Marshall versus Walras on Equilibrium and Time

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Abstract

The aim of this paper is to ponder upon Marshall's conception of equilibrium and to confront it with Walras's. In a first section, I present a rational reconstruction of the Marshallian conception. In contrast to its standard tripartite classification intepretation, I claim that this conception is based on two interlinked equilibrium concepts, normal equilibrium and market equilibrium. Several features are brought out: (a) this conception is based on what I call the 'period of analysis' hypothesis; (b) in this conception disequilibrium states have an effective existence; (c) the notion of long period equilibrium then turns out to have a most elusive meaning. In a second section, I compare Marshall and Walras on equilibrium and time. Whenever the comparison bears on their production models, a sharp contrast emerges in particular with regard to the meaning and possibility of disequilibrium. When Walras credit model is taken into account the result is more complicated. An important difference is still present which can be traced back to the fact that when it comes to time the Marshallian approach privileges the duration aspect while dodging the irreversibility or arrow of time aspect while the contrary is true for the Walrasian approach.

JEL Classification : B13; B40
Keywords : Marshall; Walras; Equilibrium

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1. Introduction

The aim of this paper is to ponder upon Alfred Marshall's conception of equilibrium and to confront it with Léon Walras's. As widely admitted, Marshall is an author whose views cannot be put in a single mould. Today it is fashionable to insist on the adaptive and evolutionary aspects of Marshall's views (see Raffaelli (2002) and Leijonhufvud (this volume)). The present paper, however, is concerned with Marshall, the value theorist, i.e. with the theoretical corpus forming Book V of the *Principles*.

2. Marshall's conception of equilibrium

A stationary equilibrium

Marshall is the heir of classical political economists such as Adam Smith and David Ricardo with whom he shares what Donzelli calls the stationary equilibrium conception:

> Further, all the above models assume a competitive adjustment process to be at work in the economy unfolding itself in 'real' time and driving the economy towards a stationary equilibrium state. The latter is assumed to be uniquely determined by the stationary data constellation characterising the economy over the entire time period to which the analysis is supposed to refer – a time period that is imagined to be 'sufficiently long' for the adjustment mechanism to work its effects through. In view of this, the supposedly unique stationary equilibrium atemporal competitive equilibrium state is interpreted in those models as the theoretical norm around which the observable states of the economy gravitate over time, and to which the economy will eventually converge in due time. Such stationary equilibrium consists of a stationary price system and an array of suitably defined quantity vectors of traded, consumed and/or produced commodities (Donzelli, 1989, 156–57).

This conception is in accord with the common-sense understanding of equilibrium – i.e. it is a point of rest. Its hallmark is that two equilibrium concepts co-exist – 'market-price equilibrium' and 'natural-price equilibrium' in the Smithian version, and 'market-day equilibrium' (in short, 'market equilibrium') and 'normal equilibrium' in the Marshallian version. Part and parcel of each other, they are in a relationship of hierarchy with normal equilibrium being the higher or more fundamental concept and market equilibrium the lower or less fundamental one. Normal equilibrium exists whenever the market outcome in a given branch is such that firms lack any incentive to change their behaviour (Marshall's attention focused more on firms than on households). Market equilibrium indicates that purchasers' and sellers' plans have been made compatible on a given market day. Note that while normal

equilibrium pertains to the matching between *normal* supply and demand, market equilibrium is a matter of *market* supply and demand matching.

The "period of analysis" framework

Marshall also treads in classical economists' footsteps by adopting the "period of analysis" framework. Although an essential feature of the stationary equilibrium notion, its presence and implications are barely acknowledged — a source of great confusion.

What I call the "period of analysis" is referred to in the *Principles* as the "period of the market".

> The unit of time may be chosen according to the circumstances of each particular problem: it may be a day, a month, a year, or even a generation: but in every case it must be short relative to the period of the market under discussion. It is to be assumed that the general circumstances of the market remain unchanged throughout this period; that there is, for instance, no change in fashion or taste, no new substitute which might affect the demand, no new invention to disturb the supply (1920: 342).

So, the "period of analysis" designates the time interval over which the market is studied. Several of its features are worth bringing out. First, each period of analysis is viewed as self-contained. As noted by Donzelli, "all activities performed by the economic agent during a given time period can have no effect outside that period, so that all intertemporal links between different periods are severed" (Donzelli 1985: 35). Small wonder that models resting on this conception of equilibrium have little room for expectations. Second, the period of analysis is sub-divided into shorter time spans. A unit of time must be devised, for example, the day. Third, when it comes to spelling out the temporal aspect of the organisation of trade, the notion of a trade round forces itself into the picture. That is, trade is supposed to occur within well-defined time spans, for example one day a week during specified opening hours.[1] One trade round plus the interval preceding the next can be called a "single period". A period of analysis is then a bounded sequence of single periods. The "unit of time" referred to the quotation from Marshall above is any given sequence of single periods of an extent shorter than the period of analysis. Another central feature is that the data of the economy (technology, tastes, population, etc.) must remain basically constant over the period of analysis. The modifier "basically" is important here. It means that only reversible changes in these data are allowed to occur. A final remark concerns the length of the period of analysis. No single definition is self-evident: in fact it is up to economists to define this length. However, their choice is conditioned by two opposite factors. On the one hand, the period

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[1] The more realistic assumption that trade is ongoing must be discarded because it runs counter to self-containedness.

must be long enough to allow adjustment processes to take place. On the other hand, the longer the period of analysis, the more contrived the assumption of constant data becomes.

The functioning of the market day

How will market equilibrium be attained? This is the question addressed by Marshall in his corn market model, expounded in Book V Chapter II of the *Principles*, and dealing with a daily corn market in a small provincial town.

In Marshall's model, agents bargain among themselves about possible quantity-price mixes. Marshall is able to show that the "true equilibrium" (the equilibrium values calculated by the omniscient outside economist) is close to that arrived at through haggling and bargaining if two assumptions are made: the separability of the utility function; and the constancy of the marginal utility of money. The quantity of corn traded and the price of corn in the last transaction are the same as in true equilibrium, but agents end up with different money balances. This scenario is appealing because of its trial and error component. It is therefore small wonder that most commentators — e.g. Hicks (1965), Dasgupta (1990) and Negishi (1985) — have bestowed high praise on Marshall for having devised it.

Unfortunately, this scenario has no general validity since the assumption of a constant marginal utility of money cannot be generalised. Therefore Marshall has a second, less ostentatious, iron in the fire, the assumption that agents are able to form correct conjectures as to the equilibrium values. Under this assumption, trade can only take place at equilibrium values, but it is almost as much a *deus ex machina* as the auctioneer assumption (cf. De Vroey 2003).

Disequilibrium

The result of the duality of equilibrium concepts within stationary equilibrium conception is that, in principle, three outcomes are conceivable: (a) the conditions for both equilibrium concepts are satisfied; (b) neither of them is fulfilled; or (c) finally, market equilibrium exists in combination with a lack of normal equilibrium. However, as just seen, Marshall excludes the second possibility: market days finish with a match between supply and demand. As a result, there is no ambiguity in attaching the term disequilibrium to the third outcome. That is, disequilibrium is present as soon as market equilibrium values (a quantity/price pair) fail to coincide with normal equilibrium values. In no way should the existence of disequilibrium be considered an odd occurrence. On the contrary, in the Marshallian framework it is the permanent achievement of equilibrium that is considered exceptional. As noted by Viner, "the ordinary economic situation is one of disequilibrium moving in the direction of equilibrium rather than of realised equilibrium" ([1931] 1953): 206). What must be emphasised, however,

is the fact that Marshallian disequilibrium accompanies a matching of the market supply and demand functions or, in other words, market clearing (cf. De Vroey 2005).

Marshall's fishing industry example

In his celebrated fishing industry example Marshall investigates the impact on prices of an increase in the demand for fish. Marshall's first step in addressing this issue is to note that it cannot be solved without first elucidating the nature of the change in demand. A preliminary classification is thus necessary.

> We may roughly classify problems connected with fishing industries as those which are affected by very quick changes, such as uncertainties of the weather; or by changes of moderate length, such as the increased demand for fish caused by the scarcity of meat during the year or two following a cattle plague; or lastly, we may consider the great increase during a whole generation of the demand for fish which might result from the rapid growth of a high-strung artisan population making little use of their muscles (1920: 369).

In this way, three time categories are separated, a specific equilibrium concept being attached to each of them: market-day equilibrium, short-period equilibrium and long-period equilibrium. This tripartite classification can be conciliated with the above dual classification by considering that the last two concepts are sub-types of the more encompassing normal equilibrium concept.

This taxonomy established, the solution to Marshall's query is at hand. It runs as follows. The effect of an increase in demand on the day that it arises will be to increase the price, leaving the quantity sold unchanged (in Marshall's time fish was a perishable good). If the change in demand is deemed accidental, no change in supply will be triggered. In turn, if the change is expected to be of moderate length (i.e. the departure from the more fundamental demand is sufficiently long for firms to find it worthwhile to change the quantity of fish they bring to the market), a short-period normal equilibrium will be established at a higher quantity/price pair. The last type of change (one of a permanent nature) is more troublesome because opposite tendencies are at work. Marshall's view is that, all in all, the new normal equilibrium supply price will be lower, due to increasing returns.

An assessment

The Marshallian conception of equilibrium has the virtue of being a disequilibrium theory. No claim is made as to the permanent realization of equilibrium. Disequilibrium states are normal occurrences. Yet whenever they exist, forces tending towards equilibrium are set up.

This conception suffers from two major flaws. The first, common to all stationary equilibrium models, lies in its inability to tackle dynamics, i.e. to picture the economy 'in time'. The second, characteristic of Marshall's theory, concerns the ambiguity of his long-period notion. These will be dealt with in turn below.

The stationary equilibrium notion is irremediably static, the direct result of adopting the period of analysis framework. The latter has little to recommend to it, save its tractability when dynamic tools are unavailable. As stated by Donzelli:

> By definition, a 'self-contained period economy' is an economy where no economic phenomenon essentially related to the time structure of economic activity can possibly occur (Donzelli 1989: 35).

The same is true of the basic assumption of constancy of data.[2] The problem with this assumption is that the passing of time is accompanied by incessant irreversible changes, be they large or small. Since they exclude this essential dimension of time, stationary equilibrium models turn out to be atemporal. Again, Donzelli makes the point aptly:

> Such models are structurally incapable of providing the slightest explanation of any economic phenomenon whose occurrence essentially depends on economic activities taking place in time (Donzelli 1989: 158).

The second flaw in Marshall's analysis concerns the notion of a long period. In the fishing industry example, Marshall gives the impression that he is analysing a single adjustment mechanism with two variants, pertaining respectively to the short and the long term. Yet upon closer scrutiny, this is not the case.

Marshall's short period analysis raises no fundamental problems. Still, in order to understand it correctly, it must be realised that three distinct equilibrium concepts are involved: (a) stationary equilibrium, consisting of those values (a quantity/price pair) that prevail in the absence of shocks; (b) short-period equilibrium, replacing stationary equilibrium for the duration of the abnormal demand; (c) market-day equilibrium, integrating any accidental shift in either demand or supply. When there is no short-period shock in demand, the two equilibrium concepts that are operative are (a) and (c). During the spell of abnormal demand, (a) is temporarily replaced by (b) as the centre of gravitation. In other words, the short-period analysis is about a temporary departure from the basic gravitation centre to a subsidiary one.

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[2] Strikingly enough, few authors seem to be aware of its presence. Hayek is an exception, but he has no qualms about its adoption. "The only condition about the necessity of which for the establishment of an equilibrium economists seem to be fairly agreed is the 'constancy of the data'. But after what we have seen about the vagueness of the concept of 'datum' we will suspect, and rightly, that this does not get us much further.… All that this condition amounts to, then, is that there must be some discernable regularity in the world which makes it possible to predict events correctly" (Hayek [1937] 1948: 48-9).

This point is well captured by Frisch, using the metaphor of a two-section pendulum (1950: 496). This is also what Dasgupta has in mind when he writes:

> Marshall provides an integrated system, in which market price is linked to the long-period normal price via a system of short-period normal prices (Dasgupta 1990: 245).

> The so-called 'equilibrium' on a day is a disequilibrium in relationship to the short period, as a short-period 'equilibrium' is a disequilibrium in relation to the longer period (idem 1990: 254).

Whenever shocks are reversible, the period of analysis framework is fitting. But what about Marshall's third type of change — a permanent change in demand, or at least one that will affect a whole generation? Here, the reader is at a loss about the meaning of the notion of long-period equilibrium. Is it synonymous with the stationary equilibrium notion, in which case the long period and the period of analysis are one and the same thing, or is it a distinct notion referring to a time period shorter than the period of analysis? Only in the latter case can Marshall's long-period analysis be considered on the same footing as his short-period analysis.

Let me start with this last option. At issue is whether it is possible to incorporate long-period changes in demand into the period-of-analysis framework. To this end, the period of analysis should be extended so as to cover several generations. This means that we would have no permanent change in demand, strictly speaking, but just a change affecting one generation, which would be reversed for the next. As a result, the reasoning developed for short period changes would still apply. In relation to stationary equilibrium, the long-period equilibrium would behave like the short-period one. However, this option must be discarded, because the assumption that economic data remain unchanged over several decades strains credibility.

This brings us to the first option, that the long period and the period of analysis are one and the same (an interpretation fitting Dasgupta's quotations above). It then turns out that what Marshall calls an adjustment towards the long-period equilibrium is not the same as the adjustment towards stationary equilibrium within a given period of analysis (the type of problem towards which his value theory is geared). Its concern is the transition from one period of analysis (stationary equilibrium) to the next. It cannot be analysed with the tools of stationary equilibrium since it runs counter to the basic premise of this conception, an unchanging set of data. When it is further realised that this adjustment is supposedly a long-drawn process, it must be concluded that a theoretical vacuum prevails as to what happens during the extended period spanning two successive periods of analysis.

3. A comparison with the Walrasian conception

General methodological differences

Though contemporaries, Marshall and Walras never met. They corresponded occasionally without entering into discussions of substance (on this, see Groenewegen (1995: 478, 778)). Any meeting would probably have been to no avail, their basic conceptions of economic theory being so far apart. To Marshall, economic theory served to illuminate particular problems related to the ordinary business of life. Priority was to be given to empirical relevance, possibly at the price of some loss of analytical rigour. In contrast, Walras's interests lay in matters of principle, in questions of a more philosophical nature — for example the logical existence of equilibrium in an abstract decentralised economy.

The following quotation from Hammond aptly summarises their differences:

> Marshallian theory is problem oriented in the following sense: 1) that it is focused on actual problems from the world of experience; 2) that one begins analysis of a problem well-armed with observed and related facts; 3) that the structure of analysis is dictated by the specific problem one is dealing with; 4) that real world institutions are accounted for and dealt with; 5) that definitions of terms are problem specific; and 6) that mathematical considerations do not take a dominant place in the analysis. The Walrasian approach is to be more concerned with generality: to make theory more abstract, and less connected with problems of policy or experience and institutions, to check the theory or otherwise resort to empirical evidence only after the theory has been worked out; and to emphasise logical consistency and mathematical elegance (Hammond 1992: 226).

There is, however, one aspect not mentioned by Hammond that to me is central. It relates to the fact that Marshall emphasised the study of isolated markets while Walras was concerned with the study of an economy as a whole. More than just a distinction between partial and general equilibrium is involved here. Some commentators — e.g. Schumpeter [1954] 1994: 836) — have claimed that Marshall did tackle the subject of general equilibrium. I disagree with them. Be that as it may, the deeper difference is that Marshall and Walras diverged as to how best to address the issue of the functioning of the economy as a whole. Marshall's implicit strategy in this respect was to start with the study of isolated markets, leaving the piecing together of these separate studies to a later stage of analysis. While this method has a common-sense appeal, its drawback is that with hindsight its second stage presents a daunting task. In contrast, Walras's work is premised on the view that an entire economy should constitute the object of study from the onset. Simplifications had, of course, to be introduced; but they pertained to the characterisation of the economy rather than to dividing it into separate sub-entities. Walras started his analysis with the most rudimentary economy possible, a two-good economy, where the two goods between them constituted the entire economy. The idea of separate markets, which would constitute a specific locus for the formation of

equilibrium, strictly speaking, makes no sense in this perspective. The whole economy constitutes a single market encompassing all agents, on the one hand, and all goods and services, on the other.

Marshall's and Walras's production models

Walras's distinctive method in his *Elements of Pure Economics* (1954) is to study successive models of increasing complexity. He starts with the analysis of different forms of an exchange economy, and proceeds to consider a production model. In the latter, only the services of capital goods are traded. The capital formation and credit model introduces the trading of capital goods. Finally, money enters the picture in the model of circulation and money. As this last model adds nothing substantial to the earlier results, the capital formation model ought to be viewed as the apex of Walras's analysis. As will be seen, this model implies intertemporality (or alternatively, it can be stated that the earlier models remain static). Whereas no complete picture of Walras's theory can be reached without considering the capital formation model, for my purpose it is nonetheless better to start the discussion with the production model.

The first striking feature of Walras's production model is that a single equilibrium concept is present. The criterion for its realisation is market clearing. Disequilibrium *à la* Walras can easily be defined – it is the opposite of equilibrium, i.e. market non-clearing – yet its existence is virtual (since out-of-equilibrium trade is excluded by definition). This marks a sharp contrast with the Marshallian conception, where disequilibrium and market clearing can co-exist. As a result, the Walrasian construct is much simpler, since the complicated assertions to be made about the Marshallian approach – e. g., that there might be at one and the same time equilibrium according to one criterion (market clearing) and disequilibrium according to the other (the attainment of normal values) – are unnecessary.

A second difference pertains to the time framework. In Walras's production model, there is no room for the notion of period of analysis since its concern is a single trade round. Moreover, the element of duration (to which Marshall is so sensitive) is absent from Walras's model (wherein the formation of market clearing occurs in logical time, i.e. instantaneously).

Another difference concerns the relationship between production and trading. In the Marshallian framework, it is assumed that production takes place before trade. On the contrary, in the Walrasian model, production and exchange are assumed to start only after equilibrium values have been calculated. In other words, production is exclusively made-to-order.

A fourth and final difference pertains to the institutional set-up of price formation. The auctioneer plays an indispensable role in this respect in the Walrasian approach, while no such figure is present in Marshall's theory, where agents are price-makers.

To conclude, whenever the comparison between the Marshallian and Walrasian conceptions of equilibrium is limited to a discussion of Walras's production model, the contrast between them stands out sharply. As we now shall see, the matter is more complicated when Walras's capital formation and credit model is considered.

Walras's dynamic model

To Walras, the production model was just a step towards his more complete capital formation and credit mode. The latter considers a 'progressive economy' by introducing savings behaviour, investment, capital accumulation and trade in durable goods. Two periods are considered, as newly produced capital goods yield no services until the subsequent round of trading (Walras 1954, p. 283). Expectations about future prices enter the picture, with agents forming expectations about spot prices in future periods based on the current-period spot prices.

Admittedly, Walras's way of positing the issue of intertemporality is rudimentary. It is nonetheless true, to borrow Van Witteloostuijn and Maks's (1989) expression, that by conceiving this model Walras proved to have been 'a Hicksian avant la lettre'. The standard interpretation is that authors such as Hayek, Lindahl and Hicks devised a new conception of equilibrium, which was dynamic rather than static. It is more correct to state that they rediscovered the notion of equilibrium that Walras had already employed, which had subsequently been forgotten (probably because Cassel had tilted Walras's views back towards the stationary equilibrium line).[3]

Hicks's aim, when introducing the temporary equilibrium framework in *Value and Capital* ([1939] 1946), was to study an abstract economy evolving over time. In his scheme, trading took place every Monday, giving rise to a temporary equilibrium. The dynamic process was described as a sequence of temporary equilibria. Firms and consumers were assumed to hold expectations about future prices, yet Hicks assumed that no futures markets existed. To him, temporary equilibrium was identical to Walras's static equilibrium, except that expectations about the future were explicitly introduced into the picture. As in Walras, the possibility of market rationing was discarded.

However, the fact that supply and demand matched every Monday did not make the disequilibrium concept irrelevant to Hicks. To him, it related to a distinct equilibrium concept pertaining to the chain of successive temporary equilibria, "equilibrium over time". This was

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[3] On this, see Donzelli (1989): 45–7.

realised if the expectations held by agents in one trading round about prices in future rounds were fulfilled. Thus, if the possibility of market disequilibrium was excluded, intertemporal disequilibrium was conceivable.

> In this (analytically important) sense, the economic system can be taken to be always in equilibrium; there is however another wider sense in which it is usually out of equilibrium, to a greater or less extent ([1939] 1946: 131).

> The degree of disequilibrium marks the extent to which expectations are cheated, and plans go astray ([1939] 1946: 132).

An assessment

Does this temporary/intertemporal equilibrium framework amounts to a return to on the stationary equilibrium conception? In this new light, it is true that the contrast drawn above between the stationary and Walrasian conceptions of equilibrium becomes less obvious, since two equilibrium concepts and two adjustment processes are present in both of them. Still, it would a serious mistake to amalgamate the two conceptions. On the one hand, the other differences evoked above (the relationship between trade and production, the working of trade rounds) remain valid. On the other hand, and more importantly, the two conceptions differ in their treatment of the time dimension. The Walrasian approach breaks with the period of analysis framework and its correlates, the self-containedness and constancy of data assumptions. From one trade round or tâtonnement point in time to the next, the data may change — be it radically or slightly, and in an irreversible way — or remain identical. This change of premise has far-reaching consequences. In particular, it paves the way for a real dynamic analysis giving pride of place to expectations.

Put another way, it turns out that the basic difference between the Marshallian and the Walrasian approaches lies in the way in which they address the issue of time. When thinking about time (what he surely did more than Walras), Marshall had in mind duration — the fact that most adjustment processes were time taking, that they should be classified accordingly, and that each of these types required a specific analysis. Yet, his adoption of a stationary conception of equilibrium forced him to forego another, equally central, feature of time, its irreversibility — the arrow of time dimension. For his part, Walras did not reflect as much on time as Marshall did. Yet, more or less unwittingly, he inaugurated a radically different approach to time, enabling him to accommodate the fact that the passing of time induces permanent changes. In turn, he excluded the duration aspect that was so dear to Marshall.

The shift from the old conception of equilibrium, held by classical economists and Marshall, to the Walrasian-Hicksian one has been a drawn-out process. Its full fruition and generalization is recent, dating from the rise of stochastic dynamic macroeconomics. Oddly

enough, it has hardly been commented upon. Donzelli (1989) is an exception, but his work is only available in English as an unpublished doctoral dissertation (although it was published as a book in Italian).[4] An author such as Robert Lucas may well have signalled that a change in the prevailing conception of equilibrium has occurred, noting in his joint paper with Thomas Sargent that "In recent years, the meaning of the term *equilibrium* has changed so dramatically that a theorist of the 1930s would not recognize it" ([1979] 1994: 15). Yet the point is barely elaborated, no hint being given that this change should be considered as a transition from a Marshallian towards a Walrasian conception of equilibrium.

4. Concluding remarks

My paper has examined whether Marshall's and Walras based their theories of value on the same conception of equilibrium. Whenever the comparison bears on these authors' production model, a striking contrast emerges. The Marshallian approach rests on two equilibrium concepts while only one is present in Walras's model. Moreover, disequilibrium is defined differently and has a distinct theoretical status — in one case it really exists; in the other it has only a virtual existence. When the more complete Walrasian model is taken into consideration, the matter becomes more complicated since the Walrasian model then contains two equilibrium concepts and the possible existence of states of disequilibrium, i.e. temporary departures from the equilibrium path. However, this increased similarity should not be interpreted as meaning that the same conception of equilibrium underpins the two approaches. A radical difference remains. The Marshallian analysis is based on the period of analysis framework, with its twin correlates of self-containedness and basic constancy of data. This framework is absent from the Walrasian approach. Hence self-containedness and basic constancy of data are also missing. This difference has far-reaching consequences since it impedes (allows) the Marshallian (Walrasian) approach to tackle the issue of dynamics.

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[4] Cf. Donzelli (1986).

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