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**PRODUCTION KNOWLEDGE
A MARSHALLIAN PERSPECTIVE ON POST-COASIAN THEORIES OF
THE FIRM**

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Production knowledge. A Marshallian perspective on post-Coasian theories of the firm

Abstract: In 1937, Coase published ‘The Nature of the Firm’, in which the idea that using the market has a cost was introduced for the first time. Later developed by Williamson, the transaction costs theory of the firm served to provide an explanation in which efficiency, rather than the power of monopoly, is the rationale for the complex managerial structures of the ‘modern corporation’. Along with Coase, Simon’s idea of bounded rationality and Chandler’s historical reconstructions of the managerial revolution in the US during the 20th century were behind Williamson’s work. However, fundamental criticisms of Williamson came directly from Simon and Chandler and, although indirectly, from Coase himself. What is of great interest from the standpoint of the history of economic thought is the re-emergence, in recent literature, of a few concepts that were at the base of Marshall’s analysis of industrial organization. Marshall’s theory, which Coase rejected during the 1930s as merely descriptive, is now associated with a model of industrial development, that of England during the 19th century, considered obsolete. However, the pillars of Marshall’s theory – Smith’s theorem, coordination costs and, most importantly, ‘production knowledge’ as opposed to ‘transaction knowledge’ – are pivotal in Simon’s as well as in Chandler’s proposals for an alternative to, or an extension of, transaction costs analysis. Moreover, and notwithstanding their opposite views of the innovative power of large managerial structures, there is a strong analogy between Marshall’s and Chandler’s accounts of the evolution of capitalism, viewed as a process of innovation triggered by individual agents endowed with heterogeneous competences. The latter are employed in coordinating specialised productive capabilities and providing the marketing connection between innovative production processes and consumer demand.

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1. Introduction

In 1937, Ronald Coase published his paper on ‘The Nature of the Firm’. As the same author later recalled, his view on the subject of industrial organization derived from the literature of the time, which was - to a significant extent - Marshallian (Coase 1988a, 61-2). Coase mentioned Marshall (1927 [1919]), E.A.G. Robinson (1931), and Robertson (1928), from whom he took the image of firms as “islands of conscious power in this ocean of unconscious co-operation like lumps of butter coagulating in a pail of buttermilk”.

Coase found this literature useful as a description of the industrial system, but he thought it lacked a “theory which would enable us to analyse the determinants of the organization of industry. It was this situation – he wrote – which led me to write ... my paper ‘The Nature of the Firm’” (1988a, 61-2).

According to Coase the “organization of industry” is a distribution of tasks among institutions, the firms, in which direct coordination takes the place of the price mechanism. Therefore, the “determinants” of this organization are those factors that guide each firm’s decisions on what to do and what to buy. In ‘The Nature of the Firm’, the costs of using the market (transaction costs) are the determinants of the organization of industry: the internal organizations of firms grow until a limit is reached where the cost of organising a transaction within the managerial unit exceeds that of carrying out the same transaction through the market.

This theory presents markets and firms as alternative ways of doing the same things – i.e. everything that is organised by a firm could be coordinated (though at higher costs) through the price mechanism – while conscious organization is entitled to emerge if, and only if, it is more efficient than markets.

The centrality of transactions, which is so typical of this approach, had already been emphasised by Commons in 1934 (*Institutional Economics; its place in political economy*), but it took a long time for transaction costs theories of the firm to emerge paradigmatically in the new institutional economics of a few decades later. Before that happened, Stigler (1951) put forth another approach which was in continuity with a long tradition, spanning from Adam Smith’s *Wealth of Nations* to Allyn Young (1928) through Alfred Marshall (1920), and based upon the general idea that ‘the division of labour is limited by the extent of the market’.

As Stigler argued in his paper, from the Smithian-Marshallian perspective the question of determining the size of firms assumes the form of a “dilemma” between increasing returns and competitive conditions: provided that the division of labour corresponds to specialization and that specialization increases productivity, why then does a specialized firm which has obtained an initial advantage in the production of a single commodity not automatically absorb the whole market for this commodity, thus becoming a monopolist?

Marshall had provided at least three solutions to this dilemma – the life-cycle hypothesis, external economies, and the idea of a downward sloping demand curve for each firm.

The life-cycle hypothesis corresponds to the common sense idea that entrepreneurial ability often tends to decline in the transition from the first to the following generations of managers, thus limiting the growth of a firm. More than a theory, it is a counterexample to the other hypothesis – derived from abstract theory – that increasing returns inevitably lead to monopoly. It has a central position in Marshall because it was employed within the theory of value, in connection with the representative firm, to make sense of the fact that an industry can be in a stationary state while younger firms grow and the older decay. After Marshall (1920), new and more refined analyses of the division of labour in relation to management were proposed by a new generation of economists educated at Cambridge¹. Like the original view, however, these new perspectives derived directly from Marshall, being in fact based on the more general idea of a trade-off between the growth of productivity due to specialisation and the costs of coordination, which is one of the pillars of Marshall's theory of organization (1920, 241).

The stringency of the life-cycle hypothesis was somewhat relaxed in *Industry and Trade*, then definitely abandoned within the Marshallian school by A. Robinson (1931). Meanwhile, Young (1928) recovered the concept of external economies – those economies which, according to Pigou (1912), were external to the firm but internal to the industry, and which had been in this form rejected by Sraffa (1926). He also expanded Marshall's third explanation based on the individual firm's "particular" market (Marshall 1920, 458) – which Sraffa (1926) accepted and Joan Robinson (1933) adopted in her theory of imperfect competition – arguing that the demand curves for the produce of entire industries, like those of the individual firm, are elastic. In Young's perspective, therefore, 'the division of labour is limited by the extent of the market', and this pertains to both an individual firm and a whole industry.

Building on these assumptions, Stigler (1951) proposed a theory of the functions of the firm as a way out of the contradiction between division of labour and competitive conditions which – he thought – could also work as a theory of integration and disintegration². By contrast, make or buy decisions are directly approached by Coase, and answered through a balance of the market's and firm's relative efficiency in carrying out the same transactions.

¹ See Marshall 1927[1919], Lavington 1927, Robertson 1928, A. Robinson 1931, Sargent Florence 1933

² Stigler assumed that each firm performs several functions and, therefore, that the cost curve of a firm is the sum of several cost curves, all of which may present increasing, decreasing, or constant returns. When so defined, a firm cannot specialize in the increasing return functions, thus becoming a monopolist, because production requires that all functions be completed (Stigler 1951, 187-8), while the limited extent of the market for increasing return functions explains why a firm cannot delegate these functions to specialized firms thus reaping the full advantage of specialization. Moreover, when the industry grows and markets expand, they are expected to become competitive markets, because the new specialized firms, though they are monopolists at the start, face elastic demand curves. They do so because those firms that had left at least one of their functions to a specialized supplier would re-internalize it if it became too expensive to buy it on the market. As a result, a new competitive industry emerges as a spin-off of the pre-existing industry, and Stigler's analysis of the whole process can also be viewed as a theory of integration/disintegration of functions which determines what a firm does and what it buys.

The two perspectives, the new one proposed by Coase and the other put forth by Stigler in continuity with Smith and Marshall, went in different directions, even though keeping an eye on each other.

Resuming the long path which led to a vaster reception of his theory during the 1970s, Coase (1988b) recalled that 'The Nature of the Firm' owed much of its earlier diffusion to its republication in the *Readings in Price Theory* by the American Economic Association, and that Stigler was one of the two editors of the book.

The *Readings* were published in 1953. It is, therefore, more than likely that Stigler had Coase in mind when he rebuked "Those too numerous people who believe that transactions between firms are expensive and those within firms are free" (Stigler 1951, 192). To these people Stigler suggested "to study the organization of England during [her] period of eminence" (ibid.) in the second part of the 19th Century.

Stigler (1951, 192-3) reproduced a long quotation from G. C. Allen's *The Industrial Development of Birmingham and the Black Country, 1860-1927* (London 1929), taken as an example of how an advanced division of labour can be organised through localization in a restricted area, where inter-firm and even inter-individual relations, which cannot be properly defined either as pure market relations or as formal hierarchical organization, coexist and take part in the completion of sophisticated processes of production.

In turn, in the same paper in which he acknowledged his debt to the Marshallian literature³, Coase commented superficially and unfavourably on Stigler, resuming the old question of the incompatibility between Smith's theorem and competitive conditions, showing little enthusiasm for Stigler's theory of the functions of the firm: "Stigler does not take us very far, but he takes us as far as we have gone" (Coase 1988a, 65).

Quite curiously, however, Coase (1988b) made a favourable reference to Stigler's quotation from Allen's book. Coase considered the localized industries that Allen describes as a counterexample to the theory of vertical integration put forth by Klein, Crowford, and Alchian in 'Vertical Integration, Appropriable Rents, and the Competitive Contracting Process' (Journal of Law and Economics, 1978), arguing that while this theory considers asset specificity as the source of vertical integration, localized industries are an example of how asset specificity does *not* lead to vertical integration, an argument that could even be taken from Marshall (1920, Book IV, chapter 10).

Through Allen's work, Stigler was referring to the same time and place in economic history upon which Marshall had built his view of localization and his generalizations about managerial functions (see below, section 2). In Marshall, localization is a privileged source of increasing returns deriving from external economies, and one of the advantages of localization is, in fact, that it permits "the use of highly specialized machinery" (1920, 271).

³ 'Industrial Organization: A Proposal for Research', 1972, reprinted in Coase (1988, 57-74).

Finally, in Coase (1988b) there is another very important, though implicit, reference to Stigler's approach, in the passage in which Coase admitted that his 1937 article is not a "general" theory of the organization of industry: it explains why firms exist, but not their specialization in one sector of production. What Coase found to be still missing as late as 1988, is a theory of the functions of the firm, which is exactly the kind of theory Stigler was aiming at in 1951.

As we shall presently see, Marshall's theory assumes specialization in different functions as the starting point of his analysis of organization. However, as a derivation of the Smithian framework revived by Stigler, this approach was scarcely of any interest to Coase. Moreover, the exemplary situation that Stigler took from the past - which was a matter of everyday experience for an English economist of the 19th century like Marshall - is at odds with the examples that countries like the US, Germany and Japan have provided economists, economic historians, and theorists of organization throughout the 20th century. In recent years, much of the debate on the issues upon which Stigler and Coase parted company, in particular the one on the determinants of the boundaries between firms and markets, has moved far away from the Marshallian world of privately owned small businesses to a more Coasian world of *Markets and Hierarchies* (Williamson 1975).

There is some ambiguity in the way in which Coase (1988b) commented on Williamson's works. Unfavourable comments would not have been unexpected, because Williamson's explanation of vertical integration is based on the same element - asset specificity - upon which Klein, Crawford and Alchian framed their theory, but Coase did not mention asset specificity when he dealt with Williamson. Rather, he acknowledged that the widespread diffusion of transaction cost theories of the firm from the early 1970s onwards was largely due to Williamson, and that Williamson was, on the whole, right when he argued that the notion of transaction costs had to be made more "operational".

Miles away from the Marshallian networks of external economies and 'automatic organization', Williamson's development of Coase's idea of a balance of efficiency between markets and firms - a method that he made more "operational" through the adoption of "opportunism" and Herbert Simon's notion of "bounded rationality" in connection with assets specificity as the basic assumptions on human behaviour - is deeply rooted in the Chandlerian world dominated by the 'visible hand'. Williamson's objective was that of "supplanting the idea that organizational innovations have anticompetitive purposes by the rebuttable presumption that organizational innovations are designed to economize on transaction costs" (1981, 1540). Similarly, the serious doubts that Simon (1991) and Alfred Chandler (1992) raised on Williamson's understanding of the modern corporation as "the product of a series of organizational innovations that have had the purpose and effect of economizing on transaction costs" (Williamson 1981, 1537), started from the common presupposition that the modern industrial landscape is in fact dominated by large organizations.

In Simon, this view is taken to the extreme conclusion that the "economies of modern industrial society can more appropriately be labelled organizational economies than market economies" (1991, 42), and that it would therefore be better to take the organization and its power of coordination - rather than the market - as a benchmark. According to Simon, the fundamental defect of the new institutional economics,

including Williamson, is that it is based on *ad hoc* hypotheses whose aim is to make organization compatible with market analysis based on maximizing behaviour. Taking a more catholic position, Chandler acknowledged the importance of Williamson's work, but he nonetheless parted company with him on the general approach to be taken in the study of industrial organization. As he explained, "The basic difference between myself and Williamson is that for him (1985, p. 41): 'The transaction is the unit of analysis'. For me, it is the firm and its specific physical and human assets" (1992, 85-6).

A point that Simon and Chandler have in common is that they both emphasize the need to expand the assumptions on human behaviour and knowledge that are typical of transaction costs analysis and of Williamson in particular, so as to include, along with transaction behaviour and knowledge, those behaviours and competences that are associated with production. Once this alternative perspective has been chosen, "production knowledge" (Langlois and Foss 1999) – incorporated in "the firm facilities and skills" (Chandler 1992, 86) – joins with "transaction knowledge" in determining the size and boundaries of the firm.

Langlois and Foss's (1999) main tenet is that production knowledge is as incomplete as transaction knowledge, and that this form of imperfect information has been overlooked in the mainstream post-Coasian literature. Production knowledge is largely made of tacit knowledge (Polanyi, 1958) acquired through a time-consuming process of learning by doing, distributed among individuals and firms, and to varying degrees non-transferable. When individuals and organizations are endowed with non-transferable complementary skills, they need to cooperate in order to produce. Langlois and Foss refer to Richardson's (1972) concepts of "capabilities" and "activities", thus conveying the idea that distributed productive competences necessitate another form of incomplete, partly tacit and distributed knowledge; that is, "knowledge about how to link together one person's (or organization's) productive knowledge with that of another" (1999, 203). Taken together, they argue, the notion of "productive knowledge" and "qualitative coordination" among distributed capabilities, along with the concepts and mechanisms elaborated in the capabilities view, provide the ground for a new theory of economic organization, "at least – they write – with respect to the boundaries of the firm" (1999, 211).

In the post-Coasian literature on the 'nature of the firm', what is of great interest from the standpoint of the history of economic thought is the re-emergence, in the form of innovative perspectives within the empirical and theoretical grounds provided by present-day industrial methods and theories of firms and organization, of at least three lines of thought which – as this paper aims to demonstrate – have much in common with Marshall's analysis of industrial organization.

One of these lines of thought, Smith's theorem, belongs to the widespread tradition identified by Stigler and has been amply used by authors like Chandler and Langlois. Another one is the trade-off between the advantages of specialization and the increasing need for coordinating specialized functions, which Stigler ignored and which is pivotal in Marshall's as well as in Chandler's understanding of managerial structures and in Simon's proposal of an alternative to transaction costs analysis. Finally, the third element - which in Marshall makes the adoption of the first two of

vital importance - is what Langlois and Foss call “production knowledge” as opposed to “transaction knowledge”.

The following sections are an attempt to show that production knowledge is a central issue in Marshall, and that he employed a refined entrepreneurial version of the Smithian framework in order to analyse its economic significance. The first two sections present an overview of Marshall’s entrepreneurial development of Smith’s theory of the division of labour and introduce the problematic comparison between Marshall and Coase as it emerges from the stimulating but irreconcilable interpretations put forth in Loasby (1990) and Casson (1993). An attempt to compose the outward contradiction between the above views of the ‘Coasian connection’ is then made on the basis of Marshall’s historical interpretation of the evolution of managerial functions.

In a nutshell, the hypothesis developed in this paper is that while Loasby and Casson focus their attention on production knowledge and transaction knowledge respectively, both kinds of knowledge are considered by Marshall. However, there is a change of emphasis throughout Marshall’s descriptions of the evolution of capitalism, in *Principles* as well as in *Industry and Trade*. This shift is revealing of a tension that exists between production knowledge, its development and full economic exploitation by individual businessmen operating in restricted business communities, and the ongoing institutional evolution of capitalism. Throughout this pattern of change identified by Marshall, production processes are increasingly managed through formal hierarchies and large markets, while their effects on the spread of production knowledge in society become a more problematic issue.

2. The division of labour and the entrepreneur

In *Principles of Economics* (Book IV, chapters viii-xii) Marshall developed a theory of industrial organization – derived from the Smithian doctrine that productivity depends on the division of labour, which is in turn limited by the extent of the market – in which both the division of labour and the extent of the market are a matter of organisation. In Marshall’s view, specialisation requires coordination, because “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” (1920, 241). In this process of specialisation, “[e]ach part gets to be less and less self-sufficient” and therefore to depend “for its well-being” on its connection with the others, thus increasing the need for coordination between separate but interdependent functions (ibid.). Marshall framed this view of organization within an evolutionary logic, in which ‘variation’ happens through entrepreneurial action while the market provides a mechanism of ‘selection’. In Marshall’s own words, any “industrial arrangement” is admitted, provided it meets an “efficient demand” (ibid., 242). Just as variation, selection is not driven altogether by chance. Quite the opposite, Marshall included marketing among the fundamental managerial functions, arguing that “the manufacturer who makes goods not to meet special orders but for the general market” must have the power of “seeing where there is an opportunity for supplying a new commodity that will meet a real want” (1920, 297. In *Industry and Trade*, this view was expressed in the notion

that “Production and marketing are parts of the single process of adjustment of supply to demand” (1927, 180).

The division of labour in production is the subject matter of chapter 9 of Book IV of *Principles*, where it takes the form of a cumulative process of learning by doing, conveyed through the common sense idea that “practice makes perfect” and the concept – borrowed from physiology – of “‘reflex’ or automatic action” (1920, 250).

Behind these ideas lies the scheme elaborated in Marshall’s early model of the human mind (*Ye Machine*. See Raffaelli 2003), in which the driving force is the dialectic between innovation and routine. Each routine is an action that can be performed automatically, and this creates a reserve of conscious energy that can be employed to contrive new solutions and/or in redeploying old routines when adaptation to a changed environment is required. In turn, successful innovations become repeated actions and, therefore, new routines that create new reserves of conscious energy, thus taking the process back to the start, ready for a new cycle of learning by doing. Viewed in this perspective, Smith’s labour saving economies due to the division of labour are explained through attention saving mental processes that increase the productivity of labour, making it more uniform and repetitive. This leads to the second stage of the process, mechanization, which is reached when a particular task has become altogether repetitive and can, therefore, be taken over by a machine. This creates new labour saving economies and shifts human attention from manual labour to the work of supervision of mechanised processes. In modern terms, the whole process is a widespread transformation of tacit knowledge (manual handicrafts skills) into codified, appropriable and transferable knowledge (codified competences and technology).

Marshall (1920, 257-65) insisted on the positive effects that specialization and technological innovation were supposed to have on the “character” of the people employed in production. Like Simon’s idea of “docility” (1991, 35), this view – which is related to Marshall’s notion of the “pliability” of human nature – is far from the opportunism in transaction behaviour and more closely related to the processes of learning and adaptation in production.

According to Marshall, specialisation and mechanization have the cumulative effect of shifting human intervention to a higher level of supervision, thus favouring the higher faculty of judgment at the expense of lower manual skills. Moreover, changing the labourers’ requisite capabilities from complex manual skills to less specific/higher level competences “weakens the barriers that divide different trades” (1920, 258), thus increasing the labourers’ adaptability to new processes. Finally, mechanization favours standardization, a trend which is considered in greater detail in *Industry and Trade*, where it works as a further basis for innovation.

The outcome of the whole process is that “complexity” is progressively transferred from individual skills to the organization of business (Marshall 1927, 62), and this explains the existence of a trade-off between specialization and coordination costs: specialization has a cost in terms of managerial coordination.

Localization and large scale production, corresponding to the exploitation of external and internal economies, are the two pathways to coordination that Marshall considers

in Book IV of *Principles* (chapters 10 and 11). Both methods permit employment of highly specialized machinery and human skills. In the case of localization, “subsidiary industries devoting themselves each to one small branch of the process of production, and working it for a great many of their neighbours, are able to keep in constant use machinery of the most highly specialized character” (1920, 271). This type of organization may be driven out by new and more expensive technology that small businesses cannot afford (1920, 279) to the advantage of large scale production, in which the same result is obtained through internal organization and, therefore, through the investment of large capitals by one or more big businesses. As to human capital, the main advantage of localization is the creation of a local market for highly specialised skills, acquired through the time-consuming process of learning described in chapter 9 (1920, 271). On the other hand, one of the main advantages of large scale production under this aspect is that it permits higher specialisation in management, relieving the “head of a large business” from routine work and thus reserving “all his strength for the broadest and most fundamental problems of his trade” (1920, 284).

Marshall considers marketing to be one of these fundamental problems (1920, 286-89). In fact, Marshall followed Smith when he argued that “It is the largeness of markets, the increased demand for great numbers of things of the same kind, and in some cases of things made with great accuracy, that leads to the division of labour” (1920, 255), but he did not take the relation between the extent of the market and the division of labour as automatic. In *Principles*, the Smithian relation between specialization and market extent takes the form of a strong nexus between marketing and production, which is particularly evident in the definition of the entrepreneurial functions: “Looking at business men from one point of view we may regard them as a highly skilled industrial grade, from another as middlemen intervening between the manual worker and the consumer” (1920, 293).

Any improvement – a new product, a better process – can successfully be introduced if, and only if, its organization guarantees a sufficient degree of coordination on the side of production and if it meets an “efficient demand” on the market. Especially when the search for increasing returns through innovation is at stake, the fact that the merchant and the supervisor of production are the same person therefore fits the case perfectly. The right hand knows perfectly what the left hand is doing, and the matching of any variation on the side of production with the merchant’s knowledge of unexploited efficient demand coming from the market occurs smoothly. This is what Smith’s theory prescribed and what British economic history after Smith confirmed. However, in Marshall’s “age of rapid change”, this pattern of progress was undergoing a dramatic modification.

“Merchants – Marshall wrote – were the ‘Venturers’ or ‘Adventurers’ from whom modern enterprise descended. They had a large part in the coordination and the finance of localized manufacture, as soon as it began to outgrow the capacity of the small master working with two or three assistants” (1927, 172). Their age was not a passing phase. “Liverpool Merchants looked down upon the Manchester cotton spinners, even after a hundred years of mechanical invention had raised the capitalist manufacturer up to the level of leading merchants in regard to the magnitude of his operations, and had entrusted to him a greater responsibility than theirs as a leader of men” (ibid.). But when this heroic period came to an end, new problems emerged that called for new solutions. When *Industry and Trade* appeared, “only a small

percentage of those ideas, which are turned to account in any existing business, were created in that business". "The stage has been passed at which a great idea is almost self-sufficing: it has to be elaborated in connection with others ... and its application is therefore not an act, but a long process, needing patience and large resources of mind and perhaps of capital" (ibid.). Especially in those productions in which advanced and expensive technology is employed, such as in steel or chemical industries, there is "a large class of improvements ... which are beyond the range of anyone who does not unite the command of a great business concern, with the possession of high faculty for appreciating new inventions, if not of creating them" (ibid. 173); other sectors, in which it is necessary to rouse an interest in new and very expensive products, require conspicuous investments and specific marketing ability (ibid.).

Marketing and production are two parts of the same process, and marketing has long been the driving force, but Marshall had no reason to expect that these two functions would always remain in the hands of the same person, nor did he think that leadership would always belong to the merchant. Moreover, looking at Marshall in retrospect, economists acquainted with transaction cost analysis and Coasian theories of the firm observe that there is no explanation – neither in *Principles* nor in *Industry and Trade* – of integration and disintegration between marketing and production, nor is there any general explanation of why coordination of economic activities is achieved sometimes through the market and at other times by formal organization.

3. The Coasian connection

With regard to the choice between markets and hierarchies, Brian Loasby (1990) has argued that Marshall had no need to provide such an explanation because, while in Coase there are the firm and the market, each one excluding the other and corresponding to organization and the price mechanism respectively, in Marshall both these institutions require management. The substance of the argument put forth by Loasby is that the kind of knowledge that is central to Marshall cannot be processed through the price mechanism. Unlike Hayek's (1945) famous argument, it needs a system of inter- as well as intra-firm personal connections.

In this perspective, the internal organization of the firm is a "device for organising the knowledge of all who work in it, and for using that organised knowledge as a basis for new initiatives" (Loasby 1990, 114). Outside the firm, external relations replicate the same organization of knowledge in competitive industries. This is especially the case of a localized industry – which "behaves rather like a scientific community, advancing knowledge through a process of conjecture, criticism, and experimentation" (ibid., 117) – and, more generally, of businesses in the same trade. Through a range of opportunities and devices, varying from localisation to trade journals and associations, firms in the same trade organize knowledge while they continue to compete (ibid.).

In this respect, Marshall's theory appears to be compatible with Richardson's (1972) reading of Coase (1937) – in which pure market relations represent no more than a limiting case, while the organization of industry chiefly depends upon the interplay between intra-firm coordination and inter-firm cooperation – and therefore similar

(through Richardson's interpretation) to Penrose's (1959) theory, in which each business is a bundle of specialised capabilities and each "firm's skills are to be directed to the specialised needs of another business" (Loasby 1990, 119).

However, this interpretation has been rejected by Mark Casson (1993), who considers Marshall's analysis unsatisfactory as it contains neither significant anticipations of Coase (1937), nor any alternative generalization within which a complete analysis of make-or-buy decisions can be framed.

Casson observes that by focusing on the market between production and wholesale, and thus excluding the other two prices in the chain (wholesale-retail and retail-consumption), Marshall put marketing outside the core of his price analysis⁴. As a consequence, he could not even attempt an analysis of the reason why wholesale and retail markets may become internal to the firm or remain external. For Casson (1993, 197), this relates to a "more general weakness" which is the "lack of a Coasian dimension" and therefore the absence of a theory of vertical integration, as well as to a more specific aspect, which corresponds to the reversal of Loasby's argument based on knowledge: "Loasby has sought to defend Marshall on the grounds that his analytical insights showed him that no theory of vertical integration is really required" – Casson contends – but "[t]he sad truth is that Marshall did not explore the relative merits of alternative methods of 'conscious organization', and of alternative mechanisms for promoting the 'growth of knowledge' in a systematic way" (1993, 216).

Casson observes that this analytical failure is very relevant within Marshall's general framework. Marshall recognised the entrepreneurial dimension of marketing (Casson 2006) and laid due emphasis on the power of innovation of these "pure information workers", whose task has always been to plan production and distribution on the basis of their anticipation of what consumer wants will be, thus bearing the risk that this anticipation may be wrong and insuring all the other agents in the chain of production (Casson 1993, 214). In Marshall's works there is a host of remarks about the two fundamental functions of "gathering information about consumer preferences, and synthesising this with information about production conditions" (ibid., 217), and this bears witness to the fact that he was pointing in the right direction, because it is the process of information synthesis that drives the economy through change. But the shortcomings of partial equilibrium analysis hindered the path:

Had Marshall formulated an explicit time-dependent model, it would have been more obvious to his readers that the role of the entrepreneur middleman is to collect information about a disequilibrium, and to turn this information to his own advantage by 'buying cheap and selling dear'. By contrast, in equilibrium the role of the middlemen is simply to pass products from producer to retailer. In equilibrium the middleman performs a simple break-bulk activity – effected through transport and storage – which is of limited economic significance" (Casson 1993, 217).

⁴ "He [Marshall] regarded retailers as offering highly differentiated services, and enjoying local monopolies. Retailing did not, therefore, conform to his standard model, and so it was inappropriate to focus on the retail price. Why he neglected the wholesale price is not clear – possibly he wished to avoid the complications created by economies of scale in wholesale distribution" (Casson 1993, 196).

Thus, we have two opposite interpretations. The first, by Loasby, focuses on Marshall's analysis of organization in Book IV of *Principles*; the second, by Casson, insists on the incompatibility between Marshall's broad view on marketing and the analytical framework of book V. Though irreconcilable, these readings of Marshall share a common view in which the agents' "knowledge" and their ability in processing "information" is what matters. However, although they both refer to knowledge and information, it seems that Loasby's paper has much more to do with productive knowledge – often in the form of tacit knowledge – while Casson's interpretation is more focused on that part of codified information which is included in transaction knowledge.

By contrast, the hypothesis developed in this paper is that both kinds of knowledge are considered by Marshall. The starting point is represented by the methods of business that prevailed in the British industry on its way towards the industrial revolution, when knowledge management and information processing were – to a great extent – in the hands of merchant undertakers. Then, a long process began which led to a completely new situation in which the use of any kind of knowledge and information depended on a multitude of individuals employed in the organizational structures of bigger firms and impersonally connected by market relations, while marketing had become a more specialized function integrated within larger hierarchical organizations or performed by specialized firms.

Eventually, a new system emerged in which the point made by Casson therefore certainly makes sense. However, as shown in the next sections, the kind of make or buy decisions of which Marshall was trying to make sense could not be understood through the application of the standard Coasian framework.

4. Between markets and hierarchies: the undertaker as a specialised multipurpose function

Unlike in Coase, the hierarchically oriented employer/employees relation is but one of a multitude of connections in which the Marshallian businessman habitually enters. In this system of connections, the way in which authority (as well as any kind of non-formalized influence or power) is employed resembles more closely Simon's (1991) view of "Organization and Markets" rather than being an anticipation of Coase's theory of the firm. As Loasby indirectly suggests in the paper quoted above, Marshallian businessmen frequently "transmit premises for making decisions rather than commands for specific behaviors" (Simon 1991, 32), thus creating a situation in which other people "can contribute their knowledge in a single decision" (*ibid.*).

In this cooperative view of organization – in which, as in Langlois and Foss (1999), the "qualitative coordination" among distributed capabilities is pivotal – the undertaker does not necessarily need a hierarchy in order to transmit the premises of other people's work. Moreover, as Simon (1991, 31-2) would suggest, the mere existence of hierarchies would scarcely be of any use if the employers were not knowledgeable enough about their employees' skills. So, in many cases reported by Marshall, a voluntary exchange between the undertaker's willingness to bear the risk and his partner's willingness to accept the premises upon which they will employ their personal knowledge would suffice.

According to Marshall, the undertaker has the power to organize production when he can give his knowledge advantage – i.e. his capacity as a risk bearer – in exchange for the producers’ skills, the employment relation thus being only one species of a wider genus. Although it does not need a formal hierarchy, this exchange cannot be carried out through impersonal market relations as it is based on the communication of information that cannot be transmitted by prices. This means that Marshall was dealing with the same practical setting recalled by Stigler at the end of his paper, in which any stark distinction between markets and firms would be misleading and in which – as Simon (1991, 38) suggests – there are transactions that can be the object of conscious organization but not of market transactions mediated through prices. In conclusion, while the Coasian employer needs formal power to give orders, the Marshallian undertaker cannot enter broader productive relations if he is not knowledgeable enough about the producers’ capabilities. It is in fact the undertaker that takes the initiative in business.

In Marshall’s own words, the “undertakers” are “those who take the risks and the management of business as their share in the work of organized industry” (1920, 745 n.1), while “business” is loosely defined as “all provision for the wants of others which is made in the expectation of payment direct or indirect from those who are to be benefited” (ibid., 291). Therefore, a business always involves some risks, but not necessarily the existence of a firm⁵.

In the woollen trade before the advent of the factory system, for instance, the work of superintending the details of production and the “narrower risks of carrying out definite contracts” were “handed over to small masters”, while the undertaker took over “the speculative work and the broader risks of buying and selling” (1920, 294). This method is particularly suited to those trades in which “the difficulty of forecasting the future is very great” (ibid.). A mixed organization is that of the “Manchester warehousemen”: these businessmen “give themselves to studying the movements of fashion, the markets for raw materials, the general state of trade ... and employing, if necessary, skilled designers to carry out their ideas ... they give out to manufacturers in different parts of the world contracts for making the goods on which they have determined to risk their capital” (ibid., 295). In these industries, there is “a continual contest between the factory and the domestic system” (ibid.), ruled by a variety of technical contingencies. This is what happens in the boot trade, in which “the growing use of sewing machines worked by steam power is strengthening the position of the factories”, while “the hosiery trade is being tempted back to dwelling-house by recent improvements in hand knitting machines” (ibid., 296). A similar situation is that of the Sheffield cutlery industry, in which the undertakers direct their employees and find the other capabilities they need at arms’ length in the market: “[m]any cutlery firms ... put out grinding and other parts of their work, at piece-work prices, to working men who rent steam power which they require, either from the firm from whom they take their contract or from someone else: these workmen sometimes employing others to help them, sometimes working alone” (ibid.).

⁵ There is “the undertaker who is not an employer” as well as “the undertaker who is an employer” (1920 IV, xii). Undertakers are also described as “a specialized body of employers, or to use a more general term, of business men” (ibid., 293), and even if “profits ... are generally connected in people’s minds with the employer of labour”, “the superintendence of labour is but one side, and often not the most important side, of business work” (ibid., 297).

All these examples show that the boundaries between market and firm are sometimes very blurred. As Chandler would suggest, the existence of these “labor-intensive industries such as textiles in past times and the service industries, software and the like today” (1992, 87) reminds us that the method of capital-intensive industries – where steady flows of input and secure markets for large volumes of output are provided through sophisticated hierarchical organizations that substitute markets altogether – is not the only one possible. “In labor-intensive industries the creation of a learning base and the resulting pattern of continuing growth differed substantially” (ibid.).

Marshall was more familiar with this kind of industries, where individual producers, small firms and merchant undertakers organized production through contracts of varying duration: from the long-term relationships with the employees to one-piece jobs commissioned to a variety of independent producers, depending on very contingent factors. Moreover, when Marshall wanted to emphasize that the work of the undertaker corresponded to a multipurpose function made of heterogeneous competence, that production is carried out within the firm as well as through the market, and that undertakers can be employers and merchants at the same time, the situations in which production knowledge was highly distributed – but nonetheless simple enough to be supervised by individual undertakers – provided useful examples and a good basis for generalization.

Thus, in Chapter 12 of Book IV Marshall explains that there are two key functions that the undertaker performs, each requiring a specific “ability”. In “his first role as merchant and organizer of production”, the “manufacturer” who works for the general market must “have a thorough knowledge of *things* in his own trade”. Secondly, “in his role of employer he must be a natural leader of *men*” (ibid., 297). Viewed in detail, however, each ability consists of an entire set of abilities:

He must have the power of forecasting the broad movements of production and consumption, of seeing where there is an opportunity for supplying a new commodity that will meet a new want or improving the plan of producing an old commodity. He must be able to judge cautiously and undertake risks boldly; and he must of course understand the materials and machinery used in his trade (Marshall 1920, 297).

In addition to these competences, there are the administrative abilities of a “leader of men”.

He must have a power of first choosing his assistants rightly and then trusting them fully; of interesting them in business and of getting them to trust him, so as to bring out whatever enterprise and power of origination there is in them; while he himself exercises a general control over everything, and preserves order and unity in the main plan of the business (ibid., 297-8).

Marshall was aware that even though this definition was based on empirical grounds, it was the portrait of an “ideal employer” (ibid., 298). In chapter 12 he emphasized that – as the size of the representative firm was growing – the functions of the employer were becoming a source of further specialisation, being thus distributed at different levels of business administration. This change represented an opportunity for people with business abilities but scarce capital to reach managerial functions, but it

was also expected to result in a bureaucratisation of industry and, therefore, in a decline of the returns to management, thus imposing a limit to the growth of the firm. More retrospectively, the same change was marking the passage to a more Coasian-like world of markets and firms. But this did not happen at a stroke.

5. Making the move to capitalism: merchant undertakers.

The transformation of the British pre-capitalistic trades into a full-fledged capitalistic system is described in *Principles* (1890, I, iii; later reproduced as App. A of the final edition) and in *Industry and Trade* (1927, Book I, chapters iii and ix, and App. C).

In Marshall's opinion, the decisive mutation took place in the field of trade and pertained to the mercantile function of the undertaker. The "growth of free capital" (i.e., capital which was not directly associated with ownership or use of land) "gave scope for men with marketing ability of a constructive order" who changed the tone of British trade (1927, 47). The "constructive trader" is a typical representative of this new class of businessmen. Instead of relying on his skill "in buying a thing for less than it is worth, and selling a thing for more than it is worth" (which is the prerogative of "people with small capitals, and especially agriculturalists"),

[t]he constructive trader ... is constantly forecasting future developments of demand, and endeavouring to turn to account the rising force of new methods of production so as to supply something which can be produced in large quantities at a low cost, and force its way into general consumption. It is to force its way, because it is sold for less than people had previously thought it to be worth; while yet it has cost him, and is in a sense worth to him, much less than what he sells it for (1927, 47).

The trader's task, therefore, was to drive the market from one equilibrium to another, coordinating present production with future demand and so 'turning to account' the producers' unexploited capabilities:

Such an undertaker sought out 'homely' producers who had the skill and aptitude for making certain classes of things economically and well; instructed them as to the precise character of the thing which he wanted; supplied generally the material and sometimes the requisite plant; and by ever widening experience learnt how better to enlarge and economize the processes of marketing (1927, 48).

As regards the function they performed, these undertakers were highly specialised, but their specialization consisted exactly of the acquisition of the less specialised/higher order knowledge required to coordinate more specialised/lower order functions. Capitalism began before the factory system, when trade fell into the hands of a new class of undertakers who had capital, less specialised knowledge, and - thanks to this knowledge of a higher order - a broader "outlook":

This change in organization is commonly described as a transition from the 'domestic' phase of industry to the 'capitalistic'. But a great deal of production, which is entirely under capitalistic control, is domestic. ... It seems therefore best to avoid the use of the term "domestic"; and to contrast the man of means, knowledge and resources with the "homely" producer: that is, the man whose resources are so small, and whose outlook is so narrow, that he cannot obtain good access to general markets (1927, 49).

Looking at the work of these men of means, knowledge and resources through the Coasian lens, we find that it entailed several tasks, and that each task implied several transactions and costs: the cost of finding homely producers and of testing their skills and aptitudes, the cost of instructing them, the marketing costs of supplying these producers with materials and implements purchased on the market, and the costs of marketing the final product. All these functions and the corresponding costs were later distributed within larger firms and reduced by organised markets. But before this could finally happen, the transition to capitalism occasioned the selection of a class of people who could afford all these costs and take advantage of the opportunity they had. This kind of ‘ideal employers’ in flesh and blood put to use what they learned about production and marketing for the creation of new connections among producers and between producers and consumers, thus extending markets and improving their organization⁶.

The advantages that the whole system could derive from a lesser degree of knowledge specialization on the part of merchants are perhaps more evident if we look at their work from the point of view of “homely producers”. Taking this perspective and considering the risk involved in each transaction as a potential cost, it can also be noticed that Marshall actually described a process which is somehow compatible with transaction cost analysis, but with two fundamental differences. First, the costs of the transactions carried out outside the firm – which in a Coasian perspective may lead to the expansion of the firm – provided the opportunity for the creation of a specialized managerial function which was external to the firm and devoted to the coordination of specific competencies in the field of production knowledge. Second, transaction costs may be better understood as “dynamic transaction costs”. As defined by Langlois and Robertson (1995, 35), these costs correspond to “the costs of persuading, negotiating, coordinating, and teaching outside suppliers”, or – more simply – to “the costs of not having the capabilities you need when you need them”.

Suppose, for instance, that a “textile manufacturer ... contracts to deliver a quantity of some fabric, of quality and design selected by a merchant, at a certain price”, and that he “fortifies himself by buying in advance the materials which he will need”. As Marshall explains, for the merchant this serves “to turn to the fullest account his powers of contriving improved models, patterns, etc., of the goods of which he has obtained special knowledge; and also of anticipating the future course of demand”. On the other hand, for the manufacturer the same method boils down to “escape from

⁶ This function was born in the passage from the first to the second of three stages, or “classes” of industries, in which the evolution of domestic production is subdivided in *Industry and Trade*. The first class included industries that worked local materials to meet a “local demand for goods of customary quality”. These industries produced no innovation, so they did not need “the services of capitalist traders”: their work “was within the range of homely associations and habits of mind” (1927, 715). The second class worked materials that had to be obtained from a long distance and produced commodities that were not sold in the local market. In these industries, there were “traders” with “larger resources and a wider connection” who provided the materials and marketed the final product, while the homely producers “congregated in the same neighbourhood, to make almost automatically a market of their own to which traders steadily resorted to supply the materials and other things needed, and purchase the things ready for sale” (1927, 716). Finally, the third class “was that conducted by small master producers, who supplied factories or workshops with their plants, and were independent of external control in all matters of detail; but yet manufactured to the order of capitalist ‘undertakers’, who bore all the risk of marketing, and often even supplied the material to be worked up” (ibid.). Even at this later stage, therefore, control was in the hands of merchants.

a task for which he is not peculiarly fitted, and to give nearly his whole energies to the administration and technical work of making” (ibid., 50). The merchant checks the homely producer’s risk and substitutes for a thicker market, making it possible to carry out increased production without enlarging the boundaries of the primitive firm:

The primitive homely manufacturing producer corresponds to the peasant, who produces only for his own use and for sale to neighbours; while he can, at the same time, be fairly certain that such things as he needs will be brought within his reach by traders, without requiring him to have knowledge or contact with distant markets. He may himself be a small employer, providing his assistants all the requisites of their work: but, as his capital is small, the capitalistic basis of his control over them is commonly ignored.

A great part of the homely industries of the country, at a later stage, were financed by capitalist traders to the extent at least that they undertook in advance to buy specified products at certain prices: that is to say the producer carried no considerable risks in regard to any particular contract, when once he had attained a fair security as to the prices he would pay for material and for such labour as he might require (Marshall 1927, 49).

Thanks to the merchant undertakers, the revolution in business organization took place outside the factory. Moreover, the experience of the first industrial revolution shows that the eclectic system of contracts managed by merchant undertakers was abandoned for external and not irreversible reasons⁷. On the other hand, when the relocation of production into larger firms finally took place, the merchant did not abandon his original function, but had to do the same job with a different hat, that of the “capitalist manufacturer”. As a result, he enlarged the scope of his activity so as to include that of employer⁸. Furthermore, along with technological changes - which Marshall considered reversible - there were other, more permanent reasons that were progressively driving capital away from the multipurpose function performed by merchant undertakers⁹. Meanwhile, all the risk-connected services that individual undertakers offered producers were subdivided in the form of specialized functions within the firm and coordinated by wider market relations connecting these firms. This led to a new and more efficient distribution of risks. However, better risk

⁷ According to Simon (1991, 41-2), “The wide range of organizational arrangements observable in the world suggests that the equilibrium between these two alternatives [organizations and markets] may often be almost neutral, with the level highly contingent on a system’s history”. In a similar fashion, in Marshall’s opinion the extension of the boundaries of the firm was not the crucial event: “... at length general attention was called to the great change in the organization of industry which had long been going on; and it was seen that the system of small businesses controlled by the workers themselves was being displaced by the system of large businesses controlled by the specialized ability of capitalist undertakers. The change would have worked itself out very much as it has done, even if there had been no factories: and it will go on working itself out even if the retail distribution of force by electric or other agencies should cause part of the work that is now done in factories to be taken to the homes of the workers” (1890, 40-1).

⁸ “The process ... was gradual and continuous; and, when it was completed, his functions as a ‘master of men’ rose to an equal level with his functions as an organizer of production and marketing” (1927, 48).

⁹ “The first prominent uses of capital in the organization of English industry were seen when ‘undertakers’ sought out domestic workers in various parts of the country, who had but little capital of their own; supplied them with material and instructions for its use, and marketed their products. Shortly afterwards the invention of textile and other machinery, suitable for being worked on a large scale by water power, set on foot the direct capitalistic ownership of all the appliances of production, except only the property that every free labourer has in himself. Thenceforward leadership and control came increasingly to those countries, and to those individuals in each country, who could invest capital without stint in expensive plant” (1927, 507-8).

management went along with a new and increasingly dispersed distribution of knowledge and information about production and innovation.

6. The decline of the capitalist merchant and the rise of markets and firms.

From the point of view of economic history, the capitalist merchants are those who coordinated production when the dimension of the firms was negligible. But they are also those who built markets, spreading into society the “business point of view”, the “conscious adaptation of means to ends” that replaced ancient social relationships based on habits and custom (1927, 164). Meanwhile, the increasing dimension of the social unity - from family and clan to larger communities - lowered the intensity of “neighbourliness”, making social relations more “business-like”: “the transactions between neighbours began to be governed by arithmetical comparisons between the value of that which was given, and that which was received in exchange” (ibid., 165). Later, when firms and markets had sufficiently grown in complexity and dimension, the opportunities for concentrating one’s efforts on the coordination of highly specialised independent producers disappeared. Marketing and production became two connected but nonetheless separate functions, and the old network of business-like but personal relations became a web of impersonal market connections:

The traders who bought goods in one locality and sold them in another were distinctively business men. But the greater number even of them seldom needed to look long ahead or very far afield: partly because they were in personal touch with those from whom they bought, and to whom they sold; and were thus directly cognisant of nearly all changes ... which were likely to upset their calculations in the short run over which each such transaction generally ran. On the other hand a broad confidence in the steadfastness and efficiency of large and various markets is a necessary condition of the highly complex modern division of labour among producers, and between producers and middlemen” (1927, 165).

In modern conditions, individual agents cannot achieve the producers’ coordination and their connection with the general market. Business organization comes to depend on the thickness and continuity of several intermediate and final markets that, from the producers’ point of view, buffer risks as middlemen did in the past:

The breadth, persistency, and fluidity of modern markets enable the producer to make things on the “speculative” chance of selling them The modern producer throws all his energies into one particular group of operations, trusting that the same market organization, which secures for him in advance approximately known prices for his sales, will enable him to buy at approximately known prices such things as he may want; whether they be small supplies of personal necessities and luxuries ... or relatively large supplies of just those highly specialized kinds of raw material and implements which are used in his work (ibid., 166).

Marshall (1927 II, v, 2) explained that modern organization is more efficient, because it “tends to distribute the risks inherent in making and marketing [so] that they fall increasingly on the shoulder best fitted to bear them”. However, since this result is achieved by deepening the gap between making and marketing, the process of specialisation creates a new problem of coordination: even though making and marketing are no longer coordinated by the same person (and, in the case of disintegration of marketing and production, not even by the same firm), they still

remain two “parts of the single process of adjustment of supply to demand” (1927, 181).

For commodities of a special kind there are “organized markets” in which professional dealers speculate and producers “hedge” their risk¹⁰. As merchant undertakers took advantage of a broader “outlook”, speculating on the future demand for commodities of which they commissioned and supervised production, professional dealers in organized markets employ their “superior knowledge” to do approximately the same thing with standardised products. Therefore, professional dealers provide insurance against the producers’ risk, but are not involved in the details of production¹¹. While buffering risks was part of the merchant undertaker’s core business, the same service is no more than a by-product of the professional dealer’s speculation. Furthermore, the dealers’ “superior knowledge” is qualitatively different from that of merchant undertakers.

A different method produces an analogous result in the case of “ordinary” products, for which there are neither professional dealers nor specialised markets. As Marshall explains, some marketing risks “relating to ‘ordinary’ products can be transferred by forward contracts: but the majority can be delegated only as incidents of the delegation of corresponding functions” (1927, II, v, 6).¹²

Broadly speaking, if kinds of make or buy decisions are traceable in Marshall, they correspond to a more efficient distribution of functions and, therefore, of risks. In turn, this distribution depends on the distribution of knowledge, and even though the technique is different, the result is the same: risks are reduced by superior (specialised) knowledge, but – as Casson contends – Marshall never conveyed this

¹⁰ There can be an organized market for a commodity if this commodity is not quickly perishable; if its quantity can be expressed in number, weight or measure and its quality is standardized; if this commodity is important enough to occupy a large number of buyers and sellers and if it is subject to significant fluctuations in prices, so as to be attractive for “professional dealers who make a living by speculative purchases and sales” (Marshall 1927, 256).

¹¹ Casson (1993, 214) defines these dealers as “market-making entrepreneurs” who can delegate production as well as “all the physical activities involved in the distribution of the product This leaves the entrepreneur as a pure information worker (to use modern technology). It is his success in handling information, rather than his success in handling material product, that governs his profitability”. The same cannot be said of the merchant undertaker of the earlier period. Even though these merchants were not involved in the details of production they nonetheless supervised the process, supplying the small master producers with both materials and instruction.

¹² An example from the building trade illustrates this notion. In this example (1927, 269-70), a builder has reduced the major risks of marketing to the lowest terms: he does not work for the general markets but only “on contract under precise specifications” and he buys “his chief supplies in advance at fixed prices”. The residual part of risks cannot be transferred without the corresponding function: “Suppose that [the builder] has insured against a rise in the standard rate of wages of each chief class of his employees. That will go but a little way, if he does not get hold of at least a fair proportion of able, alert and loyal men, and manage them with tact and firmness: nor is his success likely to be permanent, if he fails to detect and attach to his business those who will in the course of time be fit for promotion to leading places. He cannot insure against the results of errors of judgment in such matters unless by sub-letting contracts; that is, by handing over to middlemen certain functions, with the risk attached to them. Again, as his business increases, he must decide whether an extension of his plant is likely to be turned to sufficient account in future undertakings to be remunerative. He may be doubting whether to enlarge his carpenters’ shed, or to buy a steam mortar-grinding machine... . Whichever way he decides any of these questions, he must run a risk... . Constructive speculation ... is inherent in nearly every business decision: there is generally a choice of risks, but seldom any choice as to whether to take a risk inherent to a function, save but transferring function and risk together” (1927, 269-70).

view through a formal theory which explains how and when risk becomes so high that it leads to specialisation or so low as to make integration more profitable. It rather seems that Marshall's main concern was about the process of innovation, because risk reduction through knowledge specialization drives out those who were entitled to collect knowledge of a higher order.

7. Mature capitalism: innovating production in a world of markets and hierarchies

If a general tendency can be deduced from Marshall's view of British economic history, it may be that while – other things being equal – labour division leads to more specialised and therefore efficient capabilities in relation to the existing processes of production, the increasing specialisation of knowledge can be a hindrance to innovation, for it tends to crowd out those people with knowledge of a higher order who could break an equilibrium and drive the market towards a new one.

The capitalism pioneers' eclectic knowledge enabled them to concentrate in their hands the supervision of several stages of a productive process and the coordination of this process with the demand coming from the general market. The limited class of undertakers who had such great power over the economic system can be viewed as the intersection of at least three groups: those who had financial resources, those acquainted with human capital and technology and the frontier of their evolution, and those who were in close relation with market demand and its trend.

Obviously, there is no reason to take the fact that this intersection will always exist for granted. Capital is not necessarily associated with knowledge, while human capital and technology are frequently more connected with scientific research outside the firms than with trade and pursuit of profit. Yet, even if the intersection does exist, there must be someone who has the necessary motivation to take the risk that any business opportunity involves. Finally, once all these conditions are satisfied, the undertaker has to bring together – or create *ex novo* – all the capabilities a new product and a new process may require.

In the past, this class of undertakers provided the links connecting capital, technology and business. But, the more it is difficult for the intersection to exist, the more the functions they assumed can be viewed as a series of bottlenecks. In the trend described by Marshall at the end of Book I of *Industry and Trade*, it becomes more and more unlikely that individual agents should specialize in the multipurpose function performed by capitalist undertakers in the first industrial revolution.

Marshall was aware that the old pattern of development could not be repeated and, refusing the “blind fatalism” of those who think that “those changes, which are general, are probably irresistible” (1927, 175), pointed in the direction of managing the transition to the future through a better understanding of the prevailing trends:

Increasingly throughout our coming study we shall be concerned to inquire how far industrial progress is dependent on individual and how far on collective action: how far it depends on ceaseless initiative; and how far on broad ideas and knowledge, which when once acquired pass speedily into common ownership; and become part of the collective

wealth We must consider how the embodiment of a new knowledge or a new idea in a new or improved industrial implement or method is likely to require the control of large capital. We must examine the limitation which this condition imposes on the utilization of the world stores of creative faculty in the development of the material sources of well-being. We must enquire how far the gains, which accrue to a giant business as the apparent results of its fine initiative and its prudent courage in taking financial risks, are really its own; how far such gains are increasing the dominance of large capitals; and lastly how far the tendencies thus resulting are desirable, and how far they are inevitable (Marshall 1927, 174-5).

8. Some provisional conclusions: Chandler and Marshall as complementary alternatives to Coase.

The result of Marshall's historical retrospective is a problematic outlook on the early stages of the managerial revolution that Chandler would later chronicle in his works. Moreover, Chandler's emphasis on the leading role of multidivisional firms during the 20th century and on their success in the exploitation of innovative productive knowledge on a large scale is in stark contrast with Marshall's scepticism about managerial 'bureaucracies' as a model of innovative entrepreneurship. Unsurprisingly, Marshall's name is therefore usually associated with a historically determined model of economic development – that of England during the first industrial revolution – which belongs to the past.

In partial contrast with this common view, the aim of this research has been to show the relevance in Marshall's works of those aspects related to productive knowledge that post-Coasian theories of the firm – based on the experience of big business during the 20th century – are now trying to save from the oblivion in which transaction cost analysis has buried them.

As we have seen, Marshall moved from the assumption that organization is the essential phenomenon, similarly to Simon's recent suggestion. However, while in Simon's reversal of the Coasian logic markets are a consequence of organizational failures, Marshall attempted a genealogical approach: markets are a creation of those agents that coordinated production and marketing at an earlier stage – the 'merchant undertakers' and 'constructive traders' – while the Coasian world of clear boundaries between markets and firms belongs to a later phase.

The capitalistic exploitation of productive knowledge stands out as the driving force of Marshall's genealogy of capitalism, and it is in the context of this historical movement that organization emerges as the fourth "factor of production". However, provided that Marshall conveyed his conceptualization of the use of knowledge in production through the reconstruction of a specific development in history, the main conclusion of this research is that the general scheme of Marshall's economic analysis of productive knowledge is pertinent in typically Marshallian and non-Marshallian contexts as well. This result was obtained through a comparative analysis of representative post-Coasian treatments of the same subject by Chandler and Simon.

Marshall's general scheme is an entrepreneurial refashioning of the classic framework provided by Smith, a reformulation in terms of managerial functions which follows the same logic employed in Chandler's works on the managerial revolution. It is this

analytical matrix that makes Marshall compatible with Chandler, pointing in the direction of a development of the Smithian framework which is an alternative to Coase (1937) and which had not been identified by Stigler (1951).

Within this scheme of general application, management is the link between labour division and the extent of the market, a connection that Marshall and Chandler – unlike Stigler – did not take for granted. While Chandler investigated the way in which complex managerial structures connected innovation in production with final markets during the second industrial revolution, Marshall had considered the same problem from the point of view of privately-owned British businesses as they came out of the first industrial revolution. The latter approached this issue in terms of individual entrepreneurial strategy while the former dealt with it in terms of “strategy and structure”, but the entrepreneurial phenomenon they isolated as crucial was essentially the same.

Thus, while Coase (1988a, 65) showed little enthusiasm for Stigler’s development of Smith’s theorem and took the direction of transaction knowledge later followed by Williamson, the Marshall-Chandler approach included production knowledge among the “determinants of the organization of industry” (Coase 1988a, 62), or – which is the same – among the factors determining the size and boundaries of the firm (Langlois and Foss 1999). Broadly speaking, we have seen that the qualitative nature and the degree of complexity of the productive knowledge employed in production seems to be within this non-Coasian logic the element that determines the kind of organization that will prevail in a specific context. In the above quotation from Marshall (1927, 174-5), this concept took the shape of the dawn of a new era, which was expected to be very different in nature from the British industry pattern of development during the 19th century. Much later, Chandler (1992) replicated the same idea, warning that – notwithstanding their success in the ‘visible hand’ era – the managerial structures of large scale operations were not a panacea. At least in part, according to both Marshall and Chandler the size and boundaries of firms therefore depend on the productive knowledge they employ.

In this perspective, there is no irreducible contradiction between Chandler’s multidivisional firms run by “a new subspecies of the economic man – the salaried manager” (1977, 484) and the Marshallian pattern of development, based on privately owned firms mutually connected through local or inter-sectoral networks of external economies. Rather, as Marshall and Chandler would probably agree, while relations of mutual adaptation between managerial structures and the kind of productive knowledge that is employed in different industries do exist, the difficulties that Marshall’s merchant undertakers had to solve were – once again – conceptually the same as those encountered much later by the salaried managers of Chandler’s big firms:

Organizational capabilities ... provided the dynamic not only for the continuing growth of such firms, but also for the industries which they dominated, and for the national economies in which they operated. They were created during the knowledge-acquiring processes that are always involved in commercializing a new product for national and international markets. These learned capabilities resulted from solving problems of scaling up the processes of production, from acquiring knowledge about customers’ needs and altering product and process to service needs, coming to know the availabilities of supplies and the reliability of suppliers, and in becoming

knowledgeable in the ways of recruiting and training workers and managers (1992, 83-4).

Moreover, both Marshall and Chandler were of the opinion that the required “organizational capabilities” were provided by less specialised agents, who respectively took the form of Marshall’s ‘constructive traders’ and Chandler’s ‘organizational innovators’.

Operating in different contexts, these agents performed the same function that Chandler (1977, 490) thought was missing in Stigler’s theory of the functions of the firm and that in Marshall (1920) made the Smithian nexus between labour division and the extent of the market a non-automatic relation of cause and effect. The common feature of these agents is that they employ their higher order/less specialised knowledge to provide the coordination that specialisation requires. In Marshall, they were in control *before* large markets connecting complex firms were built up, when production knowledge was mostly made of individual skills and when productive processes required these individual skills to cooperate, while it was a matter of secondary importance whether they were employed within the same firm or not. On the other hand, in Chandler (1977) they prevailed *after* market coordination had become too inefficient in order to grant coordination among the different parts of capital intensive processes. At least the latter case, which corresponds to the conclusion of Marshall’s sketch of an economic history, is compatible with the Coase-Williamson scheme. In both cases, though, the Coasian framework does not allow to grasp the essential point, which is the existence of less specialised agents as the means to coordination.

The importance of this higher-order managerial function endowed with less specialised knowledge and devoted to the coordination of more specialised capabilities throughout processes of innovation – an element that did not come out of Stigler’s theory of the functions of the firm – might be viewed as the hallmark of a kind of Marshallian-Chandlerian approach to the capitalistic pattern of economic development, an approach which is alternative to the Coase-Williamson paradigm. This view could probably be conveyed through a reformulation of ‘Smith’s theorem’ in which the ‘division of labour is limited by the extent of the market *and the powers of organization*’.

References

- Casson, M. 1993, 'Marshall on marketing', in J. Creedy e R. E. Backhouse (eds.), *From classical economics to the theory of the firm. Essays in Honour of D.P. O'Brien*, Cheltenham: Edward Elgar.
- 2006, 'Marketing', in T. Raffaelli, G. Becattini, M. Dardi (eds) *The Elgar Companion to Alfred Marshall*, Cheltenham UK, Northampton, USA: Edward Elgar.
- Chandler, A. D. 1977, *The Visible Hand. The Managerial Revolution in American Business*, Cambridge US: Belknap/Harvard University Press.
- 1992, 'Organizational Capabilities and the Economic History of the Industrial Enterprise', *Journal of Economic Perspectives*, 6,3: 79-100.
- Coase, Ronald H. 1937, "The Nature of the Firm", *Economica* 4: 386-405.
- 1988a, *The Firm the Market and the Law*, Chicago and London: University of Chicago Press.
- 1988b, 'The Nature of the Firm, 1. Origin, 2. Meaning, 3. Influence', *Journal of Law and Economics*, 4.
- Hayek, F. A. 1945, 'The Use of Knowledge in Society', *American Economic Review*, 35,4: 519-30.
- Langlois, R. N., Foss, N. J. 1999, 'Capabilities and Governance : The Rebirth of Production in the Theory of Economic Organization', *Kyklos*, 52,2 : 201-18.
- Langlois, R. N., Robertson, P. 1995, *Firms, markets and economic change: a dynamic theory of business institutions*, London: Routledge.
- Lavington, F. 1927, 'Technical influences on vertical integration', *Economica*, 7: 27-36.
- Loasby, B. L. 1990, "Firms, Markets, and the Principle of Continuity", in J. Whitaker (ed) *Centenary Essays on Alfred Marshall*, Cambridge: Cambridge University Press.
- Marshall, A. 1890, *Principles of Economics, Vol. I*, London: Macmillan.
- 1927[1919], *Industry and Trade*, London: Macmillan and Co.
- 1920, *Principles of Economics. An Introductory Volume*, London: Macmillan and Co.
- Penrose, Edith T. 1959, *The Theory of the Growth of the Firm*, Oxford: Basil Blackwell.
- Pigou, A.C. 1912, *Wealth and Welfare*, London: Macmillan.
- Polanyi, M. 1958, *Personal Knowledge*, Chicago: University of Chicago Press.
- Raffaelli, T. 2003, *Marshall's Evolutionary Economics*, London and New York: Routledge.
- Richardson, G.B. 1972, "The Organization of Industry", *Economic Journal*, 82: 883-96.
- Robertson, D. H. 1928, *The Control of Industry*, Cambridge: Cambridge University Press.
- Robinson, E. A. G. 1931, *The Structure of Competitive Industry*, Cambridge: University Press.
- Robinson J. 1933, *The Economics of Imperfect Competition*, London: Macmillan.
- Sargant Florence, P. 1933, *The Logic of Industrial Organization*, London: Kegan Paul.

- Simon, H. A. 1991. "Organizations and Markets", *Journal of Economic Perspectives*, 5,2: 25-44.
- Sraffa, P. 1926, 'The laws of returns under competitive conditions', *Economic Journal*, 36: 535-50.
- Stigler, 1951, 'The division of labor is limited by the extent of the market', *Journal of Political Economy*, 59,3: 185-93.
- Williamson, O. E. 1975, *Markets and hierarchies: Analysis and antitrust implications: A study in the economics of internal organization*. New York: Free Press
- 1981, 'The Modern Corporation: Origins, Evolution, Attributes', *Journal of Economic Literature*, 19: 1537-68.
 - 1985, *The Economic Institutions of Capitalism: Firms, Markets and Relational Contracting*, New York: Free Press.
- Young, A. A. 1913, 'Pigou's *Wealth and Welfare*', *Quarterly Journal of Economics*, 27: 672-86.
- (1928), 'Increasing returns and economic progress', *Economic Journal*, 38: 527-42.