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NOTE

Overcoming Cournot's Dilemma on Increasing Returns and Competition through an Integrated Perspective on the Firm[1)]

Mario MORRONI

Department of Economics, University of Pisa, Via Serafini 3, 56126 Pisa, Italy. E-mail: morroni@specon.unipi.it

Abstract

This paper shows that Cournot's dilemma on the incompatibility of increasing returns and competition can be resolved under a new integrated perspective that overcomes the traditional disjunction between scale, knowledge and transaction-cost analyses which have been developed within separate theoretical approaches. Taking into account, not only returns to scale, but also knowledge and transaction cost considerations helps to understand why, contrary to predictions, the tendency towards an increased dimension and monopoly may not operate in spite of the presence of significant economies of scale. It is argued that the boundaries of the firm are the result of the interplay and co-evolution of knowledge-, scale-scope- and transaction-based considerations. This dynamic interaction favours the emergence of a variety of organisational structures and the coexistence of different sizes even in the same sector of activity.

Keywords: transaction costs, capabilities, economies of scale.

Thanks to the advantages of falling costs, whoever starts out first in the market will run everybody else out of the … business. Does that mean that … monopolies are inevitable? If scale economies are so important, how do small firms manage to exist at all?

(Warsh, 2006, p. 46)

1. Introduction

This paper addresses Cournot's dilemma on the incompatibility of increasing returns and competition. Increasing returns to scale and competition are thought to be incompatible because, under increasing returns, the growth of a firm implies a rise in its efficiency which may lead it to dominate the entire market, driving all others out of a given sector. If, for one individual firm, average total cost decreases as the size increases, the tendency

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towards monopoly conditions appears inevitable.[2)]

As rightly noticed by Arrow (1979, p. 156), Cournot's "dilemma has been thoroughly discussed; it has not been thoroughly resolved." This paper shows that a solution to this dilemma may be found. Building on interesting insights provided by the recent literature on this issue,[3)] the paper shows that this longstanding conundrum may be resolved under a new integrated perspective of the boundaries of the firm, which overcomes the traditional disjunction between scale, knowledge and transaction-cost analyses that "developed in substantial isolation from each other."[4)]

The following section discusses the analytical context in which Cournot's dilemma originated. The last section presents a possible solution of this dilemma, examining how knowledge and transaction-based considerations help to understand why, contrary to predictions, the tendency towards an increased dimension and monopoly may not operate in spite of the presence of significant economies of scale. If productive and transactional knowledge are not full and free,[5)] the development of capabilities and transactional relations may boost the presence of a greater number of producers and may impede the tendency towards monopoly. The paper suggests that the boundaries of the firm cannot be attributed solely to one single cause, but in most cases are the result of the interplay and co-evolution of transaction, capabilities and scale-scope considerations. This dynamic interaction favours the coexistence of firms of different sizes even in the same sector of activity.

2. The Reconciliation Problem

Alfred Marshall remarked that "some, among whom Cournot himself is to be counted,"

[2)] Given the input prices, increasing returns bring about economies of scale that consist in a decrease in total average cost as the dimension of scale increases.

[3)] In the past years Cournot's dilemma has been discussed in some interesting articles published by *The Cambridge Journal of Economics* (see Prendergast, 1992; Hart, 1996; Niman, 2004). On this longstanding conundrum, see also Marchionatti (2006, p. 617 ff.) and Morroni (2006, pp. 253–256).

[4)] Jacobides and Winter (2011, p. 14) who refer to "the literature on capabilities and organizational economics (TCE [transaction costs economics] in particular)." We can add a third separate line of inquiry regarding the organisation of production and economies of scale and scope. An integrated analytical framework on the theory of the firm was presented in Morroni (2006, pp. 1–11, 177–188, 241–253, 256–262, 2007, 2011).

[5)] The concepts of productive and transactional knowledge are associated with Richardson (1972, pp. 888–889) and Coase (1937, pp. 38–40). These concepts derive from Knight's (1928, pp. 211–216, 225, 241–243, 311) conception of "judgement" as the formation of domain-relevant categories, which depends on the absence of known probabilities distributed over a closed set.

have considered internal economies "apparently without noticing that their premises lead inevitably to the conclusion that, whatever firm first gets a good start will obtain a monopoly of the whole business of its trade…" However, Marshall observed that this conclusion was challenged by empirical evidence showing that in numerous sectors of activity competition was thriving in spite of the presence of significant internal economies of scale.[6)]

Marshall attempted to reconcile increasing returns with competition on the basis of the life cycle of the representative firm and of a definition of competition that is far from the concept of perfect competition. His definition takes into account the existence of "particular markets" characterised by a decreasing demand curve for individual firms.

The representative firm is a "normal" firm in the sense that it is "managed with normal ability," and it "has normal access to the economies, external and internal, which belong to that aggregate volume of production" (Marshall, 1890, p. 265). Marshall maintains that in order to understand why increasing returns to scale are unlikely to result in monopolisation of an industry, it is necessary to consider that very few firms have a long-continued life of active progress because the degree of entrepreneurial inventiveness and energy is not constant over time. Accordingly, the tendency to monopoly is not inevitable because of the onset of diminishing returns in the life cycle of the firm (*op. cit.*, p. 379). In arguing that the life of a firm rarely lasts very long, Marshall uses the celebrated metaphor of the "tree in the forest."[7)] Moreover, he embraced a definition of competition based on freedom of entry. "Each firm—he writes—is likely to be confined more or less to its own particular market; and, … any hasty increase in its production is likely to lower the demand price in that market out of all proportion to the increased economies that it will gain" (*ibid.*).

[6)] Marshall (1890, pp. 378, 380 fn.1); cf. Cournot (1838, p. 96 ff.). Marshall's parenthetic remark, "apparently without noticing," has been judged puzzling because Cournot was, of course, perfectly aware that increasing returns imply the tendency towards monopoly. Marshall's words may be attributed, on the one hand, to a failure to consider the contradiction between the logical consequences of the theory and empirical evidence showing that increasing returns are widespread and, on the other, to the absence of investigation into the existence of forces that may counteract the tendency towards monopolisation. On this interpretation, see Hart (1996, p. 355, fn. 3).

[7)] Neil Hart observes that "from the 6th edition of Principles …, Marshall added a significant qualification to the 'tree in the forest' analogy by acknowledging the growing importance of joint-stock companies" without noticing, however, that 'the emergence of joint-stock companies substantially altered his general proposition.' "The forced recognition that the emerging joint-stock companies could escape the inevitable decay imposed by his life cycle analogy severely challenged the relevance of Marshall's solution to the reconciliation problem" (Hart, 1996, pp. 361, 366, *passim*).

As convincingly argued by Roberto Marchionatti, Marshall's attempt to solve Cournot's dilemma "prevented the theory of competition from having a precise setting and became unacceptable for the newer generation of economists" (Marchionatti, 2006, p. 619). For this reason, some of Marshall's followers and contemporaries tried to circumvent such a dilemma by referring to the role of external economies that derive from the development of trade and the growth of knowledge and equipment common to all firms operating in a sector of activity (*ibid*.). For instance, Pigou maintained that, if some external economies are common to all producers, "the presence of increasing returns in respect of all together is compatible with the presence of diminishing returns in respect of the special work of each severally. And this is sufficient to permit a stable equilibrium."[8] But although the concept of external economies was introduced by Marshall himself, it was used as a device to overcome Cournot's dilemma mainly by Pigou and other followers of Marshall, whilst it played only a very minor role in Marshall's own reconciliation exercise.[9]

In the 1920s, the developments of partial equilibrium analysis by Pigou, Edgeworth and others became the object of strong criticism and an intense debate known as the "cost controversy."[10] In particular, the use of the concept of external economies—as a device to overcome Cournot's dilemma and to reconcile increasing returns with competitive equilibrium—was criticised by several economists. First the consideration of economies external to the firms but internal to the industry appears as an expedient of "scarce practical relevance" that does not limit the development of internal economies of scale and therefore the tendency towards monopoly (Young, 1913). Secondly, the inability to incorporate the time irreversibility associated with external (and internal)

[8] Pigou, 1912, p. 177, quoted in Marchionatti (2006, p. 621). Cf. Pigou (1913, pp. 21–22)

[9] Hart (1996, pp. 353–354). A similar idea is expressed by Marchionatti (2006, p. 619), who notices that "Marshall did not introduce external economies mainly as a device to overcome the dilemma on increasing returns and competition, but some Marshall scholars (for example Stigler, 1941) disagree with this view." For a discussion on a different line of interpretation which instead assigns a key role to external economies in Marshall's analysis, see Prendergast (1992, p. 449).

[10] It should be noted that Marshall did not proceed to the analytical demonstration of short and long-run equilibrium. The demonstration was carried out for the first time by Edgeworth and Pigou on the basis of the law of variable proportions, considering the firm simply as a production function. This new approach abandons the detailed study of the relationship between organisation and efficiency, which was characteristic not only of the classical economists but also of Marshall's analysis itself. See, for instance, Moss (1984), Loasby (1988). On the "cost controversy" see references and discussion in Morroni (1998a, b); Marchionatti (2001, p. 43 ff., 2003, p. 49 ff.); Raffaelli (2003, pp. 113–114).

increasing returns challenged the viability of the static analysis of partial equilibrium. Thirdly, external economies appear inconsistent with the partial equilibrium framework, which is based on small changes in quantities produced, because they "are not likely to be called forth by small increases in production."[11)]

To conclude this section, it can be argued that within the static analysis of perfect competition, Cournot's dilemma is an unsolvable *impasse*, because in this analytical context the presence of *internal* increasing returns inevitably leads to monopoly.

3. A Possible Solution to the Dilemma within an Integrated Perspective

This section presents a solution to Cournot's dilemma whereby the incompatibility between increasing returns and competition contrasts with the empirical evidence that shows that internal economies of scale play an important role in many sectors of activity.[12)] Internal economies of scale are mainly due to the balancing of the various productive capacities of different production elements,[13)] the presence of fixed costs due to set-up processes, increasing division of labour, the three-dimensionality of space, reduction of heat losses and economies in holding reserves. Furthermore, knowledge characteristics and the presence of significant transaction costs may involve internal economies of scale and therefore may favour an increased dimension of individual firms.[14)] Growth of the firm may entail some economies which are due to the indivisibility of some unused resources or to some particular competence or market position that create a differential advantage in expanding the size of the firm.[15)]

If we leave out from the analysis the action of knowledge and transaction aspects and focus solely on the way internal economies of scale shape the growth of the firm, a precise evaluation of the role of internal economies may be hampered. The reason is that

[11)] Sraffa (1926, p. 540). As Prendergast (1992, p. 460) suggests, "Marshall himself seems to have been aware of this problem."

[12)] On this see Pratten (1988) and Martin (2003), who provide very useful surveys on empirical findings concerning economies of scale in various industries.

[13)] Economies of productive capacity balancing derive from the possibility that an increase in the whole process could bring about more efficient utilisation of the productive capacities of some inputs. Where there are indivisible and complementary inputs, bottlenecks in productive capacity may arise. These bottlenecks often lead to idle times and waste of the productive capacities of some devices or machines. Therefore, a high volume of production is often necessary to render their different productive capacities compatible.

[14)] On the analysis of these sources of economies of scale, see Morroni (2006, pp. 166–177).

[15)] Economies of this kind are available only during the growth of the firm and therefore disappear when the expansion has been completed (Penrose, 1959, pp. 99–101).

the effects of such economies on organisational boundaries may be positively or negatively influenced precisely by the above-mentioned excluded aspects, namely knowledge and transaction aspects. In contrast, if an integrated perspective on organisational boundaries is adopted, thereby including the knowledge or transaction aspects, then a better understanding of the role of the economies of scale may be gained. In so doing, this integrated perspective may also provide a solution to Cournot's dilemma, offering an explanation which reconciles internal economies of scale with competition and clarifies why internal economies do not necessarily lead to a monopoly.[16)]

3.1 An example

Let us consider the example of air craft production to demonstrate that economies of scale considerations are important but not sufficient to explain the size of the firm and the market structure.[17)] In the aircraft industry both engine suppliers and airframe producers enjoy significant economies of scale in manufacturing, R&D and marketing activities, originating from indivisibility and complementarity effects at the human capital and technical infrastructure level. Yet in spite of the fact that both sectors share the same conditions for economies of scale, they exhibit very different market structures. The production of commercial jet engines is characterised by "intense competition, a low level of concentration and strong instability of market shares," while airframe production has witnessed "a tremendous process of concentration" (Bonaccorsi and Giuri, 2003, pp. 52, 74). Therefore, the effect of economies of scale on market structure appears to be unimportant in the jet engine sector, but significant in the airframe sector.

Why is it that the presence of internal economies of scale has not led to a strong concentration or a monopoly in jet engine production? On the mere basis of scale considerations we cannot answer this question. In other words, by focusing exclusively on the phenomenon of economies of scale, it is impossible to pinpoint factors in this sector that prevent the occurrence of a shakeout pattern in which a large incumbent would be in a position to exploit economies of scale and thus to dominate the industry. To account for this divergent pattern between engine suppliers and aircraft manufacturers, the analysis must be broadened in order to include aspects linked to the

[16)] Note that the solution presented here revives, in a different analytical context, some of Marshall's insights on the firm's particular market, and also builds on the relationship between organisation and knowledge that could not find place within the Marshallian *vulgata* elaborated by Pigou and others, which forms the basis of the partial equilibrium analysis illustrated in all microeconomics textbooks.

[17)] This example is drawn from Morroni (2006, pp. 253–254).

development of technological knowledge and to transactions that take place within vertical relations among producers. The low concentration level in the production of jet engines is explained in terms of the multiple-sourcing strategy adopted by large aircraft manufacturers, who have an interest in entering into transactional relations with many engine suppliers so as to exploit different technical capabilities. In this case, supplier heterogeneity enhances the learning processes that strengthen the competitive advantage of the aircraft manufacturer, because each customer relation is a source of specific learning. Aircraft manufacturers "do not just demand products, but rather co-develop them" with suppliers, by looking for new solutions that integrate engine and airframe (Bonaccorsi and Giuri, 2003, pp. 79, 84). Multiple-sourcing strategy is allowed by the codificability of knowledge that characterises the relationship between engine suppliers and airframe producers.

Hence, this example indicates that taking into account not only internal economies of scale but also knowledge- and transaction-based considerations may offer a solution to the Cournot-Marshal dilemma regarding the incompatibility between competition and internal economies of scale.

3.2 Development of capabilities, heterogeneity in preferences, innovative activity, internal weaknesses and external counteracting forces

If productive and transactional knowledge are not full and free, the development of capabilities and of transactional relations may boost the presence of a greater number of producers and may impede the tendency towards monopoly that is held to spring from significant internal economies of scale. Exploitation of potential economies of scale is by no means instantaneous, but it is instead the fruit of an evolutionary path moulded by a learning process through which techniques are developed and adopted. The crucial point is that during the time span in which this growth process takes place, the possibility of increasing the size of the firm in order to reap economies of scale cannot be taken for granted, but depends on various factors, in particular:

a. The growth of the firm requires on the part of the firm the development of adequate capabilities.
b. The heterogeneity in customer preferences may entail the presence of diverse types of firms characterised by specific transactional relationships.
c. Innovative activity and learning processes may need a variety of technical and organisational structures.
d. Some internal weaknesses and external counteracting forces may arise, thus hampering the growth of the firm and contrasting the tendency towards monopoly

inherent in the presence of significant economies of scale.

Let us examine each of these four factors.

a) The development of capabilities

Capabilities and organisational structures co-evolve along the path of firm development. The process of growth of the firm takes time because firms have to develop the necessary capabilities both as a means to solve "problems of scaling up the processes of production"[18] and to create a demand for its commodities. For each given scale dimension achieved and technique that can be chosen by the production unit, there are different stages of the development of abilities that facilitate the use of specific machines and equipment. Moreover growth requires the expansion of the management team, the development of managerial capabilities and effort on the part of existing managers to train new managers. This takes time and entails adjustment costs. The rate at which the firm can develop its managerial capabilities sets a limit to its *rate* of growth (Penrose, 1959, pp. 46–49; Lockett *et al*., 2007, pp. 5–6). The growth of the firm is linked to the expansion of its market share within a given market or creation of a new demand, thereby enlarging the market extension. Often the opportunity to exploit potential economies of scale is boosted by the success of a specific product, which is linked to the capacity to create a competitive advantage by exploiting technological opportunities in complementary commodities, matching potential demand and changes in consumer tastes and habits.[19] When information asymmetries are present, the development of an integrated set of dynamic capabilities through learning becomes an important basis for competitive advantage and therefore constitutes the foundation for continuing growth (Chandler, 2005, pp. 6–10). Dynamic capabilities consist in the firm's ability to integrate, build and reconfigure internal and external knowledge in order to address rapidly changing environments.[20] The formation of new capabilities is made possible by developing or tracking down new abilities and skills which are generated by the ability to utilise outside knowledge (absorptive capacity) and by intensive outside-inside interaction. Coad and Rao (2007) and Hölzl and Friesenbichler (2007) provide evidence

[18] Chandler (1992, p. 84). It should be noted that capabilities are "knowledge how"; the standard notion of a production function defines the inputs involved and the proportions, but not *how* to combine them: the process is ignored. On the co-evolution of capabilities and structures, see Jacobides and Winter (2011, p. 3).

[19] See Rosenberg (1969, pp. 111–112) and Bianchi (1998, pp. 9–11).

[20] Teece, Pisano and Shuen (1997, p. 204) and Loasby (1998, p. 176). Knowledge-based considerations have recently been highlighted by Niman (2004, pp. 282–283) as a possible solution of Cournot's dilemma.

that learning processes—linked with investments in innovative activity and in product diversification—are of great importance for high-growth firms.

b) Heterogeneity in customer preferences and transactional relations

Heterogeneity in customer preferences—concerning output qualities, learning processes and sales assistance—may favour transactional relations with very diverse types of firms within the same sector of activity.[21] On the other hand, the presence of numerous small business organisations and start-up firms enhances the diversity of options and fosters the development of innovations that often lead to the introduction of new goods by manufactures before consumers have formulated any demand.[22] Moreover, the coexistence of several firms of contrasting sizes arises from the specific benefits inherent in the small scale of production, which allow a rather different relationship between manufacturers and customers in terms of contractual advantages, flexibility and learning opportunities.

The product of a large mass-production firm is very different from the analogous product supplied by a craftsman or by large-scale industrial flexible production. Thus in spite of the significant economies of scale that characterise mass production, so highly prized is individual crafting that in many activities handicrafts have never been completely supplanted by cheaper industrial production, having instead survived alongside it. Analogously, just as traditional artisan production was not ousted by the rise of mass production in the twentieth century, it seems likely that mass production itself will not be doomed as a result of flexible industrial production (on a large or small scale): rather, the different forms meet quite different needs.

c) Innovative activity

Innovative activity and learning processes may need heterogeneous abilities and a high degree of variety in technical and organisational structures. Innovative activities are favoured by the presence within the market of a myriad of small organisations that can generate diverse options. "When uncertainties are very high, as is inevitably the case with new technologies," the market place encourages exploration "along a wide variety of alternative paths."[23] Even if new business initiatives grounded on basic research are

[21] On the role of heterogeneity of demand and its effect on the industrial structure, see Bonaccorsi and Giuri (2003, pp. 59, 75 ff.).

[22] On this see Marshall's citation of Roscher describing creation of new goods by manufacturers before consumers have formulated any demand (Marshall, 1890, p. 234).

[23] Rosenberg (1996, p. 353; 2002, p. 36, *passim*). The selection process cannot operate in perfectly competitive markets because it requires a certain degree of variety on which to work (Loasby, 1999, pp. 23–24, 127).

generally carried out by large firms, it should not be overlooked that, in some new technologies, start-up firms have a prominent role in the development of innovations. To understand why this is so, it should be noted that creative and innovative activities can be favoured by the absence of rigid, authoritarian and hierarchical relationships, a circumstance that enhances diversity of options and tolerates variety.[24] "In exploring unknown territory to the goal of better technologies," "multiple sources of decision making" formed by numerous small business organisations are essential. This explains why innovations are often associated with multiple organisations or new entries to a field.[25]

Innovative activity broadens variety. Innovations are produced because firms deliberately seek a way of differentiating themselves from rivals and adapting to a changing external environment. Hence, variety derives from the purposeful ability to introduce a genuine new idea. Purposefulness plays a crucial role in the selection processes that take place in a social context. Variety and diversity constitute a general condition both for the growth of knowledge and for profit.[26]

There is thus a *two-way relationship* between innovative activity and heterogeneous abilities. Innovative activity may create asymmetric information and heterogeneous abilities possessed by individuals. On the other hand, heterogeneous abilities explain why individuals may have a different propensity or ability to innovate.

In some cases, new technology allows a high degree of flexibility in large-scale production, while in other cases it encourages the economic potential of small firms or production units. This results in the presence of a variety of technical and organisational structures in different industries. Moreover, the "locality of learning" and the "opaqueness" of the environment imply the persistence of different organisational forms and sizes among firms, and the coexistence of diverse hybrid arrangements operating in the same sector of activity (Coriat and Dosi, 1998, p. 112; and Ménard, 2004, pp. 369–370).

d) Internal weaknesses and external counteracting forces

The exploitation of potential economies of scale through continuous expansion of the organisational boundaries may encounter setbacks because of internal weaknesses and

24) Rosenberg (1990, p. 168). On innovation and decreasing returns to hierarchy, see Screpanti (2001, pp. 239–241, 249–250).

25) Rosenberg (2002, p. 36, *passim*). See also Loasby (1995, p. 472; 1999, p. 27).

26) Loasby (1999, p. 94; 2002, p. 1234) and Saviotti (1996, pp. 42, 111). For a discussion on the tendency to variation as "a chief source of progress" in Marshall, see Loasby (1999, pp. 93–94).

external difficulties.

As far as internal weaknesses are concerned, firms may be affected by misperception and errors. Unclear allocation of rights and responsibilities tends to make decision-making mechanisms inefficient. Furthermore, as the firm grows, top management may lose touch with events affecting day-to-day decisions. This can cause problems in vertical communication within organisations, leading to decreased efficiency and efficacy, and resulting at times in quid pro quos between managers and subordinates. In addition, difficulty in establishing rewards and focusing incentives may pave the way to shirking, high coordination, monitoring and control costs, influence activities, collusion, subverted inspections, parochial interests and unimplemented decisions. If increasing coordination and control difficulties are encountered due to mounting organisational complexity, then it may prove necessary for a rising share of the labour force to be dedicated to administration, engendering growing burdens of bureaucracy as a firm grows larger.[27] Finally, the firm's growth process is generally characterised by changes that typically involve transformations in the organisational set-up and the power structure, but this may meet with resistance on the part of some members of the firm who are unwilling to accept or strongly oppose any modification in the existing equilibria. For instance, the owners of the physical assets or the top managers may have no interest in the growth of the firm if this implies the development of capabilities beyond their control and hence an alteration of power relationships.

The management may make erroneous decisions because of various forms of cognitive inertia and myopia. Ignoring some variables and applying routinised operating procedures greatly simplifies decision-making, but cannot avert the risk that the routines adopted could turn out to be inefficient because their domain of validity may have been overstepped. Erroneous decisions may be due to the tendency to adopt routinised operating procedures that have proved efficacious in the past, extending them "beyond their original domain" in which they had been tested.[28] Temporal myopia implies the tendency to privilege the short run and to disregard the distant future. Spatial myopia consists in ignoring changes in environmental conditions. Failure myopia involves

[27] On these typical inefficiencies within organisations, see Hart (1989, p. 131 ff.), Holmström and Tirole (1989, p. 63 ff.), Putterman and Kroszner (1996, p. 1 ff.) and Baker *et al*. (2002, p. 39 ff.).

[28] Egidi (2002, pp. 109–110). The experimental results offered by Egidi and Narduzzo (1997, p. 678 ff.) support this view. As we have seen above, routines are source of inefficiency as circumstances change, however their virtue is that they eliminate the need for cognitive operations and facilitate coordination. Economising cognitive resources is a classic Simon's theme, ignored in most economic analysis, but not by Smith and Marshall.

neglecting the possibility of failure and overestimating the possibility of success. (Levinthal and March, 1993, p. 95 ff.).

With regard to external counteracting forces, full exploitation of economies of scale of an individual firm may be impeded if the increase in the market share of an individual firm is slowed down by the competition of incumbent firms or new entrants, who successfully develop new capabilities and are adept in arranging transactional relations. During the process of the firm's expansion, competitors may develop different capabilities and exploit potential economies of scale as well. Incumbent competitors may establish transactional relations with costumers and such relations may become rather stable over time because of acquaintance relationships, the existence of distribution networks, fidelity to a certain trade mark, consumption habits, or lack of information regarding the value for price of new products.

4. Conclusions

The upshot of the competitive process is affected by the features of management of the various firms involved. The management's ability to seize opportunities for growth and to thwart countervailing forces is characterised by a subjective dimension which moulds the firm's evolutionary path and yields a large variety of outcomes.[29] This evolutionary path takes shape by means of adjustments that occur day by day and which are cumulative, partially irreversible and specific to one business organisation. The firm's revealed performance, size and boundaries must be regarded as "time- and path-dependent" (non-path-determined) phenomena constantly influenced not only by the various basic conditions but also by the specific manner in which the different stakeholders' interests are weighed in decisions.[30] Different behaviour and strategies are determinants of firms' differential in revealed performances. For these reasons, distinct organisational structures and firms of different sizes can live side by side even in the same sector of activity. Indeed, in industrial countries, firms exhibit a very wide range of possible property and financial structures, hierarchical set-ups, incentive and control structures, size and market power, arrangement of production processes, degree of

[29] On the logical impossibility of determining the *optimum size* of the firm, see Georgescu-Roegen (1964, p. 296), Morroni (1992, pp. 141–142), Penrose (1995, p. xii) and Foss (2002, p. 153).

[30] Basic conditions concern: the characteristics of information and knowledge, the characteristics of techniques and equipment, individual motivations and aims, individual abilities, the degree of uncertainty, structural change, institutional and market conditions. On these conditions, which influence the behaviour and performance of the firms, see Morroni (2006: chap. 1).

vertical integration and organisational features.[31)]

This huge variety suggests that there is an unavoidable subjective element concerning the way in which the firm's management is able and willing to grasp opportunities for growth deriving from the interplay between knowledge-, scale- and transaction-based considerations. In this respect, analysis of the connections between the three above-stated aspects of organisational coordination entails a new perspective that offers a rich agenda for future theoretical and empirical research.

References[32)]

Arrow, K. J. (1979) "The division of labor in the economy, the polity, and society," in G. O'Driscoll (ed) *Adam Smith and Modern Political Economy,* The Iowa State University Press, Ames, Iowa, pp. 153–164.

Baker, G., R. Gibbons and K. J. Murphy (2002) "Relational contracts and the theory of the firm," *The Quarterly Journal of Economics* 117.1: 39–84.

Bianchi, M. (ed) (1998) *The Active Consumer. Novelty and Surprise in Consumer Choice*, Routledge, London.

Bonaccorsi, A. and P. Giuri (2003) "Increasing returns and network structure in the evolutionary dynamics of industries," in P. P. Saviotti (ed) *Applied Evolutionary Economics*, Elgar, Cheltenham, pp. 50–93.

Chandler, A. D. Jr. (1992) "Organizational capabilities and the economic history of the industrial enterprise," *Journal of Economic Perspectives* 6.3: 79–100.

——— (2005) *Shaping the Industrial Century. The Remarkable Story of the Evolution of the Modern Chemical and Pharmaceutical Industries*, Harvard University Press, Cambridge, Mass.

Coad, A. and R. Rao (2007) "Innovation and firm growth in high tech sectors: a quantile regression approach," LEM Working Papers Series, 2006/18, June 2007.

Coase, R. H. (1937) "The nature of the firm," *Economica*, November: 386–405. [Reprinted in R. H. Coase (1988) *The Firm, the Market and the Law*, The University of Chicago Press,

[31)] Size of the firms ranges, even in the same sector, from very small businesses to giant companies with hundreds of thousands of employees. In the last two decades contrasting tendencies, with regard to integration and concentration processes, have emerged. High levels of merger and acquisition activity have coexisted with a trend in the opposite direction towards contracting out. The growth of giant firms has been based on horizontal expansion and diversification, and increasing concentration has been balanced by a tendency towards outsourcing and by new entries. On this see Holmström and Roberts (1998, pp. 73, 80, 83–89); Damiani and Pompei (2011, p. 1 ff.).

[32)] Pages quoted in the text always refer to the original edition unless the reprint or the translation date is indicated in the references between square brackets.

Chicago and London, pp. 33–55.]

Coriat, B. and G. Dosi (1998) "Learning how to govern and learning how to solve problems: on the coevolution of competences, conflicts and organizational routines," in D. Jr. Chandler, P. Hagström and Ö. Sölvel Chandler (eds) *The Dynamic Firm: The Role of Technology, Strategy, Organization, and Regions*, Oxford University Press, Oxford. [Reprinted in 1999, pp. 103–133.]

Cournot, A. (1838) *Recherches sur les Principes Mathématiques de la Théorie des Richesses* (in French), Hachette, Paris. [New edition with Appendices by L. Walras, J. Bertrand and V. Pareto (1938) Introduction and notes by G. Lutfalla, Librairie des Sciences Politiques et Sociales M. Rivière, Paris. English translation by N. T. Bacon (1897/1927), *Researches into the Mathematical Principles of the Theory of Wealth*, Macmillan, New York. [Reprinted in 1971, A. M. Kelley, New York.]

Damiani, M. and F. Pompei (2011) "The market for corporate control: do countries and technological regimes matter?, *International Review of Applied Economics* May: 1–27.

Egidi, M. (2002) "Biases in organizational behavior," in M. Augier and J. G. March (eds) *The Economics of Choice, Change and Organization. Essays in Memory of Richard M. Cyert*, Elgar, Cheltenham, pp. 109–146.

——— and A. Narduzzo (1997) "The emergence of path-dependent behaviors in cooperative contexts," *International Journal of Industrial Organization* 15.6: 677–709.

Foss, N. J. (2002) "Edith Penrose: economics and strategic management," in C. Pitelis (ed) *The Growth of the Firm. The Legacy of Edith Penrose*, Blackwell, Oxford, pp. 147–164.

Georgescu-Roegen, N. (1964) "Measure, quality and optimum scale," in C. R. Rao (ed) *Essays in Econometrics and Planning*, Pergamon Press, Oxford, pp. 231–236. [Reprinted in N. Georgescu-Roegen (1976) *Energy and Economic Myths. Institutional and Analytical Economic Essays*, Pergamon Press, New York, pp. 271–296.]

Hart, N. (1996) "Marshall's theory of value: the role of external economies," *Cambridge Journal of Economics* 20: 353–369.

Hart, O. (1989) "An economist's perspective on the theory of the firm," *Columbia Law Review*, 89: 1757–1774. [Reprinted in N. J. Foss (ed) (2000) *The Theory of the Firm. Critical Perspectives on Business and Management* (*Vols. 4*), *Vol. I*, Routledge, London, pp. 130–147.]

Holmström, B. R. and J. Roberts (1998) "The boundaries of the firm revisited," *Journal of Economic Perspectives* 12.4: 73–94.

——— and J. Tirole (1989) "The theory of the firm," in R. Schmalensee and R. D. Willig (eds) *Handbook of Industrial Organization*, *Vols. 2*, Elsevier, Amsterdam, pp. 63–133. [Reprinted in N. J. Foss (ed) (2000) *The Theory of the Firm. Critical Perspectives on Business and Management* (*Vols. 4*), *Vol. I*, Routledge, London, pp. 148–219.]

Hölzl, W. and K. Friesenbichler (2007) "Are gazelles more innovative than other firms?" WIFO,

Vienna (unpublished).

Jacobides, M. G. and S. G. Winter (2011) "Capabilities: Structure, Agency and Evolution," *Organization Science Special Issue* (forthcoming).

Langlois, R. N. (1999) "Scale, scope and the reuse of knowledge," in S. C. Dow and P. E. Earl (eds) *Economic Organization and Economic Knowledge. Essays in Honour of Brian J. Loasby*, *Vol. I*, Elgar, Cheltenham, pp. 239–253.

Levinthal, D. A. and J. March (1993) "The myopia of learning," *Strategic Management Journal* 14: 95–112. [Reprinted in N. Lazaric and E. Lorenz Lazaric (eds) (2003) *Knowledge, Learning and Routines. Vol. I. Knowledge and Learning*, An Elgar Reference Collection, Critical Studies in Economic Institutions, Cheltenham, pp. 530–547.]

Loasby, B. J. (1988) "Knowledge and organisation. Marshall theory of economic progress," *Marshall Studies* no. 3, July, Department of Economics, University of Florence, pp. 1–21.

——— (1995) "Running a business: an appraisal of economics, organization and management by Paul Milgrom and John Roberts," *Industrial and Corporate Change* 4.2: 471–489.

——— (1998) "The concept of capabilities," in N. J. Foss and B. J. Loasby (eds) *Economic Organisation, Capabilities and Coordination: Essays in Honour of G. B. Richardson*, Routledge, London, pp. 163–182.

——— (1999) *Knowledge, Institutions and Evolution in Economics*, *The Graz Schumpeter Lectures*, *no. 2*, Routledge, London.

——— (2002) "The evolution of knowledge: beyond the biological model," *Research Policy* 31.89: 1227–1239.

Lockett, A., J. Wiklund, and P. Davidsson (2007) "Organic growth and acquisitive growth: Re-examining and extending Penrose's growth theory," in G. Solomon (ed) *Academy of Management 2007 Annual Meeting: Doing Well By Doing Good*, 3–8 August 2007, Philadelphia.

Marchionatti, R. (2001) "Sraffa and the criticism of Marshall in the 1920s," in T. Cozzi and R. Marchionatti (eds) *Piero Sraffa Political Economy. A Centenary Estimate*, Routledge, London, pp. 43–80.

——— (2003) "On the methodological foundations of modern microeconomics: Frank Knight and the 'cost controversy' in the 1920s," *History of Political Economy* 35.1: 49–75.

——— (2006) "The 'increasing returns and competition' dilemma: from Marshall to Pigou" in T. Raffaelli *et al*. (eds) *The Elgar Companion to Alfred Marshall*, Edward Elgar, Cheltenham, pp. 617–624.

Marshall, A. (1890/1920) *Principles of Economics*, 8th ed., Macmillan, London. [Reprinted in 1990.]

Martin, S. (2003) "Globalization and the natural limits of competition" (preliminary version, March), Department of Economics, Krannert School of Management, Purdue University, Purdue, Indiana.

Ménard, C. (2004) "The economics of hybrid organizations," *Journal of Institutional and Theoretical Economics* 160.3: 345–376.

Morroni, M. (1992) *Production Process and Technical Change*, Cambridge University Press, Cambridge.

——— (1998a) "Decreasing returns," in H. D. Kurz and N. Salvadori (eds) *Elgar Companion to Classical Economics* (*Vols. 2*), *Vol. I*, Elgar, Cheltenham, pp. 209–212.

——— (1998b) "Increasing returns," in H. D. Kurz and N. Salvadori (eds) *Elgar Companion to Classical Economics* (*Vols. 2*), *Vol. I*, Elgar, Cheltenham, pp. 399–405.

——— (2006) *Knowledge, Scale and Transactions in the Theory of the Firm*, Cambridge University Press, Cambridge.

——— (2007) "Complementarities among capability, transaction and scale-scope considerations in determining organizational boundaries," *Technology Analysis & Strategic Management* 19.1: 31–44.

——— (2011) "New insights on the interaction between transaction costs and capabilities considerations in shaping organisational boundaries," *Discussion Papers* No. 113, Department of Economics, University of Pisa.

Moss, S. (1984) "The history of the theory of the firm from Marshall to Robinson and Chamberlain: the source of positivism in economics," *Economica* 51: 307–318. [Reprinted in N. J. Foss (ed) (2000) *The Theory of the Firm. Critical Perspectives on Business and Management* (*Vols. 4*), *Vol. I*, Routledge, London, pp. 101–114.]

Niman, N. B. (2004) "The evolutionary firm and Cournot's Dilemma," *Cambridge Journal of Economics* 28.2: 273–289.

Penrose, E. (1959) *The Theory of the Growth of the Firm*, Blackwell, Oxford. [3rd ed., Oxford University Press, Oxford, 1995.]

——— (1995) "Foreword to the third edition" of Penrose (1959), pp. ix–xxiii.

Pigou, A. C. (1912) *Wealth and Welfare*, Macmillan, London.

——— (1913) "The interdependence of different sources of demand and supply in a market," *The Economic Journal* 23.89: 19–24.

Pratten, C. F. (1988) *A Survey of the Economies of Scale*, Economic Papers, Commission of the European Communities, Brussels.

Prendergast, R. (1992) "Increasing returns and competitive equilibrium—the content and development of Marshall's theory," *Cambridge Journal of Economics* 16: 447–462.

Putterman, L. and R. S. Kroszner (1996) "The economic nature of the firm: an new introduction," in L. Putterman and R. S. Kroszner (eds) *The Economic Nature of the Firm. A Reader*, Cambridge University Press, Cambridge, pp. 1–31.

Raffaelli, T. (2003) *Marshall's Evolutionary Economics*, Routledge, London.

Richardson, G. B. (1972) "The organisation of Industry," *The Economic Journal* 82.327: 883–896.

Rosenberg, N. (1969) "The direction of technological change: inducement mechanisms and focusing devises," *Economic Development and Cultural Change*. [Reprinted in N. Rosenberg (1976), *Perspectives on Technologies*, Cambridge University Press, Cambridge, pp. 108–125.]

——— (1990) "Why do firms do basic research (with their own money)?," *Research Policy* 19: 165–174.

——— (1996) "Uncertainty and technological change," in R. Landau, T. Taylor and G. Wright (eds) *The Mosaic of Economic Growth*, Stanford University Press, Stanford, pp. 334–353.

——— (2002) "America's University/Industry Interfaces: 1945–2000," Department of Economics, Stanford University (unpublished).

Saviotti, P. P. (1996) *Technological Evolution, Variety and the Economy*, Elgar, Cheltenham.

Screpanti, E. (2001) *The Fundamental Institutions of Capitalism*, Routledge, London.

Sraffa, P. (1926) "The law of returns under competitive conditions," *The Economic Journal* 36.144: 535–550. [Reprinted in H. D. Kurz and N. Salvadori (eds) (2003) *The Legacy of Piero Sraffa, Vols. 2, Intellectual Legacies in Modern Economics, An Elgar Reference Collection*, Cheltenham, pp. 44–59.]

Stigler, G. J. (1941) *Production and Distribution Theories*, Macmillan, New York.

Teece, D. J., G. Pisano and A. Shuen (1997) "Dynamic capabilities and strategic management," *Strategic Management Journal* 18.7: 509–533. [Reprinted in D. J. Teece (1998) *Strategy, Technology and Public Policy. The Selected Papers of David J. Teece. Vol. 2*, Elgar, Cheltenham, pp. 197–221.]

Warsh, D. (2006) *Knowledge and the Wealth of Nations*, W. W. Norton & C., New York.

Young, A. A. (1913) "Pigou's Wealth and Welfare," *Quarterly Journal of Economics* 27: 672–686.