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DEALING WITH TIME IN ECONOMIC ANALYSIS: SOME MARSHALLIAN INSIGHTS

BY
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According to Alfred Marshall, the element of time is the most important and difficult aspect to deal with in the economic analysis. Accordingly, he has placed the concept of time at the core of his economic reasoning, and he has developed a number of analytical tools that allow including time in his analytical framework: most notably, the cæteris paribus pound, the representative firm, and the distinction between short and long periods. However, he encountered an insurmountable impasse when dealing with the real elapsing of time in his static framework: the solution proposed in his Principles of Economics remained, for him, highly unsatisfactory, problematic, and incomplete. The real elapsing of time—unavoidable in his reflections—copes very badly indeed with his analytical construction based on equilibrium. The continuity of time is the element of the Marshallian analysis most quickly criticized and rejected. After him, in the economic analysis, time gradation was rigorously divided into "short" and "long" periods, whereas Marshall's concerns for the continuity of real time were banished from what was considered a "rigorous" analysis. The main aims of this paper are to frame Marshall's distinction between short and long periods and to underline those aspects of his contribution that were lost or were substantially simplified in later literature.

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> *The incoming tide of the sea comes by waves i.e. by fluctuations: and the tide is carried over by the waves. A short view does not suffice to decide how far the rise of the tide can reach: an estimate of the future is based on the supposition that some forward movements will continue for long: in short that there will be progress. Progress is a fluctuation forwards, which has continued persistently*.
> (Marshall, manuscript note)

I. INTRODUCTION

References to time have characterized economic reasoning—at least implicitly—from its very beginning. In the writings of the classical economists, there are references to both long and short periods, although, for most of them, a rigorous economic theory could deal only with long-period considerations.

Alfred Marshall has placed the concept of time at the core of his economic reflections. He was mainly interested in finding the ways and the means of economic progress. Although, for him, "progress involves change, and perfect stability ... indicates low vitality" (1923, p. 244), fluctuations are considered "a source of weakness," insofar as they produce a kind of instability that does not promote any progress, any step forward. But, in his view, "The past and the present [have to] move towards the future" through "forward movements" (ms note, folder 5.7). Particularly injurious, for him, are the fluctuations of credit because they cause fluctuations in production, employment, and confidence. In Marshall's view, fluctuations are a serious threat to public good and well-being, and a dangerous limit to progress. This is why fluctuations are to be controlled and contained as much as possible by "thoughtful men" who are able "to anticipate the future that means may be fitly adapted to coming needs and business credit may develop more steadily and surely" (1923, p. 245). Progress implies a change in the character of the forces at work and must be clearly distinguished from a mere change in quantity, which is growth (Caldari and Masini 2008). Moreover, progress occurs continuously over the elapsing of time and this explains the great attention given to the time dimension by Marshall. Furthermore, in all his reflections and reasoning, he recalls the importance of the time element, but he also tries to deal with it by developing a particular analytical tool, which would allow both short- and long-time dimensions to be included in the economic analysis and go beyond the shortcomings of the classical approach.

His solution has led to much criticism and heated debates that have caused us to clearly distinguish (and choose) between historical and logical time, on the one hand, and between short and long periods, on the other hand.

In this paper, I follow the ways in which the time dimension has been dealt with in the economic analysis, focusing on the Marshallian contribution to time periodization in a historical and critical perspective.

This paper is structured as follows. Section II deals with classical economists and their long-run perspective; section III focuses on Marshall's time-period analysis; section IV underlines some aspects of Marshall's analysis that have been further developed or abandoned; and section V draws some conclusions.

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II. THE LONG-RUN PERSPECTIVE OF CLASSICAL ECONOMISTS

As stressed by Joan Robinson (1978, p. 1), "the main preoccupation of the classical economists was with an historical process of accumulation in a capitalist economy and its relation to the distribution of the product of industry between the classes of society.…" Accordingly, they were mainly involved with a long-run perspective, and their attention was mostly focused on what they called "natural" values. Although this approach is basically common to all the classical economists, there are some differences that are worth being underlined.

Adam Smith highlights the role of the natural price as "the central price, to which the prices of all commodities are continually gravitating" ([1776] 1957, p. 51), and it tends to coincide with the cost of production. This crucial center of gravity is given and *assured* in Smith by the free play of competition; however, if competition does not work freely (for the presence of "corporations, statutes of apprenticeship, and all those laws which restrain in particular employments, the competition to a smaller number than might otherwise go into them" [(1776) 1957, p. 55]), market prices given by the *effective* play of demand and supply may diverge—often largely—from the natural prices.

Robert Malthus dedicates special attention to the play of demand and supply and to the role of the effective demand. In his *Principles of Political Economy* he stresses: "General wealth … will always follow *effective* demand" (1821, p. 323), and, moreover, "there is no case of price, whether *temporary or permanent*, which they [demand and supply] will not determine" (1821, p. 56; emphasis added). This is an interesting divergence from Smith and his definition of natural value. According to Malthus:

> the great principle of demand and supply is called into action to determine what Adam Smith calls natural prices as well as market prices ... and … the cost of production can do nothing but in subordination to it, that is, merely as this cost affects actually or contingently the relation which the supply bears to the demand. (1821, pp. 59–60)

David Ricardo does not share the stress given by Malthus to the interconnection between demand and supply and their role in determining (natural and market) prices. Although he recognizes the effect of temporary or accidental factors on market values, he is mainly interested in the "natural values" that occur when there are no temporary disturbances that, in his analysis, are left "entirely out of consideration" ([1821] 1983, pp. 91–92). Natural values are values of tendency and market prices—established by "the proportion of the supply to the demand" ([1821] 1983, p. 94)—however much they may deviate from their natural prices, and have "a tendency to conform to [them]" ([1821] 1983, p. 94). In the long run (due to the working of the principles of population and of free competition), market values unavoidably tend to their natural level.

With Smith and especially Ricardo, John Stuart Mill shares the concept of natural value as the center value towards which the market values are constantly gravitating:

> It is like the sea that everywhere tends to a level; but it never is at an exact level; its surface is always ruffled by waves, and often agitated by storms. It is enough that no point, at least in the open sea, is permanently higher than any other. Each place is alternately elevated and depressed; but the ocean preserves its level. (1898, p. 261)

Mill recognizes the important role of demand and supply but only for the market (short-run) values or for those things that cannot be multiplied at pleasure. The working

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of Say's Law—assured by the free play of competition—causes, in the long period, market value to get closer to its natural value or equilibrium value.

The long-run perspective characterizes the analyses of classical economists, notwithstanding the different weights or emphases sometimes given to short-period phenomena. However, within the elapsing of about seventy years—from Smith to Mill—it is possible to note an important shift. In order to clarify this point, the distinction made by Geoffrey C. Harcourt between "period" and "run" could be useful: a *period* is "a theoretical concept where what is and what is not confined to the *cet. par*. pound is decided by the theorist in question," while *run* "refers to actual historical episodes where what relevant determining factors change or do not change are products of that particular historical episode and are not decided by the theorist" (2012, p. 258). Accordingly, whereas Smith has a long-run perspective, especially in his consideration of economic growth and capital accumulation, but also takes into account short-run and temporary phenomena, Mill, albeit recognizing the important role supply and demand may play in the short run, focuses on their long-period *equilibrium*. According to Smith, *if* free competitive conditions prevail, value will gravitate in the long run towards its normal level; otherwise—as often happens—it diverges from that. According to Mill—*given* the working of Say's Law, the play of free competition, and the law of population—in the long period, demand and supply will necessarily reach an equilibrium position. It is indeed with Ricardo that economic analysis becomes almost exclusively a long-period analysis: short-run phenomena are seen as temporary "perturbations" from long-period values. It is not worth focusing on short-run considerations, as Ricardo maintains, since they would not allow rigorous reasoning on the prevailing economic conditions that take place only in the long period. Malthus's attention to temporary and current facts is disregarded in favor of the tendencies prevailing only in the long run. Finally, what was a *long-run* perspective, using Harcourt's distinction—that is, a perspective referred to a distant, but still real, point in time—becomes with Mill a *long-period* perspective, much closer to an ideal state, characterized by a situation of stable equilibrium built upon some abstract assumptions.

III. SHORT- AND LONG-PERIOD ANALYSIS IN ALFRED MARSHALL

Trying to Overcome Classical Economists' Lacunae

While recognizing the importance of classical economists' contributions, Marshall nonetheless stresses some important lacunae in their writings, especially the fact that "none … paid … sufficient attention to the element of Time" (Whitaker 1996, II, p. 29) and that they "attributed to the forces of supply and demand a much more mechanical and regular action than is to be found in real life" (1920, p. 763).

The main challenges Marshall faces in developing his economic analysis from the legacy of the classical economists are, first, to give attention to the element of time—and to the qualitative, institutional changes it implies—and, second, to take into due consideration the importance of the interplay between supply and demand.

His first attempt to overcome the classical shortcomings is developed in an early work titled "On Value" (1870–71, in Whitaker 1975). Marshall notes that "the circumstances that determine the supply and demand of a commodity are widely different for different cases, the differences depending mainly on the length of the period of time to

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which the investigation applies"[1] (Whitaker 1975, I, p. 134). The periods of time are put in four classes, according to the adaptability of supply. Class A, where "time is very short," is "very unimportant in itself," since "the buyer is influenced merely by considering whether he can afford to pay the price at which the commodity is offered … [whereas] the seller fixes his price in general without much thought merely following the prices which rule in some large market" (Whitaker 1975, I, pp. 134–135). In class B "the time is not long enough for fresh commodities to be produced in order to eke out the supply but the dealers fix their prices independently" (Whitaker 1975, I, p. 135). Class C regards cases "in which no change in the modes of production is contemplated but the periods are sufficiently long to enable the supply to be regulated so as to meet the demand" (Whitaker 1975, I, pp. 137–138). Class D refers to periods long enough "to include changes in supply and demand which may in many cases be considerable" (Whitaker 1975, I, p. 139) in terms of amount changed (Whitaker 1975, I, p. 143), but neglects all the "changes in general habits and skill of the people and in their command over mechanical resources" that can take place "during generations of continuous social progress" (Whitaker 1975, I, p. 139). This neglect is necessary because one or another of the curves "may be rendered false by such an event as change in fashion, a war, a plague, the invention of new machinery, the opening up of a new market or of a new source of supply, the discovery of some new application of the commodity or the competition of a new rival" (Whitaker 1975, I, p. 140).[2]

The division into classes A, B, C, and D is replicated in another early work entitled "On Wages," where Marshall deals with the labor market, and the periodization is done according to the possibility of changes in the supply and demand of labor. Here in class A "are considered the arrangements made between an individual labourer and an individual employer" (Whitaker 1975, I, p. 186). Class B deals with "small markets and great friction," where there is the influence of trade unions (Whitaker 1975, I, pp. 186–187). In class C Marshall includes "variations of supply of labour of a particular kind and of capital seeking employment in a particular trade" (Whitaker 1975, I, p. 187). Class D contemplates cumulative change as the "influence of the progress of the country" (Whitaker 1975, I, p. 190).[3]

In both these essays, Marshall tries to link the short-run market values to the long-period natural values by means of an ad hoc "time" periodization, without rejecting

[1]It is important to note that in these two essays, the periodization used by Marshall is independent from the clock time, and it is, on the contrary, linked to what Redvers Opie (1931) has rightly defined as "operational time."

[2]Class A characterizes retail shops for very short periods; class B is for cases such as those "of fish and vegetable markets for one day [and] of corn markets for considerable periods less than a year" (1975, p. 136); class C includes the "corn market for a few years [and] of manufactured articles for varying periods" (1975, p. 138); in class D we find mainly manufactured commodities (like steel pens or preserved meat), the production of which can be increased by a better employ of the "division of labour and the application of machinery already invented" (1975, p. 140).

[3]The labor market described in classes A and B is a segmented market with the presence of different groups (of workers and entrepreneurs); the market becomes more homogeneous in class C, where capital and labor move more freely and are no longer subdivided in different groups. In class D the labor market resembles the general market dealt with by the classical economists with accumulation of wealth, and growth of capital and population. However, for this class Marshall recognizes in a note that the part should be "entirely rewritten. The curves simply confuse matters if indeed any meaning attaches to them" (1975, p. 190). This very problem, as we will see, is also stressed in *Principles of Economics*.

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classical contributions, but trying to save them and fill the gaps in classical theory, especially in the Millian version.[4]

Although he was rather critical of some parts of Mill's theory, an undoubtedly Millian approach, as explicitly stressed in its preface, is used in *Economics of Industry* (1879), the first volume published by Marshall, together with his wife, Mary Paley. The work is divided into three books.

Book II focuses on the "effects which would be produced in the long run by free competition" (1879, p. 65). By replacing the term "normal" with "natural"—which was used too "loosely" (1879, p. 67)—Marshall defines the Law of Normal Value in strictly Millian terms (1879, pp. 77–78), clearly recalling the functioning of Say's Law (1879, p. 93).

However, at the beginning of the same book, Marshall warns that in dealing with normal values, "we have to shut our eyes to … other influences" (1879, p. 65): that is, "the complex social and economic forces of the world in which we live" (1879, p. 148). When those forces are taken into account—and our eyes are open—*market* instead of normal values have to be considered: "perfectly free competition," which Marshall refers to several times in Book II, does not exist in the real world. Here, we find several market failures and imperfections, from uncertainty and errors of forecast (1879, pp. 158–164) to local differences in wages, profits, and prices (1879, pp. 168–179); from the presence of monopolies and other forms of combinations (1879, pp. 180–186) and the role and effects of trade unions (1879, pp. 187–213) to the possible forms of cooperation (1879, pp. 218–228). These elements, like in Smith, "may cause" values "to diverge for a considerable time from their Normal level" (1879, p. 128).

Market values (the subject of Book III)—as in classical tradition—are those that occur in the short run, diverging from their normal level. In explaining the relation between market and normal values, as we have seen above, Marshall uses a metaphor that was already used by Mill, the metaphor of the sea. Normal values are compared with normal tides:

> [O]bservation tells us that waves driven by the wind over the sea make its surface rapidly rise and fall.… The theory of the Normal tides does not tell us what is the highest point that the tide reaches at any place in (say) the Bristol Channel. We cannot find out this without *examining the special circumstances of the case*, and allowing for the influence of the winds, and the peculiar nature of the shores. But on the other hand we can make no progress in explaining the movements of the sea unless we first understand *which of them are due to local or transitional causes, and which to the normal influence of the attractions of the Moon and Sun*. And we cannot do this until we have first worked out the abstract theory of the tides that would be formed in a world in which there were no disturbing winds and no irregular shores. (1879, pp. 148–149; emphasis added)

If the metaphor is the same, its meaning is, however, substantially different. Whereas Mill uses the image of the sea in order to underline the essential importance of *normal* values (the level of the ocean) rather than market values (waves), Marshall clearly recognizes an important role for both, and stresses the importance of taking into account both normal (long period) and market (short run) conditions.

It is this very view that, eventually, leads him to the attempt to build up an economic analysis, which could deal both with long- and short-period conditions. This is the main effort made in his *Principles of Economics*.

[4]See, on this, Groenewegen (1995, p. 140).

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Beyond the Classical Economists' Legacy

In a letter to Nicolaas Gerard Pierson dated 1891, Marshall claims: "The attempt to work all the existing knowledge on the subject of value into one Continuous & harmonious whole, by means of a careful study of the element of Time, permeates every Book & almost every page of my volume. It is the backbone of all that, from a scientific point of view, I care to say" (Whitaker 1996, II, pp. 29–30). As we have seen, this attempt has old roots and dates back to his early writings, but it is in *Principles* that it becomes more prominent and systematic. In the preface to the first edition, Marshall underlines that the book is "an attempt to present a modern version of old doctrines," and that if the book "has any special character for its own, that may perhaps be said to lie in the prominence which it gives to … the Principle of Continuity" ([1890] 1920, pp. v–vi). This principle—synthetized in the motto *Natura non facit Saltum*—allows us to see that

> there is ... [no sharp line of division] between normal values and 'current' or 'market' or 'occasional' values. The latter are those values in which the accidents of the moment exert a preponderating influence; while normal values are those which would be ultimately attained, if the economic conditions under view have time to work out undisturbed their full effect. ([1890] 1920, p. vii)

What Marshall stresses most is that "there is no impassable gulf between these two; they shade into one another by continuous gradations.… For the element of Time … is itself absolutely continuous; Nature knows no absolute partition of time into long periods and short … what is a short period for one problem, is a long period for another" ([1890] 1920. p. vii). This approach is completely different from that used in *Economics of Industry,* where the distinction between normal and market values is further strengthened by their treatment in two different sections; but it is also an approach that clearly departs from the classical tradition, for which a predominant role was recognized for long-period values.

In the attempt to combine the complexities of the real world and its many facets and the exigencies of rigorous theory, Marshall refers to the well-known *cæteris paribus* clause. The element of time is what distinguishes real life most clearly, and is also the chief difficulty in economic analysis. In applying the method of successive approximations in relation to the time question, Marshall starts with the "fiction of a stationary state" where the "cost of production governs the value" ([1890] 1920, p. 367); there is no distinction "between long-period and short-period normal value" ([1890] 1920, p. 367), and "population is stationary" ([1890] 1920, p. 368). But this is only a fiction and these conditions are "necessarily false," far from real-world conditions, and may become "mischievous" ([1890] 1920, p. 368).

In order to get a bit closer to the "actual conditions of life," it is necessary to leave aside the perfectly stationary state and to make "less violent assumptions" ([1890] 1920, p. 369), such as those implied by the so-called static method where the *cæteris paribus* pound comes into play. By means of this clause, Marshall develops his equilibrium theory and his time-period analysis with the distinction between "short" and "long" periods. The equilibrium theory relies on the relations between demand and supply for only a single commodity and on a given time-period framework, which leads to the well-known distinction in temporary equilibrium, short-period equilibrium, and

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long-period equilibrium. The crucial element of differentiation among them is on the supply side and focuses on the capacity of adjustments that supply has in response to variations on the demand side. Although any attempt of "rigid demarcation" among them is to be avoided ([1890] 1920, p. 378), the following distinction is indeed suggested: 1) temporary equilibrium between demand and supply identifies *market* prices, and the supply "is taken to mean the stock of the commodity in question which is on hand" ([1890] 1920, p. 378); 2) short-period equilibrium with *normal* prices, "when the term Normal is taken to relate to ... a few months or a year" and "supply means broadly what can be produced for the price in question with the existing stock of plant, personal and impersonal" ([1890] 1920, p. 379); and 3) long-period equilibrium and *normal* prices, "when the term Normal is taken to refer to … several years" and supply "means what can be produced by plant, which itself can be remuneratively produced and applied" ([1890] 1920, p. 379).

The rigid distinction between market and normal values developed in *Economics of Industry* is here replaced by a *continuum*, which runs from market to long-period normal prices via short-period normal prices. The classification developed in *Principles* clearly echoes the periodization already used in his early "On Value" and "On Wages," where the length of "time" is distinguished on the basis of what it is allowed to change on the supply side. However, a couple of points are worth underlining. First, of the four classes of periodization that characterize the early writings, class A—already of little interest in "On Value"—disappears in *Principles*. Here, we find only class B, which corresponds to the case of temporary equilibrium; whereas classes C and D correspond to normal short-period and long-period equilibrium, respectively. The exclusion of class A is explained in a letter written to Francis Ysidro Edgeworth in 1902 with the following words: "you know I never apply curves or mathematics to market values. For I don't think they help much. And market values are, I think, either absolutely abstract or terribly concrete and full of ever-varying (though individually vital) side-issues" (Whitaker 1996, II, p. 391).

Second, for class D Marshall confirms the choice already made in "On Value" to exclude all changes that are not due directly "to a change in the amount produced" (Whitaker 1975, I, p. 140). In fact, the normal long period developed in *Principles* is distinguished from a fourth category, that of secular movements "caused by gradual growth of knowledge, of population, and of capital, and the changing conditions of demand and supply from one generation to another" (Marshall [1890] 1920, p. 379). These changes are partially taken into consideration in "On Wages" in a way that—as we have seen—does not satisfy Marshall and were clearly neglected in Book V of *Principles,* where he develops the "time framework" of his economic analysis. Those changes are indeed of paramount importance for Marshall, but, since they cannot be properly dealt with in the static method and curves representation of an equilibrium framework ([1890] 1920, p. 379; Whitaker 1975, I, p. 190), they are left in *Principles* to a chapter on "The Influence of Progress on Value" (Book VI), but mainly postponed to other volumes (the second volume of *Principles* and the book on "Economic Progress"), which never appeared.

Unsolved Questions and Difficulties

In the preface to the eighth edition of *Principles*, Marshall recognizes: "The present volume … remains as a general introduction to the study of economic science….

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It avoids such special topics as currency and the organization of markets; and, in regard to such matters as the structure of industry, employment, and the problem of wages, it deals *mainly with normal conditions*" ([1890] 1920, pp. xii–xiii; emphasis added). The ambitious project stated in the first edition—"to present a modern version of old doctrines with the aid of the new work, and with reference to the new problems of our own age" ([1890] 1920, p. v)—is only partly fulfilled throughout (the eight editions of) the volume. Moreover, in *Principles* a number of difficulties and questions remain unsolved.

First of all, it is easy to see the great effort and difficulties faced by Marshall in coping with the exigencies of the time dimension and to develop a rigorous analysis based on the equilibrium framework. Of course, for short periods, the use of the *cæteris paribus* clause and of the equilibrium framework is not likely to raise too many problems: it is certainly acceptable to isolate a problem from its context, to focus on it, and to discover its equilibrium conditions. However, this method becomes much less acceptable when long periods are under consideration, as clearly was stressed by Marshall himself: "violence is required for keeping broad forces in the pound of *cæteris paribus* during, say, a whole generation … thus the uses of statical method in problems relating to very long periods are dangerous; care and forethought and self-restraint are needed at a every step" ([1890] 1920, p. 379).

Second, there is an evident and unavoidable contrast between a long-run perspective and an equilibrium construction that Marshall has tried to resolve—rather unsuccessfully—by means of the representative firm. The representative firm is an "analytical and statistical construct" that represents "in miniature the supply curve of the industry" (Hart 2012, p. 86). As in a forest, a tree may be chosen as being representative of the other trees that may be growing and dying (Marshall [1890] 1920, pp. 315–316, 367). In an industry, firms may rise and fall—according to their life cycle—but the representative firm can be taken as constant in its relative size. The representative firm, therefore, allows a long-period equilibrium to be dealt with without forgoing the several individual firms in disequilibrium, which belong to the industry in question.

Nonetheless, the representative firm becomes somewhat problematic because of the so-called reconciliation problem, which arises when change—due to the passing of time and its irreversibility—is dealt with in an equilibrium framework. If the representative firm allows Marshall to "visualize an industry supply schedule that was distinct from the cost functions of the heterogeneous set of firms comprising the industry" (Hart 2012, p. 90), and to develop his equilibrium analysis along the supply schedule curve, it nonetheless prevents him from taking into account time irreversibility. In particular, as underlined by Marshall himself, "this theory is out of touch with real conditions of life, in so far as it assumes that, if the normal production of a commodity increases and afterwards diminishes to its old amount, the demand price and the supply price will return to their old positions for that amount" ([1890] 1920, p. 807). Indeed, not only "the increase in consumption arising from a fall in price is gradual" and "habits which have once grown up around the use of a commodity while its price is low, are not quickly abandoned when its price rises again" ([1890] 1920, p. 807), but even on the supply side, when the demand falls, price "would not move back by the course by which it had come,

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but would take a lower course" ([1890] 1920, p. 808). In fact, "developments of mechanical appliances, of division of labour and of means of transport, and improved organization of all kinds, when they have been once obtained are not readily abandoned" ([1890] 1920, p. 808).

It is possible to note a third difficulty, inherent and implicit in the term "time." When Marshall refers to the "time dimension," he actually has in mind and uses two different concepts, often "without any specific explanation, but leaving the context to explain his meaning" (Guillebaud 1952, p. 126): (a) time as an operational tool; and (b) time as real clock time (see Opie 1931; Robertson 1952). The former is suited for abstract analysis and is used in the theory of equilibrium; the latter is a crucial aspect of real life and problems. Marshall has tried to link the two concepts by means of the principle of continuity. However, real time involves an unavoidable path dependence that cannot be taken into account by the operational time, which characterizes the division in short and long periods. Marshall, well aware of the problem, blames the "imperfections of our analytical methods," which lead to "unsatisfactory results" ([1890] 1920, p. 809). In *Principles*, the two conceptions of time are often confused and mixed together (Opie 1931; Guillebaud 1952), and this inhibits a clear understanding of Marshall's analysis and theoretical contribution (Dardi 2003; Metcalfe 2007; Hart 2012).

IV. USES (AND DISUSES) OF MARSHALL'S INSIGHTS

After Marshall, supply-and-demand relations became one of the most pregnant elements of the economic analysis, whereas his attempts to take time and its elapsing into account were either rejected or highly simplified.

In *Principles*, Marshall deals with "day market," "short period," and "long period," but, as we have seen, for him, time is something continuous; as stressed by Amiya Kumar Dasgupta, "there is a gradation of short periods intervening as the market proceeds from the day to the long period. The day merges into a short period, even as the short periods tend to merge into the long period" (1990, p. 254). In the market for a day, the stock of a commodity is absolutely fixed because production cannot vary; as the period of time extends, production can change and therefore the supply of a good as well. In the short period, production can vary in a limited way because some resources and productive tools are fixed (machinery, specialized skills); the longer the period, the more the resources can vary and the more flexible their production becomes.

Given the continuity of time, it is also true that the day "carries the legacy of the past" (Dasgupta 1990, p. 254) and that every period is strictly interwoven with the others, an aspect often stressed in *Principles* (see, for instance, [1890] 1920, p. 372). Following the example used by Marshall, in the corn market for a day, sellers hold a fixed amount of corn and buyers hold money: for different levels of prices, sellers (buyers) will be willing to sell (buy) different amounts of corn. At only one level of price, supply and demand balance. However, since it is not a Walrasian world where the auctioneer plays a fundamental role in assuring exchanges in equilibrium, transactions can take place even at non-equilibrium prices. Looking at the

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example in *Principles*[5] ([1890] 1920, p. 333), it is possible to note that different levels of price are compatible with different amounts of supplied and demanded corn. In the market, nothing can guarantee that the exchange will be at the equilibrium price (35s). Therefore, if, for instance, the settled price is 37s, the supply would be 1000 quarters and the demand would be 600 quarters. This means that at this price, 400 quarters of corn will be unsold. This is a crucial point because it clarifies the distinction between "stock" and "supply": stock is the quantity of commodity *available* and is fixed; supply indicates the amount sellers are *willing to offer* and it is not fixed.[6] In the Marshallian example, the unsold corn of 400 quarters will be retained for a future sale. As explained by Marshall: "The amount which each farmer or other seller offers for sale at any price is governed by his own need for money in hand, and by his calculation of the present and the future conditions of the market with which he is concerned" ([1890] 1920, p. 332). In the following developments of the Marshallian theory, fish replaced corn (Robertson 1957). However, this change is not at all neutral: first, because the distinction between supply and stock disappears—fish is not a storable commodity[7]—and, as supply is considered given and fixed for the market day, sellers have to sell the whole amount of fish within the day. The rationale of the change is to be found in the following words by John Hicks: "It is a curious corn market in that corn is rather oddly assumed to be non-storable; for this reason it became common, in later Cambridge tradition, to replace corn by fish" (1985, p. 48). Second, the choice of corn is not accidental in Marshall: being a highly storable good, corn becomes an important link between past, present, and future; between the market for a day and the longer period markets. By means of corn, Marshall is stressing the continuity of time according to the very well-known motto *Natura non facit saltum.*[8]

The continuity of time was the element of the Marshallian analysis most promptly criticized and thereafter abandoned, along with the tool he invented to deal with it: the representative firm. After him, time gradation was distinctly divided into "short" and "long" periods in the economic analysis. The caesura between short and long periods, which characterized classical analysis, was therefore reintroduced, and the importance

[5]The example is summarized in the following table:

Price	Quantity sellers are willing to sell (in quarters)	Quantity buyers are willing to buy (in quarters)
37s	1000	600
36s	700	700
35s	600	900

[6]This difference is even more evident in the essay "On Value," where "stock" is what characterizes markets in class A, whereas "supply" as (smaller or greater) flow is typical of periods B, C, and D.

[7]However, see De Vroey (2005).

[8]In *Principles*, he actually uses also the example of the fish market; however, it is considered a rather special market because "the source of supply in the sea might perhaps show signs of exhaustion" and the increase in demand might be due (only) to "the scarcity of meat ... following a cattle plague" or to "rapid growth of a high-strung artisan population making little use of their muscles" ([1890] 1920, pp. 369–370). The example of fish market is also used in the essay "On Value," where Marshall has not developed yet the principle of continuity. The fish market is considered—together with the corn market for less than one year—as belonging to class B.

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of Marshall's efforts throughout his career, from his early writings to *Principles,* was lost. Marshall's concerns for the continuity of real time were banished from what was considered a "rigorous" analysis. A clear distinction was made between historical and logical time, between history and equilibrium.[9] Moreover, given the relevance of equilibrium for economic analysis, the long period was (again) preferred to the short.

Short-period analysis became a sort of niche analysis, largely developed by unorthodox economists like Richard Kahn and John Maynard Keynes. Keynes's very well-known phrase—"in the long run we are all dead"—underlines the importance of short-run considerations; but it is Kahn who, more than others, stresses the crucial role—for theoretical analysis—of the short period (1982) (see Marcuzzo 1997).

Deeply connected with the real dimension of time is another element, central in Marshall's reflections but mostly neglected in subsequent interpretations of his analysis: the presence of expectations. As rightly stressed in Martin Currie and Ian Steedman (1990, p. 16), Marshall's reference to expectations is "persistent": when in *Principles* he refers to supply, he always stresses the important component of expectations (for instance, [1890] 1920, pp. 373–374). But this is true also for his early writings: in "On Value," for instance, buyers and sellers are said to decide on the basis of the "probability of their obtaining better offers by waiting" (Whitaker 1975, I, p. 133), and people are (or should be) able to "anticipate the state of the market" (Whitaker 1975, I, p. 136). In the further developments and uses of Marshall's analytical framework, the role of expectations is mainly ignored, although, as is well known, it becomes the moving force of the Keynesian representation of the economic system.

As we have seen, the time periodization proposed in *Principles* includes a fourth element: secular movements caused by "the gradual growth of knowledge, of population and of capital, and the changing conditions of demand and supply from one generation to another" ([1890] 1920, p. 379). Secular movements are only mentioned in this brief passage and are excluded from the equilibrium analysis developed especially in Book V. They are indeed excluded in the early essays where class D is simplified so as to mean only changes in the quantity of the commodities demanded and supplied, given the impossibility to synthetize in a simple representation changes due to "the general social progress of a country" (Whitaker 1975, I, p. 143). After Marshall, on the contrary, many of the modern growth theories have inserted growth into an equilibrium framework (for example, Roy Harrod's growth model with relative prices constant along the growth path), according to the idea that to deal in a rigorous way with the elapsing of real time is not possible.

V. CONCLUDING REMARKS

In his attempt to re-elaborate the classical legacy in modern terms, Marshall focuses on two main problems: how to bring the time dimension into economic analysis, and how to properly take into consideration the play of demand and supply in value theory.

[9]Joan Robinson (1978) bases her criticism of neoclassical economics on the antagonism between history and equilibrium; a different view is expressed in Eatwell (1997) and Backhouse (2004).

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On the first aim, Marshall fell victim to the insurmountable impasse of dealing with the elapsing of real time while building an analytical static framework, or—to use Harcourt's terminology—of building short- and long-*period* analysis without renouncing short- and long-*run* considerations. The solution given to the first question—how to bring the time dimension into economic analysis—remains, for Marshall, highly unsatisfactory, problematic, and incomplete. The elapsing of real time—unavoidable in his reflections—meshes very badly with his analytical framework based on equilibrium; moreover, it is the source of a number of difficulties that in the end have blocked his original project of writing a treatise in two or three volumes that could take into account the several causes that effect the "conditions of man's life and work."

In regard to the second aim, Marshall was undoubtedly successful in putting the play of demand and supply at the core of his economic analysis, and especially in recognizing their mutable relations as one of the main subjects for a rigorous economic analysis. After Marshall, schedules of demand and supply have become the normal way to represent markets (and their equilibrium), and the division of time into short and long periods has become part of the widely used toolbox in the economic analysis.

However, the substance of Marshall's efforts has been clearly lost: market analysis, especially on the supply side, was strictly connected—in Marshall—with the time dimension and its effects in terms of changes and irreversibility. The curves apparatus developed in *Principle*s was, for him, fit for an introductory volume (or initial studies), but clearly inadequate for taking into account what, according to him, was the true subject of economic study: to understand the complexities of the real world and try to solve the most urgent problems. To find the ways and means of economic progress was probably his most important aim (Caldari 2006; Caldari and Nishizawa 2011), and, for him, progress was something very different from a mere growth of material wealth, and was clearly connected with a continuous (real) time dimension.

All the apparatus he used was but a means to start to understand rigorously where it was possible to find the true levers of progress. This was the main preoccupation of Adam Smith, but it was hidden by Ricardo's and Mill's further developments. Marshall tried to save both the perspectives and exigencies, but proposed an impossible reconciliation. After Marshall, the time period and the representation of demand and supply lost all connection to the *fil rouge* that, in Marshall, kept them together: economic progress.

REFERENCES

Backhouse, Roger E. 2004. "History versus Equilibrium: A Partial Defence of Equilibrium Economics." *Journal of Economic Methodology* 11 (3): 291–305.

Caldari, Katia. 2006. "Progress." In Tiziano Raffaelli, Marco Dardi, and Giacomo Becattini, eds., *The Elgar Companion to Alfred Marshall*. Aldershot: Edward Elgar, pp. 483–487.

Caldari, Katia, and Fabio Masini. 2008. "The Limits to Growth. Alfred Marshall and the British Economic Tradition." In Yuichi Shionoya and Tamotsu Nishizawa, eds., *Marshall and Schumpeter on Evolution. Economic Sociology of Capitalistic Development*. Aldershot: Edward Elgar, pp. 166–187.

Caldari, Katia, and Tamotsu Nishizawa. 2011. "Marshall's Ideas on Progress: Roots and Diffusion." In Heinz Kurz, Tamotsu Nishizawa, and Keith Tribe, eds., *The Dissemination of Economic Ideas*. Aldershot: Edwar Elgar, pp. 125–157.

Currie, Martin, and Ian Steedman. 1990. *Wrestling with Time. Problems in Economic Theory*. Manchester: Manchester University Press.

https://doi.org/10.1017/S1053837216001024 Published online by Cambridge University Press

Dardi, Marco. 2003. "Alfred Marshall's Partial Equilibrium: Dynamics in Disguise." In Richard Arena and Michel Quéré, eds., *The Economics of Alfred Marshall. Revisiting Marshall's Legacy*. London: Palgrave Macmillan, pp. 84–112.

Dasgupta, Amiya Kumar. 1990. "An Aspect of Marshall's Period Analysis." In John K. Whitaker, ed., *Centenary Essays on Alfred Marshall*. Cambridge: Cambridge University Press, pp. 242–257.

De Vroey, Michel. 2005. "Marshall versus Walras on Equilibrium and Time." Discussion paper 47. London: University College London.

Eatwell, John. 1997. "History versus Equilibrium." In Philip Arestis, Gabriel Palma, and Malcolm Sawyer, eds., *Capital Controversy, Post-Keynesian Economics and the History of Economic Thought*. London and New York: Routledge, pp. 386–397.

Groenewegen, Peter. 1995. *A Soaring Eagle: Alfred Marshall. 1842–1924*. Aldershot: Edward Elgar.

Guillebaud, Claude. 1952. "Marshall's Principles of Economics in the Light of Contemporary Economic Thought." *Economica* 19 (74): 111–130.

Harcourt, C. Geoffrey. 2012. "On the Concepts of Period and Run in Economic Theory." In Christian Gehrke, Neri Salvadori, Ian Steedman, and Richard Sturn, eds., *Classical Political Economy and Modern Theory*. London: Routledge, pp. 257–265.

Hart, Neil. 2012. *Equilibrium and Evolution. Alfred Marshall and the Marshallians*. London: Palgrave Macmillan.

Hicks, John. 1985. *Methods of Dynamic Economics.* Oxford: Clarendon Press.

Malthus, Thomas Robert. [1798] 1966. *First Essay on Population*. New York: Macmillan.

———. 1821. *Principles of Political Economy Considered with a View to Their Practical Application*. Boston: Wells and Lilly.

Marcuzzo, Maria Cristina. 1997. "Short-Period Economics in Retrospect." In Philip Arestis, Gabriel Palma, and Malcolm Sawyer, eds., *Capital Controversy, Post-Keynesian Economics and the History of Economic Thought*. London and New York: Routledge, pp. 398–409.

Marshall, Alfred. [1890] 1920. *Principles of Economics*. London: Macmillan.

———. 1919. *Industry and Trade*. London: Macmillan.

———. 1923. *Money, Credit and Commerce*. London: Macmillan.

Marshall, Alfred, and Mary Paley Marshall. 1879. *Economics of Industry*. London: Macmillan.

Metcalfe, John Stanley. 2007. "Alfred Marshall's Mecca: Reconciling the Theories of Value and Development." *Economic Record* 83: S1–22.

Mill, John Stuart. 1898. *Principles of Political Economy*. Edited with an introduction by J. Laurence Laughlin. New York: Appleton and Company.

Opie, Redvers. 1931. "Marshall's Time Analysis." *The Economic Journal* 41 (162): 199–215.

Ricardo, David. [1821] 1983. *On the Principles of Political Economy and Taxation.* Volume I of *The Works and Correspondence of David Ricardo*. Edited by Piero Sraffa and Maurice H. Dobb. Cambridge: Cambridge University Press.

Robertson, H. Dennis. 1952. *Utility and All That and Other Essays*. London: Allen and Unwin.

———. 1957. *Lectures on Economic Principles*. Volume 1. London: Staples.

Robinson, Joan. 1978. *History versus Equilibrium*. Thames Papers in Political Economy. London: Thames Polytechnic.

Say, Jean-Baptiste. [1826] 1867. *A Treatise on Political Economy or the Production, Distribution, and Consumption of Wealth*. A translation of the fifth edition. Philadelphia: J.P. Lippincott & Co.

Smith, Adam. [1776] 1957. *The Wealth of Nations*. Introduction by Edwin Robert Anderson Seligman. Two volumes. London: J.M. Dent & Sons Ltd.

Whitaker, John Kenneth. 1975. *The Early Economic Writings of Alfred Marshall, 1867–1890*. Two volumes. London: Macmillan.

———. 1982. "The Emergence of Marshall's Period Analysis." *Eastern Economic Journal* 8 (1): 15–29.

———. 1996. *The Correspondence of Alfred Marshall*. Three volumes. Cambridge: Cambridge University Press.

https://doi.org/10.1017/S1053837216001024 Published online by Cambridge University Press