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History of Economic Theory (10)

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## Chapter 10

### Marshall's Economics

#### 1. Principles of Economics.

As we argued in the previous chapter, contributions made by Jevons and Edgeworth to the theory of exchange are still very important from the point of view of the contemporary mathematical economics. It is, however, not Jevons and Edgeworth, but Alfred Marshall( 1842 - 1924 ) whose theory could be dominantly influential to the development of economics in England after the marginal revolution. Unlike Jevons who openly attacked the classical economics, Marshall, who began to study economics by translating Ricardo's theory of value and distribution as expounded by J.S.Mill into differential equations, did not deny the significance of the classical economics, but tried to make it more generalized.<sup>1)</sup> This is the reason why the economics of Marshall and of his followers, the Cambridge school, were originally called the neo-classical economics, though recently many of rather regard Walrasian tradition neoclassical.<sup>2)</sup> It cannot be denied, in any case, that Marshall's partial equilibrium analysis is an indispensable complement to Walras's general equilibrium analysis to form the foundations of the current mainstream economics.

To see the significance of Marshall's economics, it is convenient to make, as Hicks [10] did, a comparison of Walrasian and Marshallian economics. J.R.Hicks, who tried to combine Walrasian and Marshallian traditions in his Value and Capital ( 1939 ), argued as follows. " For a quite considerable part of the way Walras and Marshall go together;

and when they separate, it is a difference of interest, rather than of technique, that divide them. While Walras was seeking for the general principles which underlie the working of an exchange economy, Marshall forged an analytical instrument capable of easier application to particular problems of history or experience"( Hicks[10] ).

Walras first decomposes a complicated economy of the real world into several fundamental components like consumer-traders, entrepreneurs, consumers' goods, factors of production, newly produced capital goods, and money. He then starts with a simple model composed by a very limited number of such components and proceeds to more complex ones by introducing , one by one, those components so far excluded. With the exception of the last model into which all the components of a real world economy are introduced, all Walrasian intermediate models are as unrealistic as the starting model, though they are closed and self-compact. Marshall on the other hand, studies a whole complex of a real world economy as such. Of course he also simplified his study at first by confining his interest in a certain limited number of aspects of the economy. But he does it not by disregarding the existence of other aspects but by assuming that other things are being equal. He travels from the simple to the complex by reducing the number of the aspects assumed to be equal. All the Marshallian models are realistic, though most of them are open and not self-sufficient, since other things remain unexplained and have to be exogeneously given.

The most simple model of Walrasian economics is the one studied in the theory of exchange, where consumers' goods to be exchanged among individual consumer-traders are simply assumed to be endowed to them and not considered as produced at cost. There exist no production activities in this hypothetical world. The corresponding simplest model of Marshall

is that of the market day, in which consumers' goods to be sold are produced goods, though the amount available for sale is, for the time being, assumed to be constant. The production does exist in this temporary equilibrium model, though the level of output is unchanged in the very short period under consideration. In Walrasian model considered in the theory of production, capital goods are introduced as a kind of factors of production, but the investment, i.e., the production of new capital goods simply does not exist. In Marshallian short-run theory, which is also the theory of production, on the other hand, investment is undertaken, though the amount of currently available capital goods remain unchanged. In Walrasian models of the theory of exchange, the theory of production and the theory of credit and capital formation, there exists no money at all, until it is finally introduced in the theory of circulation and money. In Marshallian models, on the other hand, money exists from the beginning, though its purchasing power is sometimes assumed to be constant.

In other words, Walrasian models are in general not useful for practical purposes. They are designed to show the fundamental significance of such components of the real world economy as entrepreneurs and production, investment and the rate of interest, inventories and money, etc., by successively introducing them into simpler models which are then developed into more complex ones. Walras's theoretical interest was not in the solution of particular problems but in what Hicks[10] called the pursuit for the general principles which underlie the working of a market economy. On the other hand, Marshallian theories respectively correspond to special states of the real world economy. The market day ( temporary equilibrium ) and short-run models are as realistic as the long-run model where capitals are fully adjusted. Thus Marshallian models are practically useful to apply to what Hicks[10] called particular problems

of history or experiences. " Marshall forged an analytical instrument capable of easier application." A good example is the concept of consumers' and producers' surplus, which we shall discuss in section 2.

Thus, Hicks[10] insists that Walras and Marshall differ in interest, the former in principles and the latter in practical applications. Even if one is interested in principles only, however, Marshall's contributions are necessary complements to Walrasian ones. Firstly, the time structure of Marshallian equilibria ( market day, short-run and long-run ) clarifies the economic significance of the time elements, and gives us useful suggestions on how to generalize static and timeless Walrasian general equilibrium theory dynamically. In section 3, we shall study a problem related to a Marshallian dynamic equilibrium of the industry which is based on the biological analogy. Secondly, as we saw in section 5.2 of Chapter 7, there is an inherent difficulty to introduce money into Walrasian general equilibrium theory. Marshallian approach in which the existence of money is taken into consideration from the beginning, on the other hand, can throw light on monetary aspects of the economy, which Walrasian approach cannot do easily. The final section of this Chapter is devoted to consider the problem of trade cycles, which is a characteristic of a monetary economy, from the point of view of Marshallian theory of market and money.

Alfred Marshall was born in Clapham, England in 1842, as a son of William Marshall, a cashier at the Bank of England. Although his father hoped that his son would take holy orders, Marshall studied mathematics at Cambridge. In 1865, Lord Rayleigh was Senior Wrangler and Marshall was Second Wrangler in the Mathematical Tripos. After mathematics, Marshall studied philosophy, ethics, psychology and economics.

He was elected to a Fellowship at St John's College, and gave lectures in logic and economics for the Moral Sciences Tripos. In 1877 he married Mary Paley, a former student, and resigned his fellowship at Cambridge. Marshall left Cambridge for Bristol, where he became the first Principal of the University College and Professor of Political Economy. While at Bristol, Marshall, in collaboration with his wife, published The Economics of Industry in 1879. Then he was elected a Fellow of Balliol College, Oxford and lectured in economics. It was in 1885 that Marshall was elected as Professor of Political Economy in the University of Cambridge. Principles of Economics was published in 1890. In 1903, Marshall succeeded in persuading the University of Cambridge to establish the Tripos in Economics and Politics. He retired from the chair of Professor of Political Economy in 1908 order to devote the remainder of his life to writing. After the publication of Industry and Trade ( 1919 ) and Money Credit and Commerce ( 1923 ), Marshall died in 1924.<sup>3)</sup>

Since the first edition of Principles of Economics was published in 1890, Marshall continued to revise it at intervals during the remainder of his life and the eighth and last edition appeared in 1920. According to Guillebaud, however, " the collation of different editions would not seem to support the view that there was any real evolution or development of his ideas between 1890 and 1920 " ( Marshall[21], p. 28 ). The eighth edition consists of six books, Preliminary Survey ; Some Fundamental Notions ; On Wants and their Satisfaction ; The Agents of Production. Land, Labour, Capital and Organization ; General Relations of Demand, Supply, and Value ; The Distribution of the National Income. In addition, there are twelve appendices and mathematical appendix.

On the title page of the first edition the words "Vol. I." were written, but they were replaced by the words "An introductory volume" since the sixth edition (1910), which shows that Marshall changed his plan ( Marshall[20], P. xii ). On the other hand, Marshall's motto Natura non facit saltum remained there from the first to the last editions. Marshall declared in the preface to the first edition that the special character of his book lies in the prominence which it gives to applications of the Principle of Continuity. We can also see there Marshall's ascetic attitude towards the use of mathematics. In the preface to the eighth edition, Marshall discussed his method.

"The Mecca of the economist lies in economic biology rather than in economic dynamics. But biological conceptions are more complex than those of mechanics ; a volume on Foundations must therefore give a relatively large place to mechanical analogies ; and frequent use is made of the term "equilibrium," which suggests something of statical analogy. --- But in fact it is concerned throughout with the forces that cause movement : and its key-note is that of dynamics, rather than statics."

"The forces to be dealt with are however so numerous, that it is best to take a few at a time ; and to work out a number of partial solutions as auxiliaries to our main study. Thus we begin by isolating the primary relations of supply, demand and price in regard to a particular commodity. We reduce to inaction all other forces by the phrase "other things being equal" : ---- In the second stage more forces are released from the hypothetical slumber that had been imposed on them : changes in the conditions of demand for and supply of particular groups of commodities come into play ; and their complex mutual interactions begin to be

observed" ( Marshall[20], pp. xiv - xv ).

Book I, Preliminary Survey, explains Marshall's views of modern economy and economic science. "The fundamental characteristic of modern industrial life is not competition, but self-reliance, independence, deliberate choice and forethought." "Even constructive competition is less beneficent than ideal altruistic co-operation" ( [20], pp. 5, 9 ). "The chief motives of business life can be measured indirectly in money." Though "the significance of a given price is greater for the poor than the rich," the greater number of the events with which economics deals affect in about equal proportions all the different classes of society ; so that if the money measures of the happiness caused by two events are equal, it is reasonable --- to regard the amounts of the happiness in the two cases as equivalent" ( [20], pp. 14, 19, 20 ). Appendix A. The growth of free industry and enterprise, and Appendix B. The growth of economic science, were originally in Book I, but moved to appendices since the fifth edition ( 1907 ). This shows Marshall's early interest in historical studies and also may imply that the criticism of a historian ( Cunningham ) caused Marshall's gradual abandonment of his historical work ( Hutchison [13], pp. 66, 69 - 70 ).

Book II explains Some Fundamental Notions like wealth, production, consumption, labor, necessaries, income and capital. Definitions of capital are also explained in Appendix E.

Marshall admitted, in Chapter I of Book III, On Wants and their Satisfaction, that "until recently the subject of demand or consumption has been somewhat neglected" but warned that "the reaction against the comparative neglect of the study of wants by Ricardo and his followers shows signs of being carried to the opposite extreme "( [20], pp. 84, 85 ). In spite of Jevons, it is not true that the theory of consumption is



the scientific basis of economics, since the formation of consumers' preferences is much influenced by the productive activities of the society ( Chapter II ). Diminishing marginal utility, the equilibrium of consumer's household, demand price, and demand schedule are discussed in Chapters III and V. Elasticity of demand is defined in Chapter IV. Though Marshall made no reference, however, the concept of the elasticity of demand was already discussed by William Whewell, as is pointed out by Hutchison ( [13], pp. 64 - 65 ). Marshall discussed the consumers' surplus in Chapters VI, which we shall consider in section 2 below.

The agents of production and supply price are defined in Chapter I of Book IV, The Agents of Production. Land, Labour, Capital and Organization. Chapters II and III are devoted to discuss land, Chapters IV, V, VI, to labor, and Chapter VII, to saving. Industrial organization is considered in Chapters VIII to XII. Chapter VIII discusses Adam Smith, Social Darwinism, and division of labor. Economies of scale are divided into external economies which depend on the general development of the industry and internal economies which depend on the resources of the individual houses of business engaged in it, at the end of Chapter IX, which discusses division of labor and the influence of machinery. Chapter X treats external economies which depend on the concentration of specialized industries in particular localities. Internal economies due to production on a large scale are discussed in Chapter XI.<sup>4)</sup> As for the reason why the growth of firms reaping the benefit of internal economies does not destroy competition, Marshall argues that individual entrepreneurship is short-lived and not inherited and that growing firms encounter marketing difficulties. The Chapter XII continues to discuss that businessmen's abilities and tastes are not always inherited and new blood must be brought in by some method like private partnership, or

joint-stock companies. Chapter XIII which concludes Book IV contains the famous analogy between firms in industry and trees in forest and the definition of the representative firm, which we shall discuss, together with the problem of internal economies, in section 3 below.

After a short account of the concept of a market in Chapter I of Book V, General Relations of Demand, Supply and Value, Chapter II discusses the temporary equilibrium of demand and supply. The famous illustration from a local corn market shows that the market adjustment process considered by Marshall is different from that of Walrasian tatonnement. We shall consider this difference in section 4 below. Chapter III treats the equilibrium of normal demand and supply in the short-run. Marshall defines equilibrium in terms of the equality of the demand and supply price. While demand price is the temporary equilibrium price at which each particular amount of the commodity can find purchasers, the normal supply price is defined as the expenses of production, including gross earnings of management, of a representative firm, whose economies of production are dependent on the aggregate volume of production of the commodity. As for the influences of utility and cost of production on value, Marshall argues as follows. "We might as reasonably dispute whether it is the upper or the under blade of a pair of scissors that cut a piece of paper, as whether value is governed by utility or cost of production" ( [20], p. 348 ). "Thus we may conclude that, as a general rule, the shorter the period which we are considering, the greater must be the share of our attention which is given to the influence of demand on value ; and the longer the period, the more important will be the influence of cost of production on value. For the influence of changes in cost of production takes as a rule a longer time to work itself out than does the influence of changes in demand" ( [20], p. 349 ).<sup>5)</sup>

Investment is taken into consideration and prime and supplementary costs are distinguished in Chapter IV. What Marshall calls special, direct or prime costs are variable costs corresponding to variable factors of production, calculated per unit produced.<sup>6)</sup> What Marshall calls supplementary costs are fixed costs calculated per unit produced, which correspond to costs independent of short-run volume of production, like the general cost of administration and sale, the general physical depreciation of the durable plant in which much of capital is invested and the depreciation caused by the plant growing old. The sum of these two units costs is called by Marshall as total cost.

In Chapter V we can see the time structure of Marshallian economic theory. The famous fiction of the stationary state is introduced as the first step towards studying the influences exerted by the element of time on the relation between cost of production and value. By the use of illustration from the fishing trade, Marshall explains the relation among market prices, short-run normal prices, and long-run normal prices. "Market values are governed by the relation of demand to stocks actually in the market." The normal supply price of a certain given rate of aggregate production "is that the expectation of which is sufficient and only just sufficient to make it worth while for people to set themselves to produce that aggregate amount ; in every case the cost of production is marginal ; that is, it is the cost of production of those goods which are on the margin of not being produced at all, and which would not be produced if the price to be got for them were expected to be lower. But the causes which determine this margin vary with the length of the period under consideration. For short periods people take the stock of appliances for production as practically fixed ; --- In long period they

set themselves to adjust the flow of these appliances to their expectations of demand for the goods which the appliances help to produce"( [20], pp. 372, 373 - 374 ).

Chapters VI and VII of Book V are devoted to consider joint and composite demand and supply, while Chapters VIII to XI "are given to a study of the marginal costs of productions in relation to the values of those products on the one hand, and on the other hand to the values of the land, machinery, and other appliances used in making them"( [20], p. 403 ). The nature of quasi-rent is discussed in the final footnote of Chapter IX and the first few pages of Chapter X.

Chapter XII, along with Appendix H, examine the problem of increasing returns. Marshall considers (1) external economies, (2) the life cycle of firms and (3) difficulties of marketing to solve the dilemma of competition and increasing returns, which we shall discuss in section 3. The concept of a particular expenses curve is introduced to discuss the problem of producers' surplus. Marshall's exposition is, however, "confusing"( Blaug[3], p. 412 ). We shall consider this problem in the following section. Finally, Marshall admits that long-run demand and supply curves are irreversible and that the problem is one of organic growth and not of statical equilibrium.

Perhaps it may not be out of place to discuss the relation between short-run and long-run cost curves, which is pointed out by Frisch [6]. In the case of a single particular firm, the long-run average cost curve is the envelope of the short-run average cost curve. In the case of the representative firm with external economies, which is a small replica of an industry with free entry, the long-run average cost ( LAC ) curve is not the envelope but the locus of the minimum point of the short-run

average cost ( SAC ) curves. In Figure 1, we measure horizontally the volume of industrial output or the corresponding output of the representative firm, and vertically, prices and costs. Curves SAC are short-run average cost curves of the representative firm, and curves SMC are short-run marginal cost curves of the representative firm, which is also the short-run supply curve of the industry. Curves  $D_1$ ,  $D_2$ , etc. are demand curves for the industry. Finally, the curve LAC is the long-run average cost curve of the representative firm, which is also the long-run supply curve of the industry.

This can be seen as follows. Suppose the demand curve is  $D_1$ , which intersects with LAC at the point A. The point A signifies the long-run equilibrium of the industry. The short-run average cost of the representative firm, which corresponds to the industrial output given by the abscissa of the point A, reaches the minimum at the point A, so that the point A is also on the curve SMC. Since the normal profit is included in the cost, the representative firm is earning the normal profit at the point A, and the volume of the industrial output remains unchanged. "In a rigidly stationary state in which supply could be perfectly adjusted to demand in every particular, the normal expenses of production, the marginal expenses, and the average expenses( rent being counted in ) would be one and the same thing, for long periods and for short"( Marshall[20], P. 497 ).

If the demand curve is shifted to  $D_2$ , the equilibrium is shifted first to the point B, at which  $D_2$  intersects with the short-run supply curve SMC. Gradually, however, the cost curves of the representative firm are shifted downward by the external economies caused by the expansion of the industrial output due to the price higher than the normal supply

price at the point B. The long-run equilibrium is again established at the point C. "We thus get at the true long-period marginal cost, falling with a gradual increase of demand." "We do not expect it to fall immediately in consequence of a sudden increase of demand. On the contrary we expect the short-period supply price to increase with increasing output. But we also expect a gradual increase in demand to increase gradually the size and the efficiency of this representative firm ; and to increase the economies both internal and external which are at its disposal"( [20], P. 460 ).

In Chapter XIII of Book V, the doctrine of maximum satisfaction is considered, from the point of view of consumer's surplus. Marshall insists a tax on an increasing-cost industry and a subsidy to a decreasing-cost industry. The argument is, however, not persuasive, since a tax on an increasing-cost industry cannot be justified from the point of view of the maximum satisfaction, if the producers' surplus is taken into consideration. Chapter XIV considers the theory of monopoly, also by the use of consumers' surplus analysis. Finally, Chapter XV summarizes this long but important Book beautifully.

Book VI is concerned with the Distribution of the National Income. While Chapter I is devoted to the explanation of the marginal productivity theory as a theory of the demand for productive agents, the supply of productive agents is discussed in Chapter II. In Appendix K, Marshall argued that workers' and savers' surpluses cannot be added to consumers' surplus, which we shall critically discuss in the following section. Chapters III to V are concerned with the problem of labor. Marshall's arguments on the peculiarities of labor as an agent of production are still useful for the contemporary economics of labor and theory of human

capital. Chapter VI discusses interest of capital. Distinction between the money and the real rate of interest is explained, and Marshall's monetary theory of trade cycle is sketched. We shall return to this problem in section 4. In Chapters VII and VIII, where profits of capital and business power is considered, Marshall emphasizes the role of the fourth agent of production, organization. Chapters IX and X consider land rent and land tenure. "English features of land tenure" explain "the distinction between the quasi-rents which do not, and the profits which do, directly enter into the normal supply prices of produce for periods of moderate length"( Marshall[20], p. 636 ). Chapter XI gives an excellent summary of the first ten chapters of Book VI.

In the last two chapters of Book VI, Marshall discusses economic progress. What England "has derived from the progress of manufactures during the nineteenth century has been through its indirect influences in lowering the cost of transport of men and goods, of water and light, of electricity and news : for the dominant economic fact of our own age is the development not of the manufacturing, but of the transport industry" ( [20], pp. 674 - 675 ) In many ways "evil may be lessened by a wider understanding of the social possibilities of economic chivalry. A devotion to public wellbeing on the part of the rich may do much, as enlightenment spreads, to help the tax-gatherer in turning the resources of the rich to high account in the service of the poor, and may remove the worst evils of poverty from the land"( [20], p. 719 ).<sup>7)</sup>

## 2. Consumers' and Producers' Surplus.

Theory of consumers' and producers' surplus has been extensively applied in such fields as international trade, public finance and industrial organization. Marshall's theory of consumers' surplus ( [20], pp. 124 - 133, 841 - 842 ) is clear and straight, as is elucidated by Hicks ( [11], pp. 38 - 41 ). His theory of producers' surplus ( [20], pp. 810 - 812, 830 - 832 ) is, however, quite ambiguous. Recently, Mishan[23] even recommended that "the term producer's surplus be struck from the economist's vocabulary." It is not unnecessary, therefore, to reconsider the theory of producers' surplus in its relation to consumers' surplus and its implications in the forms in which most of recent applications are made.

The original inventor of consumers' surplus is Dupuit who was, however, criticized by Walras. "Instead of measuring utility, as J.B. Say did, by the pecuniary sacrifice which the consumer actually does make once he knows the price, Dupuit measures utility by the sacrifice which the consumer is willing to make.<sup>8)</sup> ---- Thus, the measure of total utility is geometrically represented by the area under the demand curve drawn as a function of price ; --- Unfortunately, all these statements are erroneous, ---- In general, the maximum pecuniary sacrifice which a consumer is willing to make to obtain a unit of a product depends not only on the utility of the product in question, but also on the utility of all the other products in the market, and, finally, on the consumer's means.---- We may, therefore, ---- definitely reject all Dupuit's statements in his two memoirs which bear upon the variation of utility as price varies and as quantity demanded varies from price to price.---- they rest on a confusion of ideas resulting from Dupuit's complete failure to distinguish between utility or want curves on the one hand, and demand



curves on the other"( Walras[39], pp. 445 - 446 ).

Marshall's theory of consumers' surplus is free from Walras's criticism on Dupuit. Along with the assumption that "equal sums of money measure equal utilities to all concerned"( [20], p. 471 ), Marshall assumes "that the marginal utility of money to individual purchaser is the same throughout"( [20], p. 842 ). If one wants to measure utility in terms of money, he has to assume that each unit of money has the same utility. The length of a measure must be constant, if it can measure the length of others. Since the marginal utility of a product at equilibrium is equal to the product of its price and the marginal utility of money, the utility curve of a product coincides with the demand curve, if the marginal utility of money is assumed to be unchanged. The utility of money signifies the utility of "all the other products in the market" and also the utility of "the consumer's means."

In Figure 2, which is originally due to Hicks( [11], P. 39 ), we measure the quantity of a certain product horizontally, and the quantity of money, vertically. Curves like AG and BH are indifference curves of an individual person. Since the utility of money represents the utility of all the other products which can be bought by money, we have to consider the real quantity of money rather than the nominal one. These two quantities are identical, however, since prices of all the other products are given and unchanged. Suppose the individual has initially OA amount of money, and the price in terms of money of the product in question is shown by the slope of the budget line AF. The individual chooses the point C where an indifference curve is tangent to AF. He buys OE amount of the product by paying AK amount of money. The corresponding consumer's surplus is the difference expressed in terms of

money of utility level between the indifference curve BH which passes C and the indifference curve AG which passes A. In other words, it is the vertical distance between two indifference curves, which, like AB and DC, is indeterminate in general, unless the marginal utility of money is constant.

Let us denote by  $x$  the quantity of a certain product measured horizontally in Figure 2, by  $M$  the quantity of money measured vertically, and by  $U$  the utility of an individual as a function of  $x$  and  $M$ . The constancy of the marginal utility of money  $\partial U / \partial M$  implies that  $\partial^2 U / \partial M \partial M = 0$  and  $\partial^2 U / \partial x \partial M = 0$ . In other words, the marginal utility of the product in question  $\partial U / \partial x$  remains unchanged when  $M$  is changed but  $x$  is kept constant. The slope of the indifference curves between  $x$  and  $M$  remains unchanged if  $M$  only is changed, since it is the ratio of the marginal utility of money to the marginal utility of the product. In Figure 2, the slope of the indifference curves at the points, like A and B, or D and C, which have equal abscissas, are identical. Therefore,  $AB = CD$ , and more generally, the vertical distance between two indifference curves is the same at anywhere. If the marginal utility of money is constant, therefore,  $U$  can be expressed in terms of  $M$  and the consumers' surplus is determinate. When the initial amount of money  $OA$  is changed, the equilibrium point  $C$  moves vertically on  $EL$  and there is no changes in the amount of the product purchased  $OE$ , provided that the price of the product is unchanged. In other words, the income elasticity of demand for the product is zero and there is no income effect, if the marginal utility of money is constant. This implies that the product in question is not important in the budget of consumers and the proportion of income spent upon it is very small in the total income. 9)

In addition to consumers' surplus, Marshall introduces other surpluses in Appendix K of his Principles [20], i.e., workers' and savers' surpluses which are better seen when people are regarded as producers. Workers' surplus is, for example, explained as follows. "As a worker, he derives a worker's surplus, through being remunerated for all his work at the same rate as for that last part, which he is only just willing to render for its reward ; though much of the work may have given him positive pleasure"( [20], p. 830 ). Marshall insisted, however, that these producers' surpluses cannot be added to the consumers surplus. "These two sets of surpluses are not independent : and it would be easy to reckon them up so as to count the same thing twice. For when we have reckoned the producer's surplus at the value of the general purchasing power which he derives from his labour or saving, we have reckoned implicitly his consumer's surplus too, provided his character and the circumstances of his environment are given"( [20], p. 831 ).

Workers' surplus is, for example, nothing but the consumers' surplus from the consumption of their own leisure, and we have to assume the constancy of the marginal utility of money to make it determinate, as in the case of the consumers' surplus from the consumption of a certain product. Furthermore, Marshall dismisses a generalized utility function as less adapted to express the every-day fact of economic life than an additive separable utility function( [20], p. 845 ). The equilibrium amount of the consumption of the product in question can be obtained from the condition that its marginal utility, which is independent of the quantity of leisure, is equal to the product of its price and the marginal utility of money while the equilibrium amount of the leisure is obtained from the condition that its marginal utility, which is inde-

pendent of the quantity of the product, is equal to the product of its price, the rate of wage, and the marginal utility of income. In spite of Marshall's warning to counting the same thing twice, therefore, the consumers' surplus of a product and the producers' surplus like workers' surplus are independent and can be added, provided there are many other products which can be represented by money whose marginal utility is assumed constant. The case of Robinson Crusoe mentioned by Marshall is a highly exceptional one, since there are no other products which can money represent than the one produced by his own labor.

Marshall continues, in Appendix K, to introduce additional producers' surpluses which are different from workers' and savers' ( or waiters' ) surpluses. "These surpluses must be distinguished from the excess of earnings of an appliance of production over the prime cost of its works." "All appliances of production, whether machinery, or factories with the land on which they are built, or farm, are alike in yielding large surpluses over the prime costs of particular acts of production to a man who owns and works them : also in yielding him normally no special surplus in the long run above what is required to remunerate him for his trouble and sacrifice and outlay in purchasing and working them ( no special surplus, as contrasted with his general worker's and waiter's surplus ). But there is this difference between land and other agents of production, that from a social point of view land yields a permanent surplus, while perishable things made by man do not" ( [20], pp. 831 - 832 ).

These additional producers' surpluses which factors of production specific to firms yield in the short-run can be represented by the area SAF in Figure 3, which is given by Marshall in Appendix H of his Principles

( [20], p. 811 ). The producers' surplus like workers' surplus is not included, since the curve  $SS'$  is not a true supply curve but what Marshall calls particular expenses curve in Figure 3, in which prices and costs of a product are measured vertically, the volume of industrial output, horizontally, and the curve  $DD'$  is an ordinary demand curve. "Now the difference between the particular expense curve and a normal supply curve lies in this, that in the former we do, and in the latter we do not, take the general economies of production as fixed and uniform throughout. The particular expenses curve is based throughout on the assumption that the aggregate production is  $OH'$ " ( [20], p. 811 ). The rate of wage rises, for example, as the industrial output expands.  $PM$  represents, however, expenses of production calculated by the rate of wage prevailing when the industrial output is not  $OM$  but  $OH$ . Workers' surplus is, therefore, not included in the area  $SAF$  but in the area  $SOAH$ .

Let us now introduce the producers' surplus into Figure 2. In Figure 4, as in Figure 2, we measure horizontally the volume of a certain product, and vertically, the real amount of money which represents all the other goods. Curve  $BH$  is a social indifference curve and curve  $DG$  is the production frontier which shows the amount of all the other goods to be sacrificed to produce the given amount of the product in question. The marginal utility of money is assumed to be constant. The equilibrium point is  $C$ , and  $OE$  of the product in question is produced and consumed. If this product is not produced,  $OD$  of other goods is produced, but now only  $OK$  of other goods is available. Since the money price of the product in question is given by the slope of the line  $AF$ , the aggregate income of consumers is  $OA$  and  $AK$  of it is spent on the product in question

and OK of it, on the other goods. Since the level of aggregate utility represented by the indifference curve BH is OB in terms of money, however, AB is the consumers' surplus, which represents the increase in utility caused by the consumption of the product in question. If the product is not produced, on the other hand, the aggregate income is OD. AD is, therefore, the producers' surplus, which represents the increase in utility or in income caused by the production of the product in question.<sup>10)</sup>

In the short-run, we may consider that the product in question is produced from the input of a mobile factor of production ( labor ) and the input of immobile factors of production ( capital and land ) which are specific to particular firms. Since the distribution among firms of the latter factors is given, the marginal productivity of the former factor diminishes in the production of the product in question, as more of it is transferred from the production of other goods. Thus curve DG is concave to the origin. Since the price line AF and the production frontier DG are tangent each other at the equilibrium point C, the price of the product is equalized to its marginal cost of production. In other words, the price of the mobile factor of production is equalized to its value marginal product in the production of the product in question.

Suppose that the mobile factor is one of all the other goods so that its price in terms of money remains unchanged. In Figure 4, the input of the mobile factor is DK to produce OE or KC of the product in question. Since the money value of KC of the product is AK, however, the difference of AK and DK, i.e., AD is the profit or rent to be inputed to the immobile factors of production. If we consider the curve SS' in Figure 3 as the marginal cost curve, which shows the diminishing marginal productivity of the mobile factor, then, the area SAF represents the

producers' surplus which factors specific to firms yield in the short-run. In this case, workers' surplus is not included in the area, not because the curve  $SS'$  is not a true supply curve but a specific expenses curve. Workers' surplus is simply assumed away, since the scale of the industry is assumed to be small relative to that of the economy and the rate of wage is assumed to be unchanged as the industry expands. This is the implication of the assumption that the mobile factor (leisure) is one of all the other goods which are represented by money and that the marginal utility of money is constant.

In the long-run, all the factors of production are mobile, and there is no factor of production which is specific to firms. Suppose other goods represented by money include all the factors of production. In Figure 4, curve  $DG$  is now a straight line and coincides with the price line  $AF$ . There exists no producers' surplus which is imputed to firms, since  $A$  and  $D$  coincide each other. In Figure 3, the supply curve  $SS'$  must be horizontal so that the area  $SAF$  vanishes. As in the case of two good two-factor model in the theory of international trade, however, sometimes it is considered that the production frontier  $DG$  in Figure 4 is concave to the origin even in the long-run. In such a case, producers' surplus  $AD$  does not vanish. It is, of course, not the surplus imputed to firms, but the net increase in rents imputed to factors of production, whose aggregate supply is assumed to be constant in the long-run.<sup>11)</sup>

In the long-run, we consider only such primary factors of production as land and labor. Capital goods whose supply is perfectly variable in the long-run are merely intermediate goods and can be decomposed to primary factors of production. In Figure 4 suppose that money whose volume is measured vertically does not represent factors of production.

In other words, the volume of a certain product is measured horizontally and that of money which represents all the other products is measured vertically. It is assumed that factors of production have no direct utility, so that there is no reservation demand for factors and their aggregate supplies are given constants. All the products are produced under constant returns to scale ( production functions are linear homogeneous ). Without loss of generality, we may assume that the product in question ( measured horizontally ) is relatively labor intensive while all the other products ( measured vertically ) are relatively land intensive.

Let us start from the point D in Figure 4 and increase the output of the product in question which is measured horizontally. At first we can do it easily without sacrificing much of other products. This is because the product in question can be produced by the intensive use of labor which is not used intensively in the production of other goods and therefore is not so scarce. As we move along the curve DG towards G further, however, the output of the product in question is increased relative to other products, so that the scarcity of labor rises. We have to sacrifice larger amount of other products to increase the given amount of the product in question. The curve DG is, therefore, concave to the origin. As we move along DG from D to G, the price of the product in question rises in terms of money which represents other products. The reason is that the rate of wage rises since labor is intensively used in the production of the product in question and that the rent of land declines since land is intensively used in the production of other products. The difference between the increase in wage income and the decrease in rent income is measured as AD in terms of money when the



production is carried out at the point C.

In the long-run, therefore, the producers' surplus AD in Figure 4 consists of, for example, workers' surplus caused by the production of the product in question, net of the decrease in land rent. Since the aggregate supply of labor as well as that of land are assumed to be constant, we may say that it is the net increase in ( quasi- ) rent imputed to the primary factors of production. In Figure 3, curve SS' and the area SAF correspond respectively to curve DG and the line segment AD in Figure 4. In other words, curve SS' is now a true supply curve which shows how marginal cost changes as the output of the product in question is increased. Specific expenses curve is now a horizontal straight line FA which shows the cost of production calculated by the rate of wage and the rate of rent, which realize when the output of the product is OH.

### 3. Life-Cycle Theory and Internal Economies.

1. Marshall offered three different solutions for the compatibility of increasing returns or diminishing cost and competitive equilibrium ( Robertson[31], Hague[8] ).

1. Individual firms face a downward sloping demand curve even in a competitive market, unless the market is ideally organized like a Walrasian one

"There are many trades in which an individual producer could secure much increased internal "economy by a great increase of his output ; and there are many in which he could market that output easily ; yet there are few in which he could do both. And this is not an accidental, but almost a necessary result. For in most of those trades in which the economies of production in a large scale are of first-rate importance, marketing is difficult" ( Marshall[20], p. 286 ).

"When we are considering an individual producer, we must couple his supply curve - not with the general demand curve for his commodity in a wide market, but - with the particular demand curve of his own special market. And this particular demand curve will generally be very steep ; perhaps as steep as his own supply curve is likely to be, even when an increased output will give him an important increase of internal economies."<sup>12)</sup>  
In this sense, it is also possible to argue that Marshall was a pioneer of modern theory of imperfect competition after Sraffa.

2. Increasing returns may be due to the external economies rather than to the internal economies. We have already shown that the long-run average cost curve can be downward sloping in Figure 1 of section 1 of this Chapter. As Robinson ( [32], pp. 337 - 343 ) argued, however, this does not solve the problem, if external economies of an industry

are due to increasing returns in other industries which are based on economies either internal or external to individual firms there. Nor can we rely on a Smith-Young specialization of firms in an industry, the extent of which is dependent on the general development of the industry, since there is no reason why such specialization is impossible from the beginning, when the scale of the industry is small, unless there are internal economies in individual firms. Increasing returns due to division of labor cannot be compatible with competition, unless individual demand curves are, at least partially, downward sloping, as is argued in Chapter 3, section 4. The only remaining possibility, therefore, for external economies seems to be the supply of public factors of production or public intermediate goods, which is favorable to larger industries.<sup>13)</sup>

3. Internal economies may not be fully exploited by an individual firm since its life span is limited. Like an individual tree in a forest, an individual firm in an industry grows and decays, though forest and industry remain stationary.

"Rapid growth of firms in some trades which offer great economies to production on a large scale ---- But long before this end [ monopoly ] is reached, his [ a new businessman's ] progress is likely to be arrested by the decay, if not of his faculties, yet of his liking for energetic work "( Marshall[20], pp. 285 - 286 ).

"A tendency to Increasing Return prevails : that is, an increasing output can generally be produced at a diminishing rate of cost. It is obvious that, under this tendency a firm, which had once obtained the start of its rivals, would be in a position to undersell them progressively, provided its own vigour remained unimpaired, and it could obtain all the capital it need ---- under the law of Increasing Return, there might

have seemed to be nothing to prevent the concentration in the hands of single firm of the whole production of the world, ---- The reason why this result did not follow was simply that no firm ever had a sufficient long life of unabated energy and power of initiative for the purpose" ( Marshall[17], pp. 315 - 316 ).

Marshall put the main burden in solving the problem of the compatibility of increasing returns and competitive equilibrium on this life-cycle theory of private firms. Since this theory is based on Marshall's theory of a long-run equilibrium of an industry in which individual firms are at disequilibria, we shall first consider the latter theory in general in this sub-section, and then try to rehabilitate the former theory in the next sub-section so that it can be applied in a modified form to the modern economy where the life span of firms is not necessarily limited.

Just as Marx considered market value in the case where different producers are under different conditions in the same industry ( see Chapter 6, section 6 ), Marshall also considered the long-run normal supply price in the case where "some businesses will be rising and others falling"( Marshall[20], p. 378 ). Marshall regarded the relation between an industry and its firms as the relation between a forest and its trees.

"We may read a lesson from the young trees of the forest as they struggle upwards through the benumbing shade of their older rivals. Many succumb on the way, and a few only survive ; those few become stronger with every year, they get a larger share of light and air with every increase of their height, and at last in their turn they tower above their neighbours, and seems as thsy would grow on for ever, and

for ever become stronger as they grow. But they do not. One tree will last longer in full vigour and attain a greater size than another ; but sooner or later age tells on them all. Though the taller ones have a better access to light and air than their rivals, they gradually lose vitality ; and one after another they give place to others, which, though of less material strength, have on their side the vigour of youth. And as with the growth of trees, so was it with the growth of business as a general rule"( Marshall[20], pp. 315 - 316 ).

As his first step "towards studying the influences exerted by the element of time on the relations between cost of production and value," Marshall considered the stationary state of an industry ( Marshall[20], p. 366 ). "Of course we might assume that in our stationary state every business remained always of the same size, and with the same trade connection. But we need not go so far as that ; it will suffice to suppose that firms rise and fall, but that the representative firm remains always of about the same size, as does the representative tree of a virgin forest"( Marshall[20], p. 367 ). The representative firm is defined in this way as the miniature of an industry and, as Frisch[6] emphasized, is a construction of mind, so that there may not be an actual firm which may be picked out as representative in the industry. It is, however, a very convenient device to consider the normal supply price of an industry composed of firms behaving differently under different conditions. The normal supply price is assumed to be the normal expenses of production ( including normal profit ) of the representative firm.

"This is the price the expectation of which will just suffice to maintain the existing aggregate amount of production ; some firms meanwhile rising and increasing their output, and others falling and diminishing

theirs ; but the aggregate production remaining unchanged. A price higher than this would increase the growth of the rising firms, and slacken, though it might not arrest, the decay of the falling firms ; with the net result of an increase in the aggregate production. On the other hand, a price lower than this would hasten the decay of the falling firms, and slacken the growth of the rising firms ; and on the whole diminish production"( Marshall[20], p. 343 ).

Why do some firms increase their output while others diminish theirs ? Marshall considered, of course, that young firms, like young trees, grow while old firms, like old trees, decay, on the basis of his life-cycle theory of firms. We may, furthermore, consider that a young ( an old ) firm increases ( decreases ) its output since its normal expenses of production ( including normal profit ) exceeds ( falls short of ) that of the representative firm, i.e., the normal supply price of the industry.<sup>14)</sup> In our stationary state, of course, the demand price is equalized to the normal supply price of the industry while the supply price of each firm is considered to be its normal expenses of production including normal profit.

"When ---- the amount produced is such that the demand price is greater than the supply price, then sellers receive more than is sufficient to make it worth their while to bring goods to market to that amount ; and there is at work an active force tending to increase the amount brought forward for sale. On the other hand, when the amount produced is such that demand price is less than the supply price, sellers receive less than is sufficient to make it worth their while to bring goods to market on that scale ; so that those who were just on the margin of doubt as to whether to go on producing are decided not to do so, and

there is an active force at work tending to diminish the amount brought forward for sale" ( Marshall[20], p. 345 ).

Let us denote by  $x$  the supply price of a firm and by  $p$  the supply price of the industry. A firm increases its output if  $p$  is higher than  $x$ , and decreases it if  $p$  is lower than  $x$ . It is assumed that the rate of change in output are proportional to the difference between  $p$  and  $x$ . The different firms may have an identical value of  $x$  or different value of  $x$ . Let  $y(x)$  be the total output of firms with the same value of  $x$ . Furthermore, let  $D(x)$  denote changes ( increases if positive, decreases if negative ) in  $y$ . Then, from the assumption,

$$(1) \quad D(x)/y(x) = ( p - x ).$$

Since the industrial output remains unchanged, i.e.,

$$(2) \quad \int y(x) dx = \text{constant},$$

from (1),

$$(3) \quad \int D(x) dx = \int ( p - x ) y(x) dx = 0.$$

If we define the proportion of the total output  $y(x)$  of firms with the supply price  $x$  to the total industrial output as

$$(4) \quad f(x) = y(x) / \int y(x) dx,$$

we have, in view of (4),

$$(5) \quad p = \int x f(x) dx,$$

since from the right hand side of (3)

$$(6) \quad p \int y(x) dx = \int x y(x) dx.$$

From the definition (4),

$$(7) \quad \int f(x) dx = 1.$$

Therefore, (5) implies that the normal supply price of the industry or its representative firm is the average of supply prices of individual firms in the industry.

If there exist internal economies and the supply price of an individual firm is a decreasing function of its output, there is no limit for the expansion of a young firm with the lowest individual supply price, until the whole industrial output is concentrated in its hands so that its supply price coincides with the industrial supply price. To prevent the concentration in the hands of a single firm of the whole industrial output, Marshall emphasized that the life span of private firms is limited and that expanding young firms are changed eventually into shrinking old firms long before such concentration is actually realized.

Although Marshall's life-cycle theory of firms gives a realistic picture of the nineteenth-century industry, however, the question remains is its relevancy after the great development of joint-stock companies. Marshall himself was well aware of this problem. "As with the growth of trees, so was it with the growth of business as a general rule before the great recent development of vast joint-stock companies, which often stagnate, but do not readily die"( Marshall[20], p. 316 ).<sup>15)</sup> "A private firm without great vigour is sure to die; a large joint-stock company has special advantages, many of which do not materially dwindle with age"( Marshall[17], p. 316 ). Since Marshall put the main burden in solving the problem of the compatibility of diminishing cost and competitive equilibrium on his life-cycle theory of the firm, however, it is worthwhile to consider whether the theory can be revived in somewhat modified form even without the assumption that the life span of an individual firm is limited.<sup>16)</sup>

Instead of Marshall's supposition that the life span of an individual firm is limited, we may consider that a capital asset with embodied technology has a limited life, since wages rise as a result of technical



progress. In other words, we may replace Marshall's theory of life-cycle of firm with a theory of life-cycle of technology. Though Marshall "exclude[s] from view any economies that may result from substantive new inventions"( Marshall[20], p. 460 ), we can argue that the balanced growth equilibrium with the technical progress is not so foreign from his "modification of the fiction of a stationary state" which will "bring us nearer to real life and help to break up a complex problem."<sup>17)</sup>

"The stationary state has just been taken to be one in which population is stationary. But nearly all its distinctive features may be exhibited in a place where population and wealth are both growing, provided they are growing at about the same rate, ---- For in such a state by far the most important conditions of production and consumption, of exchange and distribution will remain of the same quality, and in the same general relations to one another, though they are all increasing in volume"( Marshall[20], p 368 ).

While Marshall considers here the economic growth with both population and wealth growing but technology unchanged, we are going to consider the growth of physical wealth with technical progress and unchanged population. In view of the so-called stylized facts of economic growth that the real wage and capital-labor ratio are rising while the relative shares of capital and labor remain unchanged,<sup>18)</sup> however, it is evident that which plan will "bring us nearer to real life and help to break up a complex problem."

2. To make the story simple, let us assume that capital goods do not depreciate physically. Give a set of capital goods  $k$ , the short-run average variable cost of output  $y$  produced by the use of  $k$  and some primary factor of production like labor is denoted by  $c(y, k)$ . The

short-run marginal cost of  $y$  is increasing, since  $k$  is given. The average cost curve is U shaped, therefore, first diminishing with respect to  $y$  owing to the diminishing average constant cost, and then increasing with respect to  $y$  owing to the increasing marginal cost. Marshallian internal economies are, however, not concerned with short-run diminishing average cost under the given capital  $k$ . Marshallian internal economies imply that the average cost is diminishing, not with  $y$ , but with  $k$ .

"The tendency to increasing return does not act quickly," wrote Marshall( [20], p. 455 ). "We expect the short-period supply price to increase with increasing output. But we also expect a gradual increase in demand to increase gradually the size and efficiency of this representative firm, and to increase the economies both internal and external which are at its disposal"( [20], p. 460 ). In other words, Marshallian internal economies are concerned with long-run average cost of individual firms.

In Marshall's stationary state, technical progress does not exist and all the prices and wages remain unchanged through time. Unlike Marshall, however, we consider that the life span of a firm is not limited. Since capital goods do not depreciate physically as well as morally, investment is carried out so that the condition that the rate of profit is indefinitely normal; that is,

$$(8) \quad py - c(y, k)y = r q k$$

is satisfied, where  $p$ ,  $q$  and  $r$  denote, respectively, the price of the output, the price of a set of capital goods, and the normal rate of profit. By dividing with the level of output  $y$ , we have

$$(9) \quad p = c(y, k) + (r q k / y)$$

which implies that the price is equalized to the average cost including normal profit in the long-run equilibrium. "The normal supply price of

any amount of that commodity may be taken to be its normal expenses of production ( including gross earnings of management )" according to Marshall ( [20], pp. 342 - 343 ).

In the long-run equilibrium defined by the condition (8), furthermore, the excess profit

$$(10) \quad E = py - c(y, k)y - r_qk,$$

which vanishes at the equilibrium, must be the maximized one with respect to the level of output  $y$  and the amount of capital  $k$ . The following conditions are, therefore, necessary.

$$(11) \quad \partial E / \partial y = p - c(y, k) - y \partial c(y, k) / \partial y = 0$$

and

$$(12) \quad \partial E / \partial k = -y \partial c(y, k) / \partial k - r_q = 0.$$

Condition (11) is nothing but the condition that the short-run marginal cost of output,  $c + y \partial c / \partial y$ , is equalized to the price, and can be satisfied easily from our supposition that the competitive price is constant and the marginal cost is increasing. Condition (12) requires, on the other hand, that there should be no unexhausted internal economies remaining at the equilibrium, in the sense that the average cost including normal profit,  $c + (r_qk/y)$  can no longer be decreased by increasing  $k$ .

Provided that the long-run average cost including normal profit is falling, in other words there cannot be a long-run competitive equilibrium, since investment in capital assets is expanded indefinitely. Internal economies are not compatible with competition in a stationary equilibrium, if the life span of the firm and its capital is unlimited.

While Marshall solved this problem by limiting the life span of the firm, let us do it by introducing technical progress and limiting the life span of capital goods morally in the balanced growth equilibrium with technical progress. The possibility of a steady-state growth equilibrium with technical progress can be seen by considering the following simplified aggregate model of a growing economy where technical progress is embodied in capital.

Suppose the investment-saving relation is simply

$$(13) \quad K(t) = sY(t)$$

where  $Y(t)$  denotes the aggregate level of malleable output at time  $t$ , which can be either consumed or invested,  $K(t)$  denotes the aggregate level of investment at  $t$ , and  $s$  is a positive constant less than 1. Because capital does not depreciate physically,  $K(t)$  denotes also the amount of the existing capital produced at  $t$ . The capital-output ratio is assumed to be such a technical constant that one unit of capital always produces one unit of output. If capitals up to  $T$  years old are actually utilized in the production, then, aggregate output available is

$$(14) \quad Y(t) = K(t) + K(t-1) + \dots + K(t-T).$$

The capital-labor ratio is also assumed technically constant in such a way that a unit of  $K(t)$  requires  $a^t$  units of labor to be operated, where  $a$  is a positive constant less than 1. Technical progress can be seen in the fact that less labor is required by newer capital to produce the same output. Since labor market must be cleared,

$$(15) \quad L = K(t)a^t + K(t-1)a^{t-1} + \dots + K(t-T)a^{t-T}$$

where  $L$  denotes the stationary supply of labor.

By solving (15) for  $K(t)$ , we can easily see that the steady-state growth rate is  $1/a$  in this vintage capital model with fixed coefficients. Both aggregate output and newly produced capital grow at the rate of  $1/a$ , always with capitals up to  $T$  years old being in use. By eliminating  $Y(t)$  from (14) and (15), then, we can see that  $T$  and  $s$  vary inversely. While the supply of labor remains stationary, the level of real wage  $w(t)$  rises also at the rate of  $1/a$ , since the condition

$$(16) \quad 1 = a^{t-T}w(t)$$

must be nearly satisfied if  $t$  changes almost continually. In other words, one cannot expect profit from the use of capital oldest among the actually used. In view of (16), profits obtained from the use of capitals less old than  $T$ ,

$$(17) \quad 1 - a^{t-s}w(t) = 1 - a^{T-s} \quad s < T$$

are independent of  $t$ .<sup>19)</sup>

Generally, of course, the capital-output ratio and the capital-labor ratio are not technically constant but functions of real wage, so that the model would be much more complicated. In view of the results obtained from the simple model considered above, however, we may suppose that in general real wages and relative prices of primary factors of production whose supplies are given continue to rise as a result of technical progress while the rate of profit remains unchanged. Even though the capital assets do not depreciate physically, they

depreciate morally, since the cost of product resulting from them, combined with the labor and other primary factor input, increases as time goes on. The economic life span of capital assets is limited and there is life-cycle, not of a firm, but of technology embodied in capital, or of a branch or sector of a firm - that is, a set of capital assets. A set of newly produced capital assets, being the most efficient ones, make a profit larger than the normal one, though in the next period, being old and less efficient, they make a profit less than normal, even negative, but may still replace the variable cost. Finally, say, in the third period and on, being unable to replace even the variable cost, they cease to be utilized. In the long-run equilibrium, we can say not only the industry but also firms ( unlike Marshall[20], p. 367 ) are in equilibrium though different sections of a firm are constantly changing through the process of birth, growth, decay and death.

Let us consider whether an internal economy remains unexhausted in a section of a competitive firm when the economy grows with technical progress and wages of labor and prices of other primary factors of production continue to rise but other prices and the normal rate of profit are stationary. Though the capital goods do not depreciate physically, they now depreciate morally, since they have to compete with newer, more efficient capital goods. Suppose a section of a firm is newly created and investment is done there in the period 0, so that capital assets  $k$  can be used

in the period 1 and on. In period 1 a profit larger than the normal one can be made by the use of  $k$ , since,  $k$  being the most efficient capital, the average variable cost  $c(y, k)$  of output  $y$  is much lower than the given price  $p$  of output  $y$ . In period 2, however, only a profit lower than the normal level can be made by the use of  $k$ , since the average variable cost  $c'(y, k)$  is much higher than  $c(y, k)$ , owing to higher wages of labor and prices of other primary factors of production caused by the use of more efficient capital goods in the other parts of the economy. Since the capital cost is sunk, nevertheless,  $k$  is still used in period 2, provided that  $c'$  is somewhat lower than the unchanged  $p$ . Finally, in the period 3,  $k$  ceases to be used at all and this section of the firm has to be dissolved, since the average cost  $c''(y, k)$  is now higher than  $p$ , owing to still higher wages of labor and prices of other primary factors of production.

Since capital goods now depreciate morally, we have to take the depreciation into consideration in the calculation of average cost to be compared to price in each period. To simplify the story by avoiding this complicated problem as far as possible, however, let us simply assumed that old capital assets have no scrap value and that depreciation quotas to two periods,  $D_1$  and  $D_2$ , are such constants as  $D_1(1 + r) + D_2 = 1$ , where  $r$  denotes the rate of normal profit, which is a given constant to competitive firms.

Since free entry is assumed, the level of investment in

the period 0 satisfies

$$(18) \quad (py - c(y, k)y) / (1 + r) + (py' - c'(y', k)y') / (1 + r)^2 = qk$$

where  $p$ ,  $y$ ,  $y'$ ,  $q$  and  $r$  denote, respectively, the unchanged price of output, the level of output in period 1 and that in period 2, the unchanged price of capital assets  $k$ , and the unchanged rate of normal profit. Condition (18) states that the sum of the discounted revenues expected is equalized with the cost of  $k$  in the period 0. It can be changed into

$$(19) \quad E = (py - c(y, k)y - rqk - D_1qk) + (py' - c'(y', k)y' - rqk - D_2qk) / (1 + r) = 0$$

which corresponds to (10) in the case of no technical progress, where the average cost remains unchanged so that  $k$  can be used for production indefinitely. Condition (19) states that the excess profit is zero or the total profit is normal, with the profit in period 1 higher and the profit in period 2 lower than the normal level.

The excess profit  $E$ , which actually vanishes at equilibrium, is tried to be maximized by the competitive firm with respect to  $y$ ,  $y'$  and  $k$ . The following conditions are, therefore, necessary.

$$(20) \quad \partial E / \partial y = p - c(y, k) - y \partial c(y, k) / \partial y = 0$$

$$(21) \quad \partial E / \partial y' = p - c'(y', k) - y' \partial c'(y', k) / \partial y' = 0$$

and

$$(22) \quad \partial E / \partial k = (-y \partial c(y, k) / \partial k - rq - D_1q) + (-y' \partial c'(y', k) / \partial k - rq - D_2q) / (1 + r) = 0.$$

Conditions (20) and (21) are nothing but the condition that



the marginal cost of output is equalized to the price in each period.

Figure 5, in which the level of output in each period is measured horizontally and the cost and price, vertically, shows how cost curves are shifted between two periods. The curve SAC shows the short-run average cost including normal profit in the period 1,  $c(y, k) + (D_1 qk/y) + (r qk/y)$ ; and curve SMC, the short-run marginal cost in the period 1,  $c(y, k) + y \partial c(y, k) / \partial y$ . The profit here being higher than normal, SAC must be increasing at  $y$ , which satisfies (20). The dashed curve LAC is the envelope for SAC curves with different  $k$ 's and SAC curve is shifted to rightward when  $k$  is increased. Since the envelope, which is the long-run average cost curve, is downward sloping, there exists an internal economy and the average cost at  $y$  can be reduced by increasing  $k$ , since SAC curve is higher than the envelope at  $y$ , satisfying (20) which is located to the right of the tangential point  $T$  of two curves. This implies that the first term of  $\partial E / \partial k$  in (22) is positive.

In the period 2, on the other hand, cost curves are shifted upwards. Since the profit here is now lower than normal, the short-run average cost curve SAC' must be decreasing at  $y'$ , which satisfies (21). The average cost at  $y'$ ,  $c'(y', k) + (D_2 qk/y') + (r qk/y')$ , must be increased by increasing  $k$ , and  $y'$  must be located to the left of the tangential point  $T'$  of SAC' and the long-run average cost curve LAC', since the second term of  $\partial E / \partial k$  in (22) must be negative.

Unlike in the case of condition (12) which corresponds to condition (22) when there is no technical progress, condition (22) can be satisfied with finite  $k$ , with the first term in (22) being positive and the second, negative, even though the long-run average cost curve is downward sloping and the minimum ( with respect to  $y$  and  $y'$  ) of the short-run average cost including normal profit  $c( y, k ) + ( D_1 qk/y ) + ( r qk/y )$  and  $c'( y', k ) + ( D_2 qk/y' ) + ( r qk/y' )$  decrease as  $k$  increased. This is because a further increase in  $k$  diminishes the average cost at the actually chosen level of output in period 1 but increases such average cost in period 2. In other words, the competitive equilibrium is possible, even if an internal economy remains unexhausted and the average cost including normal profit diminishes as the amount of capital is increased.

Internal economy remains unexhausted simply because capital input cannot be changed, unlike the case of labor, in each period. If capital goods can be sold at the end of period 1, the use of capital will be increased in period 1 so far as its value marginal productivity is higher than the normal rate of profit and internal economy cannot be compatible with competition. By definition, however, capital goods are something which, once installed, cannot be disposed so easily. If they are not disposed at the end of period 1, furthermore, they have to be used rather than thrown away in period 2, even though the value marginal productivity of capital falls a short of the normal rate of profit. Investment

in period 0 has to be stopped, therefore, before the value marginal productivity of capital in period 1 is equalized to the normal rate of profit.

#### 4. From Marshall to Keynes

John Maynard Keynes ( 1883 - 1946 ) was a son of John Neville Keynes, the author of The Scope and Method of Political Economy ( 1890 ), and educated at Eton and Cambridge. In 1905, Marshall wrote to J. N. Keynes. "Your son is doing excellent work in Economics. I have told him that I should be greatly delighted if he should decide on the career of a professional economist."<sup>20)</sup> The greatest contribution of J. M. Keynes as a professional economist is certainly The General Theory of Employment, Interest and Money ( 1936 ), in which he showed the possibility of an equilibrium with involuntary unemployment in a modern monetary economy. From his Tract on Monetary Reform ( 1923 ), through Treatise on Money ( 1930 ), to General Theory, however, Keynes had been constantly emphasizing the importance of the monetary aspects of the modern economy. Keynes argued in his contribution to a Festschrift for Spiethoff, titled "A monetary theory of production," which played an important role in his movement from Treatise to General Theory, that a monetary economy rather than a real-exchange economy should be considered to study phenomena like booms and depressions.

"The main reason why the problem of crises is unsolved, or at any rate why this theory is so unsatisfactory, is to be found in the lack of what might be termed a monetary theory of production ---- An economy, which uses money but uses it merely as a neutral link between transactions in real things and real assets and does not allow it to enter into motives

or decisions, might be called ---- a real-exchange economy. The theory which I desiderate would deal, in contradiction to this, with an economy in which money plays a part of its own and affects motives and decisions and is, in short, one of the operative factors in the situation, so that the course of events cannot be predicted, either in the long period or in the short, without a knowledge of the behaviour of money between the first state and the last. And it is this which we ought to mean when we speak of a monetary economy ---- it is my belief that the far-reaching and in some respects fundamental differences between the conclusions of a monetary economy and those of the more simplified real-exchange economy have been greatly underestimated by the exponents of the traditional economics; with the result that machinery of thought with which real-exchange economics has equipped the minds of practitioners in the world of affairs, and also of economists themselves, has led in practice to many erroneous conclusions and policies ---- I am saying that booms and depressions are phenomena peculiar to an economy in which money is not neutral" ( Keynes [14], pp. 408 - 411 ).

Walrasian theory as a whole may be called a theory of a real-exchange economy in the sense of Keynes, since, as we saw in Chapter 7, section 5.2, it is based on the dichotomy between real and monetary theories and money, even if introduced, remains neutral. While money is introduced after relative prices are determined in a Walrasian system, in a Marshallian

system money does exist from the beginning, but its purchasing power is assumed constant when relative prices are considered. Because of this assumption, Keynes argued that Marshallian theory is also a theory of a real-exchange economy.

"Most treatises on the principles of economics are concerned mainly, if not entirely, with a real-exchange economy; and - which is more peculiar - the same thing is also largely true of most treatises on the theory of money. In particular, Marshall's Principles of Economics is avowedly concerned with a real-exchange economy ---- Marshall expressly states --- that he is dealing with relative exchange values. The proposition that the prices of a ton of lead and a ton of tin are £15 and £90 means no more to him in this context than that the value of a ton of tin in terms of lead is six tons. "We may throughout this volume," he explains, "neglect possible changes in the general purchasing power of money. Thus the price of anything will be taken as representative of its exchange value relative to things in general." ---- In short, though money is present and is made use of for convenience, it may be concerned to cancel out for the purposes of most of the general conclusions of the Principles ---- Now the conditions required for the "neutrality" of money, in the sense in which this is assumed in Marshall's Principles of Economics, are I suspect, precisely the same as those which still insure that crises do not occur."<sup>21)</sup>

Since Marshall gave an explicit and extensive account to the trade cycle by emphasizing changes in relative prices

caused by changes in the purchasing power of money, however, one cannot argue that Marshall's economics as a whole is a theory of real exchange economy. Marshall's theory of the trade cycle was first developed in Economics of Industry ( jointly with his wife ). He made use of it in his testimony before the Depression of Trade and Industry Commission, reproduced it in Principles of Economics, and repeated it in Money, Credit and Commerce.<sup>22)</sup> Although the general purchasing power of money is assumed constant, as one of other things being constant, in Marshall's Principles of Economics, even there we can find the following argument.

"When we come to discuss the causes of alternating periods of inflation and depression of commercial activity, we shall find that they are intimately connected with those variations in the real rate of interest which are caused by changes in the purchasing power of money. For when prices are likely to rise, people rush to borrow money and buy goods and thus help prices to rise; business is inflated and is managed recklessly and wastefully; those working on borrowed capital pay back less real capital than they borrowed, and enrich themselves at the expense of the community. When afterwards credit is shaken and prices begin to fall, everyone wants to get rid of commodities, and get hold of money which is rapidly rising in value; this makes price fall all the faster, and the further fall makes credit shrink even more, and thus for a long time prices fall because prices have fallen"( Marshall[20], pp. 594 - 595 ).

Thus Marshall's economics consists of two parts. The first is that of a real-exchange economy in the sense of Keynes, where the general purchasing power of money is assumed to be constant, money is neutral, and crises do not occur. The second is that of a monetary economy in the sense of Keynes, where the general purchasing power of money changes, money is not neutral, and crises do occur. If Marshall's economics as a whole is the economics of monetary economy in the sense of Keynes, furthermore, it has to be able to explain changes in aggregate output and employment, since Keynes argued that "the divergence between the real-exchange economics and my desired monetary economics is, however, most marked and perhaps most important when we come to the discussion of the rate interest and to the relation between the volume of output and amount of expenditure" ([14], p 410 ). While Marshall considered the trade cycle as changes in purchasing power of money and the real rate of interest, he was, of course, aware of a suspension of industry and unemployment induced by changes in relative prices.

"The connection between a fall of prices and a suspension of industry requires to be worked out ---- when prices are rising, the rise in the prices of the finished commodity is generally more rapid than that in the price of the raw material, always more rapid than that in the price of labour; and when prices are falling, the fall in the price of the finished commodity is generally more rapid than that in the price of raw material, always more rapid than that in the



price of labour. And therefore when prices are falling the manufacturer's receipts are sometimes scarcely sufficient even to repay him for his outlay on raw material, wages, and other forms of Circulating capital; they seldom give him in addition enough to pay interest on his Fixed capital and Earnings of Management for himself ---- We conclude, then, that manufacturing cannot be carried on, except at a low rate of profit or at a loss, when the prices of finished goods are low relatively to those of labour and raw material, or prices are falling."<sup>23)</sup>

"I agree with the general opinion that a steady upward tendency in general prices conduces a little more to the general well-being than does a tendency downwards, because it keeps industry somewhat better employed ---- people of all classes, and especially of the working classes, spend their income more wisely when prices and money-wages are falling, and they think themselves worse off than they are, than when a rise of prices and money-wage lends them to exaggerate their real incomes and to be careless about their expenditure"( Marshall[19], p. 9 ).

Thus Marshall explained changes in aggregate output and employment by changes in relative prices which are induced by changes in the purchasing power of money. In the recent development of Keynesian economics, on the other hand, prices are considered as fixed in the sense of Hicks, and changes in output and employment are explained directly by changes in the effective demand.<sup>24)</sup> Marshall's theory of

trade cycle cannot, therefore, be a foundation of such a model of Keynesian economics. It is, however, rather isomorphic to recent monetarist or equilibrium macroeconomics explanations of employment. For example, Friedman[5] describes the effects of a decrease in the rate of money growth in a long-run equilibrium when prices have been stable. Prices of products respond to an unanticipated decrease in nominal demand faster than prices of factors of production, while, for example, the supply of labor is temporarily decreased by the reduction in wages to below the anticipated normal level. Therefore real wages actually received go up, though real wages anticipated by employees go down since at first they tend to evaluate the wages offered at the unchanged price level. This simultaneous rise ex post in real wages to employers and fall ex ante in real wages to employees enable unemployment to increase. The former effect is clearly the one emphasized by Marshall when he wrote that "the price of finished goods are low relatively to those of labour," while Marshall also grasped somewhat vaguely the latter effect when he commented that employees "think themselves worse off than they are."

Though Marshall's theory of trade cycle with variable purchasing power of money belongs to a tradition different from recent fixprice models of Keynesian macroeconomics, it is somewhat ironic that Marshall's price theory with constant purchasing power of money, which is a real-exchange economics in the sense of Keynes, can be a microeconomic foundation of fixprice Keynesian macroeconomics. The reason is, firstly, that unlike Walrasian price theory, it is a non-tâtonnement theory and, secondly, that it suggests the possibility of kinked demand curves faced by individual firms.

In Walrasian tâtonnement, no actual transactions are carried out in any market until the demand and supply are equalized at the equilibrium price. It is impossible, therefore, to consider Keynesian underemployment equilibrium in which some laborers are actually employed while others are involuntarily unemployed and excess supply remains in labor market. As we saw in Chapter 7, section 5.2, the assumption of tâtonnement was necessary for Walras to solve the equilibrium problems without introducing money. Marshall's price theory can be a non-tâtonnement theory in which actual transactions are carried out at disequilibria, therefore, since money does exist in Marshallian economic system even when relative prices and allocation of real resources are considered.

The fact that Marshall's price theory is a non-tâtonnement theory can be seen in his consideration of the temporary equilibrium in the corn market ( Marshall[20], p. 332 ). According to demand and supply schedules given by Marshall, at the prices of 37s., 36s., and 35s., holders will be willing to sell, respectively, 1,000 quarters, 700 quarters, and 600 quarters, and buyers will be willing to buy, respectively, 600 quarters, 700 quarters, and 900 quarters. The price of 36 shillings is, of course, the Walrasian equilibrium price that is established by tâtonnement and announced by the auctioneer to individual dealers. Marshall considered, however, a non-tâtonnement market where actual transactions are carried out at disequilibrium price among dealers without the perfect knowledge of the equilibrium price.

"It is not indeed necessary for our argument that any dealers should have a through knowledge of the circumstances of the market. Many of the buyers may perhaps underrate the willingness of the sellers to sell, with the effect that for some time the price rules at the

highest level at which any buyers can be found; and thus 500 quarters may be sold before the price sinks below 37s. But afterwards the price must begin to fall and the result will probably be that 200 more quarters will be sold, and the market will close on a price of about 36s. For when 700 quarters have been sold, no seller will be anxious to dispose of any more except at a higher price than 36s., and no buyer will be anxious to purchase any more except at a lower price than 36s. In the same way if the sellers had underrated the willingness of the buyers to pay high price, some of them might begin to sell at the lowest price they would take, rather than their corn left on their hands, and in this case much corn might be sold at a price of 35s.; but the market would probably close on a price of 36s. and a total sale of 700 quarters"( Marshall[20], p. 334 ).

Why is the same price of 36s. reached by Walras's tâtonnement as well as Marshall's non-tâtonnement process? Why is the equilibrium price considered as independent of how transactions at disequilibria are carried out? The reason is Marshall's assumption of constant marginal utility of money, which we already found useful for consumers' and producers' surplus analysis ( section 2 ).

"We tacitly assumed that the sum which purchasers were willing to pay, and which sellers were willing to take, for the seven hundredth quarter would not be affected by the question whether the earlier bargains had been made at a high or a low rate. We allowed for the diminution in the buyers' need of corn ( its marginal utility to them ) as the amount bought increased. But we did not allow for any appreciable change in their unwillingness to part with money ( its marginal utility ); we assumed that that would be practically the same whether the early payment

had been at a high or a low rate"( Marshall[20], pp. 334 - 335 ).

In the Marshallian temporary equilibrium, the level of output is constant, and therefore the total gross supply of corn is constant. As was pointed out by Hicks ( [11], pp. 127 - 129 ), the assumption of constant marginal utility of money implies no income effect on demand for corn, with the result that the total gross demand for corn, including reservation demand for suppliers, is independent of the transactions carried out at disequilibria, provided that all buyers and sellers remain in the market until the equilibrium is reached, or at least return to the market whenever there is a change in the price ( Williams[41] ). It is clear, then, that the final equilibrium price reached by any non-tâtonnement process is identical to the one established by tâtonnement. Strictly speaking, however, there is no reason, contrary to what Marshall thought, that the cumulated volume of transactions in any non-tâtonnement process would also be equal 700 quarters, since, as was emphasized by Walker[38], individual net demands and supplies are not independent of the disequilibrium transactions.

If an excess supply of labor does not cause a change in the rate of wage and therefore is not cleared in a non-tâtonnement fixprice economy, laborers are quantity-constrained in the labor market and adjust their consumption demand to the level of income lower than that of the full employment. Similarly, if an excess supply is not cleared by a change in the price of a product, firms must be faced a quantity constraint in their product market and adjust their demand for labor to a level lower than that of the full capacity, which is defined by the equality of the marginal productivity of labor and the rate of real wage. To consider a Keynesian equilibrium by the use of such a fixprice method, it is necessary

to explain why prices do not necessarily change, at least in the short-run, when there are excess supplies. One possible explanation is to assume that suppliers perceive kinked demand curves in excess supplied markets.<sup>25)</sup> In this respect, it is interesting to consider the following view of Marshall on competitive markets which are not homogeneous and very imperfect.

"Everyone buys, and nearly every producer sells, to some extent, in a "general" market, in which he is on about the same footing with others around him. But nearly everyone has also some "particular" market; that is, some people or groups of people with whom he is in somewhat close touch; mutual knowledge and trust lead him to approach them, and them to approach him, in preference to strangers. A producer, a wholesale dealer, or a shopkeeper, who has built up a strong connexion among purchasers of his goods has a valuable property. He does not generally expect to get better prices from his clients than from others. But he expects to sell easily to them because they know and trust him; and he does not sell at low prices in order to call attention to his business, as he often does in a market where he is little known"( Marshall[17], p. 182 ).

The demand curve perceived by an individual producer considered by Marshall should be downward sloping and kinked at the point of the current price and current sale. It is very steep for a quantity larger than the current sale, since the producer has to sell not only in his own special or particular market but also in a wide general market, "a market where he is little known," and has to "sell at low price in order to call attention to his business." For a quantity not larger than the current sale, on the other hand, demand is very elastic at the level of

the current price, since the producer in his own particular market "does not generally expect to get better price from his clients than from others" in the general market. In this sense, it is Marshall's theory of market that can supply a firm microeconomic foundation to Keynesian economics.

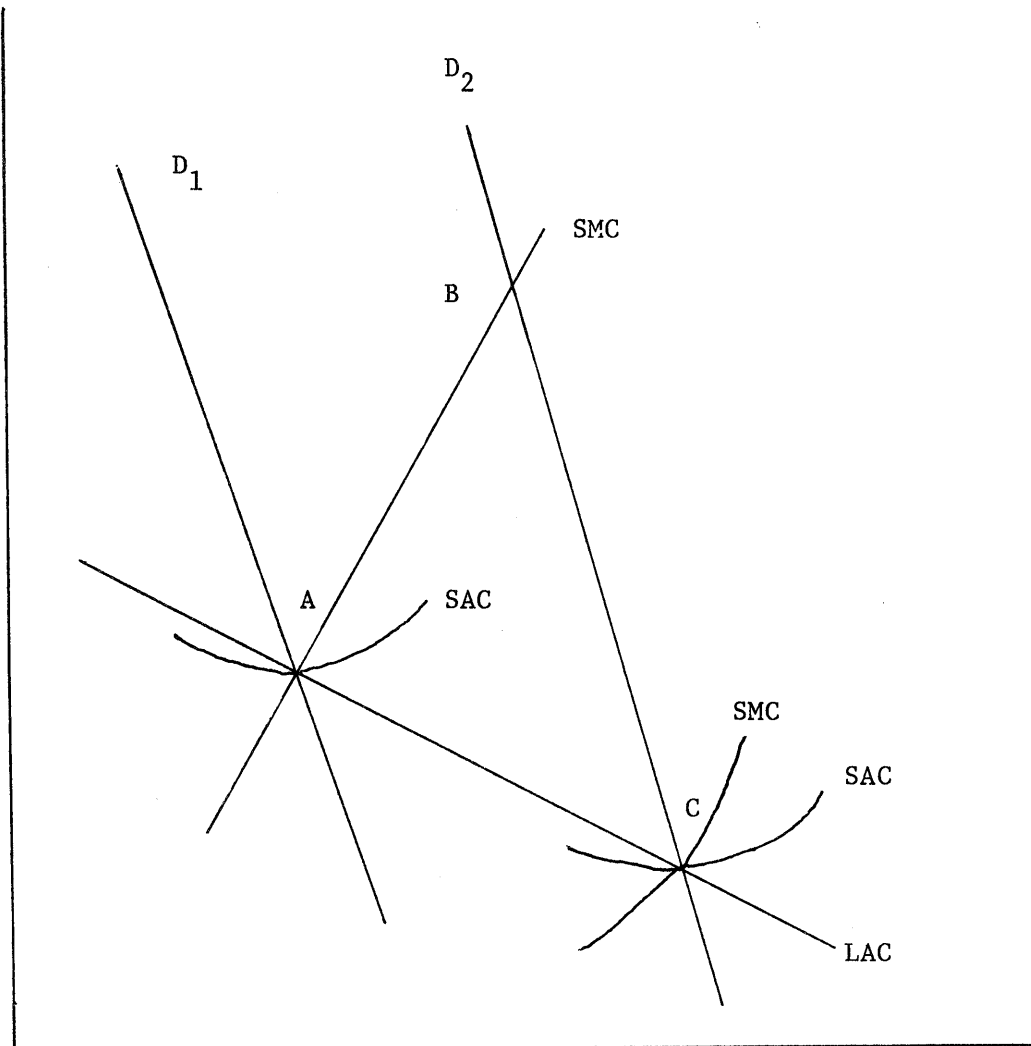


Figure 10.1



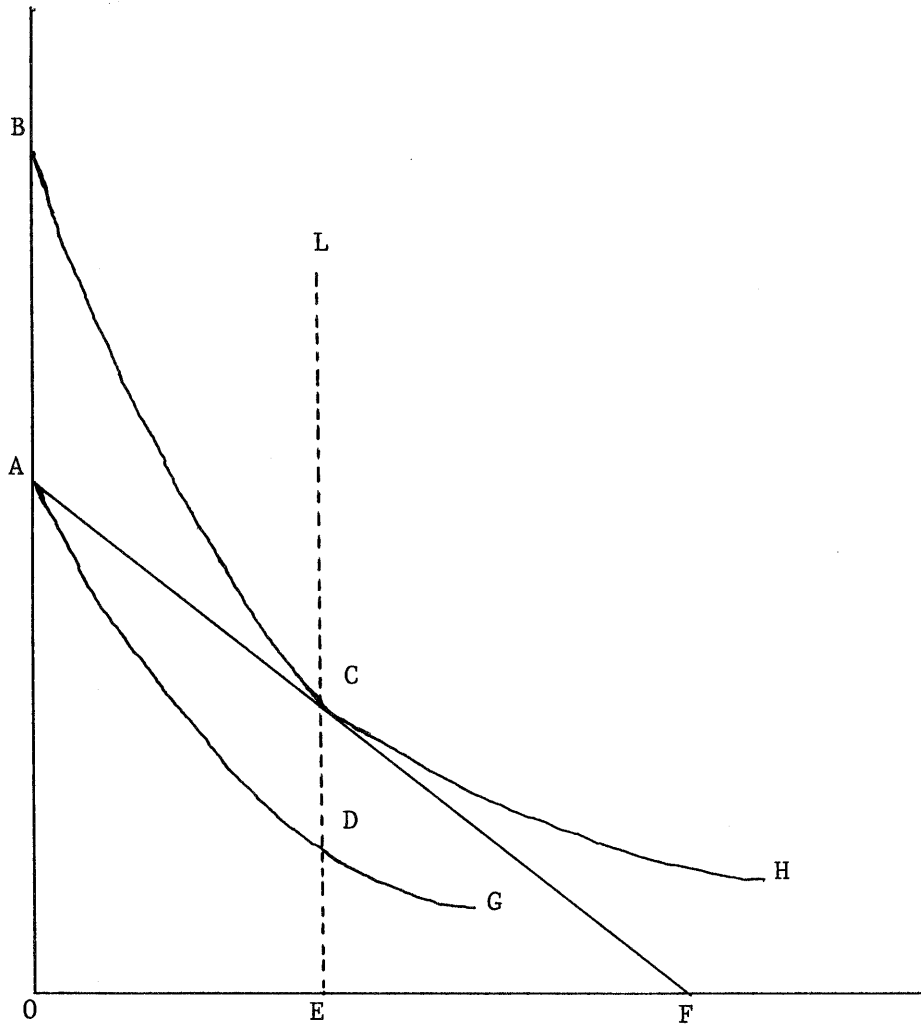


Figure 2

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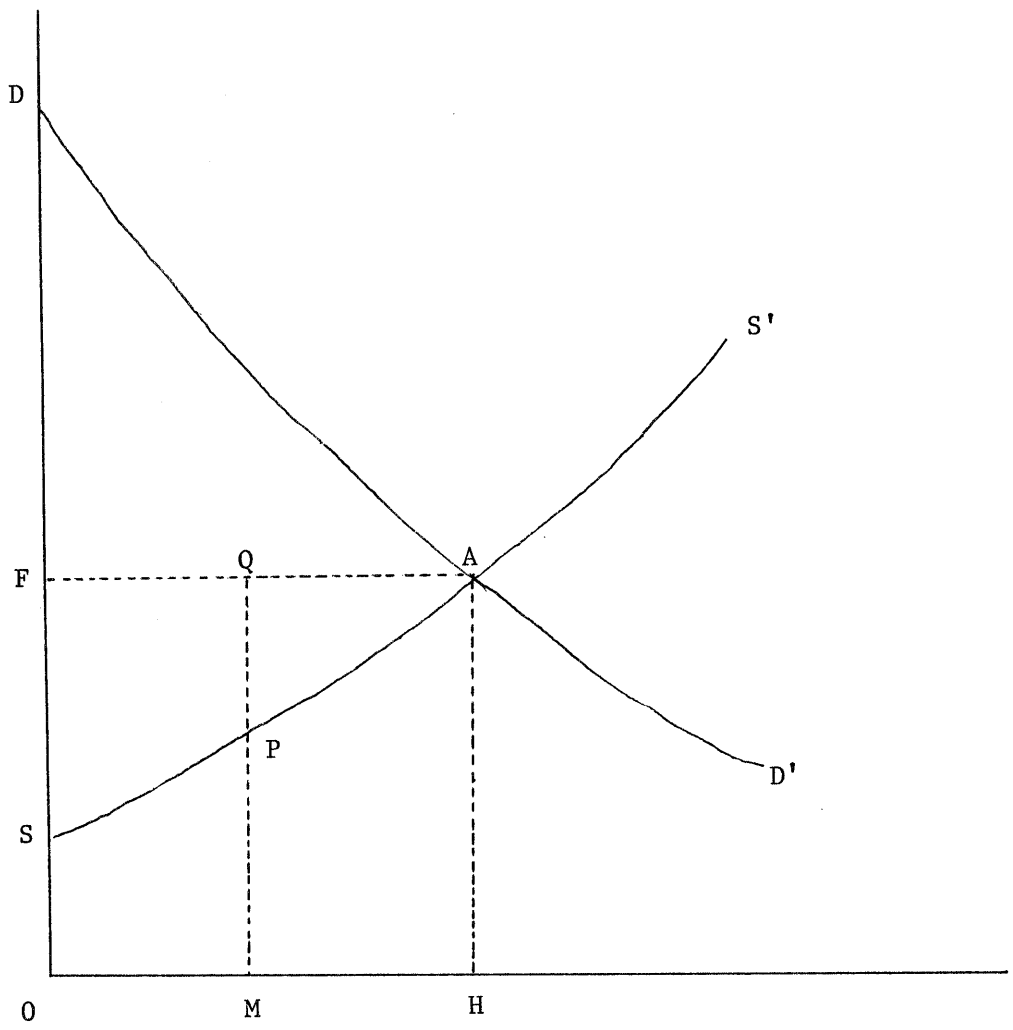


Figure 3

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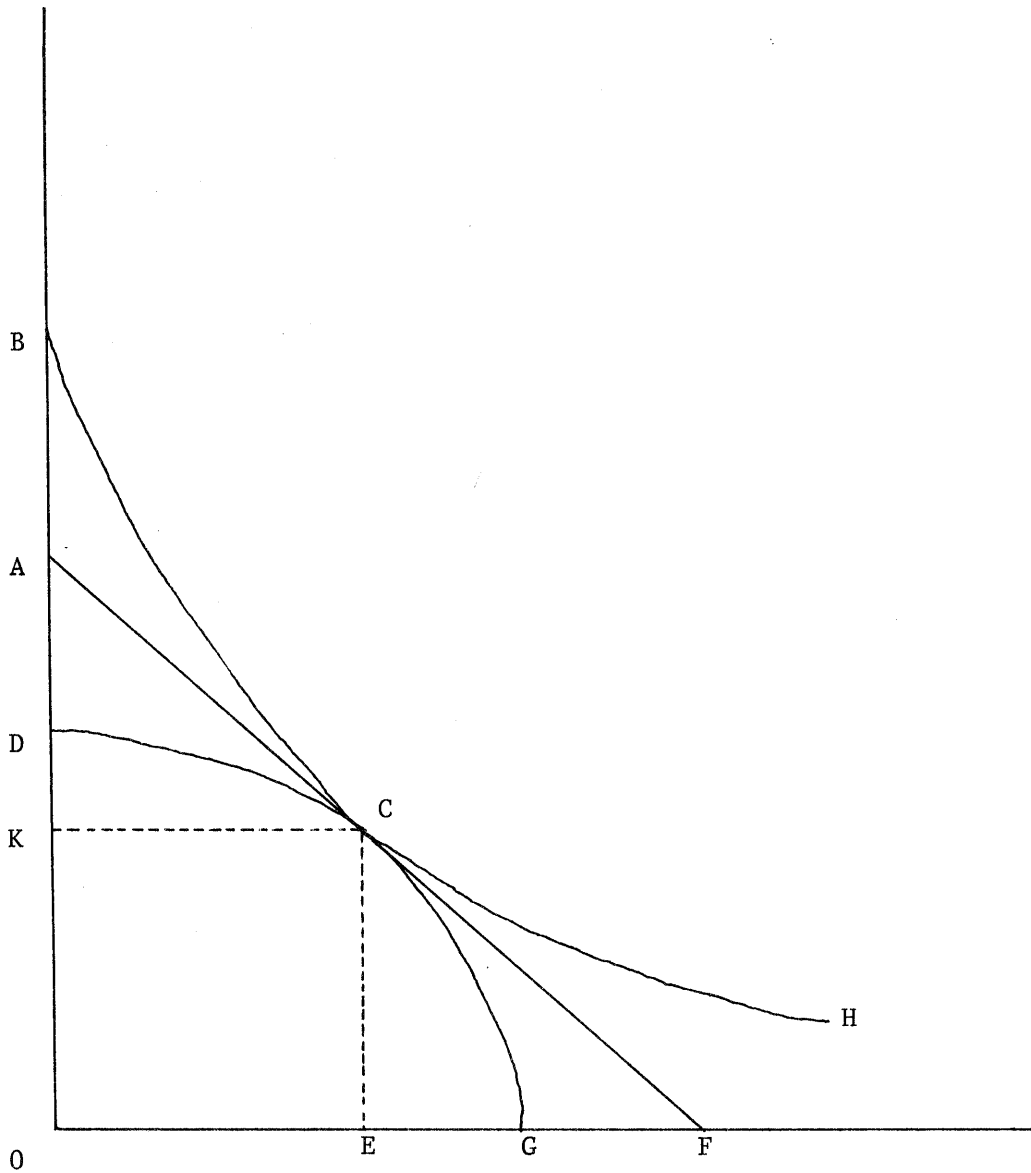


Figure 4

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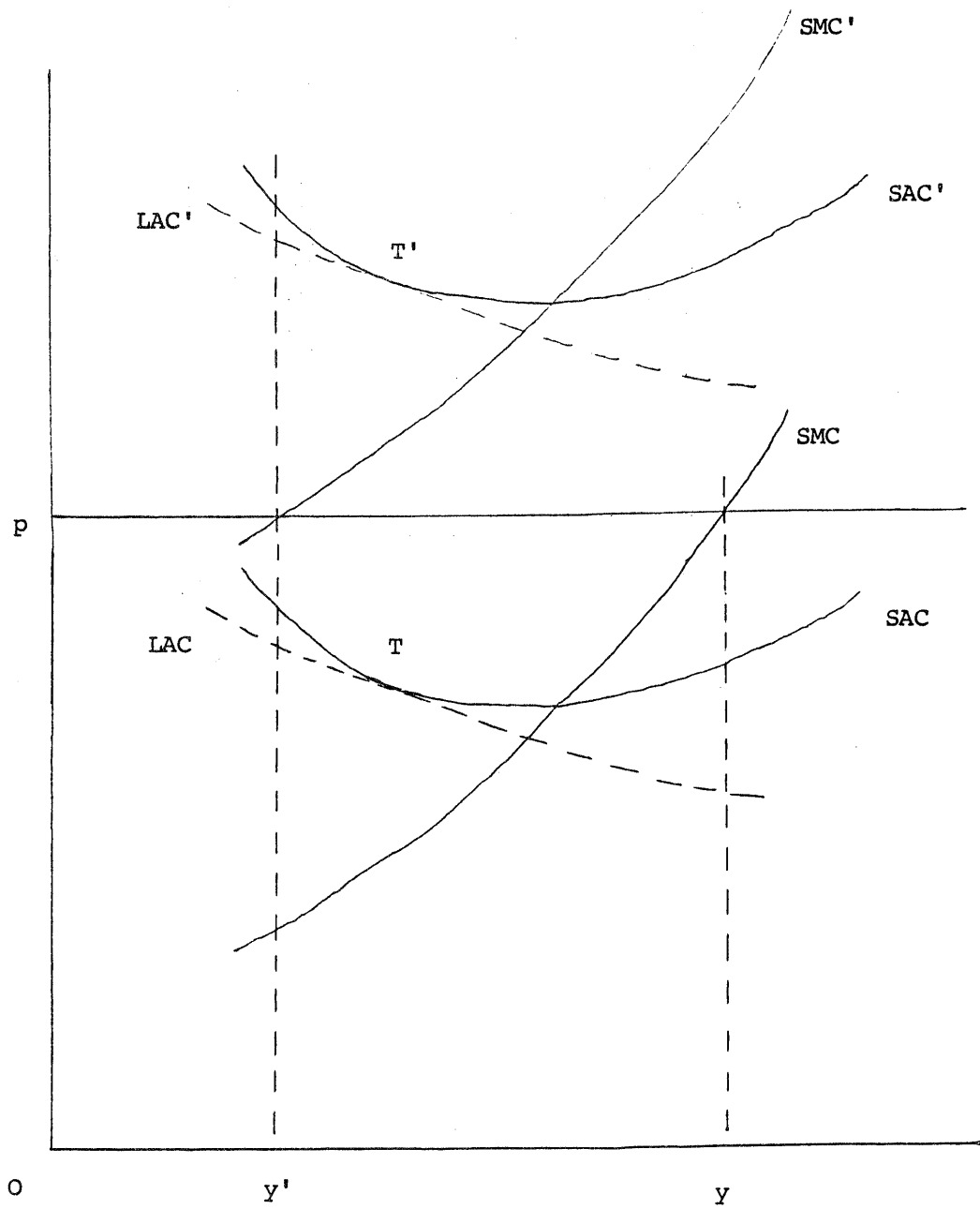


Figure 5

## Footnotes

- 1) See Pigou[29], pp. 20, 412, Shove[34], and Marshall[21], p. 6.
- 2) See Asproourgos[1], Spiegel[35], p. 565, Leijonhufvud[15], and Gide and List[7], pp. 616.
- 3) For the life of Marshall, see Marshall[21], 3 - 7, Hutchison [13], pp. 63 - 69, Ekelund and Hébert[4], pp. 328 - 331, and Pigou[29].
- 4) Chapter XI also gives an example of external economy, the growth of trade knowledge as the result of more newspapers and technical publications( p. 284 ).
- 5) In Chapter III Marshall also discusses the stability of an equilibrium. For the relation between Walrasian stability and Marshallian stability, see Negishi[24], pp. 192 - 195 and Ekelund and Hébert[4], pp. 373 - 378.
- 6) Prime cost includes "wear-and-tear of plant, which is immediately and directly involved by getting a little further use out of appliances with are not fully employed"( [20], pp. 374 - 375 ).
- 7) As a guide to Marshall's Principles, see Blaug[3], pp. 396 - 420. See also Frisch[6] particularly for Book V of Principles.
- 8) This statement of Walras is slightly unfair to Say who distinguished, in a letter to Ricardo, "utilité naturelle faisant partie des richesses que la nature ne nous fait pas payer," from "utilité créée par l'industrie, les capitaux et les terres, utilité que nous payons et qui est la seule qui fasse partie des richesses échangeables." Say's concept of natural utility is a primitive version of that of consumer's surplus. See Ricardo[30], pp. 31 - 36.
- 9) For the details of recent theory of consumers' surplus, see Varian [37], pp. 32, 93, 209 and Takayama[36].

- 10) Mishan[23] argues, in appended note, that the division of the welfare gain into consumers' surplus and producers' surplus is quite arbitrary, since it can also be made differently on the horizontal axis. Mishan seems to forget the fact that surplus can be measured only vertically in terms of money whose marginal utility is assumed to be constant.
- 11) We are following Marshall to assume a stationary state.
- 12) Marshall[20] p. 458. See also Marshall[20], pp. 457, 459 and Chapter 10, section 4 of this book.
- 13) According to the voluntary theory of public finance, the level of public expenditure is determined by individual beneficiary/tax payers seeking to maximize their net gains. Large industry is surely one of the most influential individual beneficiary/tax payers. See Negishi[25].
- 14) In other words, short-run average cost including normal profit is higher ( lower ) than the normal supply price of the industry for the contracting ( expanding ) firms, while short-run marginal cost is equal to the normal supply price of the industry for all firms.
- 15) It was in the sixth edition of Principles (1910) that Marshall first added a reservation clause on joint-stock companies. See Marshall [21], p. 343.
- 16) Instead of regular cycle of the birth, growth, decay and death of firms, Shove[33], Wolfe[42], Newman[27] and Newman and Wolfe [28] introduced random influences on cost curves and considered the statistical long-run equilibrium of the industry, - that is, the size distribution of firms.
- 17) See Whitaker[40], pp. 305 -316, for Marshall's unpublished notes on the theory of economic growth, in which changes in the art of production are taken into consideration. Unfortunately, Marshall did not inquire

"into the qualitative properties of solutions for secular growth paths: indeed the models as they stand are much too complex and unrestricted to lend themselves readily to such analysis."

18) For the stylized facts of economic growth, see Chapter 8, section 4 of this book and the literature mentioned there.

19) See Allen[2], pp. 299 - 303 for the details of this fixed coefficient model.

20) See Harrod[9], p. 107 and Ekelund and Hébert[4], p. 432. For Marshall's letters to J.M. Keynes himself, see Pigou[29], pp. 479 - 483.

21) See Keynes[14], pp. 409 - 411. For the reference to Marshall, see Marshall[20], pp. 61 - 62.

22) See Marshall[22], pp. 150 - 167; [20], pp. 710 - 711; [18], Book IV; and [19], pp. 1 - 16.

23) See Marshall[22], pp. 155 - 156; [19], pp. 7 - 8; and [21], pp. 714 - 716.

24) "It is not implied by the description Fixprice method that prices are never to be allowed to change - only that they do not necessarily change whenever there is demand - supply disequilibrium"( Hicks[12], p. 78 ). See Malinvaud[16], pp. 1 - 80, and Negishi[26], pp. 53 - 72.

25) See Malinvaud[16], p. ix and Negishi[26], pp. 87 - 98. See also Chapter 3, section 4 of this book.

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