Paley's handwriting).

17. To reinforce his justified emphasis on the importance of *Mathematical Psychics* to the understanding of Edgeworth, Creedy (1986a, pp. 135-50) provides a most useful reader's aid to this difficult work including errata, translations from the Greek and references to sources. These illustrate the wide foundations on which Edgeworth constructed his new approach to utilitarianism and economics.
18. Johnson (1978, p. 175) also recounts that in 1899 he won the Chancellor's Gold Medal for English verse with an ode to "Alfred the Great", the last few lines of which reflect the idealism which led Pigou to economics as a follower in Marshall's footsteps. Hutchison (1981, p. 63) cites Pigou's view from his inaugural lecture that economists should be fired by social enthusiasm as a sign of the beginning of the end of positive economics at Cambridge. Cf. Hutchison, 1953, p.284 which gives a more generous quotation from Pigou's lecture. Like Marshall, Pigou devoted much of his early life to government inquiries and royal commissions; unlike Marshall he published widely and much (see Brahmanand, 1959).
19. Pigou (1905, see p. v) developed from his Adam Smith Prize essay (1903) and Jevons Memorial Lectures given in 1903-04, Sidgwick's influence appears rather indirect. His *Practical Ethics* (1898) of which Essay 4, 'The Morality of Strife', tackled issues of arbitration in labour disputes (Sidgwick, 1898, pp. 108-12) is not quoted. In fact, Pigou (1905, p.181 n) only directly cites Sidgwick's *Elements of Politics*. Marshall was a much greater influence, through his *Principles* (for example, Pigou, 1905, pp. 89-90 uses the derived demand distribution analysis of Book V chapter VI to some effect), but also the *Report of the Royal Commission on Labour* (1894) in which Marshall had been very heavily involved, Marshall's introduction to Price's *Industrial Peace* (1887) and Marshall's *Elements of the Economics of Industry* (1902) particularly Book VI, chapter XIV. There is no reference to Marshall and Marshall (1879) of which Book III, especially chapter VIII, would have been highly relevant to Pigou's topic. In June 1905 Keynes completed his Mathematical Tripos (12th wrangler) and by October 1905 he was contemplating entering Part II of the Economics Tripos. As Skidelesky (1983, pp. 124-5) indicates, in 1904 Pigou had given an assessment of the young Keynes in *Granta* but both that, and Skidelsky, fail to mention Keynes's collaboration with Pigou on the mathematics of bargaining.
20. Revisions of this chapter have benefited from perceptive comments by Terence Hutchison, Warren Samuels, Ian Steedman, George Stigler, John Whitaker, Michael White and my official commentator, John Creedy. Needless to say, their valued assistance does not absolve me from any remaining errors.

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