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SOCIAL DIFFERENTIATION AND ECONOMIC THEORY

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Social differentiation and economic theory*

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The division of labour was at the core of the vision of economic progress put forward in The Wealth of Nations. But although Adam Smith is considered the birth of economics as a distinct social science, the division of labour has no place in modern economic theory. My objetive here is twofold. First, to offer some remarks on the reasons concurring to the disappearance of the division of labour in post-Marshallian economics. These basically historical remarks appear in Section I below. Second, to collect some analytical results which may hopefully serve as subsidies for the reinstatement of social differentiation in economic theory. The presentation and discussion of these results forms the subject of Section II below. Section III concludes the paper briefly advancing one conjecture on processes of social differentiation.

I. History

In describing the academic environment of Cambridge, England, at the time of her arrival, 1922, Joan Robinson coined the phrase "Marshall was economics" (Robinson,1980,p.vii). The Principles of Economics, published in 1887 and reprinted in its eight edition in 1920, as the "Bible"(p.vii) of economics. In this section, I shall reconstruct Marshall's Principles

aiming at detecting a crucial impasse in his treatment of social differentiation. This impasse derived from an ambivalence between methodological and mechanical models: it gave origin years later to two opposed approaches to social differentiation. The first, associated with Sraffa (1926) and the value revolution of the early 1930s, became dominant in economic theory. The second, associated with Young, lived on furtively, in the underworlds, to paraphrase Keynes (p.32), and was only revived in the 1970s. I shall argue that under both antithetical approaches the division of labour appears as a natural process situated outside the domain of economic theory. In the second section of this paper,the naturalness of the division of labour is called in question.

Marshall considered economics "a branch of biology broadly interpreted"(Marshall,1948,p.637). Biology was the Mecca of the economist (p.xii) and biological metaphors abound in the Principles. But in no place does he put more emphasis on the lessons to be drawn from biology than in the beginning of chapter 7,Book IV, entitled "Industrial Organization". He refers to "the general rule, to which there are not very many exceptions, that the development of the organism, whether social or physical involves an increasing subdivision of functions between its separate parts on the one hand, and on the other a more intimate connection between them."(pp.200-1). With regard to industry, Marshall continues, "This increased subdivision of functions, or "differentiation", as it is called manifests itself ... in such forms as the division of labour, and the development of specialized skills, knowledge and machinery; while integration, that is, a growing intimacy and firmness of the connections between the separate parts of the industrial organism, shows itself in such forms as the increase of security of commercial credit, and the means and habits of communication..."(p.201).

One would then expect Marshall to carry on the analysis of industrial organization, the main subject of chapters 8 to 13 of Book IV, in terms of the dynamic interplay between differentiation and integration. Yet he abandoned this systemic framework as soon as he started to dwell

upon detailed aspects of industrial organization. The difficulties he faced in the attempt of applying a dynamic systemic approach derived from his general methodological posture.

Biology was the Mecca of the economist, but Marshall hastened to add that biological conceptions are much more complex than those of mechanics. He maintained that the central idea of economics must be that of living force and organic movement; nonetheless, statical hypotheses of mechanical character were to be used as provisional auxiliaries of biological or dynamic conceptions (pp.xii-xiii). As approximations breaking up complex reality into parts to seggregate isolate causes, mechanical models of equilibrium equipped with Coeteris Paribus clauses were essential to science; and in this regard, economics is like every other science (p.30, p.304). Marshall gave a candid answer to Edgeworth's boutade that "to treat variables as constants is the characteristic vice of the unmathematical economist"(Edgeworth,p.127). "It is true that we provisionally treat variables as constants", wrote Marshall admitting of the distortions caused by analytical tools derived from mechanics to a cogent apprehension of change, "but it is also true that this is the only method by which science has ever made any great progress in dealing with complex and changeful matter, whether in the physical or moral world."(Marshall,p.315).

This claim was, and still is, far from being established. Marshall tried to reconcile mechanical, statical models of equilibrium in which phenomena take place in reversible time to the dynamical, biological nature of irreversible change subordinating the concept of equilibrium to defined procedures of cutting out the flux of time (Granger,1958,p.101). Thus he introduced equilibria for short and long periods while recognizing that time is absolutely continous, that it knows of no such partitions (Marshall, p.vii,p.314). His harmonization between mechanical and biological models, however, was problematic. Time, "the centre of the chief difficulty of almost every economic problem"(p.vii), could not be tamed by statical methods; Statics was expressly viewed as a branch of Dynamics (p.304), but

silence reigned on the vexatious problem of their proper integration. Georgescu-Roegen rightly pointed out in this connection that change and evolution elude aritmomorphic schematization. Concepts surrounded by a penumbra within which they overlap with their opposites, named by Georgescu-Roegen as dialectical, are needed to apprehend change; concepts with precise boundaries derived from mechanics are insufficient for the task of understanding evolution (Georgescu-Roegen,ch.2,ch.11,part 3).

The unresolved methodological tension between mechanical models that inspire analytical tools and biological models which capture the characteristic features of the object of study pervades the Principles. The mere mechanical "composition of forces" model was deemed by Marshall to suffice for some types of problems, but he himself added that "in nearly all problems of large scope and importance, regard must be had to biological conceptions of growth"(Marshall,pp.350-1). To treat the development of industry as that of a living organism, as a twofold process of differentiation and integration was the explicit program of Marshall in Book IV of the Principles. The analytical tools imported from mechanics, however, precluded his announced plan from being put into practice. To understand how they impaired his ideally prescribed systemic approach is necessary to expound in some detail his treatment of industrial organization in Book IV.

In the opening chapter of Book IV, entitled "The agents of production - land, labour, capital and organization", Marshall departed from the taxonomy of production factors by adding organization to the usual list. The triple classification handed down by tradition was motivated by the interest on the determinants of income distribution, namely, the ownership rights to the existing amount of factors and their relative rates of return - rental, interest and wage rates. In fact, Marshall's subject in Book IV is not income distribution, treated at lenght only later in Book VI, but rather the behaviour of supply price schedules. Supply price was defined as the unit price required to call forth the exertion necessary for producing

a given amount of a commodity (p.118). In formal terms, a supply price schedule relates hypothetical volumes of output to the unit prices required by producers to render these volumes available. To understand the determinants of supply price schedule is the objetive of Book IV as the understanding of demand price schedule was the objective of Book III. Both Books are preliminary to Book V, the analytical core of the Principles, in which value is explained by the equilibrium between supply and demand, "...a Fundamental Idea running through the frames of all the various parts of the central problem of Distribution and Exhange" (p.vii).

Marshall reckoned Organization apart in Book IV because it exerted a decisive influence on supply price schedules. Marshall distinguished between diminishing and increasing returns to scale. Under diminishing returns, the supply price schedule is positively sloped. For an increase in capital and labour applied to the production of a given commodity would cause a less than proportionate increase in the amount of produce obtained; hence the supply price associated with the larger quantity of output must be higher. The law of diminishing returns was explained by reference to a fixed factor. It would hold in agriculture unless technical innovations were to offset the fixity of land (p.126). Apart from miscellaneous topics, the first chapters of Book IV deal with the tendency to diminishing returns. But when Marshall came to industrial organization, he realized that an opposite result was to be expected. The economies of organization, or the advantages of the division of labour in the broad sense (i.e., as specialized skill, specialized machinery, subdivision of management functions, spacial specialization,etc.) allowed one to get more than proportionate increases in the amount of produce obtained from a given increase in labour and capital employed. Under increasing returns to scale, supply price schedules are negatively sloped; that is, it is possible to produce at a larger scale with smaller unit prices. Marshall worded the law of increasing

returns thus: "An increase of labour and capital leads generally to improved organization, which increases the efficiency of the work of labour and capital."(p.256).

Marshall argued that diminishing returns would set, by and large, in agriculture and some extracting industries whereas increasing returns, or the advantages of production on a large scale, are best shown in manufacture (p.123,p.232). "The part which nature puts in production shows a tendency to diminishing return, the part which man plays shows a tendency to increasing return."(p.265). He criticized Ricardo for exaggerating the scope of diminishing returns (p.137); and he sided with Adam Smith and Babbage in observing that the economies of production arising from the division of labour can only be secured in presence of enough demand for the larger output (pp.119-20). Yet an important, albeit subtle, displacement had taken place since The Wealth of Nations. The division of labour no longer retained interest as such. Its role within the economic argument was confined to its likely effects on supply price. From the formal point of view, the only relevant questions concerned the slope of supply price schedules. Consider the three Figures below.

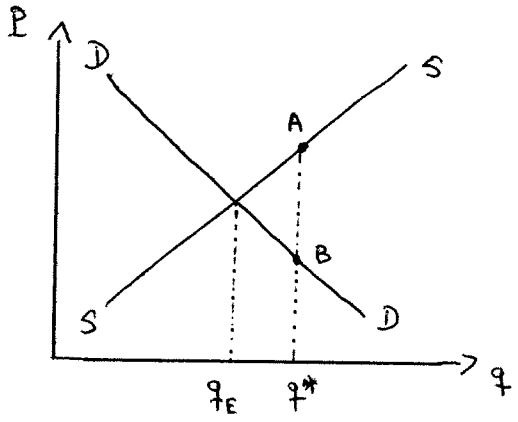

Figure 1.

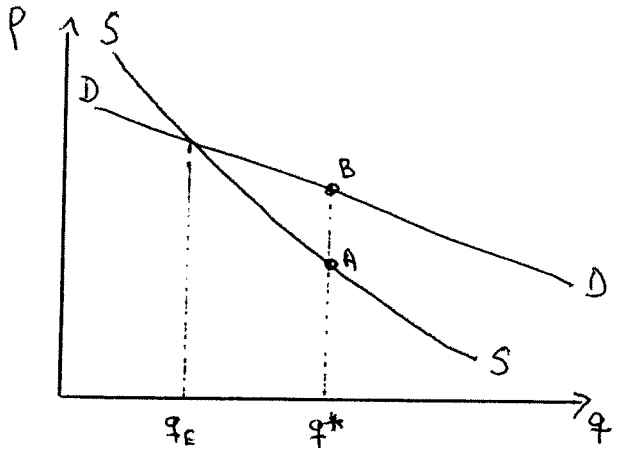

Figure 2.

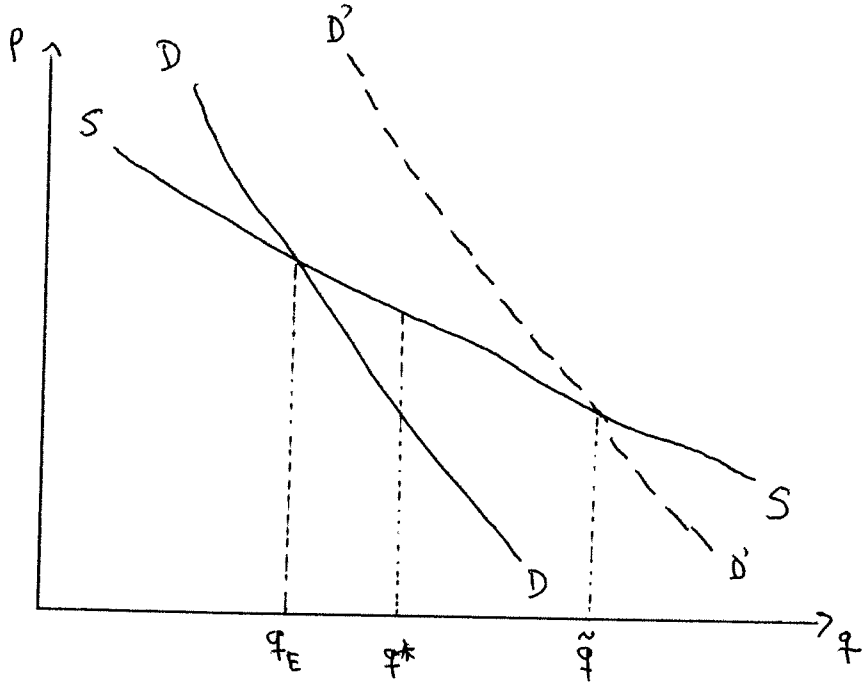

Figure 3.

In all of the Figures, output q is measured along the vertical axis while unit price p stands along vertical; DD is the aggregate demand price schedule and SS is the aggregate supply price schedule; q_E is the equilibrium output. DD slopes downward because consumers only buy larger quantities at smaller unit prices; the slope of SS depends on the assumption made on returns to scale.

In Figure 1, diminishing returns prevail. Suppose a shock forced output to increase beyond q_E, say, to q*. Once the shock is over, would market forces push output back to q_E? In Figure 1, the answer is positive. For at q* supply price exceeds demand price by segment AB; since producers face total losses of (AB).q*, output is reduced. Equilibrium is stable in the sense that market processes are endowed with self-regulation properties "...just as, if a stone hanging by a string is displaced from its equilibrium position, the force of gravidity will at once tend to bring it back to its equilibrium position."(p.288).

The mechanical metaphor of the gravidity force is, of course, indicative of the statical nature of the concept of stable equilibrium. But consider Figure 2. Suppose a disturbance raised output to q*. Producers enjoy at q* total profits of (BA).q* since demand price exceeds supply price by segment BA. Output expands even more, magnifying the difference between current and equilibrium levels of production. Market equilibrium is unstable in the sense that a small perturbation placing output above (or below) the equilibrium level would cause it to increase boundlessly (or to shrink to zero).

Consider now Figure 3. At q*, supply price exceeds demand price by AB. In this regard, the situation is similar to that of Figure 1 and market equilibrium is stable. Yet one difficulty remains. SS is the aggregate supply schedule. If any firm individually considered had a negatively sloped supply schedule, it could undersell the competitors and swallow the entire market because its unit costs of production would

decrease in consequence of the expansion of its own output. To retain the assumption of competition, and thus to bahish monopoly ghosts, it becomes necessary to assume the underlying individual supply schedules to be positively sloped. But in this case it becomes hard to understand how the negatively sloped market supply curve SS resulted from the aggregation of individual firms supply schedules.

Increasing returns to scale prevail in Figures 2 and 3; and the above disturbing implications rest just on a sensible behaviour postulate, namely, that producers increase (or decrease) output whenever they enjoy profits (or suffer losses) at the current output level. Increasing returns thus create a dilemma: to renounce to the concepts of equilibrium and stability (as imposed by Figure 2) or to drop the notion of competition in favour of some variant of monopoly theory (as imposed by Figure 3). In the former case, the compromise between mechanical and biological models no longer holds and the methodological tension of Marshall's Principles breaks up openly. In the latter case, the vision of the economi system as a self-regulating subsystem of society could no longer be sustained, partly because a general abandonment of the notion of competition, and hence the universal adoption of monopoly, would shorn away the basis on which economic laws can be constructed, as feared by Hicks (pp.83-4) and partly because the existence of monopolies opens up the space for socially desirable state regulation, as forcefully demonstrated years later by Pigou (ch.), thus rendering the economic subsystem amenable to disturbances coming from other subsystems of society.

Marshall was aware of the hindrances posed by increasing returns to scale. For the sake of preserving the scope of his analysis of change in terms of mechanical equilibria concepts, he carefully delimitated the empirical existence (as opposed to the theoretical possibility) of

increasing returns to scale. Thus he maintained that the tendency to increasing returns seldom shows itself in the short run (Marshall,pp.378, 414-5); he pointed out that "the two tendencies towards increasing and decreasing return constantly press against each other"(p.266) and that, should constant returns emerge from the balancing out of these two opposed tendencies, none of the above puzzles would appear; he argued that difficulties of marketing frequently offset the facilities of production due to increasing returns (p.379); and finally he dismissed Figure 2 as a plausible description of reality on the grounds that, should the amount produced to be increased indefinitely, demand price would necessarily fall almost to zero but supply price would not so fall and therefore, for sufficiently large volumes of output, supply price must lie above (and not below, as in Figure 2) demand price (p.655).

Marshall, however, did not yield to the temptation of underplaying increasing returns. Figure 2 was discarded, but Figure 3 retained its usefulness in depicting the determinants of value in manufacture industry. Cournot had demonstrated formally in 1838 that downward sloped individual supply schedules were not consistent with pure competitition (Cournot,ch.5). The only way left to Marshall to obviate the difficulty of making competitive conditions compatible with the prevalence of increasing returns was to forge the concept of the Representative Firm.

The Representative Firm was defined as "that particular sort of average firm, of which we need to look to see how far the economies, internal and external, of production on a large scale have extended generally in the industry and country in question."(Marshall,p.265). Internal economies were those dependent on the expansion of the output of the firm isolatedly considered, that is, those resulting from intra-firm functional specialization of labour and machinery. External economies were defined by reference to the general development of the industry as a whole. They encompassed all of the effects on firm's output ensueing from differentiation at the level of the industry to which the firm belongs (p.221). In systemic terms, the firm is

a system whose environment consists of all of the other systems (firms) that compete in a given market; internal economies reflect the own process of differentiation of a given system while external economies reflect the effects upon the given system of differentiation of the environment itself. The Representative Firm is a mental device that captures economies of scale of both types to give a miniature illustration of the supply side of the market (Frish,p.79).

The distinction beween internal and external economies was motivated by the difficulty of interpreting curve SS alluded to above. If all of the economies of scale were of the external type, individual supply schedules would be positively sloped but aggregate supply SS would be as depicted in Figure 3. To circumscribe the existing economies of scale to the external variant thus appeared as a possible, albeit perhaps of little persuasive power, way of assuring the co-existence of competition and increasing returns. Marshall seized this promising path. Internal economies were deemed to be liable to constant fluctuations (p.263); the dominance of external economies was thought to make erroneous to regard individual supply conditions as typical of those that govern aggregate supply (Marshall,pp.378-80). Marshall, however, had enough sense of proportion to refrain himself from streching this argument to the extreme of erasing internal economies from the set of phenomena recognized by economic theory. It was Pigou who, years later, relied on the possibility that external economies may exist on such a scale as to bring increasing returns for the industry as a whole while each individual firm faces conditions of diminishing returns (Pigou,pp.). The rationale for the Marshallian Representative Firm becomes apparent as we come to his characterization of the evolution of individual firms.

For Marshall, firms in the real world develop through a typical life cycle. As the analysis gets closer to reality, says Marshall, the balancing forces of the mechanical equilibrium of a stone hanging by an

elastic string cease to provide an adequate metaphor for economic processes. Sensible metaphors for equilibrium are to be sought in biology. "A business firm grows and attains great strength, and afterwards perhaps stagnates and decays; and at the turning point there is a balancing or equilibrium of the forces of life and decay..."(Marshall,p.269). The conditional "perhaps" in the above quotation reveals his aversion for absolute generalizations; exceptions to this biological pattern of development, however, can hardly be expected, even taking into account joint-stock companies whose vitality may survive that of its original founders (pp.263-4). Marshall compares the growth of firms to that of trees. Young trees struggle upwards and the successful ones attain greater height than their older rivals; but sooner or later the strains of age tell on them and they are in turn forced to give up their supremacy (p.263,p.379). The representative tree, an essentially analytical construct, mirrors the average height of the forest. It would grow steadily upwards in an expansionary forest while remaining unaltered as time goes by in a stationary environment. At any moment of time, a real tree may assume the identity of the representative tree; but its life cycle imposes the severance of its identity from that of the representative tree in a later moment. The representative tree is nothing but an open position, as opposed to a real tree, determined by the properties of the forest she stands for.

The Representative Firm shares with its metaphorical equivalent this trait of being an open position determined solely by systemic properties (p.305). Marshall was not clear as to whether this position would in fact be filled by a real firm; he required the Representative Firm to be one that have had a fairly long life, and fair success, managed with normal ability and facing normal access to economies of scale (p.265). The alleged impossibility of ascribing normal, fair conditions objectively was one of the central arguments supplied by Robbins in his 1928 assault to the Representative Firm as a superfluous and misleading construct. Robbins' criticisms, however,

missed the point. Being subject to the relentless cycle of vigorous, full life and decay, firms in the real world would not obtain the monopoly of their trades even enjoying internal economies of scale simply because their will and energy would fall short of this ambitious task. Marshall wrote that "the full life of a large firm seldom lasts very long" (p.239) - and he might have added, seldom lasts long enough to expel all competitors from the market. In the Marshallian view, the exceptional energies that enabled the firm to rise are likely to decay; the large firm, under favourable conditions, may secure for long periods a prominent share of the market, but the advantages of enterprise, ability and strenous work are no longer exclusively on its side in its competition with younger and smaller rivals (p.264). In contrast, the Representative Firm may be said to be able to increase its size and decrease its unit costs boundlessly - but there is no real firm, "no identifiable entity with a continuing will and purpose of its own, which has both the power and the inducement to expand its output" to the extreme of absorbing the entire market, as put in terms deeply plunged into the Marshallian tradition by Robertson in his reply to Robbins (Roberton,p.88).

Marshall's solution to the riddle of Figure 3 thus consisted in interpreting SS as neither the aggregate nor the single, monopolist supply schedule - but rather as the supply of the Representative Firm. Individual supply curves may be downward sloped because of internal and external economies of scale, but their expansion drawing on the energies of youthness is to be deterred by an ineluctable decay. While a particular firm cannot be in equilibrium with increasing returns because it would be driven to increase its output, the Representative Firm can be in equilibrium under similar conditions because, being a construct deprived of own life, it would only increase its output in response to evolutionary changes in the profile of market suppliers. Based on this interpretation of SS as the supply curve of the Representative Firm, it seemed possible to Marshall to reconcile increasing returns to competitive equilibrium.

Marshall thus solved the riddle posed by Figure 3 - at the cost of exposing the fragile compromise between mechanical and biological models. For on the demand side he had presented timeless consumers acting as isolated mechanical particles but on the supply side he was forced to introduce a being sensitive to the arrow of time, reflecting not the atomistic behaviour of separate particles (firms) but rather supra-individual properties of a system unfolding over time.

Marshall was fond of the biological metaphor of the trees of the forest; and yet he was lucid enough to realize that the Representative Firm was a construct that didn't fit into the analytical concepts of equilibrium derived from mechanics. He mentioned that the difficulties and risks of the statical method reach their highest point in connection with increasing returns (p.315); he devoted the Appendix H of the Principles to the "Limitations of the use of statical assumptions in regard to increasing return"(pp.655-99) after observing that "the statical theory of equilibrium is therefore not wholly applicable to commodities which obey the law of increasing returns"(p.415). At the end of chapter 12 of Book V, in which he purposedly studied the relations of demand and supply regarding commodities produced under increasing returns to scale, he still defended the theory of stable equilibrium on the grounds that it gives definitiveness to otherwise fuzzy ideas; but he concluded that "when pushed to its more remote and logical consequences, it (the theory of stable equilibrium) slips away from the conditions of real life. In fact we are verging on the high theme of economic progress; and here therefore it is specially needful to remember that economic problems are imperfectly presented when they are treated as problems of statical equilibrium, and not of organic growth."(p.382).

The subsequent developments in economic theory were deeply marked by Marshall's methodological tension between the statical equilibrium of mechanics and the organic growth of biological models. In his paper of 1928,

Young adopted the perspective of the latter models. He focused the analysis explicitly on "the high theme of economic progress" and strove for grasping not the forces making for economic equilibrium but precisely those which originate movements away from equilibrium, as illustrated by Figure 2 (Young,p.528). In contrast, Sraffa in his 1926 paper placed the entire emphasis on the consequences to be drawn from the strict logic of mechanical models of statical equilibrium.

Sraffa's central tenet was not new. He remarked that the economies which are external to every firm, but internal to the industry as a whole, are very rare in practice. The economies of scale that are responsible for increasing returns are precisely those generated by greater internal division of labour. He then insisted on the mathematical point, made in the previous century by Cournot, that under increasing returns the firm would expand its output until the barriers posed by demand are encountered. As to the Representative Firm, he held that it cannot help to reconcile the contradiction between increasing returns and unrestrained competition. His objection was simple. Suppose in Figure 3 that demand increased from DD to the dotted curve D'D'. At every price consumers now buy more than before. The new equilibrium is set at q+ in contrast to the old equilibrium q_E. The Representative Firm may be said to have increased its output from q_E to q+. But the Representative Firm is an open position; the old firms existing at q_E are different from those producing at the new q+ equilibrium. The new firms produce more at a lower unit cost - but if so, why didn't they come into existence before?(Sraffa,1930,p.92). For Sraffa, arguments inspired by organic growth models were not trustworthy. Having to choose between either denying the existence of increasing returns or droping the assumption of pure competition, Sraffa decided for the latter alternative: "It is necessary, therefore, to abandon the path of free competition and turn to the opposite direction, namely, towards monopoly."(Sraffa,1926,p.542).

This suggestion was fruitful. It inspired much of the value revolution of the 1930s centred on the notions of imperfect and monopolistic competition (Shackle,ch.5,6). This revolution may be said to have started

in 1932 when Joan Robinson published her paper "Imperfect Competitition and Falling Supply Price." The title already indicates its frame of reference; and it is revealing that, while expressly concerned just with imperfect competition, she carefully stressed the need of assumptions "to eliminate the problems connected with time"(Robinson,1932,p.545). The triumph of the mechanical component of the methodology of the Principles was soon to become complete; the incompatibility of increasing returns and pure competition, as well as mechanical concepts of statical equilibria, became years later part of standard economic theory.

The compelling strenght of the Sraffian argument derived from a purely logical fact, namely, that under increasing returns and unlimited, free competition, nothing would limit output expansion of the firm (Cournot, ch.5). Marshall was aware of this logical fact. But while acknowledging the genious and guidance of the french founder of mathematical economics (Marshall, pp.viii-ix), and in spite of being himself mathematically trained, as shown by the Mathematical Appendix to the Principles, he required caution regarding formal reasonings in connection with increasing returns: "Abstract reasonings as to the effects of the economies of production, which an individual firm gets from an increase of its output are apt to be misleading, not only in detail, but even in their general effect."(p.380).

One might credit Marshall's suspicion relative to the purely deductive reasoning of Cournot to the ampleness of mind typical of the english, as opposed to the french mind, "strong enough to be unafraid of abstraction and generalization but too narrow to imagine anything complex before it is classified in a perfect order"(Duhem,p.64); but I shall not pursue here this speculative suggestion on the differences of national styles of thinking which Duhem showed to be so remarkable in the development of mechanical models in physical theory (Duhem, ch.4; also Granger,1978). Marshall's suggested approach to the riddles posed by increasing returns was to treat each concrete case very much as an independent problem "under the guidance of staple general reasonings"(Marshall,p.380). The shiftiness of his suggestion stands to reason. A solution to those riddles along lines diammetrically oposed to those followed by Sraffa was propounded by Young.

Young entitled his paper "Increasing Returns and Economic Progress". It was delivered on September 10,1928, as his Presidential Address before Section F of the British Association for the Advancement of Science at Glasgow University. Glasgow was indeed an appropriate place. For the paper was presented by Young as providing minor variations on the theorem by Adam Smith that the division of labour depends upon the extent of the market, "one of the most illuminating and fruitful generalizations which can be found anywhere in the whole literature of economics"(Young,p.529). Marshall had suspended the discussion of increasing returns verging "on the high theme of economic progress"(Marshall,p.382); Young took up from precisely this point.

Young wrote of Marshall being right in distinguishing between internal and external economies of scale. The distinction was deemed to be a safeguard against the common (and Sraffian) error of assimilating increasing returns to an effective tendency towards monopoly (Young,p.527). But Young departed from Marshall by shifting attention away from the value of commodities. The "high theme of economic progress" ought to be treated not in a chapter on "equilibrium of normal demand and supply with reference to increasing returns" (chapter 12,Book V of the Principles) but rather in the light of the simpler and more inclusive vision of the economy put forward by Adam Smith. Instead of trying to solve the riddles posed by increasing returns to the determination of value, Young inquired into the working of the law of increasing returns as the mechanism assuring that "change becomes progressive and propagates itself in a cumulative way"(p.533). Marshall had hinted at this principle of cumulative causation in Appendix H of the Principles by insisting on the irreversibility of movements along a declining supply curve; but what was relegated to an appendix on the limitations of statical assumptions regarding increasing returns became under Young's pen the core of the theoretical argument.

Young's distance to Marshall, however, surpassed that due to differences in the object of analysis. Instead of analysing the functioning of a market taken in isolation from other markets, Young was concerned with

the unfolding of the economic system as a whole, in one word, with economic progress. For the purposes of the former, Marshallian task, the static notion of equilibrium might be judged sufficient; but the appropriate conception for the latter task is that of a moving equilibrium (Young,p.535). Against Marshall, he observed that "The apparatus which economists have built up for the analysis of supply and demand in their relations to prices does not seem to be particularly helpful for the purposes of an inquiry into these broader aspects of increasing returns"(p.535). The broader, un-Marshallian aspects of increasing returns constitute the essence of economic progress. The criticism directed to the analytical tools derived from mechanics prepared the way for his understanding of reciprocal demand.

Young kept distance to Say's law by arguing that it depends on some elasticity conditions. Technical points aside, an increase in the output of one commodity is an increase in the demand for other commodities and every increase in demand will in turn evoke an increase in supply. Increasing returns are viewed in their full spill-over effects once the operation of reciprocal demand is introduced in the picture. The division of labour is limited by the extent of the market; but the extent of the market is itself a function of the division of labour. Adam Smith's dictum is then modified: "the division of labour depends in a large part upon the division of labour" (Young,p.533). Young hastened to add that this is more than mere tautology. "It means, if I read its significance rightly, that the counter forces which are continually defeating the forces which make for economic equilibrium are more pervasive and more deeply rooted in the constitution of the modern economic system than we may commonly realize."(p.533).

Once unraveled from the needless complications created by mechanical models of equilibrium, the Marshallian program of understanding industrial organization in terms of the systemic interplay of integration and differentiation seemed feasible to Young. Integration was considered the obvious result of increasing output; "but the opposed process, industry differentiation, has been and remains the type of change characteristically associated with the growth of production"(p.537). Adam Smith had emphasized intra-firm differentiation in the

form of splitting up occupations and craft categories; echoing Marx(1977, ch.14,15) and Marshall(ch.9,Book IV), Young laid stress on the transformation of complex processes into successions of simpler processes accomplished by the division of labour which renders possible the introduction of machinery (Young,p.530). Intra-firm differentiation, however, was only of secondary importance when compared to industry differentiation. Not all of the external economies can be accounted for by adding up internal economies of all separate firms; when we look at differentiation of a particular firm we envisage a condition of comparative stability whereas the conditions for departure of equilibrium appear clearly as differentiation and specialization at the level of the industry as a whole. Young thus took a stand against the atomism of mechanics arguing that primordial phenomena must be sought at the systemic level: "Not much is to gained by probing into it (the field of external economies) to see how increasing returns show themselves in the costs of individual firms and in the prices at which they offer their products."(p.528).

The primordial role accorded to industry differentiation can be understood by reference to roundabout, or time-consuming, methods of production. They were considered by Young as the main source of the economies associated with the division of labour in its modern, as opposed to the pristine Smithian, forms. Roundabout methods tend to become feasible "when their advantages can be spread over the output of the whole industry"(p.539). His arguments on the presumed connections between industry differentiation and roundabout technologies are certainly obscure; but from the point of view adopted here, the role ascribed to industry differentiation is significant in that it displaces the Representative Firm as a construct of interest. "With the extension of the division of labour among industries the Representative Firm, like the industry of which it is a part, loses its identity."(p.538). Thus the translation of differentiation to the systemic plane made the concept of Representative Firm hollow.

It follows from this brief reconstruction of the destiny of increasing returns in post-Marshallian economics that, notwithstanding their immense differences, both Sraffa and Young disposed of the concept of Representative Firm. This is hardly surprising. The rationale for the

Representative Firm was tied to the Marshallian compromise between mechanical and biological models; once this compromise is broken up in favour of either model, the Representative Firm becomes deprived of interest. In another point did the opposite paths of Sraffa and Young also coincide. Both of them subsumed differentiation under the head of increasing returns to scale. Differentiation is fully recognized and yet distorted in this subsumption. It figures in the theoretical discourse disguised as a natural process.

The naturalization of the division of labour, broadly interpreted to cover both intra-firm and inter-firm differentiation, can be best seen in Kaldor's paper of 1972 entitled "The Irrelevance of Equilibrium Economics." It was written under the double purpose of providing a critique of current, dominant general equilibrium economic theory and vindicating Young's forgotten path of incorporation of increasing returns. Kaldor rightly held that, after Sraffa had showed Marshall's attempt to accomodate both increasing and decreasing returns within the same analytical framework to be logically faulty, economic theory had imposed the absence of increasing returns as an axiom. The wisdon of the intimate connection between the social economy and increasing returns vislumbrated by Smith had fallen into oblivion. Since mainstream, or general equilibrium economics was concerned exclusively with price determination in a statical and competitive environment, the axiomatic denial of increasing returns could not be avoided. But reality is at variance with general equilibrium theory; on an empirical level, nobody doubts that increasing returns dominate the economic scene "for the very reasons given by Adam Smith in the first chapter of the Wealth of Nations: reasons which are fundamental to the nature of technological processes and not to any particular technology."(Kaldor,p.1242). To the reasons put forward by Young, Kaldor adduces some others that are due simply on account of the three-dimensional nature of space. Increasing returns are presented as a feature of the material organization of the world; for example, the cost of construction of a cylinder varies with the size of the diameter, but the capacity grows at the square of the radius (p.1242).

I shall not discuss here Kaldor's claim that increasing returns are pervasive in modern industrial world. The apparently innocent issue of the extent of increasing returns has always been ideologically loaded because it hinges on the optimality of the functioning of capitalism. Since Sraffa it has been widely held, pace Marshall and Young, that increasing returns are inevitably accompanied by imperfect or monopolistic competition which in turn is thought to justify government regulation. I shall also not discuss whether Kaldor's criticisms are still fair in face of recent papers in mainstream economics dealing with implications of increasing returns (Krugman,Weitzman). Of interest to my purpose here is to note that Kaldor shares the same ground as the theories he criticizes in a crucial respect. Increasing returns are defined to encompass everything that makes for larger average productivity as output expands. Strictly physical or natural economies of area or size, such as the one illustrated by Kaldor's cylinder, stand on the same position as strictly social economies which ensue from differentiation processes. Once subsumed under increasing economies of scale, social differentiation is naturalized in the sense of being regarded as if it were a natural process. Physical laws of the material world do not form a proper subject of economic analysis; nor do social differentiation processes misrepresented as just one, among others, arguments buttressing the belief in the pervasive nature of increasing returns.

To understand the naturalization of the (broadly interpreted) division of labour, one has to recede back to the constitution of economics as such. Both for Kaldor and general equilibrium theory, economics consists in explaining ruling prices and produced quantities conditional to given behavioural and technological assumptions. Alterations in the set of assumptions generally leads to modifications in the deduced implications; but the assumptions are, by hypothesis, posited and not explained. To probe into technological (or behavioural) assumptions is to trespass upon engineering (or psychology). Even for Kaldor, who considered the three opening chapters of The Wealth of Nations the foundations of economics, the division of labour solely matters

because one has to build up theories based on realistic assumptions. The problem is whether increasing returns hold in the real world or not; and the answer is to be supplied by empirical studies that estimate the impact of output upon average productivity. The pin factory example of The Wealth of Nations reinforces the plausibility of increasing returns; and this evidence is to be piled up with evidence coming from purely natural features pertaining to the material organization of the world. Once assimilated to these physical, natural features that presumably make for technologies of the increasing return variety, the division of labour ceases to be a proper subject for economic analysis.

The naturalization of the division of labour, an inevitable consequence of this delimitation of the constitutive domain of economics, was already complete under Sraffa and Young; and it remained untouched in Kaldor and modern general equilibrium theory. To apprehend it in statu nascendi we must go back to Marshall. It was seen above that Marshall's "correlation of the tendencies to increasing and diminishing return"(Marshall,p.262) was not symmetrical in that the roles of nature and society differred in the two cases. Marshall was not content with that formulation. He endorsed Bullock's argument to the effect that the term "Economy of Organization" should be substituted for increasing returns. The point was not terminological. "He (Bullock) shows clearly that the forces which make for Increasing Return are not of the same order as those that make for Diminishing Return; and there are undoubtedly cases in which it is better to emphasize this difference by describing causes rather than results..."(p.266). To describe causes rather than results, to elaborate on the differentia specifica of industrial organization as a system differentiating itself over time, would require the inclusion of the division of labour in the economics research agenda. But Marshall refrained himself from pursuing this adumbrated path; he set the pattern for latter developments in the field by limiting his discussion to the reasons by which increasing returns are likely to prevail and its consequences for the equilibrium of the firm.

The firm in the Principles bears witness to the Marshallian compromise discussed above. On the one hand, it is a living being, endowed with history and identity; on the other hand, it is a black box inside which inputs are transformed into outputs. The transformation law may conform to increasing or decreasing returns; this transformation law, allowing for prices of both inputs and outputs, is reflected in the shape of the individual supply price schedule. The firm then appears simply as a function with input and output co-ordinates (see Leibenstein for a critique). Rosen and Marglin looked into the black box of the firm recently. In Rosen, the division of labour is viewed as an intra-firm standard allocation problem. Given the characteristic features of the labour force, the firm defines jobs that explore the comparative advantages of workers in performing productive tasks. In the radical approach of Marglin, the intra-firm division of labour results from the need to preserve power inside the workplace in class struggles contexts. In Section II of this paper, a distinct perspective on social differentiation is presented.

II. Theory.

It was seen in Section I that, once subsumed under the category "increasing returns to scale", processes of social differentiation have no distinct imprint on the determination of prices and quantities. The mere critique of the naturalness of the division of labour, however, does not suffice to assure social differentiation a place in the edifice of economics. The reinstatement of social differentiation within economic theory depends upon the existence of theorems relating specifically social differentiation to the determination of prices and quantities. In this Section, I shall outline a theory bringing out social differentiation in full relief. According to this theory, firms search for the work organization that minimizes costs under conditions of uncertainty. Possible candidates to the overall cost minimizing work organization have to satisfy the similarity requirement. Based on those ideas, a theorem comparing social differentiation under capitalist and pre-capitalist societies can be derived. This theorem bears on the assumption of uniform profit rates of classical economics. Consequently, it is directly

relevant to the determination of prices and quantities. The comparison theorem presented below testifies to the fruitfulness of exploring the implications of de-naturalized social differentiation processes for economic theory.

In his discussion of the relations between economics and psychology, Simon(1982) argued that mainstream economics has sought to minimize its dependence upon cognitive theories by postulating man to be endowed with unlimited computational capacity. This postulate, however, cannot be validly maintained in face of complex problems whose straightforward solution lies beyond human bounded rationality. Agents can solely cope with very complex problems, represented formally in complex search spaces, by selecting and utilizing heuristic search rules that maximize the likelihood of finding satisfactory solutions by scanning just small portions of complex search spaces (Simon,1978).

The application of bounded rationality theories to the division of labour is immediate. A work organization is a set of work categories; and each category in turn groups together several labour tasks as dictated by the existing technology of production. Adam Smith counted 18 tasks in his pin factory (Smith,p.4); Ford's assembly line for model T, to give another eminent example, had 45 tasks (Arnold and Faurote,pp.140-50). Each different grouping of tasks into work categories gives origin to a distinct work organization. Under simplifying assumptions (Arida,1980), it can be shown that the number of possible work organizations, or designs, for a technology of N tasks is 2^{N-1}. In an imaginary technology of two tasks, for instance, the number of possible designs is two: a design with one category encompassing the two tasks and another design with two categories of one task each. By the 2^{N-1} formula, the number of designs increase exponentially with the number of tasks; Adam Smith's pin factory admits of 131.072 different ways of being organized.

In terms of the bounded rationality theories, the search space for the division of labour has 2^{N-1} possible candidates. In the scenario envisaged here, there is no outside source of information on the advantages

brought forth by each design. Alternative designs are not fully given ab initio, but have to be conceived of in the plane of thought and tried out in the plane of practice. Since experimentation is costly, the firm has to select an heuristic search rule that excludes on aprioristic grounds a large part of those 2^{N-1} possible alternatives.

Of historical interest is the search rule based on the parcelling out of work categories. This search rule may be formulated thus: given the ruling design, try another obtainable from the ruling one by dividing up its work categories. If successsful, this search rule leads to minute fragmentation of work. It is a very restrictive search rule. It covers just a tiny portion of the search space - less than 1% for Adam Smith's pin factory, and this proportion is even smaller for technologies with larger number of tasks (Arida,1981). Under what conditions does this selective rule is resorted to and becomes successful in reaching optimal designs?

To answer tentatively the first part of the above question, it is worthy of note that this search rule had important cognitive advantages in early capitalism. During its first phases, firms relied heavily on traditional work organizations centred on handicrafts. Depending on the nature of the commodity produced, the firm may either bring several distinct crafts together or simply assimilate an already existing one (Marx,1977,ch.14); in both cases, technical knowledge was possessed by craftsmen. There was no book of blueprints describing how to carry on production. To conceive of alternative, and presumably more efficient designs the firms must gather detailed information on production. Since technical knowledge was embodied in practical form in the skill and dextery of craftsmen, the easiest source of information on production technologies was the attentive observation of craftsmen's practice. To combine, group or divide differently the existing handicrafts, firms had first to master the tasks they consisted of. The intellectual operation involved is analysis: the resolution into simpler elements. In the search rule described above, the same analytical intellectual operations by which firms grasped the know-know of craftsmen guided the search for more efficient work organizations. The careful examination of the detailed constitution of traditional handicrafts that occurred in the

plane of thought begetted the process of parcelling out that ocurred in the plane of practice. Alternative designs based on handicrafts fragmentation sprang naturally from a sufficiently probing observation of craftsmen's practice in early capitalism.

Turning now to the second part of the question regarding the effectiveness of the search rule based on fragmentation of work categories, it is possible to prove an interesting result. Consider a firm in early capitalism seeking to find out cost minimizing ways of organizing production. Current work organization or design was inherited from the past and exhibits little division of labour. Possible designs are ordered having as extremes the zero division of labour (where one handicraft subsumes all of the existing tasks) and the maximum division of labour (where each category of work is riveted to just one task). It can be shown (Arida,1981) that the search rule at issue is likely to be effective if the optimum design is close to either of the extremes; its perfomance, however, becomes very poor if the optimum lies somewhere in the middle range between the extremes.

This result has an interesting interpretation. The search rule based on the fragmentation of work categories had cognitive advantages in early capitalism. As a tool for coping with complex search spaces, however, its utilization ceases to be rational for search processes located in the middle range. Search in early capitalism was then bounded to occur either in the neighbourhood of the zero or in the neighbourhood of the maximum division of labour design. In the former case, one notices little difference relative to the work organization handed down from pre-capitalist society. But in the latter case, Adam Smith's paradigmatic pin factory emerges.

Although attractive, this result suffers from a crucial limitation. Its rationale derived from the problem of cutting down the vast maze leading to the optimal work organization. We saw indeed that there are 2^{N-1} candidates for the optimum in a N-task productive process; and the number of paths in the maze is even larger. The 2^{N-1} formula follows from an elementary combinatorial calculus. The number of feasible work organizations, however, tends actually

to be smaller. For work categories are defined by the requirement of grouping similar tasks. Tasks demand specific skills, broadly defined to encompass both dextery in the handling of materials and the abstractness of understanding necessary to perform them properly. Similar tasks demand similar skills; not every combination of tasks makes a work category because work categories must satisfy the requirement that the similarity of tasks inside categories is always greater than the similarity of tasks belonging to different work categories. I shall call this requirement as the requirement of similarity; and it is apparent that the number of possible designs satisfying the similarity requirement is smaller than that calculated from an unrestrained combinatorial formula. The imposition of the similarity requirement thus brings about a reduction of complexity of the search space, a fact discussed in more detail below.

The similarity requirement was viewed by Babbage (pp.175-6) as a crucial source of the advantages associated with the division of labour. While discussing the alleged advantages pointed out by Adam Smith (namely, the increase of dextery due to specialization, the savings of time lost in passing from one task to another and the greater inventiveness made possible by concentrating attention on a narrow phenomenal field), Babbage argued that the most important and influential cause had been altogether unnoticed. Wages paid for a given job are proportional to the variety of skills it demands; the larger the range of skills pressuposed by the job, the higher tends to be the attached wage. If jobs embraced tasks dissimilar in terms of skill requirements, job holders would get higher wages than if jobs were confined to similar tasks. The best strategy for cost minimization seemed to Babbage to explore fully the economies made possible by the similarity requirement. The Babbage principle, as it was later baptized, consists in keeping the diversity of skills grouped under the same job to a minimum by defining jobs to encompass very similar tasks. This minimal heterogeneity depends on the strength of the factors inhibiting functional specialization (Arida,1982a). The higher the proportion of wages in total costs, the more important the Babbage principle becomes; in the early capitalism of manufactures, when the relative importance of fixed

capital was small, obedience to the Babbage principle was crucial in determining success or failure in business activities (Marx,1977,pp. ; also Marshall, pp.220-23).

The similarity requirement, however, is not a specific attribute of capitalist organizations of work. Irrespective of the characteristics of the underlying technology, it seems true that in any social organization intra-categories similarities are greater than inter-categories similarities. Jobs in early capitalism satisfied this requirement as did handicraft trades in pre-capitalist social formations. Work categories are nothing but clusters of similar tasks. The universality of the similarity requirement motivates the following definition of equilibrium. Consider all of the tasks involved in the production of all commodities in a given society. An equilibrium is then a set of work categories such that (i) each task is subsumed under one and only one category and (ii) the similarity requirement holds throughout.

In other words, an equilibrium is an allocation of tasks to categories such that all of the tasks are allocated, no categories overlap and the similarities of tasks within categories are always greater than similarities across categories. This definition of equilibrium is not subordinate to specific features of any social formation. Equilibria positions depend just on the existing technology as well as upon current modes of perceiving and assessing similarities between tasks. I use equilibria in the plural because, for a given technology and for a given mode of perception, work categories change as the similarity requirement becomes more stringent. If the similarity requirement is taken too broadly, all of the tasks are grouped together and society exhibits no division of labour at all. If the similarity requirement is taken too narrowly, there are as many categories as tasks. Neither extreme provides an adequate description of existing societies. Between these extremes, in general many intermediate social equilibria positions exist.

This definition of equilibrium is almost innoxious. Yet it renders manifest one important property of social systems. Following Simon(1981), a structure is said to be decomposable if the interactions among subsystems are

are weaker than interactions within subsystems. An intermediate equilibrium as defined above reveals the existence of a decomposable structure because similarities (or interactions) among work categories (or subsystems) are weaker than those within categories (or subsystems). Simon ventured two conjectures on decomposable structures which are of interest in connection with social differentiation processes.

First, that complexity frequently takes the form of hierarchic decomposable structures - that is, of decomposable systems that are composed of subsystems that in turn have their own subsystems and so on. This conjecture supposedly captures properties common to diverse kinds of complex systems (social,biological,physical and symbolical). Second, that the ubiquity of this hierarchical arrangement of complexity testifies to the fact that hierarchic systems evolve far more rapidly than non-hierarchic systems. "Among possible complex forms, hierarchies are the ones that have time to evolve"(Simon,1981,p.209). This second conjecture on the architecture of complexity follows from the argument that the probability of evolution depends on the existence of intermediate stable equilibria configurations without which evolution would occur solely by abrupt discontinuities. The existence of intermediate equilibria render evolution more probable; and these equilibria are supposedly more frequent in hierarchic than in non-hierarchic systems.

These conjectures can be easily recast in terms meaningful to processes of social differentiation. Imagine social differentiation to unfold without changes in either technology or in the mode of perception of tasks. Differentiation is accompanied then by increasingly stringent similarity requirements. It traces out a sequence of equilibria. Along this sequence, previous work categories (subsystems) are decomposed into more specialized categories (or in their own subsystems). Thus construed, the process of social differentiation is a Simonian evolutionary process taking place in an hierarchic system. Two questions are in order. First: Is it reasonable to assume away technical and perceptual change? Second: in Simon, the speed of evolution is linked to the existence of intermediate equilibria; and equilibria, regarding processes of social differentiation for given technology and perception, depend just upon the strictness of the similarity requirement. Can one give

give a sensible criterion for the density of equilibria positions over the course of social differentiation processes? This second question bears to the problem of the acceleration of history for the larger the number, or the greater the density of equilibria, the more probable evolution becomes by Simon's conjecture.

The first question admits of no general answer. According to Marx's periodization of history, the answer is positive for manufacture but negative for large-scale industry. For manufacture rests upon a "subjective principle"(Marx,1977,p.501); technical change is confined to the differentiation and specialization of tools beared by the labouring subject (p.460);similarly, the productive process is perceived by reference to his practice for its analysis "coincides completely with the decomposition of a handicraft into its different partial operations."(p.457). In manufacture, the division of labour is the light of particular hue that is cast upon everything, tingeing all of the other colours (Marx,1970,p.212). For analytical purposes, the twofold exclusion of technical and perceptual change does not distort the historical reality of the manufacture period to an overwhelming extent. By contrast, large-scale prodution possesses an "entirely objective organization of production"(Marx,1977,p.508); machinery and the application of natural science to industry develop and technical change in emancipated from the demands of the labouring subject (pp.616-7); and the productive process is viewed "in and for itself"(p.616), without reference to standards set by the existing division of labour (see Arida,1982b, for this contrast between the two periods). To freeze out technical and perceptual change in the large scale period seems to be hardly defensible even for purely analytical purposes.

As to the second question, a relevant comparison theorem was proved in Arida,1982a. I compare two institutional arrangements for the same tecnology and the same mode of perception of similarities. In the guilds arrangement, the similarity requirement rules over all of the tasks in social production. In the manufacture arrangement, its scope is reduced. The similarity requirement is restricted to hold over the tasks subsumed under a given productive process. To illustrate the difference, consider two commodities X and Y. Suppose task x of the productive process of X is very similar to task y of the productive

process of Y. In the guilds arrangement, this means that x and y belong to the same work category. But in manufacture this is not necessarily so, because similarities across commodity borders don't matter. The similarity requirement is therefore weaker in manufacture than in guild arrangement.

The names "guild" and "manufacture" as used in the preceeding paragraph derive from the fact that the stronger, guild-like version of the similarity requirement rules out the division of labour inside the production process of any given commodity. This fact is proved formally (Arida,1982a). Its interpretation conforms to Marx's observation that, while the division of labour in society at large can exist in diverse economic formations, "the division of labour in the workshop, as practiced by manufacture, is an entirely specific creation of the capitalist mode of production"(Marx, 1977,p.480). Irrespective of the known difficulties posed by the notion of mode of production, Marx's statement seems to be an accurate comparative description of the contrasts between manufacture and guilds institutional arrangement. Marx noted in this connection that the division of labour in pre-capitalist arrangements led either to inter-commodity production differentiation or to duplication, but never to intra-commodity production differentiation: "If circumstances called up for a further division of labour, the existing guilds split themselves up into subordinate sections, or founded new guilds by the side of the old ones. But they did this without concentrating different handicrafts in one workshop."(p.479). Work categories (or handicrafts) under the guilds arrangement were never riveted to subsets of tasks of a given productive process. By associating the stronger similarity requirement to guilds and the weaker to manufacture it becomes possible to capture, at a high level of abstraction, the <u>differentia specifica</u> of the two arrangements of social production.

Marx described differentiation under the guilds arrangement as spontaneous and comparable to "the same natural law that regulates differentiation of plants and animals into species and varieties"(p.479). In contrast, the differentiation process under manufacture capitalism is presented by Marx as an intentional result of decisions taken by firms. This gives an ancillary argument supporting the identification of manufacture to the weaker version of the similarity requirement. For decision units (firms) act separately and

independently; the degree of strictness of the similarity requirement adopted by firm X, say, in the organization of the productive process of commodity X has no compelling import for firm Y and commodity Y. Under decentralized decision-making, there is no a priori reason for expecting the similarity requirement to hold with the same intensity over all of the production tasks.

It is now possible to explain the comparison theorem proved in Arida,1982a. Consider two extreme states of social differentiation, state A with none and state Z with maximum social differentiation. We saw earlier that neither extreme provides an adequate description of existing societies for in A the similarity requirement is too ample (A has just one work category) whereas in Z it is too strict (Z has as many categories as tasks). For the sake of logical clarity, imagine social differentiation as a process going from A to Z under the limiting condition that neither technical nor perceptual change take place. The comparison theorem then states that social differentiation encounters more intermediate equilibria positions in the traverse from A to Z under manufacture than under guild institutional arrangement. More precisely, it shows that every equilibrium under the guilds arrangement has an equivalent counterpart under manufacture but not vice-versa. From the strictly logical point of view, capitalism is more general than pre-capitalist social systems.

Three interpretative remarks on the comparison theorem seem appropriate.

First, it shows that the process of social differentiation under capitalism cannot be said to be a continuation of that taking place under a pre-capitalist institutional arrangement. To appreciate this first remark, let E stands for the guild equilibrium prevailing immediately before the emergence of manufacture capitalism; and let M be the current manufacture equilibrium. Could it be said that, had capitalism not taken place, social differentiation under guilds would necessarily sooner or later attain the M equilibrium? The answer is negative by the comparison theorem. Not all of

the equilibria attainable by capitalism are equilibria possibilities feasible for the guilds arrangement. Institutional change generates virtual novelty.

The second remark is based on Simon's conjectures on complexity. To the extent that these conjectures are true, the comparison theorem implies an acceleration of social differentiation following an institutional change from guilds to manufacture. Since for Simon the speed of evolutionary processes depends upon the richness of stable intermediate equilibria, the comparison theorem brings forth the implication that the history of social differentiation has a faster pace in capitalism as compared to previous societies. Exploring even further this line of reasoning, the comparison theorem also suggests that duplication tends to be a phenomenon more common to guilds arrangement than to capitalism. Marx observed that the guild handicrafts attained their equilibrium at first by experience and then strove "...to hold fast to that form (the equilibrium) when once it has been found, and here and there succeed in keeping it for centuries"(Marx,1977,p.485). In the light of the above comparison theorem, this unchangeability may be explained by the scarcity of intermediate equilibria positions. External perturbations tend to be accomodated within the status quo equilibrium by a duplication of the existing social arrangement, new guilds being formed by the side of old ones (p.479), instead of leading the system to a new equilibrium position. For it is the density of intermediate equilibria positions that renders evolution possible without having to undergo abrupt discontinuities. Systems confronting a rarity of equilibria positions have to resort to duplication more frequently than those endowed with a rich variety of equilibria.

The third remark pertains to a topic closer to economics proper: the equalization of profit rates. Classical economics has by and large endorsed the notion that ruthless competition brings about profit rates equalization in capitalism. Under admittedly simplifying assumptions, profits out of a given capital are related to the extent of application of the Babbage principle. Profit rates are equalized when this principle is applied by all firms with the same degree of intensity. It can be shown that the set of work categories that obtains when the Babbage principle holds for all commodities with the same force is an equilibrium as defined above. Yet it is an equilibrium that does have a counterpart in the list of equilibria open up for the guilds

arrangement (Arida,1982a). The assumption of an uniform, general profit rate can thus be justified in that the underlying work categories form an equilibrium; but this assumption ignores the novelty of capitalism, namely, the virtual equilibria positions unaccessible to the guilds arrangement. The recent turn to dualistic labour market structures in which no mechanism of profit rates equalization occurs (Piore) can thus be supported not only on empirical, but also on more fundamental, theoretical grounds.

These three interpretative remarks attest to the fruitfulness of the practice of introducing formal models for the understanding of historical processes. The comparison theorem reveals the sensitiveness of social differentiation to the existing institutional arrangement; it bears on the acceleration of tempo under capitalism; and it undermines the classical faith on profit rates equalization, thus imposing a severance between the true statement that competition is inherent to capitalism and the ungranted assumption of uniform profit rates. The quest for logical precision, however, imposes costs in descriptive accuracy. As it often happens in modelling complex historical phenomena, some aspects of the subject at issue appear in their purest form only by dissociating in analysis elements that are indissolubly tied in concrete historical experience. The proof of the comparison theorem proceeds under the double assumption that neither technical nor perceptual change take place. Some comments on the historical conditions under which this twofold assumption can be expected to hold as a first approximation to reality appeared above; by way of clarification, I conclude this section with some theoretical comments on this twofold assumption.

In the comparison theorem, the division of labour appears in a de-naturalized form, not only in that other sources of increasing returns to scale were ruled out, but also in that a specific trait of social work organizations, the similarity requirement, was explicitly resorted to. The comparison theorem casts doubt on the assumption of uniform profit rates; consequently, it suggests that classical models like that of the later Sraffa (1960), in which prices are such that a uniform profit rate obtains for all sectors of the economy, may actually provide a misleading view of capitalism. The comparison theorem bears on the determination of prices and quantities, the proper subject of economics, because prices reflect ruling profit rates and

quantities produced reflect in turn the prices at which commodities can be sold. The comparison theorem serves the purpose of reinstating social differentiation within the discourse of economic theory. To discard technical change, which of necessity supposes the metabolism between man and nature (Marx,1977,ch.7), highlights the purely social traits of social differentiation disentangling it from the properties of material, natural organization of the world.

As to perceptual change, there are less satisfactory reasons for ignoring it. The perception of similarities and dissimilarities between tasks is nothing but a register of a meaningfully structured world. To assess the likeness of tasks is to imprint differential meaning to them, to attach meaning to social organizations of work. To say that the dimension of the search space is reduced when the similarity requirement holds, as seen above, is just to say that meaning, which is of necessity differential, works as a mode of reducing complexity peculiar to social systems. There can thus be no valid argument justifying the assumption that meaning remains unaltered over the course of social differentiation. The proof of the comparison theorem allowing for perceptual change, however, seems very hard for it hinges upon a theory on meaning as conditioned by, and in turn exerting an influence upon, social differentiation. This crudely pragmatical reason is the sole explanation for an otherwise entirely unsubstantiated assumption.

III. A conjecture.

Instead of concluding with a summary of the previous argument, I prefer to explicate out a further implication of the comparison theorem that I suspect to shed light on some neglected aspects of social differentiation.

By the comparison theorem, capitalism generates virtual novelty in that, even disregarding technical and perceptual change, it may rest at equilibria positions which do not belong to the catalogue of virtual equilibria or pre-capitalist societies. Imagine a process of differentiation going from A to E under pre-capitalist, and from F to Z under capitalist society. Can one describe the traverse from A to Z as a straight differentiation process?

The answer supplied by the comparison theorem to this simple question seems frustrating: not necessarily. The differentiation of work categories may be likened to the biological metaphor of differentiation of gender into species. I say may be because the theorem leaves open an intriguing possibility of redifferentiation. Redifferentiation is not to be confounded with undoing differentiation; to run time backwards is excluded by hypothesis. The possibility left open by the comparison theorem is to reshape work categories, recreating differentiation instead of fostering further differentiation in the already differentiated society inherited from pre-capitalist past.

I do not see this indetermination as negative. On purely formal grounds, it is true that one cannot decide whether capitalism is to be associated with further differentiation or redifferentiation. My conjecture is that both possibilities are relevant; that formal indeterminateness reflects indeed the richness of historical experience; that redifferentiation, at first view just a mere formal possibility, does in fact correspond to a shadowy side of history; that perhaps redifferentiation is as important as historical process as further differentiation. Perhaps further progress of thought may render necessary to cast biological metaphors aside, not to vindicate the mechanical metaphors which formed the other side of the coin of the Marshallian compromise, but because biological metaphors may prove to be actually too poor to capture historical phenomena of social differentiation.

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TEXTOS PARA DISCUSSÃO

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1980/1983

01. Lara Resende, A. "Incompatibilidade Distributiva e Inflação Estrutural" (esgotado)

02. Malan, Pedro S. "Desenvolvimento Econômico e Democracia: A Problemática Medição do Estado" (esgotado)

03. Bacha, E.L. "Notas Sobre Inflação e Crescimento: Um Texto Didático" (esgotado)

04. Lopes, Francisco L. "On The Long-Run Inflation-Unemployment Trad-Off" (esgotado)

05. Williamson, J. "World Stagflation and International Monetary Arrangements" (esgotado)

06. Lara Resende, A. e Lopes, Francisco L. "Sobre as Causas da Recente Aceleração Inflacionária" (esgotado)

07. Camargo, J.M. "A Nova Política Salarial, Distribuição de Rendas e Inflação"

08. Bacha, E.L. e Alejandro C.D. "Financial Markets: A View from the Periphery"

09. Modiano, E.M. e Lopes, Francisco L. "Dilemas da Política Energética"

10. Bacha, E.L. e Lopes, Francisco L. "Inflation, Growth and Wage Policy: In Search of a Brazilian Paradigm"

11. Monteiro, J.V. "A Economia do Crescimento do Setor Público"

12. Modiano, E.M. "A Three-Sector Model of A Semi-Industrialized Economy"

13. Modiano, E.M. "Derived Demand and Capacity Planning Under Uncertainty" (Revised edition)

14. Lopes, Francisco L. "Rational Expectatîons in Keynesian Macro-Models"

15. Camargo, J.M. "Reflexões sobre o Ensino de Economia"

16. Camargo, J.M. "Brazilian Size Distribution of Income and Governamental Policies

17. Modiano, E.M. "Energy Prices, Inflation and Growth"

18. Modiano, E.M. "Estratégias de Racionamento: Uma Generalização"

19. Bacha, E.L. "Recessão, Balanço de Pagamentos e Crescimento"

20. Fritsch, W. "Brazilian Economic Policy During the World Post-War Boom and Slump 1919-1922"

21. Bonelli, R. e Cunha, P.V. "Distribuição de Renda, Estrutura de Consumo e Produção: Uma Análise Multi-Setorial da Economia Brasileira para o Período de 1970/1975"

22. Arida, P. "The Division of Labour as a Search Process"

23. Lopes, Francisco L. "Stabilization Policy, Rational Expectations, and Staggered Real Wage Contracts"

24. Correa do Lago, L.A. "Balança Comercial, Balanço de Pagamentos e Meio Circulante no Brasil no 2º Império: Uma Nota para Uma Revisão"

25. Monteiro, J.V. "Uma Análise do Processo Decisório no Setor Público: O Caso do Conselho de Desenvolvimento Econômico 1974/1981"

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27. Bacha, E.L. "Vicissitudes of Recent Stabilization Attempts in Brazil and the IMF Alternative"

28. Lopes, Francisco L. "Rational Expectations, Discrete Price-Setting and the Role of Monetary Policy"

29. Malan, P.S. e Jonh R. Wells "Structural Models of Inflation and Balance of Payments Desequilibria in Semi-Industrialized Economies: Some Inplications for Stabilization and Growth Policies"

30. Abreu, Marcelo P. "Anglo-Brazilian Economic Relations and the Consolidation of American Pre-Eminence in Brazil: 1930-1945"

31. Diaz-Alejandro, C.F. "Latin America in the 1930's"

32. Diaz-Alejandro, C.F. "The LDCs in the 1982 International Economy: Two Comments"

33. Lopes, Francisco L. "Inflação e Nível de Atividade no Brasil: Um Estudo Econométrico"

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36. a) Abreu, M.P. e W. Fritsch "As Lições da História: 1929-33 e 1979-8?"

36. b) Lara Resende, A. "A Ruptura no Mercado Internacional de Crédito"

36. c) Correa do Lago, L.A. "A Programação do Setor Externo em 1983: Uma Breve Análise Crítica

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36.h) Bonelli, R. "Investimento e Emprego Diante de Desequilíbrios Externos e Internos"

36.i) Modiano, E.M. "Choque Externos e Preços Internos: Dificuldades da Política Econômica"

36.j) Monteiro, J.V. "Organização e Disfunções da Política Econômica"

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