# Notions of Competition and Organised Markets in Walras, Marshall and some of the Classical Economists

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## Introduction

In Lesson 5 of his Elements of Pure Economics, Walras declared, "*value in exchange, when left to itself, arises spontaneously in the market as the result of competition*". This general proposition is qualified a few lines later by the statement, "[t]*he more perfectly competition functions, the more rigorous is the manner of arriving at value in exchange. The markets which are best organised from the competitive standpoint are those in which purchases and sales are made by auction…*" (Walras, 1926, 1954, pp. 83-84). The emphasis Walras gave to the relationship between value and price determination in the market was of course not new, though his linking of the degree of rigour by which value in exchange is determined with the superior quality in which a specific market was organised from the standpoint of competition was more novel. The more 'perfect' or more "*free*" (only the last adjective seems to have been used by Walras in the context of "*competition*"), competition in a market is organised, the more precisely exchange value is determined in that market. Auctions, as reflected in the mode of exchange operations on the French stock exchange, and in certain wholesale produce markets, organised competition in the market to the highest possible degree; other markets, like those of fruit, vegetables or poultry, to use Walras' examples, were less well organised in this respect, while at the retail level of stores and shops – 'baker's, butcher's, grocer's, tailor's, shoe maker's' – markets exist "*where competition, though poorly organised, nevertheless operates quite adequately and satisfactorily*" (Walras 1926, 1954, p. 84). At this stage, Walras left it to the reader's imagination in what respect markets are well, or less well organised to generate the highest degree of competition. However, this, as shown later, can be inferred from his text. For his main theoretical work, the Eléments, Walras tended to assume the presence of free competition. It can be said that Walras' English contemporary, Alfred Marshall, likewise contemplated organisational features of markets which generated high degrees of competition, even if, for Marshall, 'perfect competition' was a notion which could never exist in reality. Hence Marshall avoided its use, preferring the term 'free competition' when analysing price determination in particular markets for goods and for the services of agents of production according to the degree of competition which could appropriately be assumed for such markets. Unlike Walras, Marshall never made the general simplifying operating assumption of universal free competition for his theoretical work, preferring to treat the degree of competition as one of many variables when discussing the price determination process for a specific type, or set, of market(s). This paper explores the meaning of organised competition with respect to particular markets in the work of Walras (section I), of Marshall (section II) and of some earlier, classical writers (section III). The last is particularly warranted given Walras' praise for his 'classical predecessors', the Physiocrats, because they had declared "*that for the production of wealth, free competition is the best general rule, subject to exceptions only when they can be justified*" (Walras 1926, 1954, p. 397). The paper thereby partly revisits the terrain covered in Stigler's 'Perfect Competition Historically Contemplated' and in his entry on "*Perfect Competition*" for the New Palgrave (Stigler 1957, 1965; 1987), though this well known paper and the Palgrave entry largely ignored Walras and the views of the Lausanne School. Stigler's argument also failed to explore organisational features of specific markets in this context, despite the fact that Walras and Marshall had done so. The final section (IV) draws some conclusions.

Given the importance of "auctions" to this discussion, it may be pointed out at the outset that the word "auction" itself is not unambiguous. Although auctions have been in existence for a very long time – Herodotus reported their presence in Babylon for as early as 500 B.C. (Smith 1987, p. 138) – different countries have used different arrangements for auctions, of which the "*Dutch auction*" and the ordinary English auction are classic examples. Palgrave (1894, pp. 68-69) indicated in his article, "auction", that this type of market in England was the traditional vehicle for wholesale dealing in raw materials such as wool, while in Holland the Dutch auction system was extensively used in selling fish, vegetables and other raw produce. He also indicated that Thornton (1869) had shown that Dutch and ordinary English auctions could yield different price results, as is briefly mentioned in section III below. Smith's (1987, pp. 138-44) entry on auctions for the New Palgrave widened the range of type of auctions by adding first price and second price auctions to the traditional English and Dutch forms, noting in addition that not all of them are as competitive as they appear to be. "*The open-bid English auction*", for example, "*is particularly vulnerable to collusion, since a subset of buyers have only to agree not to bid against each other in order to reduce the expected price that will be paid*" (Smith 1987, pp. 143-4). Moreover, art auctions, as Smith (1987, p.138) also indicates, are different again, offering one object (or set of objects) at the time of sale, and likewise exhibiting institutional variation in different countries.

# I) Walras, Competition and Organised Markets

Although exchange, markets and exchange value are briefly defined by Walras in Lesson 4, §27, 28 (Walras 1926, 1954, pp. 68-9) which likewise distinguishes special markets from the market in general, the notion of competition and competitive markets is not really introduced until Lesson 5, §41. As already indicated in the introductory section, competition is first mentioned as the mechanism by which "*value in exchange, when left to itself, arises spontaneously in the market"* (Walras 1926, 1954, p. 83). The market is here generally identified as the space where exchange takes place through the process of "*buyers making their demands by outbidding each other*" and sellers making "*offers by underbidding each other*". The meeting of buyers and sellers on the market place ultimately yields the values in exchange for particular commodities which may be rising, stationary or falling, depending on the particular conditions of the market ruling at the time. The more effectively competition functions in such meetings of buyers and sellers, the more rigorous the manner by which value in exchange is reached (Walras 1926, 1954, p. 83). This leads Walras to discuss the type of market which organises competitive exchange in the best possible manner. For him, this is the auction market where by means of brokers or "criers" acting as agents, exchange transactions are centralised in such a way that the terms of every exchange are openly announced and an opportunity is provided for all sellers to lower their prices and for buyers to raise their bids. The emphasis on brokers and criers acting as agents underlines the fact that they are able to represent large numbers of buyers and sellers in the market; that on centralisation stresses the importance of location and space in organising competitive markets, while that on open announcements stresses the crucial factor of free information in the establishment of competitive markets. That the example of the bourse was not as straightforward as appeared has been amply demonstrated by Walker (2001, esp. pp. 190-91), which indicates that in 1892 the Paris bourse was not easily depicted as a single market because it consisted of as many as eight, highly specialised markets for specific types of securities.

For Walras, auction markets as highly competitive markets were represented by the stock exchange, by commercial exchanges, grain markets, fish markets, etc. However, Walras' specific writings on the stock exchange (Walras 1860, 1987; 1867, 1987; 1880a, 1880b, 1992) did not dwell to any extent on the organisational nature of these competitive qualities. Such markets in practice were often highly localised: the Le Havre cotton market, the Bordeaux wine market, and the stock exchange as the market for industrial securities. Less well organised

markets, partly because they are frequently less centralised, are fruit, vegetables and poultry markets which still enable competition to operate effectively. Highly localised shops and stores in city streets, the next stage in Walras' hierarchy of markets, are more poorly organised from the standpoint of competition, but nevertheless still function quite satisfactorily in this respect. As indicated previously, the reader is left to infer the precise organisational features which generate various degrees of competitive behaviour in these individual markets. However, on taking Walras' hints in his description of the qualities of auction markets emphasised in the previous paragraph, it can be said that such organisational features relate to aspects of size, location and the manner of making information available characteristic of specific markets. Centralised locations enable greater size and more widespread diffusion of information in markets. The fact that this matter seems never to have been explicitly raised by Walras is illustrated by the way the argument of §41 is continued. From the organisational aspects generating different degrees of competition in particular markets, the argument switches to the presence of competitive forces per se in markets in general. Competition, Walras asserts, is the primary force in determining the values of professional services whether provided by medical men, lawyers, musicians, or singers. The whole world, Walras concludes §41, can be envisaged as one giant market made up of different special markets where items of wealth can be traded. This perspective allows Walras to define his scientific task as discovering the laws to which such market exchanges conform, a task best commenced by assuming that markets are as competitive as possible. For Walras, this assumption was analogous to the frictionless world of pure mechanics.

The organisational features making for highly competitive markets are not really further explicitly pursued by Walras on my reading of the Eléments. It is true that §42, with its detailed illustration of the nature of transactions conducted at the Paris Stock Exchange, implicitly suggests homogeneity of product traded at any particular moment: 3 per cent French rentes are 3 per cent French rentes are 3 per cent French rentes to invoke Gertrude Stein's dictum. In Lesson 18, §188, high mobility of agents of production is implicitly discussed as essential to ensure the uniform prices of their productive services concomitant with a high degree of competition, once again an aspect designed (implicitly on Walras' part) to remove the problem of space from preventing the achievement of free competition. In Lesson 22, §221, Walras indicates that free competition generates uniform prices for all productive services and commodities traded in markets. In Lesson 27, §264, free competition in the capital market ensures a uniform price in the form of equal net income for savers and for actual investors (in machines, equipment and other productive resources). It is nevertheless reasonable to explore the evidence left by Walras on the organisational aspects of markets designed to enhance their competitive structure inherent in his example of the specific market hierarchy presented in Lesson 5, § 41. That hierarchy consisted of the stock exchange and specific commodity markets and exchanges; broad produce markets and finally retail stores and shops of all kinds. It seems obvious that specialisation on a specific type of commodity or set of commodities declines as you move down this hierarchy of markets ranked by the degree of competition they embody. This implies likewise that the degree of homogeneity attributable to the commodities traded on these markets declines and with it the ease (and cost) by which requisite information can be imparted to their potential participants. Lack of uniformity in products generates lack of uniformity in prices, or ease for the sellers to depart from standardised (competitive) prices, as in the case of regional produce markets (even if relatively specialised) and especially in shops and stores situated in ordinary city streets. Price competition may there be transformed into competition by quality of service or location in terms of customer access, though this is an aspect of competition which Walras did not really explore in his Eléments. The possibility of multi-price structures in the differentiated provision of specific, uniform services and commodities, even under free competition, is also admitted by Walras (Lesson 41, §384). Examples are luxury wrapping for chocolates and other types of confectionary, the grading, and differential pricing of theatre seats (where all enjoy the same

performance), and discriminatory pricing in markets for luxury goods, where the consumers are generally "*thoughtless, vain and capricious*". Imperfections in competitive markets enter by intentional differentiation of the product to cater for vanity, thoughtlessness and caprice and thereby allow monopoly elements to enter what otherwise would be freely competitive markets.

In the context of city stores and shops, such product differentiation is almost axiomatic, given the impulse to such discrimination inherently given by location (actual viscinity, for example, to high, medium or low income districts in large towns), and the relative ease by which range of commodities offered and the manner in which they are displayed can be manipulated extensively (a matter pertaining to differential access to information about the market). Walras is clearly aware of these aspects as well, as is evident from his discussion of the limitations of competition and their nature (Lesson 22, §223). All these are organisational aspects of specific markets by which the degree of competition present in these markets can be favourably, or detrimentally, influenced. Generally speaking, improved access and information, the last in turn assisted by degree of homogeneity of product and location, achievable by specialisation of particular markets and their centralisation, enhances the degree of freedom of competition in these markets. The fish market then becomes a clear case where organisation enhances the degree of competition when it is envisaged as an auction market in which the "*catch of the day*" is auctioned off to prospective buyers from fish retailers and restaurateurs, sorted out in lots by type and quality. It may be noted here, partly à propos my earlier criticism of Jaffé's use of "*perfect competition*" in this context, that some of Walras' implied qualities making for a high degree of free competition in the market, resemble the attributes much later assigned as necessary and sufficient conditions for the theoretical construct of perfect competition. Following Knight (1921, pp. 76-86), as summarised by Joan Robinson (1934, 1960), these can be specified as "*rational conduct on the part of buyers and sellers, full knowledge, absence of frictions, perfect mobility and perfect divisibility of factors of production, and completely static conditions*" (Joan Robinson, 1934, 1960, p. 20). Knight (1921, p. 82) also stressed that if "*intercommunication is actually perfect, exchange can only take place at one price*". Buyers in the perfectly competitive market were therefore implicitly price-takers. It is interesting that "*absence of* [market] *frictions*" included with Knight's conditions for perfect competition, matches Walras' analogy of the frictionless world of mechanics with a freely competitive world in economic theory. However, as Arena and Ragni (1994, p. 164) have pointed out, such parallels cannot be driven too far. For example, the horizontal demand curve for the individual firm as a characteristic of perfect competition is not to be found in Walras. Nor did Walras explicitly accept the notion of buyers as price takers as an essential characteristic of a freely competitive market, or view the competitive economic system in his Eléments as essentially static. For Walras, the notion that markets can be organised into becoming more competitive by assigning certain qualities to them becomes a feature of his applied economics. Making markets more competitive of course entailed the specific reward for Walras that it directly increased the welfare of individual consumers. Removing artificial restrictions and regulations from actual markets was one way of achieving this objective, long recognised in the literature (and one aspect for which Walras applauded what he saw as the generally erroneous doctrines of the Physiocrats). Free trade needed to be applied domestically as well as to international trade. Walras admitted that provision of the group of commodities and services, generally supplied by the State, was not amenable to improvement through the extension of competition, but only when "*the public interest*" was involved in their production (Walras 1926, 1954, p. 257, Lesson 22, §223). These aspects of the problem cannot be investigated here, since they would take the discussion too far from its specific purpose of examining notions of competition in organised markets in the work of Walras, Marshall and earlier, classical economists (They are of course ably dealt with in many specialist writings on Walras, e.g. Walker, 1984; Van Daal and Jolink, 1993; and Jolink, 1996).

## II) Marshall, Competition and Organised Markets

Marshall's approach to competition and organised markets is at the same time quite distinct from that of Walras, and quite similar to it. It is distinct from Walras because Marshall rarely suggested in his Principles that the presence of competition is essential for reaching precise analytical results (a good example of this is in Appendix F of the later editions of the Principles). This did not stop him from assuming that the broad relations of "competition" are common to nearly the whole of economics. Thus, in the context of his investigation of "*the equilibrium of normal demand and normal supply*", he initially assumed "that the forces of demand and supply have free play in a perfect market; there is no combination among dealers on either side, but each deals for himself: and there is free competition" (Marshall 1890, p. 402). By the eighth edition, Marshall, however, had eliminated the reference to a perfect market from this sentence and the phrase, "*there is free competition*" had been qualified by placing the word "*much*" before "*free*" (Marshall 1920, 1961, I, p. 341). Like Walras, Marshall identified the qualities essential for free competition, sometimes even of perfect competition (unlike Walras, Marshall occasionally mentioned that terminology, only to dismiss it as irrelevant to real economics), and linked high degrees of competition with particular forms of traders in markets. In a striking passage in one of the introductory chapters on distribution theory, Marshall indicated that his analysis of distribution nowhere relied on the assumption that "*competition is perfect*" (Marshall 1920, 1961, Book VI, chapter II, §8, I p. 540). The rationale for this is explained in the argument that follows: Perfect competition requires a perfect knowledge of the state of the market; and though no great departure from the actual facts of life is involved in assuming this knowledge on the part of the dealers in Lombard Street, the Stock Exchange, or in a wholesale Produce Market; it would be an altogether unreasonable assumption to make when we are examining the causes that govern the supply of labour in any of the lower grades of industry. For if a man had sufficient ability to know everything about the market for his labour, he would have too much to remain long in a low grade.

This paragraph from the first edition of the Principles (Marshall 1890 pp. 540-1) resembles Walras' position in that Marshall here associated perfect knowledge as the prime quality of perfect competition with specialist dealers in Lombard Street (that is, in the money market), the Stock Exchange and in wholesale Produce Markets. These were precisely the markets regarded as most competitive by Walras. However, although the great access to information provided in these markets is a key factor in Marshall's treatment of them as highly competitive markets, it is the fact that they are auction markets which was the decisive matter for Walras; a matter not explicitly raised by Marshall in this context. There were after all important institutional differences between the organisation of securities trading as conducted on British stock exchanges compared with those on French and other continental European stock exchanges (cf. Kregel 1992, p. 532; Walker 2001, pp. 186-7; Withers 1910, chapter 10). Nevertheless, and this is the important aspect for the objective of this paper, in his economics Marshall clearly associated the degree of competition present in a market with the form of its organisation. That this is indeed the case is made clear in the introductory chapter to Book V of the Principles ("*General Relations of Demand, Supply and Value*"), devoted as it is to markets in general and in particular. Marshall warned at the outset that this was a theoretical enquiry, and did not "*deal constructively with real problems"*. Nor did it require "*assumptions which specifically belong to any particular class*" (Marshall 1920, 1961 I p. 324). However, Marshall stressed that the treatment given to markets in this context could only be "short and provisional", because "*the organisation of markets is intimately connected both as cause, and effect, with money, credit and foreign trade*". A "*full study*" therefore had to be deferred to a later volume (Marshall 1920, 1961, I, p. 324). When that volume finally appeared in 1923, Marshall did not really keep his promise to deal in detail with these aspects of organised financial and foreign trade markets.

Following Cournot (1838, chapter 4) Marshall defined the term "*markets*" as used by economists "*not [as] any particular market place in which things are bought and sold, but [as] the whole of any region in which buyers and sellers are in such free intercourse with one another that the prices of the same goods tend to equality easily and quickly*" (Marshall, 1920, 1961 I p. 324). He then approvingly quoted Jevons (1871, 1970, p. 132) who indicated that great cities contained as many markets as there are branches of trade, that such markets need not be localised, but that the central point of a market is the public exchange, mart or auction rooms, where the traders agree to meet and transact business. In London the Stock Market, the Corn Market, the Coal Market, the Sugar Market, and many others, are distinctly localised; in Manchester the Cotton Market, the Cotton Waste Market, and others. But this distinction of locality is not necessary. The traders may be spread over a whole town, or region of a country, and yet make a market, if they are, by means of fairs, meetings, published price lists, the post-office or otherwise, in close communication with each other (Jevons 1871, 1970, p. 132). Marshall inferred from their descriptions of markets that "*the more nearly perfect a market is, the stronger is the tendency for the same price to be paid for the same thing at the same time in all parts of the market…",* so that buyers in that market were implicitly treated as "*price takers*", even if this term was not explicitly used by Marshall. Given that the next paragraph in this section introduced technical improvements in the means of communication ("*the telegraph, the printing-press and steam traffic*") information is here again the key feature stressed by Marshall for raising the degree of competitive perfection in any particular market, as it was indeed for Jevons (cf White 2004, pp. 99-100). Among examples of such perfect markets "*on a world scale*", Marshall mentioned those "*for many kinds of stock exchange securities, for the more valuable metals, and to a lesser extent for wool and cotton, and even wheat*" (Marshall 1920, 1961 I p. 325). Produce markets, of "*cotton, wheat and iron*", allowed Marshall to introduce homogeneity of product achieved by standardisation as an important factor influencing the degree of perfection of markets. Purchases could then be made from "*representative samples*", a further illustration of the importance of transmitting useful information for organising greater perfection in special markets. Homogeneity of commodities is a special feature of the markets in "*stock exchange securities and the more valuable metals"* (Marshall 1920, 1961, I, p. 326). As Marshall put it himself, "*any one share or bond of a public company, or any bond of a government, is of exactly the same value as any other of the same issue: it can make no difference to any purchaser which of the two he buys*". Hence the bonds of large governments and of "*very large public companies*" make an international market. Stock exchanges set the pattern for these markets in produce, provided that produce can be "*easily and exactly described*". In sharp contrast to these - Marshall used the phrase "*the opposite extremity*" – are markets which deal in totally heterogeneous goods and services; those specifically designed for particular individuals (such as "*well fitting clothes*") but also "*perishable and bulky goods*", presumably when they are indivisible. However, such markets do not feature analytically in Marshall's discussion of price determination where, at least for the market period, the emphasis is on produce markets like wheat, wool and fish. His fish market example, however, dealing as it does with a highly perishable commodity, is also used to indicate more precisely the various impacts of time in the supply and demand analysis of price determination, with particular reference to the factor of supply (Marshall 1920, 1961, Book V, chapter 2, esp. pp. 332-6; chapter 5, esp. pp. 369-72). As wholesale produce markets, these are clearly highly organised competitive markets for Marshall. The topic of organised markets is more fully broached in Marshall's Industry and Trade (Marshall 1919, Book II, chapter V, §3), where the "*Stock Exchanges of the chief industrial countries*" are singled out as their highest form. Because the economics of the Stock Exchange is best discussed in conjunction with money markets, a position Marshall had already announced in the Principles, he confined this discussion of organised markets to various produce markets. Their necessary characteristics were defined by him as follows : "*The chief conditions needed for rendering any class of products suitable to be handled in an organised market are, (1) that it be not quickly perishable; (2) that the quantity of each thing can be expressed by number, weight or measure; (3) that its*

*quality can be determined by tests that yield almost identical results when applied by different officials, assumed to be expert and honest; and (4) that the class is important enough to occupy large bodies of buyers and sellers*" (Marshall 1919, p.256).

Marshall added a fifth consideration. This emphasised that such markets needed to be made attractive to prospective dealers. It was achieved by making the commodities in which specific produce markets specialised liable to considerable price fluctuations, because such variations provided traders with the opportunity for profit in these markets (Marshall 1919, pp. 256-7). Marshall also indicated that such markets were particularly well represented by futures markets generating opportunities for "*constructive speculation*" of benefit to the public. He added the warning that "*unscrupulous men*", assisted by the "*folly of ill-informed speculators*" could bring harmful speculation to such markets (Marshall 1919, Book II, chapter V, § 4-5; for a discussion of Marshall's views on speculation, see Dardi and Gallegati, 1992). Marshall's organised markets in part reflect some of the conditions for "perfect competition" as later enumerated by Knight and others. These include a high degree of homogeneity of product, achieved by standardisation as to quality, and wide access to information on all aspects of the market available to most participating dealers. The last qualification is necessary, as implied by Marshall's discussion of "*unwarranted speculation*" in which he assigned an important role to "*ill-informed speculators*" and their follies. In the background to this discussion, Marshall explained in the conclusions to his 1919 book, lay various "*interpretations of competition*". These, Marshall indicated, generally tended to fall under three heads: (a) friendly emulation, implying cooperation in case of any need, as when two friends rival one another in the ascent of a difficult mountain; (b) ordinary business competition, in which each of several neighbourly producers or traders endeavours to get ahead of the others; but neither makes, nor tolerates the making by others, harsh judgment of their actions; (c) competition with destructive aims, in which each would go to some trouble and expense in order so to hurt others, as to clear the field for his own advance. The largest and the most savage developments of destructive competition on record have been incidents in campaigns for crushing inconvenient competitors by a Juggernaut car of combination striving for monopoly (Marshall 1919, p. 653). Thus organised competition for Marshall could take on both a benevolent guise and a highly "destructive" one. The last arose when in special markets its instruments were ultimately employed to crush competition by eliminating rivals through a "*Juggernaut car of combination striving for monopoly*", to use Marshall's colourful language from the passage just quoted. For Stigler (1957, 1965 pp. 251-3), Marshall's discussion is a far cry from invoking a "*strict concept of competition*" (read "*perfect competition*"), particularly when Marshall suggested that competitive behaviour was quite compatible with "*fear of spoiling the market*" and firms with "*negatively sloping demand curves*". According to Stigler, by the third edition of the Principles in 1895, Marshall had introduced "*the horizontal demand curve for the individual firm as the normal case and gave it the same mathematical formulation as did Cournot*". The textual evidence Stigler provided for this statement is weak. The passages he cited in support are the following. One draws on remarks in a long footnote on the marginal shepherd in which Marshall indicated that the twenty additional sheep thrown on the market by the farmer hiring the additional (or "marginal") shepherd, do not appreciably alter their price, because they constitute only a very small portion of the total market for sheep (Marshall 1920, 1961, I p. 517 n.). The second refers to Mathematical Appendix, Note XIV (Marshall 1920, 1961, I pp. 849-50), where Marshall made a similar remark in the context of estimating the marginal product of an additional worker in the case where the employer produces only a "*thousandth part*" of the aggregate output "*in a large market*". These remarks at best reflect close approximations to the theoretical ideal of the horizontal demand curve facing the individual firm in a perfectly competitive market, particularly when in both instances Marshall also alluded in these passages to the "*fear of temporarily spoiling a man's market*", a perception, as Stigler himself explicitly noted, completely incompatible with the notion of perfect competition.

Marshall's treatment of competition and organised markets is therefore diverse. For a start, he clearly avoided any appeal to a theoretical construct of perfect competition defined by him in terms of perfect access to information by dealers in the market. However, he generally portrayed the degree of competition present in actual markets as more or less free, the variations in competitiveness depending on the extent the conditions for free competition in terms of access to information were present in the market under consideration. Size of the market, the importance of the individual firm in the market, access to information for participating dealers, and degree of homogeneity of product were more generally the factors Marshall stressed as influencing the actual degree of competition experienced in a market. As certain organised markets – the stock exchange, markets dealing in the precious metals, and general produce markets – exhibited these characteristics most fully, they tended to enjoy the highest degrees of competition. Neither the stock exchange nor the bullion markets were in the end discussed by Marshall from this perspective, organised produce markets (wheat, iron, fish) took centre stage in his analysis of competitive price determination. Stigler's view (1957, 1965, pp. 251-2) that Marshall's treatment of competition did not go beyond that of Adam Smith and failed to reach the quality of that of some of his (unspecified) contemporaries in this context (J.B. Clark, F.Y. Edgeworth?) is difficult to share on the evidence.

## III) The Classical Economists, Competition and Organised Markets

Given Walras's views on the subject, it is perhaps appropriate to open this brief survey of the views on competition and organised markets of classical economists with a review of the Physiocrats' perception of the subject. This is followed by quickly examining Turgot's opinions and those of Smith, Ricardo, J.B. Say, Nassau Senior and John Stuart Mill (thereby achieving a partial blending of the conventional view of classical economics with that of Marx). Needless to say, this is not a detailed exercise, and Section III of the paper can only briefly note the extent to which these classical economic writers addressed the issue of competition and organised markets. As Walras had correctly appreciated, the Physiocrats following Quesnay stressed the necessity of free competition for securing growth of national output. (In what follows, Quesnay's views are taken as fully representative of those of the Physiocrats as a whole.) First of all, competition in the grain trade, secured both domestically and externally by removal of all barriers to that trade, was considered essential for securing the appropriate price to farmers for their product, which covered their costs and enabled them to realise a surplus from their crop (Quesnay 1757, 1962, p. 87). Competition also lowered costs for farmers, since their necessary outlays were reduced when competition prevailed among the suppliers of farm inputs. Thus wages were driven to subsistence in a competitive labour market (Quesnay 1766, 1962, p. 194), and other farming costs from purchasing non-labour inputs were similarly lowered to their absolute minimum by competition. When leases required renewal, competition ensued among farmers which enabled the whole agricultural net product to return to landlords (proprietors) by eliminating short term farming profits (Quesnay 1766, 1962, p. 185; cf Meek 1959, 1962, p. 304; Vaggi 1987, chapter 4). Apart from implying free mobility of resources including labour, and total absence of artificial restraints on trade, the precise nature of free competition was never fully specified by Quesnay, nor were the aspects of market organisation through which extensive competition in particular markets (those for grain and labour) was to be generated. However, free competition was an essential feature of physiocratic economic policy, not only in the grain trade and the labour market, but in the market for all farm inputs. It lowered farm costs and raised agricultural surplus, both essential to achieve the substantial economic growth Quesnay's Tableau économique modelling held in prospect for an "*agricultural kingdom under good cultivation*".

Turgot, much of whose economic work was geared heavily to the freeing of markets in order to make them more competitive (for a general statement, see Turgot 1759, 1977, pp. 29, 30, 32) also fully appreciated the role of competitive markets in determining current market values by

making them conform to cost of production (Turgot 1766, 1977, §32; 1767, 1977, p. 120 n.16). More interesting for the purpose of this paper is Turgot's argument prepared for the Encyclopédie in which he contrasted the practice of organised fairs with that of free markets. Fairs were depicted as special markets organised by artificially limiting competition to benefit specific local merchants, artisans and the revenue of the prince. Markets, by contrast, arose spontaneously and naturally, if trade and commerce were left unregulated, to the benefit of every buyer and seller. Buyers satisfied their wants at the cheapest possible rate, sellers found a regular spot to dispose of their goods at the appropriate market price which covered their costs and secured them an adequate return on their advances. For Turgot, free competition implied free entry into markets for all who wished to do so, mobility of both product and productive resources including labour; and was argued to develop naturally in towns and villages to benefit those participating in their trading activities. Free markets were sharply contrasted with artificially created (organised) markets, of which the great fairs were such a striking example. Fairs only benefited special interests and harmed the public good. In his *Wealth of Nations*, Adam Smith first uses the word, "*competition*" in the opening chapter on the division of labour in the context of trade rivalry between France and England (Smith 1776, 1937, pp. 6-7). No explanation of the term is provided, but that omission is repaired in Book I chapter 7 dealing with "*natural and market prices*". This argues that competition drives up market prices when supply falls short of effectual demand in line with the economic strength of the effectual demanders, and that when the opposite situation prevails and supply exceeds effectual demand, sellers become the active competitors in bringing the market price down depending on the pressure on them to get rid of their goods, particularly important when these are perishable (Smith 1776, 1937, pp. 56-57).

Competition therefore ultimately brings market and natural prices into equality, just as it equates the wages of the same kind of labour and the rates of return to capital where there is "*perfect liberty*" (Smith 1776, 1937, pp. 87, 99 and cf. p. 147, where Smith mentioned the advantages for management of "*free and universal competition*"). Absence of restrictions on mobility, or on the "*free circulation of goods*", and of monopoly in a market secured free competition (Smith 1776, 1937, pp. 115, 129). Competition is likewise enhanced when a large number of dealers are active (Smith 1776, 1937, pp. 342-3) or, in short, in an extensive market (Smith 1976, 1937, pp. 112-3). Smith seems to have said very little about the precise nature of these markets, on the necessary organisation to make them competitive, and the word 'market' did not feature in the index to his book. Smith's views on competition were absorbed by most of the subsequent classical economists in Britain. Ricardo's Principles, for example, assumed the market and natural price equalising properties of free competition or of "*competition without restraint*" (Ricardo 1817, 1951, I pp. 12, 187), so that "*exchangeable value*" of goods is sufficient to pay the wages of labour necessary for their production and to return the capital employed to "*its original state of efficiency*" (Ricardo 1817, 1951, I p. 91). In this context, Ricardo also stated that Smith had said virtually everything that needed to be said on this topic. Markets were only discussed in general by Ricardo, as in the case of the need for finding new markets from which to import cheap corn or, more generally, from which to obtain commodities en masse (Ricardo 1817, 1951, I pp. 93, 132). Conditions for organising markets to achieve more effective competition was a topic not really explored by Ricardo, except for his development of the general case for free trade.

Like Ricardo's Principles, Say's Treatise was so influenced by Smith's work that the presence of competition was more or less taken for granted, except when specific cases of monopoly or government regulation were discussed. In fact, at several stages of the argument, absence of regulation and restraints is taken to imply that "*free competition*" exists (Say 1832, pp. 184-6, 326). Say invoked competition as the mechanism which secures the eventual equality of market prices with cost of production (Say 1832, pp. 89-93), it was also said to "*moderate profits*" (Say 1832, p. 83) and to equalise returns to the various agents of production. Say also related the presence of competition with very large numbers (he used the phrase, "*an infinity*") of sellers in

the corn market (Say 1832, p. 192) but generally speaking Say did not associate higher degrees of competition with specific market forms. The market for subsistence (Say 1832, p. 323) and the wine market (Say 1832, p. 290) were exceptions. Perfect freedom in international trade generated competition and, following Smith's pioneering analysis, thereby enhanced national prosperity. Say is yet another example of a classical economist who added little to the discussion of competition in organised markets. Nassau Senior, to take a "late" classical economist, barely dealt with "*free competition*" in his economic work. His few remarks on the subject treated "*free competition*" as an assumption or postulate of political economy, especially relevant for distribution theory, and as the factor which equated market price to cost of production or to the sum of labour and abstinence which the production requires (Senior 1928, II p. 17; cf. Senior 1836, 1951, pp. 101-02). Senior's discussion of competition completely lacked any discussion on the qualities which make competition "perfect", or on the type of market organisation which secures the highest degree of competition. After Smith's and Ricardo's treatments, the analytical and factual properties of competitive markets appear to have been more or less taken for granted.

John Stuart Mill (1848, 1965) succinctly exposited the classical view on the nature and necessity of competition for political economy. For Mill, competition was an essential postulate if anything "firm" was to be concluded on the laws of wages, profits and rent (Mill 1848, 1965, Book II, chapter 4, §1, p. 237). Competition also equated prices and cost of production, hence generated a tendency for uniformity of price in particular commodities, again a somewhat axiomatic proposition. In practice, however, Mill conceded that prices tended to vary for the same commodities at retail level. There are "*in every large town, and in almost every trade, cheap shops and dear shops, but the same shop sells the same article at different prices to different customers: and as a general rule, each retailer adapts his scale of prices to the class of customers whom he expects*". Only the wholesale trade is "*under the dominion of competition*", because it is under the control of professional traders and not ruled by the whims and caprices of indolent customers as the retail trade tends to be (Mill 1848, 1965, I pp. 242-3). For developing clear principles, the axiomatic properties of competition were important to Mill. However, social application of such laws in practice made the actual facts of the matter relevant. Mill therefore indicated that free competition can only really prevail in the well-ordered, organised professional wholesale markets: the actual conditions of the retail trade provided little scope for that price equalising competition the theory of political economy needed to assume.

A short comment on Thornton's (1869) treatment of auction markets, in which he indicated the potential for varying results with respect to price under a system of Dutch auction as against English auctions, needs also to be given. In the context of Thornton's desire to refute the law of supply and demand (the foundation of the wages fund as he saw it), Thornton thought he needed to give only one single example by way of exception in order to deny the generality of that law. He claimed to have found one such exception by demonstrating that price may vary under a system of Dutch auction as compared with an English auction system. For example, as price was lowered (the Dutch system) a buyer perhaps offered eight shillings for a hundred herrings rather than risk not getting the herrings he wanted; under the English system, a bid of six shillings may have secured him that quantity of fish (Thornton 1869, pp. 56-57). J.S. Mill, it may be noted here, did not see this example as a valid negation of the law of supply and demand, but as an affirmation that this law could be consistent with two different prices, depending on the organisation of the market. Edgeworth (1891, p. 13) also criticised Thornton's argument because when the number of competitors at the auction is large, this result disappears. Although free competition initially could not be taken for granted by the classical economists in practice, it was clearly seen as something to be advocated for the public good (Quesnay, Turgot and to a large extent still Smith). Subsequent generations of classical economists (Ricardo, Say, Senior and J.S. Mill) may be said to have taken the existence of free competition sufficiently for granted to make it an appropriate assumption for their general theorising on the forces determining market prices

and the “*laws of distribution*”. Little was said by these later classical economists on what generated high degrees of competition, or what form of market organisation was best suited to raise its intensity. J.S. Mill is a partial exception, given his explicit denial of much competition to the retail trade and his confinement of high degrees of competition to the more professional and better organised wholesale markets. Although organisational features of this competitiveness were not discussed by Mill in detail, this aspect of his work nevertheless brings it somewhat closer to the views on competition and organised markets espoused by Walras and Marshall in their different ways.

## Conclusion

What conclusions are derivable from this comparative study of Walras, Marshall and the “classical economists” on the subject of organised markets and the degree of competition? First, and somewhat negative, support for the notion of what became known in the 1920s and 1930s as perfect competition (Knight 1921; Robinson, 1934, 1960) was pretty well non-existent for these economic writers, despite attempts to put words into the mouths of some of them (For Walras, this included Jaffé’s attempt when translating the Eléments to smuggle in usage of the phrase “*perfect competition*” on Walras’ part, unwarranted in terms of the French text. For Marshall, it included Stigler’s remarks trying to impose a horizontal demand curve for the individual firm on him in a “*perfectly competitive*” industry as the general competitive case). Secondly, only Walras and Marshall appear to have connected particular types of organised markets with high degrees of competitiveness in a surprisingly similar manner with respect to the particular form of market organisation they identified in this context. The earlier classical writers, generally speaking, failed to do so. Turgot, however, in emphasising the special market form of organised trade fairs did so to condemn their anti-competitive nature; while Mill unambiguously pointed to the non-price competition he saw prevalent in the retail sector. The emphasis by classical economists on the actual lack of free competition in contemporary grain and labour markets especially, was explicitly ascribed by them to government regulation and not to the precise organisational form of the markets in which grain and labour were traded. Only Mill did so when identifying wholesale markets with the prevalence of competition and retail markets with restrictive practices (this is yet a further reason for differentiating him from the classical school of economics and associating him with their more modern successors). With respect to the general qualities associated with high degrees of competition in particular markets, the similarities between the views of the authors surveyed appears greater, particularly with respect to the outcomes attributed to competitive markets. High degrees of competition in markets were invariably related to a great deal of price uniformity for the items actually traded there, including in this context the productive services of agents of production. Mobility of, and uniformity in the things traded, the last viewed as essential for generating full information to the dealers in these markets, were seen as key factors in securing the equilibrium prices and rates of return free competition implied. Size of the market, indicated by the presence of a large number of traders, was also generally recognised as a crucial attribute of a genuinely competitive market. Taken together, these qualities suggested quite specific organised markets as particularly amenable to competition, and thereby facilitated the identification of market organisation where lack of mobility, uniformity and large market size made free competition difficult to achieve. The last included markets for specific talents reflected in both short and long-lived artistic performances, or individually crafted consumer goods so frequently mentioned by classical writers (Smith, Ricardo) as instances where competition was not easily applied.

Although generally speaking only implicitly raised in the discussion so far, the literature surveyed often treated competition as an axiom, as a policy goal and as an existing fact, occasionally confusing the differences between the three (a problem discussed in some detail in

Edgeworth, 1881, 1932, esp. pp. 17-19). There were differences in practice, often associated with the degree to which free competition had advanced in the period when individual economic writers were making their contributions. Thus for the Physiocrats and Turgot, achieving free competition was a policy goal yet to be realised in those markets with the operations of which they were particularly concerned. In spite of this, they tended to assume competition when drawing conclusions from their theorising. The same can be said to a large extent for Smith, and even more so, Ricardo, who assumed the existence of competition when analysing value and distribution, while being fully aware of the absence of much competition in the markets of their contemporary worlds. Whether the same applied to the writings of later classicals, such as Say, Senior and J.S. Mill, is more difficult to say. In any case, the axiomatic importance of free competition to their economic theorising was more explicitly acknowledged, their belief in the benefits of competition for human welfare is difficult to doubt, while their realisation that such free competition did not actually exist, or could not exist in many areas of economic activity, is easily demonstrated. Moreover, for the classical economists whose views on competition were briefly looked at, organised markets were rarely explored in this context. J.S. Mill is a rare exception, given his strong differentiation of actual wholesale and retail markets on this score. A substantial shift can be noted between the classical economists' position and that of Walras and Marshall. For Walras and Marshall, free competition was confined to specific forms of organised markets where traders consist largely of well-informed dealers and traded commodities can be standardised if they are not uniform by nature; where information is near perfect and where the market is centralised and large. However, explicit differences between Walras and Marshall on this subject should also be noted. Although both recognised the usefulness of assuming free competition, their use of this assumption was decidedly different. Walras, as mentioned previously, needed to assume highly competitive markets for his general equilibrium analysis. For him, the operations of the Paris bourse were indicative of competitive markets in general, even though he clearly recognised a hierarchy of competitiveness in actual markets. Marshall, generally speaking, resisted that temptation when dealing with competitive markets, because their implications about access to information by participating dealers, could not be applied to particular types of markets such as the unskilled labour market. For Marshall, the stock exchange and segments of Lombard street were quite unrepresentative of most actual markets. This was almost certainly the reason why he explicitly rejected the assumption of perfect competition for his economic analysis in general. The conclusions of perfectly competitive analysis were invariably unrealistic and useless. At best, the analytical implications from perfect competition provided close approximations of an actual situation, due to special circumstances ruling in the particular markets in question.

I am therefore highly dubious about Stigler's remark that Marshall advanced little beyond Smith on the issue of competition. Two reasons suffice for this. First, Marshall appears to have been far more alert than Smith was to the analytical consequences of assuming artificial theoretical constructs such as perfect competition; a notion in all fairness totally out of the range of Smith's analytical imagination. Secondly, although both Smith and Marshall had a firm understanding of the realities of their contemporary market place, the shifts in market organisation in the intervening century made it impossible for them to treat the phenomenon of competitive markets in the same way. What Smith and Marshall share, and this was not noted by Stigler, is a subtlety about the nature of competitive markets which came from their staunch analytical practice of attempting to deal with economic phenomena as they actually existed. The contemporary notion of perfect competition was not really fully constructed until the 1920s and 1930s, and in some respects even later, though some nineteenth century theorists came close to distilling its more important properties. Modern notions of perfect competition are, however, far more rigid than the notion of free competition in Marshall and Walras, let alone that of the classical economists, even if some of the properties of perfect competition properties were recognised during the eighteenth century. From my knowledge of the literature, its association with organised markets

was largely a late nineteenth century phenomenon, implicit to a degree in Mill, explicit in Walras and Marshall. As such, it always tended to stay in touch with reality, something which cannot be said about contemporary highly artificial constructs of perfect competition. Perfect competition is a pure analytical device, which caricatures rather than captures actual behaviour in markets, more or less organised. It could only be grafted onto economic theory when concerns with realism are prized less than analytical rigour and logical proof (cf Edgeworth 1881, 1932, esp. pp. 40-42). Despite his hierarchy of organised markets in terms of degrees of competition, this conclusion also applies to a rigorous theorist like Walras when his Eléments alone are contemplated. When, as this paper has not done, his work on social and applied economics is included, such a conclusion is more difficult to sustain and Walras becomes as much a "realist" as Marshall and some of the classical economists.

## REFERENCES BIBLIOGRAPHIQUES


ARENA R. and RAGNI L. (1994), « Libre concurrence et méthodologie walrasienne – une tentative de mise en relation », *Economies et Sociétés*, Serie histoire de la pensée économique, n° 21-22, October/November, pp. 161-82.

COURNOT A.A. (1838, 1963), The Mathematical Principles of the Theory of Wealth, Homebush, Illinois: Irwin paperbacks.

DARDI M., GALLEGATI M. (1992), "Alfred Marshall on Speculation", *History of Political Economy* vol 24, n°3, Fall, pp. 571-94.

DONZELLI F. (2004), "*Equilibrium and tâtonnement in Walras' Eléments*", preliminary version of paper presented at the 4th Walras Colloque, Nice, 23 September.

EDGEWORTH F.Y (1881, 1932), *Mathematical Psychics, An Essay on the Application of Mathematics to the Moral Sciences*, London; London School of Economics and Political Science Series of Reprints of Scarce Tracts n° 10.

EDGEWORTH F.Y. (1889, 1925), "On the Application of Mathematics to Political Economy", in: EDGEWORTH F.Y., *Papers relating to Political Economy*, London: Macmillan for the Royal Economic Society, volume II pp. 273-312.

EDGEWORTH F.Y. (1891), « La Théorie mathématique de l'offre et de la demande et le coût de production », *Revue d'économie politique* vol 5, n°1, pp. 10-28.

JAFFE W. editor (1965), *Correspondence of Léon Walras and related Papers*, Amsterdam: North Holland Publishing Company, three volumes.

JEVONS W.S. (1871, 1970), *The Theory of Political Economy*, edited by R.D. Collison Black, Harmondsworth: Pelican Classics.

JOLINK A. (1996), *The Evolutionary Economics of Léon Walras*, London: Routledge.

KNIGHT F.H. (1921), *Risk, Uncertainty and Profit*, New York: Houghton, Mifflin and Company.

KREGEL J.A. (1992), "Walras' Auctioneer and Marshall's Well-Informed Dealers: Time, Market Price and Normal Supply Prices", *Quaderni di storia dell'economia politica*, vol 10, n°1, pp. 531-52.

MARSHALL A. (1890), *Principles of Economics, London*: Macmillan, first edition.

MARSHALL A. (1919), *Industry and Trade*, London: Macmillan.

MARSHALL A. (1920, 1961), *Principles of Economics*, variorum edition, edited C.W. GUILLEBAUD, London; Macmillan for the Royal Economic Society, 2 volumes.

MARSHALL A. (1923), *Money, Credit and Commerce*, London: Macmillan.

MEEK R.L. (1959, 1962),"The Physiocratic Concept of Profits", in MEEK R.L. (ed) *The Economics of Physiocracy*, London: Allen and Unwin, pp. 297-312.

MILL J.S. (1848, 1965), *Principles of Political Economy*, ROBSON J.M. (ed) Toronto: Toronto University Press, 2 volumes.

PALGRAVE R.H.I (1894), "Auctions", in *Dictionary of Political Economy*, London: Macmillan, volume I, pp. 68-69.

QUESNAY F. (1757, 1962),"Corn", in MEEK R.L. (ed) *The Economics of Physiocracy*, London: Allen and Unwin, pp. 72-87.

QUESNAY F. (1766, 1952), "The Second Economic Problem" in MEEK R.L. (ed) *The Economics of Physiocracy*, London: Allen and Unwin, pp. 186-202.

RICARDO D. (1817, 1951), *Principles of Political Economy and Taxation*, SRAFFA P. (ed) Cambridge: Cambridge University Press for the Royal Economic Society.

ROBINSON Joan (1934, 1960), "What is Perfect Competition?", in ROBINSON J., *Collected Economic Papers*, Oxford: Basil Blackwell, pp. 20-34.

SAY J.B. (1832), *A Treatise of Political Economy*, translated from the fourth French edition by PRINSEP C.R., Philadelfia : Claxton, Remsen and Haffelfinger.

SENIOR N.W. (1836, 1951), *An Outline of the Science of Political Economy*, London: Allen and Unwin.
SENIOR N.W. (1928), *Industrial Efficiency and Social Economy*, LEVY L. (ed) London: P.S. King.
SMITH Adam (1776, 1937), *An Inquiry into the Nature and Causes of the Wealth of Nations*, CANNAN E. (ed) New York: Modern Library edition, Random House.
SMITH V. L. (1987), "Auctions", in EATWELL J, MILGATE M. and NEWMAN P (eds) The New Palgrave. A *Dictionary of Economics*, London: Macmillan, volume I, pp. 138-44.
STIGLER G.J. (1957, 1965), "Perfect Competition Historically Contemplated", in STIGLER G.J. *Essays in the History of Economics*, Chicago: Chicago University Press, pp. 234-67.
STIGLER G.J. (1987), 'Competition' in EATWELL J., MILGATE M. and NEWMAN P. (eds) *The New Palgrave. A Dictionary of Economics*, London: Macmillan, volume 1, pp.
THORNTON W. (1869), *On Labour: its Wrongful Claims and Rightful Dues; its Actual Present and Possible Future*, London: Macmillan.
TURGOT A.R.J. (1757, 1977), "Fairs and Markets" in GROENEWEGEN P.D. (ed) *The Economics of A.R.J. Turgot*, The Hague: Martinus Nijhoff, pp. 14-19.
TURGOT A.R.J. (1759, 1977), "In Praise of Gournay", in GROENEWEGEN P.D. (ed) *The Economics of A.R.J. Turgot*, The Hague: Martinus Nijhoff, pp. 20-42.
TURGOT A.R.J. (1766, 1977), "Reflections on the Formation and Distribution of Wealth", in GROENEWEGEN P.D. (ed) *The Economics of A.R.J. Turgot*, The Hague: Martinus Nijhoff, pp. 43-95.
TURGOT A.R.J. (1767, 1977), "Observations on a Paper by Saint-Péravy" in GROENEWEGEN P.D. (ed) *The Economics of A.R.J. Turgot*, The Hague: Martinus Nijhoff, pp. 109-22.
VAGGI G. (1987), *The Economics of François Quesnay*, Durham, Duke University Press.
VAN DAAL J and JOLINK A. (1993), *The Equilibrium Economics of Léon Walras*, London: Routledge.
VON BORTKIEWICZ L. (1890), Review of « Léon Walras, Éléments d'économie politique pure », *Revue d'économie politique*, vol 4, Jan.-Fév., pp. 80-86
WALKER D.A. (1984), "Is Walras' Theory of General Equilibrium a Normative Scheme ?", *History of Political Economy* vol 16, n°3, Fall, pp. 445-69.
WALKER D.A. (2001), "A Factual Account of the functioning of the nineteenth century Paris Bourse", *European Journal of the History of Economic Thought,* vol 8, No.2, Summer, pp. 186-207.
WALRAS L. (1860, 1987), « La Bourse et le développement du capital » in: DOCKES, P., GOUTTE P.H., HEBERT C., MOUCHOT C., POTHIER J-H and SERVET J.M. (eds), *Mélanges d'économie politiques et sociale*, Paris: Economica, pp. 111-20.
WALRAS L. (1867, 1987), « La Bourse » in DOCKES P., GOUTTE P.H., HEBERT C., MOUCHOT C. POTHIER J-H and SERVET J.M. (Eds), *Mélanges d'économie politique et sociale*, Paris: Economica, pp. 180-83.
WALRAS L. (1880a, 1992), « La Bourse, la spéculation et l'agiotage », Bibliothèque Universelle et Revue Suisse, in: DOCKES P. (ed), *Etudes d'économie politique appliquée*, Paris: Economica, pp. 401-21.
WALRAS L. (1880b, 1992), « La bourse, la spéculation et l'agiotage », Bibliothèque Universelle et Revue Suisse, in: DOCKES P. (ed), *Etudes d'économie politique appliquée,* Paris: Economica, pp. 422-45.
WALRAS L. (1896), *Etudes d'économie sociale*, Lausanne: F. Rougé and Paris: F. Pichon.
WALRAS, L. (1926, 1954), *The Elements of Pure Economics or the theory of Social Wealth*, JAFFE W. ed, London: Allen and Unwin for the American Economic Association.
WALRAS L. (1874, 1988), *Éléments d'Économie politique pure ou Théorie de la richesse sociale*, in DOCKES P., GOUTTE P.H., HEBERT C,. MOUCHOT C., POTHIER J-P and SERVET J.M. (eds), Paris : Economica.
WHITE M. (2004), "A Grin without a Cat: W.S. Jevons' Elusive Equilibrium", in ASPROMOURGOS A. and LODEWIJKS, J. (eds), *History and Political Economy*. Essays in Honour of P.D. Groenewegen, London: Routledge, pp. 97-117.
WHITERS H. (1910), *Stocks and Shares*, The Lombard Street Library, London, John Murray.