real change takes real time and thus may not be disposed to easy analysis.

One is reminded of the story of the impertinent gentleman who one evening lost his only quarter far from the nearest streetlight; but he spent all his time looking under the streetlight—because the light was better! I think the profession has devoted enough time searching under the light of Foundations; it is time to go back to where the quarter was last—Book IV of the Principles. I am not suggesting that the solution to the difficulties with the element of time is to be found in Book IV, but only that in Book IV at least the emphasis is on a realistic approach—an approach which still allows development and constructive criticism. If teachers wish to be truthful with their students they will tell them where the quarter is.

References

Marshall's Theory of Industrial Progress

Earl F. Beach

Alfred Marshall was a phenomenon. No other economist enjoyed such prestige during his lifetime. Yet that prestige fell so rapidly about the time of his death in 1924 that Schumpeter (1941) could state that "his analytical apparatus is obsolete"... "His vision of the economic process, his methods, his results, are no longer ours." He had reigned for some forty years. How do we explain such a high and long-maintained prestige, and such a sudden fall?

The understanding of economics requires a combination of theory and observation, which most people find to be difficult. In this respect, Marshall was unique (Keynes 1924 and Guillebaud 1961). In early life he mastered the techniques of mathematics, and thereafter was not overly fascinated by them, as many others were. He made a careful study of history, and chose this form of approach in the first edition of the PRINCIPLES. He took great care to observe current industrial operations, and was very much interested in workers' organizations.

He was criticized on all sides. Cunningham took issue with his presentation of history. Marshall was so sensitive to such criticism that in subsequent editions this historical material was relegated to appendices. His interest was not that of an historian as such, but in the use of such material for the illumination of the study of economics.

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References to Marshall's PRINCIPLES are to the 1920 eighth edition.

His refusal to display his mathematics in his text brought criticisms of inexactitude. In trying to make his text readable by a wide range of students he was said to be compromising his pure theory with Oliver's dicta and indulging in sociological economics. Even his great interest in the working classes was supposed by some to cloud his objectivity.

Marshall is considered to be neoclassical economist and is remembered principally for his value theory. Modern text uses his concepts of supply and demand, of elasticity and partial equilibrium, but his warnings about their inadequacies are forgotten. I shall argue that Marshall has been seriously misjudged. He certainly revered his classical predecessors, but, much more important, he attempted to preserve their interest in growth and development, and to perfect their analytical apparatus. He offered a model of economic progress which stands up well against modern alternatives.

Other economists have not understood what he was trying to do. Blinded by their theoretical apparatus, as Young feared, they have expected and indeed demanded what is not there, and have been unable to see that what is there is an alternative to the more abstract apparatus to which they are so firmly committed.3

3Cf. Lancaster (1974, p. 3): "The serious study of dynamic microeconomics has barely commenced..."
Consider but one example, that of the supply curve. Marshall is universally condemned for leaving this unclear, so that others, Harrod, Hicks, etc., have felt that they had to explain it in more understandable terms. A supply curve, if, however, a description of a condition at a point of time. There could be a short term curve, or a long term curve, depending on the conditions assumed, but in either case, it is not an analysis of change, but of the potentiality of change. It is sometimes presumed that long run supply curves are indications of historical trends; yet, they are the most abstract of relations, being based on holding fixed for long periods, things which will surely not remain so.

For Marshall, whose static tools were but “auxiliaries” to the analysis of change. They can be very useful in understanding the conditions at any time, but a model of change must be conceived in a very different way.

After ninety years of comment, much of it negative, it is clear that the explanation of the system could be improved for modern readers, and that there are some elements that could be added. A comparison of the Preface to the first edition and that to the eighth edition, some thirty years later, illustrates his efforts to meet this need even in his lifetime. He explains his approach to the complications of “forces” that are “so numerous.” He is to start with a small part of the economy and gradually extend the scope by loosening the assumptions. This paragraph follows:

“The main concern of economics is thus with human beings who are moved, for good and evil, to change and progress. Fragmentary statical hypotheses are used as temporary auxiliaries to dynamical—or rather biological—conceptions: but the central idea of economics, even when its foundations are under discussion, must be that of living and moved men.”

Few have been persuaded that this has been any more than a vision (to use Schumpeter’s phrase). Marshall’s theory is very generally regarded as static, partial equilibrium theory.

My task is to show that on all three counts he offered much more than that. He did penetrate beyond the statics; he has more to say on industrial interrelations than do most others; and his was not a theory of equilibrium conditions.

**Equilibrium Conditions**

The Sraffa (1926) and Robbins (1928) criticisms were based on CONDITIONS of equilibrium. Such criticisms are irrelevant to the Marshallian system because a Marshallian firm is seldom, if ever, in equilibrium. The “representative firm” was one which (p. 331) “enjoys a fair share of both of those internal economies... and of those general or external economies...” When such a firm is assumed to be in equilibrium, it cannot be so described. Its “access to” (p. 317) such economies is denied, and hence essential ingredients of Marshall’s theory are negated. He has been accused of inconsistency, whereas it is the critics who have not understood.

Marshall did not use the term “perfect competition,” but “free competition” in the sense of freedom of entry. Sraffa continued to use the term which had characterized classical economics since Adam Smith, but he gave it different overtones, implying uniformity of price, which quickly became the understanding of his followers.

Bitch (1980) has recently thrown fresh light on this controversy. In Knight’s papers he found manuscripts upon which the comments of Allyn Young were written. Young was Knight’s mentor at Cornell when Knight was one of the early critics of Marshall’s “universality” and noted the “inconsistency” that we are discussing. Young (1928) refused to be convinced, although he did not at the beginning understand why. He observes that:

“No analysis of the forces making for economics equilibrium, forces which we might say are tangential at any moment of time, will serve to illuminate this field, for movements away from equilibrium, departures from previous trends, are characteristic of it.”

Even this perspective is, however, inadequate, and the point is of such importance that it must be given more attention. Young escapes by changing the content of the variables. As we shall see below, analysis of changing commodities and industries contributes substantially to completing the Marshallian system; still it is only a weaseling out of the dilemma that we are analyzing here. He has, however, put his finger on a key point.

Knight had early been trained in physics, and in his classic book he asserts that all forces are equilibrating. Samuelson (1921, p 17) developed a more helpful classification of forces which suffers an important inadequacy. We are given no way of getting from one equilibrium point to another unless the exogenous variables change. (Samelson 1947, especially Chapter XI, and Chisham, 1965)

More particularly, an equilibrating system as it is conceived by the mathematicians requires that the endogenous variables be equilibrating, and those which do not so perform, are taken to be exogenous. There are, however, two variables which cannot easily be considered to be equilibrating, and yet are central to the question of economic change—productivity and capital. There is no obvious concept of equilibrium for either of these, and attempts to internalize them by creating bogus equilibria have not been very helpful. Even Harrod’s famous equilibrium rate of growth is suspect. He takes it to be a rate at which entrepreneurs have been satisfied, and assumes that they will repeat their actions. This is a very naive view of entrepreneurs.

Thus it is seen that present equilibrating techniques are not adequate for the purpose of creating a really dynamic system. George Roegen (1966) quotes Schrodinger to the effect that it is not the mathematics that is difficult and complicated, but nature itself. The great difficulties come from fitting the mathematics to nature. Marshall’s system undertakes to solve this particular problem by making productivity and capital endogenous variables, without requiring that either has, at any time, an equilibrium level.

We may press our criticisms further. The equilibrium theorists sometimes want it both ways. They assert the existence of equilibrium so that they can impose equilibrations that hold only at the equilibrium point, and yet they sometimes say that they do not mean it, and that we need be only in the area of equilibriums. There are still two problems. On the one hand they should assure us with a measure of some kind that we are near equilibrium in some sense. On the other hand, it seems to be enough for them to allow change to be the result of many interplaying forces while exogenous forces carry the equilibrium point to a new location, like Boulling’s (1941) dog chasing the rabbit. This does not provide a system in which change in equilibrium itself is an endogenous event (Chisham 1965). Marshall’s system does make change endogenous.

**Equilibrating Forces**

Equilibrating forces were essential elements of Marshall’s industrial system. As usual, however, he was not content to deal with their abstract nature but wished to make them quite concrete. There were two equilibrating systems constantly operating. In the current literature these are usually characterized as “Walrasian” or “Hicksian” on the one hand, and “Marshallian” on the other. They are presented as alternatives, and usually the Marshallian comes off second best.

Both systems are needed. (Beach 1979)

The first one is a system of equilibrating of
market prices, dealing with supplies that are readily at hand, and demands for them. The result is a tendency to avoid extreme difficulties in prices for similar products. There need not be perfect uniformity of price for a market to be viable, but it may be so taken for purposes of illustration and explanation, as Marshall did. (Beach 1979)

The second system of equilibrium deals with the relation between these market prices and unit costs. We may conceive of an average level of prices and an average level of unit costs for similar products. Individual firms will differ, so that even if the two averages are equal, there will be some firms making profits, others expanding, and other firms suffering losses and forced to recognize their production or leave the industry. These forces for change will be strengthened when the two averages deviate in either direction.

There will be a continuing drive for new investment either for expansion or for recon- struction, and that new investment will incor- porate new technology. The pace of accumu- lation and of technological change will depend upon the relation between prices and unit costs, which will vary from time to time, but they will depend upon other things as well, including the "animal spirits" of the entrepreneurs, and the rate of invention and the availability of the particular resources needed. Macro theorists generally search for "the" cause of investment. There are several at any point of time, and over time they alternate in their relative importance.

It should be clear that capital accumulation and technological change are internalized variables, important aspects of change which are only in part exogenous to a particular industry, but in large part they are endoge- nous to the interplay of forces that are at work there. There may, in some sense, be an equi- librium rate of change of one or other of these variables, but the concept of an equilibrium level at any time is difficult to conceive. Hickman (1965) has suggested a "desired" level of physical capital or an industry, and yet if there happens to be a Schumpeterian entrepreneur among them, such a concept is quite unreal.

**Interrelations of Industries**

Marshall is said to be the master of partial equilibrium theory, and Walras is the master of general equilibrium theory. Yet there is nowhere in Walras' work the presentation of the realistic aspects of interrelations such as may be found in Marshall's *PRINCIPLES* in Chapter VI of Book V. Here is a discussion of joint and composite demand and joint and composite supply. To Schumpeter and many others the concept of a multitude of mathe- matical relations having an equilibrium was a great vision. To Marshall it was no great thing. He wished to give it real economic content.

It should be noted that Marshall stayed rather rigidly with fixed concepts of commod- ity and industry—which is understandable in view of the great task of explanation that faced him. Young made a notable contribu- tion in showing how these did, in fact, change, transform, and evolve—a fine extension of Marshall's system.

Young strove valiantly to show how "change becomes progressive and propagates itself in a cumulative way" (p. 533). He might have carried more conviction if, instead of using static concepts of elasticity and demand curves, he had thought in terms of the interre- lations of industries that result from techno- logical change and capital accumulation. The mechanism of one industry often implies an increase in demand for other industries. Continuing mechanism and technological change, built on investment that is aided and abetted by credit expansion is, as is well known, a source of general expansion. Ecom- mists who have wished to analyze interrela- tions in real terms only, have missed the interaction between real and financial changes.

Central to this form of interrelation is the increase in the demand for labour that results from the action of "storing up," an integral aspect of capital accumulation that has been understated over even since Adam Smith pointed it out.

**The Action of Storing Up**

The usual way of showing the effects of a shift in demand from one commodity to another is to show two "Marshallian curves," to shift the two demand curves in opposing directions, and then compare the resulting points of equilibrium with the previous posi- tions. If the shift is towards a capital intensive industry, there is a presumption of a loss in employment. Neiser attempts to argue this in precise numerical terms.

Consider, however, a continuing shift in demand from the use of coal to the use of petroleum and electricity, which takes place over decades, and brings many accompanying changes. There will be shortages of capacity that will have to be created, and the shift towards more capital intensive industries will heighten the increase in the demand for labour as the process continues.

Here is an example of the interrelations of industries which Marshall did not portray, but he might have done so if he could have foreseen how his static tools were reused to show results that are not just false, but perverse. (Beach 1976)

Consider next the simple act of mechaniza- tion. The textbook presentation is a move- ment along an isoquant of a production func- tion. Since it is a comparison of two points of equilibrium, any new investment that is needed to get from one point to the other is disregarded on the grounds that this tempo- rary effect has vanished. Yet in this case, there had to be some addition to the real capital in place, and continuing movements of this kind, as during the industrial revolution, would imply continuing investment. Once more the comparison of equilibrium points is seen to be lead to false conclusions.

Furthermore, the amount of employment entailed in this new investment can be seen to be substantial because the new employment created by the making of the new machine- ry—extra employment in addition to the mere replacement of machinery—is related to the additional investment, which is a multiple of the annual saving in the wage bill for operat- ing labour which results from the change. It can be shown that the net result is much more likely to be an expansion in employment than the reverse, as equilibrium theorizing implies.

Consider, now technological change. There is much worry about an increase in labour sav- ing technology. (US National Commiss- ion, 1966) Yet it has been established that the continued introduction of capital intensive technology implies the storing up of much more labour than is displaced.

**Disequilibrium Theorizing**

Marshall's theory is a form of disequi- librium theorizing in the sense that each of its active ingredients, the firms, is out of equilib- rium. It strives to reach its objectives, but opposing forces continue to frustrate that achievement at least for most of the time. Entrepreneurship is seen as an important input, warranting substantial returns. (Kremer 1973; Robinson 1978)

The dividing line between entrepreneurship in the Schumpeterian sense, and more mundane management is not as sharp as in Schumpeter's model. Indeed, the entrepre- neurs are not exceptional people, and innova- tion is not the exceptional event that Schum- peter insisted it is. For Marshall, there are many people contributing to the process of change, under varying conditions. A multi- tude of small changes can be as effective as one big change. One who gives up the driving of an automobile for a decade or so will understand this. In fact, this form of innova- tion plays an increasing role in our daily lives.
Marshall's theory is distinct from institutionalist thought. It is a theory of change which rather naturally entails progress. It does allow for, and indeed explains further, the phenomenon of increasing returns which Hahn and Matthews (1964 p 833) noted played a "prominent part". "In past discussions of growth since Adam Smith," but were "neglected" by "the mainstream of the recent neo-classical theory... to a surprising extent..." This "neglect" is surely a serious weakness of current theory.

Marshall had foreseen this tendency. The warnings of Appendix H Chapter VIII of Bock V should be noted. (p 461)

"The theory of stable equilibrium of normal demand and supply helps us to give definiteness to our ideas; and in its elementary stages it does not diverge from the actual facts of life, so far as to prevent its giving a fairly trustworthy picture of the chief methods of action of the strongest and most persistent group of economic forces. But when pushed to its more remote and intricate logical consequences, it slips away from the conditions of real life. In fact we are here verging on the high theme of economic progress: and here it is especially needful to remember that economic problems are imperfectly presented when they are treated as problems of statical equilibrium and not of organic growth... Its limitations are so constantly overlooked, especially by those who approach it from an abstract point of view..."

These words, and those that have been omitted, are surely an adequate answer to Sraffa and Robbins and to many who have followed them. Indeed it is surely a refutation of Samuelson's technique and a comment on his use of the term "foundations" that is so different from the use that Marshall made of it in the quote on the second page of this paper. Young's words of 1928 were prophetic. (p 527)

"I suspect, indeed, that the apparatus which economists have built up for dealing effectively with the range of questions to which I have just referred may stand in the way of a clear view of the more general or elementary aspects of the phenomena of increasing returns..."

Statics and Dynamics

Economists have indeed been blinded by their "apparatus" and have misjudged Marshall's. Let us be as clear as to what is "statical" in the Marshallian apparatus. The short run supply and demand curves are representations of a situation at a particular point of time, or a short slice of it. Their slopes and elasticities are also. Indeed, representations of longer run curves and their slopes and elasticities are also, and become quite unreal when the ceteris paribus assumption is asserted for a long time. The very long run supply curve should not be taken as a representation of an actual time trend.

Thus, in asking Marshall to tidy up his supply curves, we are insisting on more statics, not dynamics. Even Allyn Young used the static concept of function and slope when he was attempting to explain the basis of increasing returns. This is not wrong, but it should be recognized for what Marshall called it in our first quote, an "auxiliary." It is an analysis of the potential for increasing returns. It is still an analysis of conditions. Young would have been more helpful if he had thought in terms of dynamics, in particular the action of storing up of labour, but this is asking a great deal. Dynamic analysis requires the relating of changes at different points of time. There have been a number of approaches, as in period analysis. For present purposes we wish to make it specific, as Marshall would have wished, and hence we must relate the decision to change and the investment undertaken in an early period to the installation of the machinery and displacement of workers in a later period. We relate the extra wages paid in the early period to the loss in wages in a later period. Such a comparison requires new concepts of measurement.

Employment is not measured by the number of people at work. That is a rate of employment, and a quantam of employment is like a quantum of wages paid out, which is a rate per unit of time, multiplied by the length of time. It is only with the use of such units of measurement that the gain and losses in employment, or in wages paid, during particular periods of time, can be compared when analyzing, say, the effects of mechanization.

Take another example. When two points of equilibrium are compared, the jobs lost through mechanization, are lost forever, since that change is unlikely to be reversed. Yet in analyzing the dynamics of the change, it is more helpful to measure the amount of employment gained and the amount of employment lost in units that have just been described. It is with the help of concepts of this kind that Marshall's "dynamical" system can be completed, and then we may move on to biological change, which entails mutation of the commodity variables themselves, and so on to the "high theme of economic progress."

References


"Cf. Hamilton who considers only Marshall's value theory, and dismisses him as a "mechanic. Marshall was not a "Newtonian" but one of the greatest of the "Darwinians." As an institutionalist, one might have supposed that Hamilton would be interested in Marshall's use of history, and his emphasis on "biological conceptions."

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