

# HICKS ON WALRASIAN EQUILIBRIUM IN THE 1930S AND BEYOND

by

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## 1. Introduction

In 1973 *Economica* devoted its February issue to celebrating Sir John Hicks. On that occasion, Hicks's famous monograph *Value and Capital* (1939) was hailed as "the book that transformed economic theory" (p. 1). Nowadays *Value and Capital* (henceforth *VC*) is viewed as the starting point of the so-called neo-Walrasian research programme. From at least the 1970s Hicks himself endorsed that qualification and recognized his own Walrasian affiliation at the time when he was writing *VC* (1983b, p. 85).

Yet, on re-reading *VC*, such parentage does not stand out so clearly. *VC* is subdivided into four parts, the first two devoted to 'statics' and the last two to 'dynamics'. One should expect that, at least in the 'static' parts of *VC*, Walras should be at the centre of the stage; but this is not really so. It is true that, soon after the beginning of Part II – General Equilibrium, Hicks (1939, p. 61) declares: "I shall follow Walrasian methods in considerable parts of this book". Yet, if one peruses the one hundred and ten pages of the 'static' parts, one immediately realizes that the pride of place goes to Marshall and Pareto; Walras is hardly mentioned, except when it is strictly necessary. And even when his name is mentioned, as it happens at the pages 57-61, where Hicks evokes the allegedly Walrasian equation-counting method for 'proving' equilibrium existence and alludes to Walras' Law, the reference is far from favourable: at p. 61, in particular, the "Walrasian system" is blamed for its "sterility", which is ascribed to the fact that "Walras did not go on to work out the laws of change for his system of General Equilibrium."

If one then moves to the 'dynamic' parts of *VC*, the situation is understandably even worse. In the two fundamental chapters introducing Part III, respectively called "The Method of Analysis" and "Equilibrium and Disequilibrium", there is room for Böhm-Bawerk, J.B. Clark, Cassel, Keynes, Knight, Pigou, and Wicksell, but not for Walras or any other economist of the "Lausanne School" (this being the name occasionally used by Hicks in those years to designate Walras, Pareto and their followers). Walras is only mentioned once, together with Edgeworth, in the two-page long Note to Chapter IX on "The Formation of Prices" (1939, pp. 127-9), which is almost entirely devoted to Marshall's theory of barter and temporary equilibrium.

Further, it is at least curious that the *VC* model, nowadays universally regarded as the point of departure of the neo-Walrasian programme, should have been called with a name, 'temporary equilibrium model', that is directly drawn from Marshall's, rather than Walras's, conceptual system.

As a matter of fact, the controversial relationship between Hicks and the Walrasian approach is not only exemplified by some passages to be found in *VC*, but is also instanced by the contents of almost all of Hicks's writings in the 1930s. For instance, in his 1933 paper in German, now re-published in English translation as (1980b), Hicks not only criticizes Pareto for his ambiguity about the equilibrium notion and his lack of any proper theory of capital, but also attacks Walras for his confusion about the meaning of equilibrium, a confusion that is regarded as even more serious than Pareto's, and, as a consequence, for his mistaken theories of capital and money (1980b, pp. 29, and 33, fn. 13). Strong criticisms are raised against Walras's conception of equilibrium and his theory of capital also in Hicks's 1934 *Econometrica* article specifically devoted to Walras; but what is perhaps even more striking in this paper is the way-out suggested by Hicks in order to escape from the fallacies beleaguering Walras's theory: for he recommends a stationary interpretation of both the Walrasian equilibrium notion and Walras's theory of capital. Quite paradoxically, however, a

few months Hicks abandons the stationary equilibrium interpretation (1935b, pp. 68) and reproaches Pareto, among others, for allegedly interpreting the equilibrium concept in a stationary sense (1936a, p. 85).

The intricate relationship between Hicks and the Lausanne School in the 1930s, culminating in the ambiguous connotations of *VC*, has been indirectly acknowledged by Hicks himself, who has come back over and over again to those years, on the one hand to offer an inside reconstruction of his own intellectual history during that decade, and, on the other, to reinterpret, qualify, amend, and even disown and repudiate the *VC* model and the underlying method of analysis.

The aim of this paper is to clarify the theoretical reasons behind the winding path followed by Hicks over the 1930s, especially as far as the Walrasian conception of equilibrium and equilibration is concerned. In Sections 2 and 3 we shall examine Hicks's ideas on the Walrasian approach and related matters in the early 1930s, focusing especially on Hicks's 1933 paper in German and his 1934 article on Walras: Section 2 will chiefly deal with the exchange model, while Section 3 will be mainly devoted to the models with production and capital formation. Section 4 will summarize the questions that are left open by the 1934 article. In Section 5 we shall analyse the evolution of Hicks's thought on Walrasian equilibrium and equilibration during the years of the gestation of *VC*, focusing especially on Hicks's two important 1935 papers (1935a and 193b) and on his two reviews of the Keynes's *General Theory* (1936a and 1937). Section 6 will discuss the *VC* temporary equilibrium model. Section 7 concludes.

## **2. Hicks on Walrasian equilibrium and equilibration (1930-1934): exchange**

Hicks's reflections on equilibrium date from his first theoretical paper on Edgeworth and Marshall (1930) and are central to all his other works of the early 1930s: the paper on uncertainty and profit (1931), the book on the theory of wages (1932), the paper on equilibrium and the cycle (1933), as well as the joint paper with Allen on consumer and demand theory (Hicks and Allen, 1934a and 1934b). Yet, since the focus of the present paper is on Walrasian equilibrium, it is convenient to start from the 1934 article on Léon Walras (called the 'Walras' paper in the following), where Hicks systematically confronts our main issue, going back to the previous writings when necessary.

The 'Walras' paper was commissioned to Hicks by the editors of *Econometrica* on the occasion of Walras's centenary and was meant to provide a general presentation of that author's ideas to the benefit of the readers of that journal. According to Hicks's later opinion, he did not do a good job, for in the paper "there [was] too much about the relation of Walras to Marshall, who naturally bulked large in the circles in which I was moving" (1983b, p. 85). As a matter of fact, the place of Marshall in the paper is absolutely out of proportion, as can be seen, e.g., from the following passage:

Indeed, the modern reader of Walras' *Eléments d'Economie Politique Pure* is struck by its affinity, not with the work of Jevons or Menger, but with that of Marshall. For a quite considerable part of the way Walras and Marshall go together; and when they separate, it is a difference of interest, rather than of technique, that divides them. (Hicks 1934, p. 338).

In the 1980s Hicks ascribed his juvenile overvaluation of the affinities between Walras and Marshall to the influence of the scientific environment from which he was then surrounded. This is certainly true, but it is not all the truth: for, in the whole of the 'Walras' paper, one observes a systematic tendency on the part of Hicks to blur the differences between Walras and Marshall, a tendency that will persist over the years and will have momentous effects in *VC*, as will be seen in Section 6 below. In 1934, the most important instance of such tendency can be found in a passage where Hicks maintains that both Walras and Marshall, starting from the same "conception of perfect competition", traceable to "Cournot's analysis [of] Unlimited Competition", are able to

build a theory of individual competitive behaviour that is at the basis of their “theory of exchange value generally”:

In the hands of Walras, this conception of perfect competition was converted into a special technique of using prices as economic parameters. Although this technique was used by Marshall as well, its very consistent employment is highly characteristic of Walras’s work. (Hicks 1934, pp. 339-40)

Yet Marshall, unlike Walras, never assumed price-taking behaviour and never used “prices as economic parameters”<sup>1</sup>. Many years later, Hicks will recognise his mistake (Hicks 1983a, p. 88, fn. 7). In the 1930s, however, the blurring of the differences between the two economists was there to stay and to play an important role in Hicks’s story.

According to Hicks, it is with the determination of the equilibrium conditions in the multiple exchange problem that, “for the first time, we have a characteristically Walrasian doctrine. What is it worth?” (1934, p. 341) Hicks’s answer runs as follows:

The types of equations used by Walras in determining exchange equilibrium are two; those which express the dependence of the amounts demanded and supplied by particular individuals on the system of market prices, and those which express the equality of demand and supply in particular markets. These two classes stand on very different footings. So far as the first class is concerned, they have become the essential foundation for the whole branch of economics to which they refer. [...]

The second class, which expresses the equation of supply and demand in the different markets [...] has proved much more open to criticism. For it is on this class that the meaning of Walras’ system of general equilibrium depends, and by far the most important divergence between Walras and Marshall turns on this point. (Hicks 1934, p. 341)

What Hicks has in mind in the last part of the last sentence may appear mysterious at first sight. But the meaning is clarified by the content of a footnote appended to the quotation, where the reader is referred to “Edgeworth’s review of Walras in *Nature* (1889) and his controversy with Bortkiewicz in the *Revue d’Economie Politique* (1890-91). Also his comment in *Papers*, II, 311.”

What the references in this footnote make clear is that the issue Hicks is concerned with is that of the establishment of equilibrium, that is, of the process by which an equilibrium state is arrived at in the exchange model: for the chief objection raised by Edgeworth against Walras’s theory in his 1899 review of the second edition of the *Eléments*, an objection reiterated with almost identical words thirty five years later in the passage of Edgeworth’s *Papers* referred to by Hicks, concerns precisely Walras’s view of the equilibration process, the celebrated *tâtonnement* construct. That construct also represents the main bone of contention in the controversy between Edgeworth (1891a) and Bortkiewicz (1890), acting as Walras’s spokesman in this contingency<sup>2</sup>.

After recalling the Walrasian rule of price adjustment underlying *tâtonnement* in exchange (“if demands and supplies are not equal, prices will be changed until equilibrium is reached”), Hicks continues as follows:

What, however, Walras does not make really clear is whether any exchanges do or do not actually take place at the prices originally proposed, when those prices are not equilibrium prices. If there is no actual exchange until the equilibrium prices are reached by bidding, then Walras’ argument is beyond reproach on the score of logical consistency, though it may be called unrealistic. (The market then proceeds under Edgeworth’s principle of

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<sup>1</sup> See Donzelli (2008, Section 4).

<sup>2</sup> See Donzelli (2009).

“recontract”, or provisional contract.) But if such exchanges do take place, then, in general, the final equilibrium prices will be affected by them. (Hicks 1934, p. 342)

To this passage a long footnote is appended, where Hicks quotes a well-known passage belonging to Lesson 5 of the *Eléments*, right at the beginning of the part on exchange, where Walras expresses his view that the markets which are best organized from the competitive standpoint are those in which transactions are centralized and prices are openly announced by professional agents (Walras 1988, p. 70<sup>3</sup>). This passage, however, has nothing to do with Hicks’s dilemma and can consequently do nothing to dispel his doubts. Hence, not surprisingly, the footnote ends with the sentence: “This remains ambiguous” (1934, p. 342, f. 11).

Yet, all, or at least most, of Walras’s ambiguities censured by Hicks would have been removed if the latter, instead of quoting the irrelevant passage on organised markets, had quoted another famous passage, immediately following the one referred to by Hicks, where Walras explicitly solves the dilemma in favour of the first alternative: for, in the context of a specific example concerning the market for a particular kind of securities (perpetuities) traded on the Paris Stock Exchange, he makes an explicit assumption to the effect that no trade is allowed to take place (“Théoriquement, l’échange doit être suspendu” or “Suspension de l’échange”) up until equilibrium is reached (1988, p. 89, 2-4).

One can hardly believe that this passage may have escaped Hicks’s attention<sup>4</sup>. It is true that the few words expressing the ‘no trade out of equilibrium assumption’ were not present in the first edition of the *Eléments* and were inserted only in the second. But, since Hicks was then using the 4<sup>th</sup> edition, as he himself informs us, his neglect of the ‘no trade out of equilibrium assumption’ cannot be explained with its belated introduction. It is more likely that Hicks’s neglect be deliberate, that is, motivated by his desire to stress the general dilemma underlying any equilibration process of the Walrasian type, as well as, perhaps, Walras’s own ambiguities in this respect.

For Walras had certainly been very undecided and unclear about the interpretation of his tâtonnement: as far as the exchange model is concerned, most probably Walras’s original view had been a very realistic one, allowing transactions to take place out of equilibrium as well; as far as the models with production (i.e., the exchange and production model and the capital formation model) are concerned, it is instead absolutely certain that from the very beginning Walras had envisaged a *tâtonnement* process where observable exchange and production activities are allowed to take place out of equilibrium<sup>5</sup>. While postponing an examination of the models with production to the next Section, we discuss now the issues related with the equilibration process in the exchange model.

As is well-known, in 1883 Bertrand criticised a version of the exchange model contained in the second edition, published in the same year, of Walras’s *Théorie de la richesse sociale* (Walras 1993). Bertrand’s contention was that, owing to the actual carrying out of observable transactions during the equilibration process (this being Bertrand’s interpretation of *tâtonnement* in exchange), the data of the economy would change during the process, so that no prediction could be made of the equilibrium eventually reached and the model would turn out to be indeterminate.

Walras reacted to this attack at first in 1885, by explicitly introducing a ‘no trade out of equilibrium assumption’ in an obscure paper on an entirely different subject, and then in 1889, by inserting the above mentioned words in the relevant passage of the second edition of the *Eléments*. Yet, apart from that insertion, the whole structure of Walras’s reasoning, as far as the exchange

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<sup>3</sup> Since 1988 a comparative edition of Walras’s *Eléments* is available, where the texts of the various editions of the *Eléments* (1<sup>st</sup> 1874-77, 2<sup>nd</sup> 1889, 3<sup>rd</sup> 1896, 4<sup>th</sup> 1900) are collated and compared. When quoting from or referring to the *Eléments*, we shall use the comparative 1988 edition. All references will have the following form: (Walras 1988, page number(s), edition number(s) in bold). When no edition number is specified, as in the reference above, this should be taken to mean that the text has remained unchanged over all the editions.

<sup>4</sup> In effect, it does not escape the attention of Kaldor, who, at about the same time as Hicks, provides an interpretation of Walras’s *tâtonnement* in exchange where due account is paid to the ‘no trade out of equilibrium assumption’ (Kaldor 1934, p. 126).

<sup>5</sup> See Donzelli (2007).

model is concerned, remained unaffected. So that Hicks, though formally incorrect, had after all some substantive justification in signalling the existence of a problem that Walras had simply swept under the carpet with his “no trade assumption”<sup>6</sup>.

After describing the dilemma confronting Walras as far as the equilibration issue is concerned, Hicks proceeds to explain how Marshall had tried to face the same issue from a different perspective:

Marshall’s way out of this dilemma was to concentrate on a particular market, where he could show that if the marginal utility of one of the commodities exchanged could be treated as constant, then the final rate of interchange would be independent of the path followed to reach it. But this solution – which is, after all, only a very particular solution – is usually not available in the case of General Equilibrium. (Hicks 1934, pp. 342-3)

Hicks is here referring to Marshall’s theory of barter and its generalisation to the theory of market or temporary equilibrium, respectively discussed in Appendix F. Barter and Chapter 2, Book 5 of Marshall’s *Principles of Economics* (1961a). Marshall’s theory of barter had also been the subject matter of a controversy between Edgeworth (1891b), (1891c) and Berry (1891), acting in this contingency as Marshall’s spokesman<sup>7</sup>. In 1934 Hicks is well aware of this debate, for it had been at the centre of his 1930 paper. Moreover, in his article with Allen on the theory of demand (Hicks and Allen 1934a and 1934b), Hicks had also arrived at restating Marshall’s assumption of a constant marginal utility of one of the commodities exchanged (in the theory of barter) or of money (in what Marshall’s calls the “theory of buying and selling”, i.e., the usual Marshallian theory of a particular market where an ordinary commodity is traded for money) in terms of the newly worked out conceptual apparatus, based on marginal rates of substitution and income elasticities of demand: specifically, he had been able to show that the Marshallian property of a constant marginal utility of one commodity or of money is equivalent, in the new terminology, to the property of a zero income-elasticity of demand (a zero income-effect) for either the other commodity involved in the barter or the commodity proper exchanged against money (Hicks and Allen 1934a, pp. 64-5).

In the passage from the ‘Walras’ paper quoted above Hicks appears to rule out the possibility of extending Marshall’s special solution of the equilibration issue from a “particular market” to the multiple-exchange case characteristic of “General Equilibrium”. Yet, the results reached just a few months before in the Hicks and Allen paper had apparently been more favourable to such extension: for, “if the marginal utility of one commodity out of many is constant, the income-elasticities of *all* the rest will be zero”<sup>8</sup>; and this would seem to suggest that Marshall’s solution is not necessarily confined to his partial equilibrium framework. However, since the possibility of extending Marshall’s solution to a “General Equilibrium” multi-commodity context will play a paramount role in Hicks’s construction of his *VC* temporary equilibrium model, we put provisionally aside this issue, postponing its discussion to Section 6 below.

Up to now, in examining the equilibration issue with exclusive reference to the exchange model, Hicks has explored three alternative ‘solutions’, all of which have apparently turned out to be

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<sup>6</sup> It is worth noting that Keynes, to whom Hicks had sent a copy of the ‘Walras’ paper, wrote to Hicks that, in his opinion, Walras had certainly had in mind the first alternative: Keynes’s conjecture was not based on a superior knowledge of Walras’s writings, but on his empirical acquaintance with the method followed at the Paris Stock Exchange for arriving at equilibrium prices, a method coinciding with Hicks’s first alternative, and on his persuasion that Walras couldn’t but be aware of what was going on at the Paris Stock Exchange (Hicks 1973). Even if we now know that Walras’s reason for introducing the “no trade” assumption was theoretical, rather than empirical, we must also add that Keynes was right in his conjecture: for Walras had indeed been aware of the rules governing the price adjustment process at the Paris stock Exchange, including the “no trade” rule, as he had made clear in an applied paper published in 1880. Hicks will duly take into account Keynes’s remark in *VC*, changing his interpretation of Walras’s passage quoted in the ‘Walras’ paper accordingly (Hicks 1939, p. 128, fn. 1).

<sup>7</sup> See also Marshall (1961b).

<sup>8</sup> Hicks and Allen (1934a, p. 65; italics added). See also the footnote appended to the quoted sentence.

unsatisfactory. Let us summarise their respective features, as outlined by Hicks in the ‘Walras’ paper. The first alternative, according to which the equilibration process is a purely virtual process in ‘logical’ time with no observable counterpart, is “logically consistent”, but “unrealistic”; this ‘solution’ would be exemplified by Edgeworth’s recontracting process, if interpreted as a purely mentalistic process, as suggested by Hicks, and by Walras’s *tâtonnement* process in exchange, under the ‘no trade out of equilibrium assumption’ (but Hicks is apparently unaware of its adoption by Walras). The second alternative, according to which the equilibration process is an observable process in ‘real’ time with actual trades, is “realistic”, but either logically inconsistent, if combined with the assumption that the equilibration process should not change the data of the economy nor affect the equilibrium eventually arrived at, or, as supposed by Hicks, producing an undetermined outcome; this ‘solution’ would be instanced by Walras’s *tâtonnement* process, if it lacked the ‘no trade out of equilibrium assumption’, as supposed by, e.g., Bertrand. Finally, the third alternative, according to which the equilibration process is an observable process in ‘real’ time, with actual trades taking place under Marshall’s assumption of a constant marginal utility of either a money-commodity or money, is “realistic” and does not affect the final rate of exchange, if applied to a two-commodity barter economy, or the final money price, if applied to a Marshallian particular market, but the possibility of extending it to a multi-commodity economy is dubious.

In view of this, it is certainly not surprising that Hicks, in concluding his preliminary review of the alternatives put forward by the economists of the “Lausanne School” or, for that matter, by Marshall himself in order to solve the equilibration problem in a multi-commodity exchange model, should express the following negative opinion:

Neither Walras nor Pareto faced up to this difficulty; when we do so, it is impossible to avoid the conclusion that the “Lausanne equations” are of rather less significance than they imagined. (Hicks 1934, pp. 343)

But is it really true, as Hicks would make us to believe, that neither Walras nor Pareto faced up to the difficulties inherent in the analysis of the equilibration process in a general equilibrium framework?

### **3. Hicks on Walrasian equilibrium and equilibration (1930-1934): production and capital**

As already recalled, Walras explicitly introduced the ‘no trade out of equilibrium assumption’ in the mid-1880s to get rid of the indeterminacy problem in the exchange model, but he did not at the same time change the assumptions concerning the nature of the *tâtonnement* in the models with production. As a result, in the second and third edition of the *Eléments* Walras kept to the assumption, already made in the first one, that in the models with production the quantity adjustment process is a process in ‘real’ time, involving exchange and production activities that are aimed at transforming capital services into products. The process repeats itself over a sequence of rounds or periods, under unchanging technical conditions (summarised by a single-output, fixed-coefficients technology) and a constant provision of capital services; the process brings about a progressive adjustment, in accordance with the Walrasian rule of quantity adjustment which stipulates that the change in each industry’s output be a sign-preserving function of that industry’s profits. The process goes on until the production equilibrium conditions (zero profits in all industries) are eventually satisfied.

Up to this point, the analysis is common to both types of models with production. But from now on one has now to distinguish between the exchange and production model, on the one hand, and the model with capital formation, on the other: in the first model production consists in transforming capital services (by definition non durables) into non-durable consumer goods; in the second, instead, the outcome of the production process is represented not only by consumer goods, but also by capital goods proper. Hence, while in the exchange and production model there are only

flow-commodities (services and non-durable consumer goods), in the model with capital formation there are also stocks (capital goods proper). Therefore, the economy described by the exchange and production model is a pure-flow economy; that described by the capital formation model is an economy where both flows and stocks are present.

In a pure-flow economy there are no linkages between time periods: in each period the data are purely exogenous, since there is no possible carry-over of stocks from the past. Hence the assumption of invariance of the data over time is legitimate. The equilibrium eventually arrived at has the nature of a stationary equilibrium, identically repeating itself over time.

In an economy where stocks are present, however, the data characterizing the economy in each period are not purely exogenous: part of the data (namely, the produced capital goods) are the result of the production activities carried out in the past. No assumption of data invariance in 'real' time can be legitimately made in this case. Hence, the capital formation model of the second and third edition of the *Eléments* is an inconsistent model, for it employs a stationary equilibrium concept which runs foul of the endogenous source of change in the data represented by the production of capital goods.

In the end, in the second and third edition of the *Eléments* Walras finds himself in an awkward corner, for each one of his three models is characterised by a different equilibrium concept: the exchange model is associated with an instantaneous equilibrium concept, the exchange and production model with a consistent stationary equilibrium concept, and the capital formation model with an inconsistent stationary equilibrium concept.

To escape this predicament, Walras eventually resolves, in the fourth edition of the *Eléments*, to make an assumption, called "hypothèse des *bons*", which rules out all observable trade and production activities during the equilibration process: the agents are supposed just to exchange "*bons*", without carrying out any actual action. In this way the *tâtonnement* processes at work in all the three models are turned into purely virtual processes, taking place in logical time and driving the economy towards an overall instantaneous equilibrium.

The time structure of the analysis can be specified as follows:

Au moyen de l'hypothèse des *bons*, on peut distinguer nettement, surtout si on les suppose successives, les trois phases suivantes :

1° La phase des *tâtonnements préliminaires* en vue de l'établissement de l'équilibre en principe ;

2° La phase *statique* de l'établissement effective *ab ovo* de l'équilibre [...] pendant la période de temps considérée, aux conditions convenues, sans changements dans les données du problème ;

3° Une phase *dynamique* de trouble continu de l'équilibre par des changements dans ces données et de rétablissement continu de l'équilibre ainsi troublé.

En conséquence de ces définitions, il doit être bien entendu que les capitaux neufs [...] qui seront livrés pendant la seconde phase [...] ne fonctionneront que dans la troisième phase, constituant ainsi un premier changement dans les données du problème. (Walras, 1988, pp. 447, 449, 4)

As can be seen, the economy envisaged by Walras is, in modern language, a sequential economy, where markets open at specified instants of 'real' time (i.e., the time over which the economy evolves). Such instants are distributed over time at intervals ("périodes") of arbitrary length, which for simplicity may be supposed to be always the same. At each specified instant an equilibrium is instantaneously reached by means of a purely virtual *tâtonnement* process in 'logical' time ("*tâtonnements préliminaires*"). The equilibrium contracts made at the initial instant of each period are actually carried out during the period ("phase *statique*"), without any change in the data. The data can only change, for both exogenous and endogenous reasons, at the timeless juncture between any two periods, i.e., at the initial instants of the second one ("phase *dynamique*"). The

endogenous source of change in the data specifically mentioned by Walras consists in the production of new capital goods proper.

In the light of the above definitions and assumptions, the evolution of the economy can be described (or explained) by means of a chronologically ordered sequence of instantaneous equilibria, each corresponding to the data prevailing at the instant to which the equilibrium is associated. Walras (1988, p. 447, 4) designates this descriptive (or explanatory) procedure by the expression “*équilibre variable ou mobile*”. No assumption of stationarity of the data nor of the sequence of instantaneous equilibria is either necessary or possible in this theoretical framework; and, in effect, no such assumption is made by Walras. Moreover, no special limitation as to the nature of the commodities that can be traded or produced in the economy is required in this context: in particular, both stocks and flows can be the object of economic activity.

Pareto reaches very similar conclusions even before Walras. As a matter of fact, in his *Cours d'économie politique* (1896-97) Pareto very closely follows in Walras's steps, structuring his theoretical system by means of the same tripartite classification of nested models (exchange, exchange and production, capital formation) as that adopted by Walras; moreover, to each one of the three models Pareto associates a specific *tâtonnement* process along the lines suggested by his predecessor. Yet, already in 1896 he arrives at interpreting the *tâtonnement* construct and the equilibrium concept in a way that will be fully endorsed by Walras only when he finally adopts the “*hypothèse des bons*” in the 1900 edition of the *Eléments*. Specifically, Pareto suggests to interpret the time variable as a discontinuous variable, subdividing the continuous flow of time into discrete periods. To the initial instant of each period a “static” equilibrium is associated. The evolution of the economic over time can then be described, as in Walras (1900), by means of a chronologically ordered sequence of such equilibria. This method of analysis is called by Pareto the “method of successive equilibria” (Pareto 1896-97).

In his later book, the *Manuel d'économie politique* (1909), Pareto develops a much more abstract and general theory of individual choice and economic equilibrium. In this new framework, the *tâtonnement* construct disappears, as well as Walras's distinction between “revenues” (flows) and “capitaux” (stocks); any implicit or explicit reference to time, attained by Walras through these two devices, evaporates. Yet the “method of successive equilibria”, viewed as the only tool on which economic theory can presently rely to describe (or explain) the evolution of the economy, survives in the *Manuel* as well (1909).

After this necessary digression on the evolution of Walras's and Pareto's views on equilibrium and equilibration, with special reference to the models with production and the capital formation issue, let's go back to Hicks's ‘Walras’ paper. In the section of the paper devoted to a critical examination of Walras's theory of capital, Hicks reminds the reader of Walras's “confusion about the exact meaning of equilibrium”, already discussed in a preceding section of the paper, a “confusion” that would explain Walras's inability to comprehend Wicksell's critique (to which we shall come back in a moment). It is worth noting that to the above-quoted sentence Hicks appends a footnote, where he asserts that “the confusion [...] gets palpably worse in the later part of Walras's work. See, for example, the rather pathetic passage on pp. 214-215 of the *Eléments*” (Hicks 1934, p. 346, fn. 19). But the cited passage is precisely the one, quoted in full above, where Walras discusses the consequences on the time structure of the analysis and the interpretation of the *tâtonnement* construct and the equilibrium concept of the “*hypothèse des bons*”. That passage is contained in Lesson 28, one the very few added *ex novo* to the fourth edition of the *Eléments*.

Since, as we shall see, the interpretation of *tâtonnement* and equilibrium put forward by Walras in the above-quoted passage will play a significant, though only implicit, role in the construction of Hicks's VC temporary equilibrium model in 1939, it is natural to ask which are the reasons underlying such a severe judgement as that passed by Hicks on the very same passage in 1934.

One reason is probably the following. The assumption newly introduced by Walras in the fourth edition of the *Eléments*, the “*hypothèse de bons*”, magnifies those elements of artificiality that were already present in the *tâtonnement* construct from the very beginning, one such element being, for

instance, the assumption that prices or quantities are publicly announced at random at the start of the process (“prix” or “quantités criées au hasard”), and subsequently changed by an unspecified entity according to the Walrasian rules of price or quantity adjustment. This is the reason that leads Kaldor (1934, p. 127) to qualify “Walras’s assumption” about the *tâtonnement* in exchange as “slightly ridiculous”.

But the main reason must be that the “hypothèse des *bons*”, by making explicit the assumption of an instantaneous equilibration process and by extending it to all models and all kinds of activities, including production, amplifies the “unrealism” of the Walrasian *tâtonnement* construct, an “unrealism” that had already been denounced by Hicks in connection with the exchange model alone, pushing it to unbearable limits: for the adjustment to equilibrium takes time, particularly when production is allowed for, and the idea of an “instantaneous process” is a contradiction in terms.

If the most important reason for Hicks’s rejection (in 1934) of the “hypothèse des *bons*” and its consequences is the one stated in the previous paragraph, then it becomes easier to account for another passage in the ‘Walras’ paper, that might appear unexplainable otherwise. For, immediately after having concluded that, due to the inability of Walras and Pareto to “face up to [the] difficulty” inherent in the analysis of the equilibration process, “the ‘Lausanne equations’ are of rather less significance than they imagined”, Hicks suddenly changes his mind, opening the door to a possible resolution of the “difficulty”, provided that a particular interpretation of the equilibration process is adopted:

The equations of Walras are not by any means a complete solution of the problem of exchange; but they remain a significant step towards such a solution. For Walras’ system of prices will be reached, either if contracts are made provisionally or (a more important case) if people come on to the market on successive “days” with the same dispositions to trade, and there is no carry-over of stocks (or a constant carry-over) from one day to the next. *When it is understood in the last sense*, the theory of static equilibrium of exchange takes its place as a step towards the development of a complete theory. (Hicks 1934, pp. 343; italics added)

Hicks is here referring to the exchange model. This is not accidental: for, as we shall see in a moment, extending the argument to production raises some special problems. Yet, for the discussion’s sake, it is preferable to start immediately from a more general framework.

Of the two interpretations of the equilibration process which are suggested by Hicks in the above passage, the first would follow from the adoption of something like the “no trade out of equilibrium assumption” or, more generally, the “hypothèse des *bons*”; in Walras’s theoretical system, as we have seen, it corresponds to the conception of either the *tâtonnement* process in the exchange model since the second edition or the so-called *tâtonnements préliminaires* in all models since the fourth. The second interpretation would instead follow from the assumption that the same activities repeat themselves over a sequence of periods under unchanging exogenous conditions in a pure-flow stationary economy; in Walras’s theoretical system, this interpretation corresponds to the conception of the *tâtonnement* process in the exchange and production model in the second and third editions.

Hicks never explicitly recognises that the two alternative interpretations he suggests precisely correspond to alternative conceptions of the *tâtonnement* process associated with specific equilibrium models put forward by Walras in the same or in different editions of the *Eléments*; in particular, he tends to present his second interpretation, the stationary one, as if it were something altogether new, unthought of before, and all the same instrumental in solving the long-standing “difficulty” with the equilibration process. Nor does Hicks explicitly acknowledge, in 1934, that his two alternative interpretations almost exactly correspond, also in the phrasing, to the two alternative interpretations of the recontracting process put forward by Edgeworth in a long series of writings: a

purely mentalistic interpretation, based on the idea of ‘provisional and revocable contracts’, which leads to a notion of instantaneous equilibrium (or, more generally, solution) at a moment of time; and an effective interpretation, based on the idea of ‘enforceable and irrevocable’ one-period contracts, reiterated over a sequence of periods under unchanging exogenous conditions, which leads instead to a notion of stationary equilibrium (or solution) analogous to the stationary equilibrium of a Walrasian pure-flow economy<sup>9</sup>.

Hicks had already adumbrated the distinction between the two alternative interpretations of the equilibration process, albeit somewhat confusedly, in his 1933 paper on “Equilibrium and the cycle” (1933, pp. 29-30). There Hicks’s problem was to make more precise the “deliberately ambiguous definition” of equilibrium put forward by Pareto in the *Manuel*. In the 1933 paper, as in the ‘Walras’ paper of the following year, Hicks openly expresses his preference for the second alternative, presupposing a “continuing” or “ongoing market” and leading to a stationary equilibrium notion, over the first, which leads instead to an instantaneous equilibrium notion: in 1933 the “second interpretation of Pareto is more to the point” (p. 30), while in 1934 it represents, as we have seen, “a more important case”.

Thus, in the end, in analysing the alternative interpretations of the equilibration process compatible with general equilibrium theory, of either the Paretian or Walrasian variety, Hicks is led by his preference for the “ongoing market” interpretation over the instantaneous adjustment one to unearth that traditional notion of stationary equilibrium that he had already employed in *Theory of Wages* (1932) in an essentially Pigouvian partial equilibrium framework, with some sprinklings of Walras and Böhm-Bawerk.

In a general equilibrium framework, however, a problem arises that in the partial equilibrium analysis of a consumer good market, or of the labour market for that matter, can be swept under the carpet by means of the Marshallian *ceteris paribus* clause: the problem of capital.

In the 1933 paper, where Pareto’s theory is the point of departure of the analysis, Hicks maintains that in the *Manuel* there are clues indicating that

in essentials Pareto accepted the theory of capital and interest due to Böhm-Bawerk [...]. But this notion was never fully worked out and incorporated into his system – though the incorporation would not have presented any particular difficulty once it had been decided that equilibrium was to be interpreted in the second sense – that of the ongoing market. (Hicks 1933, p. 30)

Therefore, having arrived at the conclusion that, for the purpose of analysing the equilibration process, the stationary framework of an “ongoing market” should be preferred to the alternative framework focusing on one single instant of ‘real’ time, Hicks now discovers that the stationary framework is also to be preferred for the purpose of incorporating into general equilibrium theory the phenomena of time-taking production and capital. Yet, if the “ongoing market” framework is more favourable to the development of a theory where time and capital have an important role to play, at the same time it imposes upon the theory a “most significant limitation”: for

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<sup>9</sup> The first interpretation, the better known of the two, is the prevailing one in Edgeworth (1881), (1891b), and (1891c). Both interpretations are presented as equally valid alternatives in (1904). The second interpretation is the prevailing one in (1924). In the ‘Walras’ paper Hicks only alludes to the first interpretation, when he associates “Edgeworth’s principle of ‘recontract’” with the idea of “provisional contracts” (1934, p. 342). But he is certainly aware of the existence of the second interpretation, which is in effect hinted at in his paper in German published in the previous year (Hicks, 1933, p. 30, fn. 3). To our knowledge, Berry is the first to openly suggest the possibility of interpreting Edgeworth’s recontracting as a stationary process in ‘real’ time, taking place over a sequence of periods in each of which effective one-period contracts are stipulated. Berry’s suggestion is made during his controversy with Edgeworth over Marshall’s theory of barter (1891). On the same occasion, Berry also suggests to identify the unit period in the stationary sequence with the “week”; his suggestion will prove useful to Hicks, first in 1935, when he will resume that term to designate the unit period in a sequence that is however non-stationary, and then a few years later in *VC* (see Sections 5 and 6 below).

the extended equations would only [be] applicable to the conditions of a Stationary Equilibrium – the equilibrium of an economy in which there is no net saving. [...] The Lausanne equations become no more than an exact formulation of what Marshall called the ‘famous fiction’ of the stationary State. As such, they are not a description of reality. At most, they are a tool for its analysis. (Hicks 1933, p. 31)

In spite of unrealism of such an extended theory, “a precise formulation of the conditions of Stationary Equilibrium is a useful achievement”. Hence, Hicks sets out to provide a sketch of the equations determining such a Stationary Equilibrium, under the assumptions of stationary expectations and zero net saving: the first assumption is the most natural under stationary conditions and can therefore be justified under the same circumstances; the second, which finds expression in a “capital equation” of an aggregate type, “has often caused trouble”, but is nevertheless required by the structure of the extended Stationary Equilibrium model (Hicks 1933, p. 31).

After providing this concise and altogether unsatisfactory outline of the model, however, Hicks does not dwell upon it: for, in 1933, he believes that the extended Stationary Equilibrium model can be replaced, in its only function as a tool of analysis, by a better model: the extended general equilibrium model with Perfect Foresight.

In outlining this alternative model, Hicks directly draws his inspiration from the writings of Knight (1921), which had already been the point of departure for Hicks (1931), and especially from Hayek (1928), where a semi-formalised model of perfect foresight instantaneous equilibrium had already been discussed in some detail. But Hicks can also gain some insight from the almost contemporary works of a few Swedish economists, particularly Lindahl (1929) and (1930) and Myrdal (1932), who are exploring similar paths. As Hicks himself tells us (1982b, p. 7), he is informed by Hayek in 1932 of the existence of Hayek’s 1928 paper. We also know that, when writing his 1933 paper in German, Hicks has not yet read the Swedish economists’ works, nor has he been able to talk with them yet; but their ideas are in the air.

So Hicks takes the idea of ‘period analysis’ from the Swedish economists’ tool-box: in a way very similar to the one suggested by Walras after the adoption of the “*hypothèse des bons*”, time is subdivided into periods, changes in the data take place at the junctures between periods, while endogenous variables are assumed constant (at their equilibrium levels) within each period. Hicks’s endogenous variables are prices, in the competitive tradition. Therefore, each unit period is taken to be “so short that the movement of prices *within it* can be neglected” (Hicks 1933, p. 32): this is an assumption that will survive up until VC. Since the stationarity assumption is dropped, the assumption of stationary expectations is no longer justified. Perfect Foresight can however be invoked to make expectations and equilibrium determinate at one and the same time: a Perfect Foresight equilibrium is defined as a system of current and expected prices such that, at those prices, all markets (current and future) clear. “Disequilibrium is the Disappointment of Expectations” (Hicks 1933, p. 32).

The Perfect Foresight equilibrium model, as the Stationary Equilibrium model, is barely outlined: no analytical discussion, let alone a formal proof of any statement or proposition, is really put forward. Yet, the simple sketch provided is enough for Hicks to arrive at a very definite conclusion:

Such a ‘dynamic equilibrium’ is obviously still far from being a description of reality. It does nevertheless serve as a model of a *perfectly working* economic system, which is much more usable as a standard of comparison than is the model of Stationary Equilibrium. (Hicks 1933 p. 32; Hicks’s italics)

Somewhat paradoxically, however, the sharp conclusion reached in 1933 concerning the relative merits of Perfect Foresight and Stationary Equilibrium is completely reversed just one year later: in

the ‘Walras’ paper, in fact, Perfect Foresight Equilibrium vanishes, while Stationary Equilibrium gains once again the centre of the scene. This preference reversal can be explained as follows.

In the Section of the 1934 paper devoted to Walras’s theory of capital, after stressing the highly controversial character of this part of Walras’s overall theory, Hicks recalls one of Wicksell’s chief objections against it: since Walras’s theory “determines the rate of interest on the market for new capital”, it is “apparently inapplicable to stationary conditions” (Hicks 1934, p. 446)<sup>10</sup>. But this can be regarded as a compelling criticism only if, contrary to the conclusion reached by Hicks in the 1933 paper, compatibility with Stationary Equilibrium is viewed as a prerequisite for producing a good theory of capital. So, in the end, why does Hicks change his mind, in so short a stretch of time, about the relevance of the stationarity condition?

There are two main reasons underlying Hicks’s change of view. The first is implicit in the whole trend of Hicks’s reasoning in the preceding Sections of the ‘Walras’ paper: there Hicks had defended the stationary interpretation of the equilibration process against the instantaneous one for only the first interpretation allows the theorist to account for the ‘real’ time required for equilibrium adjustment; therefore, a good theory of capital must satisfy the stationarity condition, for only a Stationary Equilibrium is empirically justifiable. The second reason, instead, is made explicit by Hicks at precisely this point of his argument. It has to do with the relatively greater plausibility of the assumption of stationary price expectations, what can in effect directly explain the reversal of Hicks’s preferences concerning Stationary and Perfect Foresight Equilibrium:

Further, as Walras would have realized if it had not been for his confusion about the exact meaning of equilibrium, it is only in a stationary state that we can get any sensible sort of equilibrium so long as people expect the prices of products to remain unchanged in the future (as Walras tacitly assumed they do). (Hicks 1933, p. 346)

So, a good capital theory has to be consistent with the stationarity assumption. Walras’s original theory is not consistent with Stationary Equilibrium, and consequently cannot be a good theory. However, Walras’s oversight can be remedied. A “slight extension” of Walras’s original theory of capital, implying that the “new capital goods become not only net additions to the capital stock, but also replacements”, is enough to immunise the theory from Wicksell’s criticism, for in that case “the capital market does not disappear in the stationary state”. In view of this, Hicks can conclude his discussion by asserting that, “once the amendment is made, Walras’ theory of capital becomes as good as Wicksell’s, and better than Böhm-Bawerk’s” (Hicks 1934, pp. 346-7).

Yet, in reaching this conclusion, Hicks unfortunately forgets that the stationarity assumption, legitimate in a pure-flow economy, becomes illegitimate in an economy with stocks and any other intertemporal linkages: and capital, not only for Wicksell and Böhm-Bawerk, but also for Walras, certainly represents a linkage between present and future.

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<sup>10</sup> It should be noted that neither Wicksell, nor Hicks (in the ‘Walras’ paper) are able to identify the ultimate reason why Walras, in order to determine the rate of interest, is forced to assume that the economy under investigation be “progressive”, so that there can exist positive net saving to be exchanged against newly produced capital goods proper, whose prices can then be determined on the corresponding markets, eventually allowing the rate of interest to be determined. From a logical point of view, the requirement of a positive net saving, characterising a “progressive” economy, is as disturbing as the symmetrical requirement of a zero net saving which characterises a stationary economy: both requirements, in fact, impose upon the agents of the economy a particular type of saving behaviour, whereas the agents should be free to choose whatever sort of saving behaviour they prefer according to their preferences. In fact, Walras is forced to assume the “progressiveness” of the economy because of another tacit assumption, inadvertently introduced in the analysis, which constrains in a different way the agents’ behaviour: for he tacitly assumes that the already existing capital goods be unsaleable. If they were saleable, there would be no need to assume “progressiveness” of the economy, nor, for that matter, stationarity in order to provide some equation with which to determine the rate of interest..

#### 4. Eight unsettled questions (1934)

Looking back at the scientific path travelled by Hicks during the early 1930s, one cannot but be impressed by the great number of questions confronted, the many diverse fields explored, and the important results reached. However, the positions taken by Hicks in those years on several controversial issues do not display that steadiness and conclusiveness that might be hoped for: as has been seen, on many crucial topics, concerning in particular equilibrium, equilibration, expectations, and capital, Hicks changes his mind quite often and sometimes unexpectedly, thereby rendering the rational reconstruction of the course travelled by him over the 1930-1934 period a very complicated task. In order to make the reconstruction of the subsequent half-decade easier, it is convenient to summarise at this point the most contentious issues remaining unsettled at the end of 1934, also keeping in mind that that year represents a turning point in Hicks's intellectual history. Even if the unsolved questions are obviously interconnected, it is expedient to group them under the following eight headings.

##### 1. General vs. partial analysis

As the 'Walras' paper clearly shows, Hicks is undecided about which of the two great traditions, the Walrasian and the Marshallian, should be privileged. Walrasian general equilibrium theory should be praised for its generality, but it runs the risk of falling into abstractness and sterility. The strengths of Marshallian partial equilibrium analysis are its concreteness and fruitfulness; its weakness lies in its specificity. Hicks implicitly asks the following question: How and to what extent can the two traditions be combined?

##### 2. Equilibration, equilibrium, and disequilibrium: Walras-Pareto vs. Marshall

Hicks stresses the following dilemma: an observable disequilibrium theory in a general equilibrium framework, such as the Walrasian exchange model, leads to indeterminacy; an observable disequilibrium theory in a Marshallian partial equilibrium framework can be made consistent with a determinate outcome, at the cost of making some special assumptions. Hicks leaves the following question to be answered: How and to what extent the special assumptions employed in a partial equilibrium framework can be exported to a general equilibrium framework without losing their effectiveness?

##### 3. Equilibrium, equilibration, disequilibrium: unobservable vs. observable disequilibrium in a general equilibrium framework

Hicks perceives that, in general equilibrium analysis (of the Walrasian, Paretian or Edgeworthian type), there exist two alternative interpretations of the equilibration process, both of which consistent with the premises of the theory and compatible with determinacy: the first, unobservable disequilibrium in 'logical' time, leads to an instantaneous equilibrium notion; the second, observable disequilibrium in 'real' time, leads to a consistent stationary equilibrium notion. Hicks is dissatisfied with both interpretations: the first is unsatisfactory for its unrealism, the second for its narrowness. Yet, in 1934, he does not exactly know how to overcome the ascertained limitations. He only tries to broaden the set of phenomena to which stationary equilibrium theory can be applied (see below). The question that Hicks implicitly poses is the following: How can the empirical strength of the observable equilibration process supporting a consistent stationary equilibrium be combined with the generality and flexibility of instantaneous equilibrium?

##### 4. Instantaneous equilibrium

Hicks dislikes this notion, due to the unrealism of the underlying equilibration process. Yet, perceiving its generality and potentialities, he makes use of it in special context, even if he refrains from justifying its employment on empirical grounds. The best instance of Hicks's attitude towards instantaneous equilibrium is his use of the Perfect Foresight equilibrium concept in the 1933 paper, where it is essentially justified as a quasi-normative standard of reference with no claim to realism. The temporary equilibrium concept makes just a flimsy

appearance in the 1930 paper. Hicks implicitly poses the following question: How and to what extent can the normative uses of the instantaneous equilibrium notion be reconciled with its possible uses in positive theory?

5. Stationary equilibrium

Hicks likes the kind of realistic equilibration process supporting this equilibrium notion, but finds the pure-flow economy, to which the concept can be consistently applied, excessively restrictive. Therefore he repeatedly tries to employ the stationary equilibrium concept also to discuss issues connected with stocks and capital (in 1932, 1933, and 1934). However, Hicks's attitude towards stationary equilibrium models with capital formation is winding. The questions that Hicks tacitly poses are: How can the stationary equilibrium notion be rescued from its limitations? Should it be rescued?

6. Expectations

Already since 1931, when he publishes his paper on uncertainty and profits, Hicks is aware that in principle expectations should be represented by means of probability distributions. Yet he generally keeps to the more traditional representation of expectations as point expectations. Moreover, in line with the competitive tradition, he typically identifies expectations with price expectations. Stationary point price expectations are then justified when the economy is assumed to be stationary, and consequently the equilibrium is stationary as well; they are unwarranted otherwise. Correct price point expectations are the hallmark of competitive perfect foresight equilibrium, which should be used as a standard of reference. Hicks implicitly raises the following questions: How are expectations formed? Should they be regarded as exogenous or endogenous?

7. Capital

Hicks distinguishes three main theories of capital: the Austrian theory, meaning by that the theory of Böhm-Bawerk and Wicksell; Walras's original theory; Walras's amended theory. There are many clues suggesting that Hicks's preferences go to the first theory, but it is also clear that he feels unable to formalise it and uncertain as to its soundness. The discussion of Walras's theory, both in its original version and in the amended one, is wholly unsatisfactory. In 1934 the problem of capital is viewed by Hicks as strictly connected with the problem of stationary equilibrium. So Hicks's unsettled questions concerning capital are essentially the same as those concerning the stationary equilibrium notion.

8. Production and demand theory

In the early 1930s Hicks provides important contributions to the theory of production (in the 1932 book) and fundamental ones to the theory of demand (in the 1934 paper with Allen). Such contributions are somewhat uncoordinated with the other breakthroughs that Hicks is simultaneously accomplishing in the fields listed above, as well as in others. In this respect, the fundamental question that Hicks ought to answer is the following: How and to what extent can the results already obtained in the fields of individual and market demand and production be merged with the results already achieved or yet to be achieved in the other fields of interest?

With the benefit of hindsight, we know in advance which is the end point that Hicks will finally reach at the conclusion of his five-year journey from 1935 to 1939: the arrival is nothing but *Value and Capital*. Yet, since the interpretations of VC are still nowadays highly controversial, it may prove illuminating to try and understand how exactly Hicks arrives at his final destination (which is of course final only with respect to the 1930s). Moreover, even if at the beginning some of the final ingredients are already present in embryonic form, from a theoretical point of view the starting point is still very far from the arrival; hence, not only is the distance to be covered long, but also the questions to be answered are many and diverse: as a matter of fact, Hicks should be able to answer all the questions listed under the eight headings above. It should be clear, however, that not all the issues are tackled and solved by him at one and the same time; further, not all the solutions suggested over time are final and immutable: as in the early 1930s, so also the mid- and late 1930s

there are some afterthoughts and changes of mind, though in a lesser degree than before; finally, not all the solutions eventually arrived at are equally convincing: *VC*, after all, is only a step in Hicks's intellectual history, albeit an important one.

Before embarking upon a more detailed discussion of the individual issues, it is still convenient to distinguish the questions that are confronted in the period from mid-1934 to 1939, leaving some evidence of the progress made in published papers and documents, from the questions whose solution is disclosed only when *VC* is finally made available.

The questions grouped under headings 2 and 3, that is, the questions concerning the equilibration issue, as well as the question under 8, that is, the question concerning the possible amalgamation of the various parts of Hicks's theoretical endeavour, are left to be spelled out in *VC*. This does not mean, of course, that they are not jointly analysed with the others, but only that their resolution requires the previous systematisation of the whole architecture of the theoretical system to be put forward in *VC*. The question under heading 1, as we shall see, is repeatedly confronted over the intervening years, and some traces are made public in the papers published in that period; but, also in this case, a full solution of the underlying methodological issue can only be provided when the picture is complete.

The questions under the headings from 4 to 7, on the contrary, are systematically tackled over the five years from 1935 to 1939, and the advances progressively made find their way to the press. There are a few papers playing a crucial role in this regard: the first is a paper published in 1935 with the title "Wages and Interest: The Dynamic Problem", but soon relabelled by Hicks the 'Bread' paper, in view of the assumed nature of the only consumer good supposed to be produced in the economy therein described; then there are two papers related with the appearance of Keynes's *General Theory*, namely, the timely review of Keynes's book, published on *The Economic Journal* in 1936, and the celebrated IS-LM paper, published in *Econometrica* in 1937. The focus of the 'Bread' paper is formally on capital (under 7), but actually on the two alternative equilibrium notions (under 4 and 5). The focus of the two *General Theory* papers is on expectations (under 6) and the two alternative equilibrium notions (under 4 and 5). Finally, as already said, the grand methodological issue concerning the alternative between the Walrasian and the Marshallian tradition insinuates itself everywhere, but is not really solved before the appearance of *VC*.

## 5. Value and Capital: The Long Gestation (1935-1939)

Let us start from the 'Bread' paper (Hicks 1935b), whose central model is in many respects a small-scale anticipation of the *VC* temporary equilibrium model. However, apart from the difference of scale, which is not irrelevant, there are many other differences between the two models that will be specified in due time. Money and all the monetary complications are essentially disregarded in the 'Bread' paper, except for a few hints in the last section. With the exception of this last section, the model discussed in the paper is a three-commodity general equilibrium system, with two flow-commodities (labour services and Bread) and one asset (loans). All prices "are reckoned in terms of 'Bread'. The rate of interest is a 'bread' rate of interest". Capital, called Equipment, "is not exchangeable"<sup>11</sup> (Hicks 1935b, p. 69).

In the 'Walras' paper, as will be recalled, Hicks had concluded that an amended version of Walras's theory of capital, satisfying the stationarity assumption and an aggregate capital equation, presumably of the type suggested by J.B. Clark (1899) or Cassel (1932), would represent the best point of departure for economic dynamics. Yet, in the 'Bread' paper, Hicks stance on this issue is altogether different: quite evidently, the reasons underlying his previous support for a stationary equilibrium approach have been fading away in the meanwhile, and this has induced him to change his mind on the capital issue as well.

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<sup>11</sup> The non-exchangeability of existing Capital makes the model more similar to Walras's original model with capital formation, where only newly produced capital goods are exchangeable, than to the *VC* model, where all capital goods are exchangeable.

To begin with, Hicks recalls that

most modern capital theories fall into one of two classes. On the one hand, there is the ‘timeless’ type of theory, which treats capital as a factor of production like any other. Such a theory is that of J.B. Clark. On the other hand, there is the ‘period of production’ theory of Böhm-Bawerk and Wicksell. [...] They are both stationary theories, built upon the hypothesis of a stationary state, quite satisfactory under that hypothesis, but incapable of extension to meet other hypotheses, and consequently incapable of application. In a stationary state they are both correct. [...] But once we leave the stationary conditions, these convenient inequalities disappear, and theories based on them cease to be applicable. (Hicks 1935b, pp. 67-8)

To this passage, the following somewhat cryptic sentence is appended:

To found a theory upon an assumed equality, which is not a real equality, is a most dangerous thing to do [...]. (Hicks 1935b, p. 68)

This sentence may be interpreted as asserting that, while the aggregate capital equation is assumed to satisfy an appropriate stationarity condition, depending on the specific approach followed, such stationarity condition is imposed from outside the model, rather than being the endogenous outcome of the individuals’ choices, as it should be in a consistent general equilibrium model. If this interpretation is correct, this is the first passage where Hicks proves to be aware that the stationarity assumption is illegitimate outside the model of a pure-flow economy.

In any case, this is a first reason to abandon the stationary equilibrium approach. A second reason is provided, at the time when the ‘Bread’ paper is written, by the theoretical developments that had been taking place in Swedish economics since 1929, by virtue of the pioneering works of Lindahl (1929) and (1930), and Myrdal (1932)<sup>12</sup>. Hicks had read Myrdal (1932) at the beginning of 1934, enthusiastically reviewing it in *Economica* (Hicks, 1934b). Moreover, in the summer of 1934 Hicks had had the opportunity to discuss directly with Lindahl his 1929 and 1930 papers in Swedish, an experience that would have been repeated in 1935.

Starting from Wicksell’s monetary theory and his analysis of the so-called “cumulative processes” (Wicksell 1898, and 1901-6, vol. 2), Lindahl had developed a method of analysis that, as already recalled, will later become known as a ‘period analysis’: the method, of which Hicks had already made a rudimentary use in his 1933 paper, consists in subdividing time into a sequence of periods and in studying the equilibrium conditions of each individual period and, possibly, of the entire sequence as well. In his 1929 paper Lindahl, after critically discussing the stationarity assumption, had put forward two alternative models of instantaneous equilibrium, under the alternative assumptions of perfect or imperfect foresight, respectively. These equilibrium models had then been employed in the 1930 paper to discuss the Wicksellian problem of the “cumulative process”. Similarly Myrdal, after criticising the method of assuming a stationary state as the starting point of the analysis, had put forward, with many a proviso (Myrdal 1932, p. 44), an instantaneous equilibrium model with given expectations, to be used as the foundation of his ‘period analysis’.

In the ‘Bread’ paper Hicks, after dropping the stationarity assumption, quite deliberately chooses “to treat the continuous variable time as if it were discontinuous” (1935b, p. 68, fn. 2). The single periods into which time is subdivided are called “weeks”. The market is only open on the first day of the week, i.e., on Mondays. Perfect competition is assumed in all markets (for Bread, labour, and loans, respectively) and a competitive equilibrium is supposed to be reached on each Monday: at the equilibrium prices (wages and rate of interest), demand equals supply in each market. Walras’ Law is explicitly proved and exploited to allow the theorist, in determining the

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<sup>12</sup> Myrdal’s 1932 essay in German will be translated into English and published in a few years’ time, under the title of *Monetary Equilibrium* (Myrdal 1939)

equilibrium conditions of the model, to get rid of one of the markets and of the corresponding market-clearing equation; availing himself of this opportunity, Hicks chooses to disregard the market for loans, which is identified with “that elusive thing, the ‘capital market’”.

As can be seen, the inspiration of the model is clearly Walrasian. And yet, the choice to restrict the analysis to just three markets is certainly due to Hicks’s desire to combine Walrasian rigour with Marshallian concreteness. The model is in effect a macromodel with some Walrasian microfoundations: the device of assuming representative agents (one labourer, one entrepreneur, one rentier) is exploited, but the treatment is unsatisfactory. Hicks contents himself with discussing the probable effects of changes in current and possibly expected prices on demands and supplies, but no definite conclusion can actually be reached, in spite of Hicks’s assertion to the contrary (1935b, p. 78, fn. 11), for the model is insufficiently specified. In particular, there is a quite detailed discussion of the representative entrepreneur’s choices of intertemporal production plans under alternative assumptions about price and price expectation changes. But since the model is not really closed, all this discussion does not go beyond the casuistic analysis of the representative entrepreneur’s choices, without providing any explanation of market results<sup>13</sup>.

So the ‘Bread’ model certainly anticipates many aspects of the VC temporary equilibrium model. In particular, one can already find in the 1935 paper the systematic use of ‘period analysis’, the distinction Monday-week, the assumption that a competitive Walrasian equilibrium is established on each Monday, the idea that the dynamics of the economy concerned can be described by means of a chronologically order of equilibria associated with successive Mondays. Yet, at the end of the story, in assessing the results achieved by using the machinery of the model, Hicks is forced to acknowledge that the potential inherent in ‘period analysis’ has not really been exploited, particularly as the dynamic aspect is concerned. For

in all our investigations we have never got beyond our first Monday. There is no reason why theory should be becalmed at that point; [...] we ought to go on to see what happens on Monday week. However, time must go on in its own order, and Monday week will have to be another story. (1935b, p. 79)

Hicks raises here the problem of the relationship between static analysis, which aims at determining the equilibrium prevailing on each Monday together with its properties, and dynamic analysis, which aims instead at stringing together all such equilibria in a sequence, whose properties must then be separately examined. However, it is clear that, at least as far as the ‘Bread’ model is concerned, the static part of the analysis tends to absorb all the energies of the researcher, killing the dynamic part before it can even start to do its job. A similar problem arises also in connection with the method of analysis adopted by Keynes in his *General Theory*. To better understand similarities and differences between the approach that Hicks is trying to build in the second half of the 1930s and the approach that Keynes is striving to construct at about the same time, let us now turn to examine Hicks’s reactions to the appearance of Keynes’s *General Theory* at the beginning of 1936.

As is well-known, Hicks puts forward his assessment of Keynes’s book on two different occasions: the first opportunity arises when Hicks is asked to contribute a review-article to *The Economic Journal* immediately after the publication of the book (Hicks 1936b); the second chance is instead given by the presentation of the famous IS-LM paper at a meeting in Oxford in September 1936 (Hicks 1937). While the 1937 article is of course of paramount importance for the future development of Keynesian economics, and of macroeconomics in general, the 1936 review is instead more relevant to the understanding of the impact of Keynes’s theory on Hicks’s own ideas and on the systematisation of the issues that are still open in his methodological and theoretical view.

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<sup>13</sup> The inadequate specification of the ‘Bread’ model can also help explain the contradictory results obtained by Hicks in using the ‘Bread’ model to test some conclusions reached a few years before in *The Theory of Wages* (1932). On this, see also Hicks’s comments in (1892d).

The IS-LM article, as is well-known (Hicks 1980a), is a reconstruction of a part of the analytical core of the *General Theory* along Walrasian lines, a reconstruction that Hicks is able to provide in so short a time because he can exploit much of the work already done in view of his ‘Bread’ paper. The most evident influence of the Walrasian methodology, as contained in the ‘Bread’ paper, is represented by Hicks’s reliance on Walras’ Law in order to reduce the equilibrium conditions of a three-market macromodel (money, bonds, and goods) to a two-equation system or a two-dimensional diagram (the IS-LM diagram), thereby also getting rid at one stroke of the so-called “loanable funds” controversy. Keynes, who expresses overall appreciation about Hicks’s reconstruction, is unable to understand this point<sup>14</sup>, thereby confirming his distance from the analytics of the Walrasian approach.

For the present purposes, however, it is the 1936 review to be the more relevant. Here Hicks starts with pointing out that the *General Theory* “is sometimes presented as a theory of ‘output in general’; sometimes as a theory of ‘shifting equilibrium’” (Hicks 1936b, p. 84). These two features identify the most revolutionary traits of the *General Theory* from Hicks’s own point of view.

As to the first point, Hicks writes:

It is a theory of output in general *vis-à-vis* Marshall, who took into account many of the sort of complications which concern Mr Keynes, but took them into account only with reference to the single industry. [...] The technique of this work is, on the whole, conservative: more conservative than in the *Treatise*. It is the technique of Marshall, but it is applied to problems never tackled by Marshall and his contemporaries (Hicks 1936b, pp. 85, 99)

From Keynes’s bold generalisation of Marshall’s theory to a large body of issues that Marshall had disregarded, combined with his preservation of Marshall’s technique and pragmatic attitude, Hicks draws an encouragement to do the same with respect to Walras and, at the same time, to make a further effort to overcome the Marshall-Walras opposition.

As to the second point, Hicks writes:

It is a theory of shifting equilibrium *vis-à-vis* the static or stationary theories of general equilibrium, such as those of Ricardo, Böhm-Bawerk or Pareto.

While the inclusion of Ricardo in the list of the economists to rebuke is essentially due to Keynes’s definition of ‘classics’, the names of Böhm-Bawerk and Pareto allude to the sort of value and capital theory on which Hicks has been working over the last few years.

But now Keynes’s theory provides a further argument to the already remarkable list of reasons in favour of the abandonment of the stationarity assumption, which however continues to be fashionable among Cambridge economists<sup>15</sup> and many other quarters:

Ordinary (static) economic theory, so the old argument went, explains to us the working of the economic system in ‘normal’ conditions. Booms and slumps, however, are deviations from this norm, and are thus to be explained by some disturbing cause. [...]

The present theory [i.e., Keynes’s *General Theory*] breaks away from the whole of this range of ideas. It is no longer allowed that ordinary economic theory can give a correct analysis of even normal conditions; the things it leaves out of account are too important. The changing, progressing, fluctuating economy has to be studied on its own, and cannot usefully be referred to the norm of a static state. (Hicks 1936b, p. 85)

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<sup>14</sup> On this see the Keynes-Hicks exchange of correspondence in (Keynes 1973, pp. 79-83).

<sup>15</sup> See, e.g., Pigou’s 1935 book *The Economics of Stationary States*, reviewed by Hicks (1936a) at the time when he is also reviewing the *General Theory*.

One might suspect that dropping the “norm” may cause the theory to become indeterminate. Yet, this is not so, if Keynes’s most important innovation, “the method of expectations”, is accepted. For

from the standpoint of pure theory, the use of the method of expectations is perhaps the most revolutionary thing about the book [...]. The point of the method is that it reintroduces determinateness into a process of change.. (Hicks 1936b, pp. 86-7)

According to Hicks, the method of expectations works as follows:

If we assume given, not only the tastes and resources ordinarily assumed given in static theory, but also people’s anticipations of the future, it is possible to regard demands and supplies as determined by these tastes, resources and anticipations, and prices are determined by demands and supplies. Once the missing element – anticipations – is added, equilibrium analysis can be used, not only in the remote stationary conditions to which many economists have found themselves driven back, but even in the real world, even in the real world in ‘disequilibrium’. (Hicks 1936b, p. 86)

This is a quite precise description of what will become the *VC* temporary equilibrium model, rather than of Keynes’s *General Theory* model. What will become the *VC* model, however, is presented here as the outcome of Keynes’s most revolutionary innovation.

The use of Keynes’s method allows the theoretician to determine the equilibrium at a certain “date” (the “week” of the ‘Bread’ paper or of *VC*). There is of course the problem of stringing together the equilibria referring to successive “dates”: it is the problem of the so-called “continuation” theory. In this respect Hicks is very cautious:

It is, indeed, not impossible to say something about further effects; for we can deduce what the stocks of goods will be at the end of the period if the decisions are carried out, and this gives us a basis for the analysis of a second period. But it is probable that the change in actual production during the first period will influence the expectations ruling at the end of that period; and there is no means of telling what that influence will be. (Hicks 1935b, p. 87)

The first part of this passage is purely Walrasian theory (after the adoption of the “hypothèse des *bons*”). But the second part alludes to a source of dynamic indeterminacy (the unpredictable influence of current performance on end-of-period expectations) that had certainly not been contemplated by Walras, given his tacit assumption of stationary (or static, as they are currently called) expectations.

## **6. Hicks’s Temporary Equilibrium Model: Walras *retrouvé*?**

As we have seen in the previous Section, during the long period of gestation of *VC* Hicks confronts most of issues that had been left unsettled at the end of 1934, achieving some provisional results that, immediately made public through publication in scientific journals, will eventually be systematized and incorporated in *VC*. Yet, two important fields to which Hicks had devoted much of his time and effort in the early 1930s, the field of consumer and producer choice and the equilibration issue, remain essentially frozen during the *VC* gestation period: Hicks is evidently working on these themes as well, but he is waiting for the appropriate framework where to fit his results. That framework is finally provided by *Value and Capital*.

As regards the theory of individual choice, as well as the related theories of demand and production, Hicks’s chief problem in the mid-1930s is to find a way to coordinate the results achieved in this area with the results already obtained or hopefully to be obtained in other fields,

such as the theory of money and capital, traditionally unrelated with the previous ones. The opportunity to systematize all these apparently disparate subjects is offered by *Value and Capital*. Here Hicks takes two important methodological steps which, independently of their intrinsic validity, that is indeed questionable and has in effect been repeatedly questioned over time, allow him to cope with his still unsettled questions.

The first of the two steps we are hinting at consists in sharply dividing Statics from Dynamics. At the very beginning of the dynamic part of *VC*, Hicks puts forward the following blunt definitions:

I call Economic Statics those parts of economic theory where we do not trouble about dating; Economic Dynamics those parts where every quantity must be dated. (Hicks 1939, p. 115)

The second step consists in remorselessly subdividing the subject matter of economics into two neatly separate parts, each of which is then allocated to Statics or Dynamics, apparently without any overlapping. To Statics Hicks allocates all of traditional choice, demand and production theory, that is, all those issues on which he had been working in the early 1930s, obtaining the results collected in the 1932 book and in the joint 1934 paper with Allen. To Dynamics all the remaining parts of economics are allocated.

By taking a closer look at the static part of *VC*, one realizes that, apart from individual choice theory (both producer and consumer), also an important portion of market equilibrium theory is included in Statics. Yet, since in Statics no quantity is dated, all activities that are essentially related with time must be excluded from it. Therefore,

[Statics] abstracts from capital and interest, saving and investment, and all that complex of activities which, in an earlier chapter, I called ‘Speculation’. (Hicks 1939, p. 100)

To this list of excluded activities, which appears towards the end of the static part of *VC*, a further list is added at the beginning of the dynamic part, which includes “trade fluctuations” and “money”. What remains after all these exclusions essentially coincides with the activities allowed for in the consistent models of stationary equilibrium discussed in the previous sections, that is, with all the activities and only those activities that are allowed for in a pure-flow economy.

So, in the end, a statical equilibrium model, in the *VC* sense, is nothing but a consistent stationary equilibrium model of a pure-flow economy, where, in accordance with Hicks’s conventions and definitions, all the variables have been deprived of any time dimension. In traditional consistent stationary-equilibrium models all the variables used to have a time dimension; since the economies studied in the models belonging to this class can only be pure-flow economies, all the variables were in effect referred to the same time period. The time dimension used to play a role in traditional stationary-equilibrium models because those models were traditionally associated with an equilibration process, which requires that the variables be dated. But now, according to the new distinction between Statics and Dynamics proposed by Hicks, the analysis of the equilibration process becomes one of the subjects to be studied by Economic Dynamics. Hence a consistent stationary-equilibrium model of a pure-flow economy can be legitimately transformed into a timeless static model in the sense of Hicks.

Yet, even if a Hicksian static model is timeless, there are two ways of dating its variables which are compatible with the structure of the static model. If all the variables are assigned the same date, we obtain the model of a ‘Spot Economy’, that is, an economy where all transactions are for immediate delivery. On the contrary, a model where all variables are dated, but the dates are not all the same, can be interpreted as a ‘Futures Economy’, where markets are currently open for all present and future dates (Hicks 1939, p. 136). The ‘Spot Economy’ and the ‘Futures Economy’ are extreme cases of some theoretical interest. They are dynamic models, according to Hicks’s

definitions, since in such models the variables are dated. But the very fact that such models are formally identical with a static model makes it clear that Hicks's definitions are not as clear-cut as he probably expected.

As we have seen, the analysis of the equilibration process, traditionally regarded (by Hicks himself) as belonging to Statics, becomes now a part of Dynamics: this is unavoidable, in the light of Hicks's new definitions, since "the adjustments needed to bring about equilibrium take time" (Hicks 1939, p. 116). So, let us now proceed to Dynamics, and specifically the second big issue still in need of clarification, namely, the equilibration issue.

In the 'Walras' paper Hicks had eventually identified four alternative equilibration mechanisms through which market equilibrium can be supposed to be established; three of these mechanisms are consistent with the logic of general equilibrium theory and the determinacy requirement, while the fourth is not. The inconsistent one is best exemplified by the equilibrium mechanism that would be at work in a Walrasian exchange model where the "no trade out of equilibrium assumption" were not to hold. Of the three consistent processes, the first is instanced by the Walrasian virtual *tâtonnement* process in 'logical' time or, for that matter, by the similarly interpreted Edgeworth recontracting process; both processes are supposed to drive the economy towards an instantaneous equilibrium. The second is exemplified by the Walrasian observable *tâtonnement* process in 'real' time taking place in a pure-flow stationary economy or, for that matter, by the similarly interpreted Edgeworthian recontracting process; both processes are supposed to drive the pure-flow economy towards a stationary equilibrium. Finally, the third is represented by Marshall's observable equilibration process in 'real' time, as applied to a barter system or to the daily market for a consumer good or service under suitable assumptions about the traders' utility functions; this process would drive the system or the market towards a final equilibrium which is determinate, as far as the rate of exchange between the two commodities or the money price of the consumer good or service are concerned.

Now, according to Hicks (1939), of the three consistent mechanisms the first, namely, the Walras-Edgeworth virtual mechanism implying that an equilibrium be actually reached before any observable activities are allowed to take place, concretely applies to "highly exceptional" markets only. Hence Walras's and Edgeworth's virtual "solution (if it may be called one) [is] not very convincing" and must be put aside (Hicks 1939, p. 128). So one is left with the remaining two processes: the equilibration process under stationary conditions, which is here called the "method of the Austrians", and the "method of Marshall" (Hicks 1939, p. 117).

Yet, while the consistent stationary equilibration process applies only to pure-flow economies, Hicks is well-aware that the economists who have embraced the stationarity assumption – not only the Austrians, who for Hicks (1939) are essentially Böhm-Bawerk and Wicksell, but also many others, among whom J.B. Clark, Cassel and Pigou are explicitly mentioned in this connection – have tried to use, and effectively used, this method to deal with capital as well.

Now, in the case of J.B. Clark and Cassel, their endeavour has led, according to Hicks, to "great errors" (p. 116, fn. 1). As to the Austrians, Hicks is not so explicit, contenting himself with saying that the stationary-state approach has had "a baneful influence on the minds of economists", encouraging the neglect of all those time-related phenomena that are "supremely important" in economic dynamics (Hicks 1939, p. 119). Yet, it is precisely the very last paragraph of VC to dispel any possible doubt as to Hicks's ultimate opinion in 1939 about the stationary-state approach:

We began our study of dynamic economics by rejecting the concept of a stationary state as an analytical tool. We rejected it then, because it seemed to be no more than a special case, which offered no facility for generalization. We have come in the end to doubt whether it is even conceivable as a special case [...]. (Hicks 1939, p.302)

So, in the end, Hicks is only left with

the method of Marshall; though since, in the relevant part of Marshall's work, [...] he is concerned with the determination of the value of one commodity only, considered as much as possible in isolation, while we are concerned with the determination of the whole system of values, we cannot follow him in all respects. (Hicks 1939, pp. 119-20)

Yet, it is quite easily shown that, in generalizing Marshall's "framework, so that it can be used for the discussion of the problems of a whole economic system" (1939, p. 122), Hicks ends up by jettisoning most of Marshall's conceptual framework.

As is well-known, in the Book V of his *Principles*, Marshall adopts a tripartite classification of time periods according to their 'length' (Day, Short Period, Long Period), to which a similar classification of equilibrium concepts is associated (temporary or market-day equilibrium, short-run normal equilibrium, long-run normal equilibrium). While in the temporary equilibrium model the problem at issue is to exchange given stocks of the commodity in question during the specified day, in the two normal equilibrium models one has instead to do with an "ongoing market" extending over a "short" or "long" sequence of days, in each of which a flow of the commodity in question is produced and exchanged under unvarying market conditions (more or less restrictively specified according to the length of the period).

According to Hicks (1939, p. 122), "these categories are suitable enough for Marshall's isolated market, but they hardly fit the analysis of the whole system". Hence, he drops the Short Period and the Long Period, together with the respectively associated normal equilibrium concepts, which many economists, no doubt including Marshall himself, would regard as the most characteristic concepts in the Marshallian system, and is left with the Day and the associated temporary equilibrium concept.

But this is not all. For Hicks, unlike Marshall, wants production to be allowed to take place during the Day. In view of this, Hicks changes the name of his shortest period, calling it "a Week, to distinguish it from Marshall's Day"<sup>16</sup>. The markets are assumed to be open only in the first day of the week, so that it is only on Mondays that contracts can be made.

Still according to Hicks (1939, p. 120), in his temporary equilibrium model Marshall has an "ingenious argument" by which he is able to show that the price at which the market will finish up at the end of the Day, that is, the temporary equilibrium price, is determinate in spite of the equilibration process proceeding by trial and error, by means of bilateral exchanges taking place at prices different from the temporary equilibrium one, prices that are labelled by Hicks (1939, pp. 120, 128) as 'false' prices. Hicks trusts that Marshall's "ingenious argument" may survive basically unaltered in a general equilibrium framework as well; and this is what he tries to prove in the Note to Chapter IX on the "Formation of Prices" (Hicks 1939, pp. 127-9).

We shall come back to this in a while. For the time being, if we provisionally take for granted, for the discussion's sake, that Marshall's argument generalizes to "a whole economic system", we can conclude that all markets smoothly proceed by trial and error, by higgling and bargaining, through transactions at 'false' prices, to a determinate equilibrium position on each given Monday, which remains thereafter unaltered over the following week. The data of the economy, including the agents' expectations, change at the junctures between successive weeks, for both endogenous and exogenous reasons. The evolution of the economy over time, namely, its dynamics, can be described by means of a chronologically ordered sequence of temporary equilibria.

The time structure of Hicks's temporary equilibrium model is tremendously similar to the time structure of Walras's general equilibrium theory after the adoption of the "hypothèse des *bons*", as stated in the passage of the fourth edition of the *Éléments* quoted at the beginning of Section 3 above: the equilibration process supposed to take place during Walras's "phase des *tâtonnements préliminaires*" is similar to the equilibration process occurring during the market hours on Hicks's 'Monday'; Walras's "phase statique" is analogous to Hicks's 'week'; finally, Hicks's change in the

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<sup>16</sup> As will be recalled, the "week" had already made its appearance in (Hicks, 1935b) and, much before, in Berry (1891).

data at the juncture between successive weeks reminds us of Walras's "phase dynamique" of trouble and change in the data at the end of each "phase statique".

The similarity between the two approaches stands out even more clearly if one considers the following passage by Hicks (1939, p. 127):

By using the week, we become able to treat a process of change as consisting of a series of temporary equilibria; this enables us still to use equilibrium analysis in the dynamic field.

By reading this sentence, the following question spontaneously arises: Which is the difference, if any, between Hicks's temporary equilibrium method, as described above, and Pareto's "method of successive equilibria" or Walras's method of "mobile equilibrium"?

At first sight, the difference might appear to be flimsy or altogether in-existent. And yet, in 1934, Hicks had qualified as "rather pathetic" the passage by Walras, referred to above, on the time structure of the analysis after the adoption of the "hypothèse des *bons*". In the attempt to find some justification for Hicks's behaviour, one is led to look at the relevant passages more closely.

At a closer inspection, the chief point of difference between the two approaches appears to be the following: in Hicks's *VC* model the equilibration process underlying the temporary equilibrium concept is conceived as a 'real' time, observable disequilibrium process, in the spirit of Marshall's higgling and bargaining of the market, whereas in the fourth edition of Walras's *Eléments* the equilibration process supporting the Walrasian equilibrium concept (after the adoption of the "hypothèse des *bons*") is explicitly viewed as an unobservable process in 'logical' time.

In view of this, it now becomes important to answer the question that has been raised and immediately postponed above: Is Hicks's generalization of Marshall's "ingenious argument" really legitimate? The way in which this question is answered will allow us to reach a definite conclusion on whether or not there exist any significant differences, at least as far as the equilibration process and the time structure of the analysis are concerned, between Walras's instantaneous equilibrium concept in the fourth edition of the *Eléments* and Hicks's temporary equilibrium concept in *VC*.

Hicks's argument in the Note on the "Formation of Prices" appended to Chapter IX of *VC* runs as follows. In Marshall's partial equilibrium analysis, trading at 'false' prices gives rise to income effects, which are then sterilised by Marshall's assumption about the constancy of the marginal utility of money<sup>17</sup>; the latter assumption, in turn, can be empirically justified for all commodities on which the consumer's expenditure is small with respect to his total income. Hicks then proceeds as follows:

It remains true in the general case, just as in Marshall's special case, that gains and losses due to false trading only give rise to income effects – effects, that is, which are the same in kind as the income effects which may have to be considered even when we suppose equilibrium prices to be fixed straight away. (Hicks 1939, p. 129)

But this statement is definitely wrong: for it is not true that, "in the general case", 'false' trading only gives rise to income effects of the standard type, inducing that usual "degree of indeterminateness" to which economic theory has got accustomed and with which it is well prepared to deal. In the last analysis Hicks's mistake can be traced to his unwarranted belief, documented in Section 2 above, that Marshall's idea of competition and competitive behaviour is after all very similar to Walras's idea of competition and price-taking behaviour.

To see why such unfounded conviction can lead to serious mistakes, let us consider, to keep things as simple as possible, a Walrasian pure-exchange general equilibrium framework with interdependent markets, that is, markets not benefiting from that Marshallian kind of isolation that

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<sup>17</sup> The formal equivalence between the constancy of the marginal utility of money and the absence of income effects (as far as the commodities different from money are concerned) had been proven by Hicks in 1934, in his joint article with Allen on the theory of consumer choice and demand (Hicks and Allen 1934, pp. 26-7).

would be entailed, in a pure-exchange context, by the assumption that all the traders' utility functions are additively separable and quasi-linear in one commodity (money or the money-commodity). Now, if in such a framework of interdependent markets, which is the typical Walrasian framework, trading at 'false' prices were allowed to take place, where such 'false' prices would presumably consist in rates of exchange different for each transaction (that is, for each pair of commodities and each pair of traders involved in the transaction), then the consequences would not, by any means, be confined to income effects of the usual kind, that is, income effects arising under the standard Walrasian price-taking assumption or, alternatively, in a Marshallian isolated market context; rather, the whole Walrasian structure would fall to pieces, due to the occurrence of transactions on which the theory has nothing to say, so that no prediction could be made concerning the transactions actually taking place, or the path possibly traced over time by the trading process, or, finally, the ultimate outcome (if any) of the process.

Hence, Hicks's attempt at making his approach more 'realistic' in a Marshallian spirit ends up in a failure. In the 'Walras' paper (1934), as recalled above, Hicks had doubted of the possibility of generalizing the Marshallian equilibration mechanism to a multi-market context; five years later, in *Value and Capital*, he has eventually persuaded himself not only that there is a way in which such a generalization can be carried out and made acceptable, but also that he has been able to discover it; but unfortunately his conjecture is wrong. So that, in the end, if one were asked by which sort of equilibration process Hicks's temporary equilibrium concept can be supported, one ought to conclude that any such process could not significantly differ from the virtual process in 'logical' time, advocated by Walras in the fourth edition of the *Eléments* to support his instantaneous equilibrium concept.

Over the 1930s Hicks is able to make important progress over Walras and Pareto in a number of diverse fields, bringing about theoretical innovations and analytical improvements that cause general equilibrium theory to be at the end of the 1930s something altogether different from what it had been at the beginning. Apart from achieving remarkable results in the theory of choice and equilibrium strictly speaking, Hicks makes advances in the more specialised fields of uncertainty, money and financial assets, of expectations, intertemporal relations and planning, indirectly contributing, in this way, also to the theory of capital.

All these results are incorporated into the *VC* temporary equilibrium model, which is therefore by far richer than Walras's original model in all these respects. In particular, the following two points should be stressed: 1) while in his *VC* temporary equilibrium model Hicks makes a very conscious use of generalised competitive point expectation function, making expectations of future prices to depend on current (and occasionally past) prices according to functions that can in principle take any analytical form, Walras had only tacitly introduced stationary price expectations into his analysis, making of them a quite parsimonious use; 2) while in his *VC* temporary equilibrium model Hicks systematically employs the notion of intertemporal plan, thereby making it possible to distinguish between equilibrium at a point of time and equilibrium over time and paving the way for an analysis of intertemporal disequilibrium, Walras confines his attention to currently open markets only, thereby telescoping all future planning into the current choices among currently available capital goods.

All these differences are no doubt very significant. And yet, as regards the interpretation of both the equilibration process and the equilibrium concept *stricto sensu*, there are no major distinctions to be drawn between the results eventually arrived at by Walras in 1900 after twenty five years of revisions and amendments and those reached by Hicks in 1939 after ten years of reflections and changes of mind: in both cases the equilibration process is essentially virtual and the equilibrium concept is essentially instantaneous. The only difference is that, in Hicks's case, the virtuality of the process and the instantaneity of the equilibrium concept are disguised under a mask of superficial Marshallianism. Hicks himself, on the other hand, seems to be aware of the true nature of his constructs and of the real implications of his assumptions, for he writes:

Since we shall not pay much attention to the process of equilibration which must precede the formation of the equilibrium prices, our method seems to imply that we conceive of the economic system as being always in equilibrium. (Hicks 1939, p. 131)

In the years and decades following the publication of *Value and Capital*, Hicks's awareness of the ultimate implications of the temporary equilibrium method, which is only embryonic in 1939, grows stronger and stronger, leading him eventually to disavow it:

The fundamental weakness of the Temporary Equilibrium method is the assumption, which it is obliged to make, that the market is in equilibrium – actual demand equals desired demand, actual supply equals desired supply – even in the *very* short period, which is what its single period must be taken to be. This assumption comes down from Marshall, but even in a very competitive economy, such very short-run equilibration is hard to swallow [...]. (Hicks 1965, p. 76)<sup>18</sup>

## 7. Concluding remarks

After many explorations in different directions during the early 1930s, Hicks ends up in 1934 by putting forward an interpretation of Walras's equilibrium and capital theory along stationary lines, an interpretation that does not correspond to the view endorsed by the last Walras and by Pareto. This is due, in part, to the influence of the scientific environment surrounding Hicks in the years of his formation and, for another part, to Walras's sheer confusion and Pareto's excessive conciseness and insufficient analysis. But it also reveals the existence of inner difficulties in the general equilibrium approach.

In the following years, however, Hicks embarks upon a systematic revision of his inherited or acquired ideas in a number of fields, first of all in the general theoretical field of equilibrium and equilibration, a revision that follows a path very similar to that followed by Walras himself in the last quarter of the nineteenth century. In the second half of the 1930s, during the long gestation of *Value and Capital*, Hicks's ideas on equilibrium and capital progressively change and mature, to eventually culminate, with the publication of *VC* in 1939, in the rediscovery of a method of analysis and an equilibrium concept (Hicks's temporary equilibrium) that are substantially similar to the method of analysis and equilibrium concept ("mobile equilibrium" and "method of successive equilibria") put forward by the last Walras and by Pareto.

Yet this link with the Walrasian tradition is not overtly recognised by Hicks in *VC*. In particular, the essentially Walrasian character of the equilibration process supporting Hicks's temporary equilibrium concept is disguised under Marshallian garments.

This fact has delayed Hicks's own recognition of the limits of the *VC* approach, which will start to be cautiously questioned only in 1956 and, more openly, in 1965. Yet, in view of the enormous diffusion of *VC* and of the centrality of its role in the development of the neo-Walrasian programme, Hicks's ambiguities as to the ascendance of *VC* have also had two less private consequences.

From a historiographical point of view, Hicks's ambiguities have concurred to spread the legend that the *VC* temporary equilibrium concept is an entirely new concept, essentially due to Hicks and a few other economists at work in the late 1920s and during the 1930s. It is only since the late 1970s, with the works of Diewert (1977), Morishima (1977), later followed by Witteloostuijn and Maks (1988), (1990), and others, that the origin of the concept is eventually traced back to Walras.

From a theoretical point of view, a fuller awareness of the tormented history of the temporary equilibrium concept, and of the reasons explaining such a winding path from Walras's time

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<sup>18</sup> It is worth noting that, even in 1965, Hicks does not disown the alleged Marshallian parentage of the *VC* temporary equilibrium model.

onwards, would have helped to build the neo-Walrasian programme on partially different and perhaps sounder foundations.

## References

- Bertrand, J. (1883), “*Théorie mathématique de la richesse sociale*, par Léon Walras, professeur d'économie politique à l'académie de Lausanne, Lausanne, 1883. *Recherches sur les principes mathématiques de la théorie de richesses*, par Augustin Cournot, Paris, 1838”, *Journal des Savants*, septembre, 504-8; as reprinted in Bridel (1996), pp. 195-202.
- Berry, A. (1891), “Alcune brevi parole sulla teoria del baratto di A. Marshall”, *Giornale degli Economisti*, 2, Serie 2<sup>a</sup>, giugno, pp. 549-53.
- Böhm-Bawerk, E. (1889), *The Positive Theory of Capital*, New York, 1923.
- Bortkiewicz, L. (1890), “Léon Walras. Eléments d'économie politique pure, ou Théorie de la richesse sociale. 2<sup>e</sup> édition. – Guillaumin et Cie. Paris”, *Revue d'économie politique*, 4<sup>e</sup> année, n° 1, tome IV, Janvier-février, pp. 80-6; as reprinted in Bridel (1996), pp. 355-9.
- Bridel, P. (1996), *Le chène et l'architecte. Un siècle de comptes rendus bibliographiques des Eléments d'économie politique pure de Léon Walras*, Librairie Droz, Genève-Paris.
- Cassel, G. (1932), *The Theory of Social Economy*, Augustus M. Kelley, New York, 1967; English translation of G. Cassel, *Theoretische Sozialökonomie*, 1918.
- Diewert, W.E. (1977), “Walras' Theory of Capital Formation and the Existence of a Temporary Equilibrium”, in G. Scwödiauer (ed), “Equilibrium and Disequilibrium in Economic Theory”, D. Reidel Publishing Company, Dordrecht, Holland, pp. 73-126.
- Donzelli, F. (2007), “Equilibrium and *Tâtonnement* in Walras's *Eléments*”, *History of Economic Ideas*, XV, 3, pp. 85-139.
- (2008), “Marshall vs. Walras on Equilibrium and Disequilibrium”, *History of Economics Review*, n. 48, pp. 1-38.
- Donzelli, F. (2009), “Edgeworth vs. Walras on Equilibrium and Disequilibrium“, *mimeo*, Dec.
- Edgeworth, F. Y. (1881), *Mathematical Psychics. An Essay on the Application of Mathematics to the Moral Sciences*, Augustus M. Kelley, New York, 1967.
- (1889), “The Mathematical Theory of Political Economy. *Eléments d'économie politique pure*. Par Léon Walras” (Lausanne: F. Rouge, 1889.), *Nature*, vol. 40, 5 septembre 1889, pp. 434-436; as reprinted in Bridel (1996), pp. 267-9.
- (1891a), “La théorie mathématique de l'offre et de la demande et le coût de production”, *Revue d'économie politique*, 5<sup>e</sup> année, tome V, n° 1, janvier, pp. 10-28; as reprinted in Bridel (1996), pp. 363-75.
- (1891b), “Osservazioni sulla teoria matematica dell'economia politica, con riguardo speciale ai Principi di economia di Alfredo Marshall”, *Giornale degli economisti*, Serie 2<sup>a</sup>, Vol. II, marzo, pp. 233-45.
- (1891c), “Ancora a proposito della teoria del baratto”, *Giornale degli economisti*, Serie 2<sup>a</sup>, Vol. II, ottobre, pp. 316-8.
- (1904), “The Theory of Distribution”, *Quarterly Journal of Economics*, 18, 2, February, pp. 159-219; as reprinted in Edgeworth (1925), pp. 13-60.
- (1925), *Papers Relating to Political Economy*, 3 Volumes, Macmillan, London.
- Hayek, F.A. (1928), “Das intertemporale Gleichgewichtssystem der Preise und die Bewegungen des ‘Geldwertes’”, *Weltwirtschaftliches Archiv*, N. 28, pp. 33-76.
- (1931), *Prices and Production*, Routledge and Sons, London.
- Hicks, J. (1930), “Edgeworth, Marshall and the ‘indeterminateness’ of wages”, *Economic Journal*, Vol. 40, No.158, June, pp. 215-31; partially reprinted in Hicks (1983a), pp. 71-84.
- (1931), “Theory of Uncertainty and Profit”, *Economica*, No. 32, May, pp. 170-189; partially reprinted as “Uncertainty and Profit” in Hicks (1982a), pp. 11-27.
- (1932), *The Theory of Wages*, Macmillan, London.

- (1933), “Gleichgewicht und Konjunktur”, *Zeitschrift für Nationalökonomie*, Vol. 4, No. 4, Aug., pp. 441-55.
- (1934a), “Léon Walras”, *Econometrica*, Vol. 2, No. 4, Oct., pp. 338-48; partially reprinted in Hicks (1983a), pp. 86-95.
- (1934b), Review of “Der Gleichgewichts-begriff als Instrument der Geldtheoretischen Analyse”, by G. Myrdal, in F.A. Hayek (ed.), *Beiträge zur Geldtheorie*, Julius Springer, Vienna, 1933, *Economica*, Vol. 1, No. 4, Nov., pp. 481-3; reprinted as “A Review of Myrdal” in Hicks (1982a), pp. 42-5.
- (1935a), “A Suggestion for Simplifying the Theory of Money”, *Economica*, Vol. 2, No. 5, Feb., pp. 1-19; as reprinted in Hicks (1982a), pp. 46-63.
- (1935b), “Wages and Interest: The Dynamic Problem”, *Economic Journal*, Vol. 45, No. 179, Sep., pp. 456-68; as reprinted in Hicks (1982b), pp. 67-79.
- (1936a), Review of *The Economics of Stationary States*, by A.C. Pigou, *Economic Journal*, Vol. 46, No. 181, Mar., pp. 98-102
- (1936b), “Mr Keynes’s Theory of Employment”, *Economic Journal*, 1936, 46, 182, June, pp. 238-53; reprinted as “*The General Theory: a First Impression*” in Hicks (1982a), pp. 84-99.
- (1937), “Mr. Keynes and the Classics”, *Econometrica*, Vol. 5, No. 2, pp. 147-59; as reprinted in Hicks (1982a), pp. 101-115.
- (1939) *Value and Capital. An Inquiry into Some Fundamental principles of Economic Theory*, Oxford University Press, London.
- (1956), “Methods of Dynamic Analysis”, in *25 Economic Essays in English, German and Scandinavian Languages – Essays presented to Erik Lindahl*, *Economisk Tidschrift*, Stockholm; as reprinted in Hicks (1982a), pp. 219-35.
- (1965), *Capital and Growth*, Oxford University Press, London.
- (1973), “Recollections and documents”, *Economica*, Vol. 40, No. 157, Feb., pp. 2-11; as reprinted in Hicks (1977), pp. 134-48.
- (1976), “Some Questions of Time in Economics”, in A.M. Tang *et al.* (eds), *Evolution, Welfare and Time in Economics: Essays in Honour of Georgescu-Roegen*, Lexington Books, Lexington, pp. 263-80; reprinted as “Time in Economics” in Hicks (1982a), pp. 282-300.
- (1977), *Economics Perspectives. Further Essays on Money and Growth*, Oxford University Press, Oxford.
- (1979a), “The Formation of an Economist”, *Banca Nazionale del Lavoro Quarterly Review*, No. 130, Sep., pp. 195-204; as reprinted in Hicks (1983a), pp. 355-64.
- (1979b), Review of *Microfoundations: The Compatibility of Microeconomics and Macroeconomics* by E.R. Weintraub, *Journal of Economic Literature*, Vol. 17, Dec., pp. 1451-4; reprinted as “Micro and Macro” in Hicks (1983a), pp. 349-52.
- (1980a), “IS-LM: An Explanation”, *Journal of Post-Keynesian Economics*, Vol. 3, No. 2, Winter 1980-1981, pp. 139-154; as reprinted in Hicks (1982a), pp. 318-331.
- (1980b), “Equilibrium and the Trade Cycle”, *Economic Inquiry*, Vol. 18, No. 4, pp. 523-34; English translation of Hicks (1933); reprinted as “Equilibrium and the Cycle” in Hicks (1982a), pp. 29-41.
- (1981a), *Wealth and Welfare*, vol. I of *Collected Essays on Economic Theory*, Basil Blackwell, Oxford.
- (1981b), Prefatory Note to “A Reconsideration of the Theory of Value”, in Hicks (1981a), pp. 3-5.
- (1982a), *Interest and Wages*, vol. II of *Collected Essays on Economic Theory*, Basil Blackwell, Oxford.
- (1982b), “Introductory: LSE and the Robbins Circle”, Chapter 1 in Hicks (1982a), pp. 3-10.
- (1982c), Prefatory Note to “Equilibrium and the Cycle”, in Hicks (1982a), pp. 28-9.
- (1982d), Prefatory Note to “Wages and Interest: The Dynamic Problem”, in Hicks (1982a), pp. 64-7.

- (1983a), *Classics and Moderns*, vol. III of *Collected Essays on Economic Theory*, Basil Blackwell, Oxford.
- (1983b), Prefatory Note to “Léon Walras”, in Hicks (1983a), p. 85.
- (1985), *Methods of Dynamic Analysis*, Oxford University Press, Oxford.
- Hicks J.R. and R.G.D. Allen (1934a), “A Reconsideration of the Theory of Value. Part I”, *Economica*, Vol. 1, No. 1, Feb., pp. 52-76; as reprinted in Hicks (1981a), pp. 5-29.
- (1934b), “A Reconsideration of the Theory of Value. Part II. A Mathematical Theory of Individual Demand Functions”, *Economica*, Vol. 1, No. 2, May, pp. 196-219; as reprinted in Hicks (1981a), pp. 30-55.
- Kaldor, N. (1934), “A Classificatory Note on the Determinateness of Equilibrium”, *The Review of Economic Studies*, Vol. 1, No. 2 (Feb.), pp. 122-36.
- Knight, F.H. (1921), *Risk, uncertainty and Profit*, University of Chicago Press, Chicago, 1971.
- Keynes, J.M. (1973), *The General Theory and After. Part II. Defence and Development*, in *The Collected Writings of John Maynard Keynes*, Vol. XIV, Macmillan, London.
- Lindahl, E. (1929), “Prisbildnings problemets uppläggning från kapital-theoretisk synpunkt”, *Economisk Tidskrift*, pp. 31-105; translated into English as “The Place of Capital in the Theory of Price” in Lindahl (1939), pp. 269-350.
- (1930), *Penningpolitikens medel*; translated into English as “The Place of Capital in the Theory of Price”, in Lindahl (1939), pp. 137-278.
- (1939), *Studies in the Theory of Money and Capital*, Augustus M. Kelley, New York, 1970.
- Marshall, A. (1961a), *Principles of Economics*, Ninth (Variorum) Edition with Annotations by C.W. Guillebaud, Vol. I. Text, Macmillan and Co., London.
- (1961b), *Principles of Economics*, Ninth (Variorum) Edition with Annotations by C.W. Guillebaud, Vol. II. Notes, Macmillan and Co., London.
- Morishima, M. (1977), *Walras’ Economics: A Pure Theory of Capital and Money*, Cambridge University Press, Cambridge.
- Myrdal, G. (1932), “Der Gleichgewichtsbegriff als Instrument der Geldtheoretischen Analyse”, in F.A. Hayek (ed), *Beiträge zur Geldtheorie*, Julius Springer, Vienna, 1932.
- (1939), *Monetary Equilibrium*, Augustus M. Kelley, New York, 1965.
- Pareto, V. (1896) *Cours d’économie politique. Tome I*. Nouvelle édition par G.-H. Bousquet et G. Busino, Librairie Droz, Genève, 1964.
- (1897), *Cours d’économie politique. Tome II*. Nouvelle édition par G.-H. Bousquet et G. Busino, Librairie Droz, Genève, 1964.
- (1909), *Manuel d’économie politique*, Librairie Droz, Genève, 1966.
- Pigou, A.C. (1935), *The Economics of Stationary States*, Macmillan, London.
- Walras, L. (1883), *Théorie mathématique de la richesse sociale*, as reprinted in Walras (1993), 225-278.
- (1885), “Un économiste inconnu: Hermann-Henri Gossen”, *Journal des économistes*, 4<sup>e</sup> série, 30, avril-mai, 68-90; as reprinted in Walras (1896), 311-330.
- (1896), *Etudes d’économie sociale : Théorie de la répartition de la richesse sociale*, édition comparée, in Auguste et Léon Walras, *Œuvres économiques complètes*, 9, Economica, Paris.
- (1988), *Eléments d’économie politique pure ou Théorie de la richesse sociale*, édition comparée, in Auguste et Léon Walras, *Œuvres économiques complètes*, 8, Economica, Paris.
- (1993) *Théorie mathématique de la richesse sociale et autres écrits d’économie pure*, in Auguste et Léon Walras, *Œuvres économiques complètes*, 11, Economica, Paris.
- Wicksell, K. (1893), *Value, Capital, and Rent*; English translation of *Über Wert, Kapital und Rente Nach den neueren nationalökonomischen Theorien*, G. Fischer, Jena.
- (1898), *Interest and Prices. A Study of the Cause Regulating the Value of Money*, Macmillan, London, 1936; English translation of *Geldzins und Güterpreise. Eine Studie über die den Tauschwert des Geldes bestimmenden Ursachen*, G. Fischer, Jena.

- (1901-6), *Lectures on Political Economy*, 2 vol., George Routledge and Sons, London, 1934; English translation of *Föreläsningar I Nationalekonomi*, II ed., C.W. Gleerups Förlag, Lund.
- Witteloostuijn, van A., and J.A.H. Maks (1988), “Walras: A Hicksian *avant la lettre*”, *Economie appliquée*, 41, 3, pp. 595-608.
- (1990), “Walras on Temporary Equilibrium and Dynamics”, *History of Political Economy*, 22, 2, 223-37.