INCENTIVE-BASED AND KNOWLEDGE-BASED THEORIES OF THE FIRM: SOME RECENT DEVELOPMENTS°

Nicola Meccheri, Mario Morroni***

Abstract

The article presents a critical review of the advances made in incentive-based and knowledge-based theories of the firm. In particular, the authors explore some developments in the incentive-based approach regarding relational contracts and contracts as "reference points", while the evolution of knowledge-based theories has led us to focus on the interesting implications of the concept of dynamic capabilities. Finally, we investigate some recent attempts to bridge these two main research streams, which have long been considered to clash with rather than complement each other.

Keywords: theory of the firm, contracts, incentives, transaction costs, knowledge

Parole chiave: teoria dell'impresa, contratti, incentivi, costi di transazione, conoscenza

Jel Classification: D21, D23

Received: 29.5.2010
Final revision received: 17.6.2010

° The authors wish to thank the participants of the *SIEPI* annual workshop, held in Alessandria in January 2010, and of the *STOREP Annual Conference*, held in Trento in June 2010 for their helpful comments. We would also like to thank Francesco Silva and Nicola Giocoli for their useful criticisms and suggestions. Usual disclaimers apply.
* Università di Pisa, Dipartimento di Scienze Economiche; meccheri@ec.unipi.it.
** Università di Pisa, Dipartimento di Scienze Economiche; morroni@specon.unipi.it.

Economia e Politica Industriale - Journal of Industrial and Business Economics
2010 vol. 37 (3): 69-91

Introduction

The aim of this article is to present a critical review of the recent advances made in the economics of the firm. Why do firms exist and what determines their boundaries are key questions in economic theory, industrial organization and management strategy. These issues were addressed first by Coase (1937) in his classic groundbreaking article "The nature of the firm". Initially, few economists took Coase's question seriously, but its importance as a research topic has increasingly been recognised. Indeed, Coase's argument regarding the emergence of firms in response to the inefficiencies arising from transaction and contracting costs is a fundamental cornerstone, but has left open several related issues. The recent literature, which has sought to analyze these issues, can be roughly divided into two main strands: the incentive-based and the knowledge-based perspectives. A particular feature of this article is that it considers both streams of research. The incentive-based theories see firms as organizations that provide efficient solutions to contract incompleteness caused by informational problems arising from knowledge asymmetries among contractual parties. In contrast, knowledge-based theories see firms as organizations that produce, store, and use knowledge to create and sustain a competitive advantage in response to the incompleteness of technical and productive knowledge. One basic difference that distinguishes these two main research streams is that, in incentive-based theories, asymmetric information does not prevent agents' farsightedness, while, in knowledge-based theories, technical and productive abilities are not homogeneous across organizations and agents are generally characterized by myopia and other significant cognitive anomalies. Obviously, divergent assumptions on the agents' cognitive abilities strongly affect the results of the analysis.

Let us insert some caveats. First, the paper concentrates on organizational boundaries and does not consider, except incidentally, related topics in organizational economics, such as authority and delegation in hierarchical organizations (see Garrouste and Saussier, 2005). Second, we focus exclusively on theories.[1] Finally, this essay is not an exhaustive survey of the extensive literature on the economics of the firm. Indeed, we discuss some novel contributions within the incentive-based and knowledge-based theories that, in our opinion, deserve particular attention.

The remainder of the article is organized as follows. Section 1 outlines recent advances in the incentive-based strand, with particular reference to two theoretical approaches based on contractual peculiarities: relational contracts

1. For extensive surveys of empirical evidence about theories of the firm see, for instance, Klein, 2005; Carter and Hodgson, 2006; Lafontaine and Slade, 2007.

and contracts as "reference points". Section 2 presents recent developments in the knowledge-based theories. Finally, section 3 concludes by taking into account some interesting convergence processes between incentive-based and knowledge-based perspectives.

1. Relational contracts, reference points and the theory of the firm

Before discussing the recent advances in relational contracts and contracts as "reference points", let us consider briefly the state of the art of incentive-based theories at the end of the 1990s from which these two developments originate. A common tenet of the incentive-based view is that the decision to carry out a transaction through the market or inside a firm (in other words, the decision on the scope of a firm's boundaries) is a matter of economic efficiency. This is because it affects economic agents' incentives in a world characterized by opportunism and contractual incompleteness where, as a consequence, hold-up and moral hazard problems are pervasive. In this line of thought, three main theoretical frameworks dominated the scene at the end of the 1990s:

a. the transaction costs economics, mainly due to the works of Oliver Williamson;[2]
b. the property rights theory of the firm, also known as the Grossman-Hart-Moore model;[3] and
c. the theory of the firm as an incentive-system.[4]

While certain aspects of these three frameworks are similar, they also present significant differences. In particular, although the property rights theory was sometimes considered as a formalization of transaction costs economics, the two theories have different and often conflicting implications.[5] Moreover, although in the mid-1990s the property rights theory became the reference model in the mainstream theory of the firm, subsequent contributions have

2.Williamson, 1975, 1985. See also Klein, Crawford and Alchian, 1978.

3. Grossman and Hart, 1986; Hart, 1995; Hart and Moore, 1990.

4. See, in particular, Holmstrom, 1999; Holmstrom and Milgrom, 1991, 1994; Holmstrom and Tirole, 1998. We do not consider here important contributions, such as "the nexus of contracts" view (Alchian and Demsetz, 1972; Jensen and Meckling, 1976) and theory of "corporate culture" (Kreps, 1990). The former has served as important background for further developments, but has presented some analytical difficulties in providing a convincing theory of the firm. For a critical assessment on this, see Hart (1989) and Holmstrom (1999) who compare the "nexus of contracts" view with the property rights theory. On the other hand, the theory of "corporate culture", even if somewhat related to the theories we refer to, does not directly deal with the issue of the boundaries of the firm.

5. See, in particular, Gibbons, 2005; Whinston, 2001, 2003; and Williamson, 2000 for a broad analysis of this point.

highlighted some weaknesses. Perhaps the most prominent is that, assuming sole proprietorships, i.e. business entities owned and run by single managers, it offers a theory of individual ownership of assets, but does not explain why firms own assets (Holmstrom, 1999). Further, considering ownership and control as synonymous, it fails to analyze the role played by agency considerations in defining the optimal firms' boundaries (Bolton and Scharfestein, 1998; Holmstrom and Roberts, 1998). The theory of the firm as an incentive system (IST) by Holmstrom and others provides its most valuable contribution on precisely this point, which has been developed by the recent literature on relational contracts.

Below, we present and discuss two recent theoretical advances in the three dominant theories outlined above, highlighting the major novelties.

1.1. Relational contracts

In the theory of the firm based on relational contracts, Baker, Gibbons and Murphy extend previous works in various directions.[6] First, as in the theory of the firm as an incentive system, they consider incentive problems related to multi-tasking and performance-measuring issues, but with two major distinctions:

a. incentive contracts are implicit, or informal, while the theory of the firm as an incentive system considers formal (incomplete) incentive contracts; and
b. the framework is dynamic (instead of static), in which parties' transactions repeat and evolve over time.

Second, while in transaction costs economics Williamson argues that markets essentially rely on formal contracts (i.e. enforceable by courts) and that firms may use relational contracts to overcome some of the difficulties inherent in formal contracts,[7] by contrast, the relational contracts theory of the firm emphasizes that informal agreements can be crucial between as well as within firms.[8]

6. See Baker, Gibbons and Murphy, 2001, 2002, 2008; see also Halonen, 2002.
7. See Williamson, 1975; Williamson, Wachter and Harris, 1975. The idea of relational contracts is built on the early work of Simon (1951). Also Blau and Scott (1962, p. 6) pointed out that «It is impossible to understand the nature of a formal organization without investigating the networks of informal relations and the unofficial norms as well as the formal hierarchy of authority and the official body of rules, since the formally instituted and the informal emerging patterns are inextricably intertwined».
8 Klein (1996) had already emphasized that relational contracts *between* firms often supplement incomplete explicit contracts and a shock may cause one firm to renege on the relational contract. However, he did not analyze how integration decision may affect the possibility of making an informal agreement self-enforceable, which is instead the key-element of the relational contracts theory of the firm.

Technically speaking, a relational contract is an informal or implicit agreement that cannot be enforced by a third party, such as a court. In many situations, relational contracts may outperform formal agreements. For instance, a relational contract may allow the parties to use their detailed knowledge and to adapt to new contingencies as soon as they become known, even when such information is not promptly verifiable by a court. However, because relational contracts cannot be enforced by courts, they must be *self-enforcing* to be effective: in order to provide parties with incentives to fulfil informal agreements, the contract must be designed so that the value of continuing the relationship in the future is sufficiently large that neither party wishes to renege on the contract (e.g. Bull, 1987). In this context, the main contribution offered by the relational contracts theory of the firm is to show that the choice of integration vs. non-integration, or of make vs. buy, matters. In other words, in certain settings, integration may support a "better" relational contract than non-integration, while in other settings the reverse holds true.

In order to describe this result in greater detail, consider the usual transaction between a buyer, B, and a seller, S. In this case, a convenient way to think of the relationship is that of an upstream party (the seller) that must provide a downstream party (the buyer) with an intermediate item (that, possibly, the downstream party uses to produce a final output). Similar to the theory of the firm as an incentive system, let's assume that, in order to produce, B uses an asset (e.g. production equipment) and must choose an effort (or action) e, which is multi-dimensional and cannot be verified by a court. Define as V the value of the relationship, when S provides the intermediate item to B. However, there is now also the possibility that, once the intermediate item is produced, it is sold to someone else in the market. This possibility depends on the ownership of the asset because it is assumed that ownership of the asset conveys ownership of the intermediate item produced using the asset. Thus, if S owns the asset, he/she has the right to choose between providing the item to B or selling it in the market, while if B owns the asset (the item), he/she can prevent S from dealing with outside customers. Note that these two different situations represent, respectively, the cases of non-integration, in which S is an independent contractor, and integration, in which S is an employee of B. Define as R the value of the alternative use of the item in the market (or S's opportunity cost of providing the item to B, when S owns the asset) and assume that $V > R$, that is the value of trading the item inside the relationship, always exceeds that in the alternative use. This could be related to the presence of some asset specificities (e.g. the asset has been specialized to meet B's needs).

Note that the scenario described above produces a situation in which the efficient solution implies both:

a. since $V > R$, S and B always trade with one another, and
b. since V depends on S's effort, e must be chosen efficiently by S (define as e^* S's first-best effort and as V^* the corresponding value created inside the relationship).

In order to motivate S to choose e^*, the parties may agree on a contract providing that B pays S an additional bonus contingent to e^*. This contract, however, is assumed to be informal (not verifiable by a court), hence there is always the hazard that B reneges on the promised bonus even if S chooses e^*. Indeed, in a static framework, this would be the most obvious result, but, as is well known, repeating the relationship over time opens up the possibility that the cooperative solution realizes. Now, however, the asset's ownership plays a role. Indeed, B's temptation to renege on the promised bonus is stronger under integration (B owns the asset) since he/she can simply take the item without paying the bonus to S. Thus, self-enforcing B's promise to pay a bonus is more complex under integration than non-integration (in which S may refuse to sell the item to B if the latter does not pay the bonus). However, under non-integration (S owns the item) there is the opportunity for S to take an action $e \neq e^*$ that increases R, the alternative use value of the item, so as to increase his/her bargaining power vis-à-vis B and collect a greater share of V, even if this implies $V < V^*$.[9] Therefore, we obtain a trade-off: in some settings, the first of the above considerations prevail, so integration is more efficient; in others, the second dominates, so non-integration is optimal.

The presentation provided above, albeit very basic, enables us to pinpoint its prominent aspects and the main novelties introduced since the earlier literature. First, hold-ups are possible within as well as between organizations. While actions to increase the surplus share appropriated through bargaining represents the typical hold-up between independent contractors, the main focus of the previous literature, reneging on promised bonuses is just one possible example of hold-ups within firms. Other possible examples may concern promotions, task allocation, capital allocation, internal auditing transfer payments, and so on. Second, the theory highlights that «the formal governance structure should be chosen not only for its own impacts but also for how it affects the feasible set of relational contracts» (Gibbons, 2005, p. 237). Formal and informal structures not only coexist but also interact and this creates another opportunity to choose the former to facilitate the latter. Hence, a broader understanding of the nature and the functioning of the firm must take this aspect into account. Finally, this opens up new opportunities to study non-traditional (or "hybrid") organizational forms, such as joint ventures, strategic alliances, networks, business groups, and so on, since, in many situations, these non-standard organizational forms can take advantage, much better than traditional ones (i.e. markets and hierarchies), of the benefits

9. Thus, not only the size of the incentive to renege but also the identity of the party tempted to renege depends on who owns the asset.

that derive from the interplay between formal structures and informal (relational) contracts. In particular, this issue is analyzed in detail by Baker, Gibbons and Murphy (2008), who show that different possible hybrid forms could be optimal in a one-shot interaction and that the possibility of future interaction modifies the nature of these governance structures in ways that alter the optimal organizational form and the management challenges faced.

1.2. Contracts as "reference points"

As discussed extensively in the literature (e.g. Gibbons, 2005; Williamson, 2000), the dominant property rights theory approach always leads to ex post efficiency and the focus of the analysis is on inefficiencies in ex ante investments. This approach, however, is restrictive: particularly, the assumption that parties, using side payments, always bargain ex post with no costs seems a poor description of what happens inside firms. Many decisions made in a firm will be carried out without consultation or negotiation with other firms even when these decisions have a major impact on the other firms. In other words, nowadays it is widely recognized that a theory of ex post inefficiencies is needed in order to provide a more solid theory of the firm, as well as of other related aspects such as firms' organizational forms (i.e. authority, hierarchy and delegation). There are different ways to abandon the ex post efficiency assumption. The most drastic is to assume that some decisions are not contractible either ex ante or ex post but that the control over them can be transferred with ownership. Several recent articles explore firm boundaries (and internal organization) adopting this idea.[10] Another possibility, on which we will concentrate below, is to introduce behavioural considerations into the analysis, referring to the concept of "contracts as reference points", as in the most recent works on the boundaries of the firm by Hart, Moore and Holmstrom.[11] According to this approach, initial (incomplete) contracts circumscribe or delineate parties' senses of entitlements, possibly because the latter have been negotiated under competitive conditions. Parties do not feel entitled to outcomes not provided by the contract but, if the contract is sufficiently open-ended (or flexible), they may have different views of what they are entitled to within the contract. More specifically, each side may interpret the contract in a way that is most favourable to him/her. When he/she does not get his/her most favoured outcome within the contract, he/she feels aggrieved and shades in the

10. See, for instance, Aghion, Dewatripont and Rey, 2004; Alonso, Dessein and Matouschek, 2008; Baker, Gibbons and Murphy, 2008; Mailath, Nocke and Postlewaite, 2004; Rantakari, 2008.
11. Hart, 2008, 2009; Hart and Moore, 2007; Hart and Holmstrom, 2010.

contract's execution by performing in a perfunctory rather than a consummate fashion, creating deadweight losses (ex post inefficiencies). In this context, asset ownership proves important, since it can affect the parties' possibility or opportunity to cause the deadweight loss by means of shading.

Once again, in order to fix ideas, it is useful to provide a formal sketch, largely based on Hart and Moore (2007), of this new approach to the theory of the firm. Consider the standard relationship buyer(B)-seller(S), with V the value of the item for B and R the opportunity-cost for S related to the provision of the item (for simplicity, no production costs are taken into account). Assume, for the moment, the case of non-integration, in which S owns the assets needed to produce the item. Obviously, trade is efficient whenever $V \geq R$ and any initial contract establishing a price p such that $R \leq p \leq V$ reaches the first-best. However, suppose that the realization of V and R is uncertain when parties negotiate the initial contract. In such a case, it may be impossible to find a single price p that will always fall between the future realizations of R and V. An initial contract providing for a range of trading prices, instead of a single price, may be superior, since the larger the range, the more likely the possibility of finding a price in the range that falls between R and V whenever $V \geq R$. Nevertheless, the "flexible" contract, with a large range of prices, also has its own cost. Even if both parties regard the contract as "fair", possibly because it is negotiated under competitive conditions, it provides for different possible prices and this can generate disagreement between parties about the appropriate price within the contract. For instance, define as $[p_L, p_H]$ the range of prices of the contract and, without loss of generality, suppose that each party feels entitled to the best possible outcome permitted by the contract, that is, B (S) feels entitled to the price p_L (p_H). This implies that once the final price is chosen in $[p_L, p_H]$,[12] at least one party, and possibly both, will be disappointed by the actual outcome. What are the consequences of this? It is assumed that each disappointed party will shade, i.e. he/she provides "perfunctory" rather than "consummate" performance (assuming that such behaviour cannot be verified and penalized by a court), causing a deadweight loss inside the relationship.

How may asset ownership (i.e. integration decision) affect the efficiency of the relationship in this context? Consider that, in the case of integration, B owns the assets needed to produce the item, thus he/she can get it without S's operations (i.e. B can hire someone else and obtain the item without S). Let us assume, however, that there is the possibility for S to buy the item back from B in order to earn R. This implies that, under integration, if no trade between B

12. The choosing rule is not so relevant for this discussion. Indeed, the initial contract may be assigned to a party with the right to choose the price or provide a mechanism for choosing from the set.

and S occurs, the former earns V, while if trade occurs the latter obtains R. In other words, the situation is reversed compared with the case of non-integration: trade is now efficient if and only if $V \leq p \leq R$. In order to provide an intuition as to the role of assets ownership, consider two special cases: first, let's assume $V > R$ with probability one. In this case integration dominates non-integration. More precisely, with integration the efficient (first-best) outcome is feasible, while under non-integration it is not. This is because under integration the status quo point is such that B owns the assets and earns V (the efficient outcome) without the need to trade with S (who is irrelevant). By contrast, under non-integration, B can attain V only by trading with S. This may require a flexible contract (with a large range of trading prices), but this leads to an aggrieved state and shading, which reduce efficiency. By contrast, assuming $R > V$ with probability one, we obtain the reverse result. Now trading is not required to reach the first-best under non-integration, while integration leads to inefficiency because a range of prices is needed to ensure that B always trades the item to S; however, this leads to shading inside the relationship.

Although the special examples discussed above are necessarily "toy" ones, their logic can be extended in different directions. For instance, using the idea that contracts operate as reference points and the costs of the aggrieved state are important in buyer-seller relationships, Hart (2008) analyzes a situation in which there is ex ante uncertainty about the most efficient method of production and shows that who controls or decides the production method is a key issue in choosing between organizational forms. Instead, Hart and Holmstrom (2010) provide a model in which deadweight losses from shading interplay with coordination decisions between production units and show that (horizontal) integration and non-integration make the opposite kind of mistake, since, on the one hand, non-integration can lead to *too little* coordination, when the benefits from coordination are unevenly divided across the units, while, on the other hand, integration generally leads to *too much* coordination.[13] All these works, moreover, clarify that, in comparison with previous theories, this approach adds a third important factor in explaining the relationship between asset ownership and integration. While in transaction costs economics the key factor in determining integration decisions is the level of quasi-rents and in property rights theory it is the marginal product of quasi-rents with respect to (non-contractible) ex ante investments (e.g. Gibbons, 2005; Whinston, 2001; Holmstrom and Roberts, 1998), the theory of the firm based on contracts as reference points emphasizes the role of the *variability* of quasi-rents with respect to the state of the world, that is, the role of *payoff uncertainty*.

13. In Hart and Holmstrom (2010) this framework is also adopted to study delegation of authority inside organizations.

2. Knowledge-based theories of the firm

This section deals with recent developments in the knowledge-based theories of the firm, a broad stream of research that sees firms as organizations that produce, store, and use knowledge to create and sustain a competitive advantage.[14] The knowledge-based theories focus on the incompleteness of technical and productive knowledge, given that technical and productive problem-solving abilities are not homogeneous across organizations and that agents tend to be short-sighted and suffer from other significant cognitive anomalies. According to the knowledge-based theories, producing for the market implies that business organizations enhance their competitiveness by acquiring and increasing their capabilities to produce and sell particular goods and services to satisfy potential demand.

Some knowledge-based analyses distinguish between capabilities and competencies. For instance, some authors define the firm's *capabilities* as the abilities to produce specific goods and provide specific services for the market, for example, to produce a type of software, computer or car.[15] Thus, the firm's capabilities are clearly different from the mere sum of the individual abilities and skills of its members, seeing that these are the temporally cumulative result of the organization and integration of the individual abilities of a group of people. On the other hand, the firm's *competencies* are defined as «'chunks' of *organizational abilities* identified in terms of performed tasks and the knowledge-bases upon which they draw» (Dosi, Faillo and Marengo, 2008, p. 1169). For example, the legal, medical, mechanical, chemical, accounting, administrative, managerial, organizational, marketing, and sale competencies used to shape the firm's overall capabilities. According to these definitions, both capabilities and competencies are understood as potentialities that can be triggered in specific contexts.[16]

The various knowledge-based theories all agree that a firm's capabilities are not simply acquired but created. Competitive advantage ensues from the development of capabilities that are different to those of others. The posses-

14. Knowledge-based theories of the firm include behavioral and cognitive theories, Penrosian and resource-based views, neo-Schumpeterian, evolutionary and competency perspectives. On this see Dosi and Marengo, 2007, p. 491; Marengo and Dosi, 2005, p. 304-ff.
15. Dosi, Nelson and Winter, 2000, p. 3-ff.; see also Dosi, Faillo and Marengo, 2008, p. 1166-ff.; Morroni, 2006, pp. 134-135.
16. There is as yet no generally accepted vocabulary on capabilities and competencies. For instance, in a recent article von Tunzelmann (2009, p. 435-ff., 446) provides a different definition of capabilities and competencies. He considers competencies as potential, based on learning by searching, and capabilities as realized, resulting from learning by doing.

sion and control of rare, inimitable or difficult-to-substitute resources creates market power. Accordingly, firms tend to specialize in activities based on inimitable capabilities to maintain their peer competitive advantage. Non-contestable capabilities are called core capabilities. Core capabilities are related to the set of specialized activities, routines, entrepreneurial, managerial and organizational skills that are embodied in a firm and which «cannot be readily assembled through markets» (Teece, Pisano and Shuen, 1997, p. 205). The inimitability of core capabilities is linked to the existence of heterogeneous abilities which are based on asymmetric information and heterogeneous knowledge. The latter, in turn, are due to conflicts of interest among individuals as well as the specific characteristics of knowledge (tacitness, non-measurability, non-appropriability and non-exchangeability) and the possibility of an unpredictable response by an agent. In this context, the knowledge developed by business organizations through experience helps to explain the differentials in revealed performances among firms.[17]

Specific knowledge, which is the basis of a firm's core capabilities, is built up according to the business concept of the entrepreneur-manager.[18] Designing the firm's strategy, which is the entrepreneurial activity par excellence, involves the development of new capabilities in anticipation of the possible evolution of market conditions and new business creation. The role of the entrepreneur or executive in enhancing the firm's ability to learn is essential to strengthen the firm's competitive advantage. This learning ability is referred to as a dynamic capability. Dynamic capabilities are the firm's ability to integrate, build, and reconfigure internal and external knowledge to respond to rapidly changing environments.[19] In recent analyses belonging to both the evolutionary and capabilities-based perspectives, the concept of dynamic capabilities plays an essential role and can be regarded as a common feature of these research perspectives.[20] New capabilities can be achieved by developing or sourcing new abilities and skills. Often, a firm's rapid growth is driven by the significant success of a specific product, which is linked to the capacity to create a competitive advantage by exploiting technological opportunities in complementary commodities and matching potential demand. In a recent paper, Pitelis and Teece (2009, pp. 5, 10-11), by merging the neo-Schumpeterian and

17. Barney, 1991, p. 94-ff.; Dosi, Nelson and Winter, 2000, p. 6.
18. On the business conception, see Cohendet, Llerena and Marengo, 2000, pp. 96-98, 106 and Witt, 2007, p. 1125-ff. See also Kalantardis, 2004; Shane, 2003.
19. Fujimoto, 2000, p. 246-ff.; Pisano, 2000, p. 129-ff.; Teece, Pisano and Shuen, 1997, p. 204. See also the related concept of combinative capabilities proposed by Kogut and Zander, 1992, p. 383-ff.
20. See, for instance, Dosi and Marengo, 2007; Dosi, Faillo and Marengo, 2008; Pitelis and Teece, 2009.

the capabilities-centric tradition, draw attention to the nature and essence of the innovative firm, which is linked to its ability to capture profit from innovation by developing dynamic capabilities, spotting potential future markets and establishing a sustainable competitive advantage. This crucial process of the co-creation of new markets tends to change consumer tastes and needs.

3. Convergence processes between incentive-based and knowledge-based theories of the firm

In the last few years a tendency to spot some complementarities between the knowledge-based approach and the incentive-based theories has emerged. The convergence process between these two streams of research has taken place mainly in relation to three different issues:

a. the interaction between considerations centred on transaction costs and capabilities in shaping the boundaries of the firm;
b. hybrid forms of collaboration among firms; and
c. the relationship between incentives and the development of knowledge.

Below, we make a more detailed examination of each of these three issues.

3.1. Interaction between transaction costs and capabilities considerations

Among recent contributions that investigate the relationship between capabilities and transaction considerations, Pitelis and Teece (2009) emphasize the need to integrate transaction costs and capabilities considerations to capture the essence of entrepreneurial and managerial activity.[21] The two authors intend to "revamp" market failure and transaction cost approaches by taking into account knowledge-based considerations. Markets for know-how may not exist – they claim – for many reasons *including transaction costs*. «However, markets may suffer in their development for reasons other than transaction costs. They may not even exist because the entrepreneurs have not as yet created them». «Entrepreneurs and managers can implement coordination that not only saves on transaction costs (in the sense of Coase and Williamson) but also involves creating markets, creating new combinations and capturing value (profiting)».[22] Going back to the Knightian idea of the non-tradability of "en-

21. Complementarities between capabilities and transaction consideration are indicated, among others, by Antonelli, 2005; Argyres and Mayer, 2007; Leoncini, Montresor and Vertova, 2006; Leoncini, Lombardi and Montresor, 2009.

22. Pitelis and Teece, 2009, pp. 5-6, passim. Interestingly, Penrose and Pitelis (2002, p. 34) quote a letter by Coase in which he points out the complementarity of his vision on transac-

trepreneurial judgments",[23] Pitelis and Teece claim that selling an entrepreneurial idea «in the open market may be hard for at least two reasons. First, being tacit, it may be hard to transmit. Second, [...] explaining it to others can lead to its expropriation. So we have a two-pronged type of market failure, which, however, is not directly linked to transaction costs». These two points can help to explain «the superiority of organization as a governance structure vis-à-vis extant markets» (Pitelis and Teece, 2009, pp. 10-12, passim).

In a germane perspective, Morroni (2006, pp. 183-188, 247-251, 2007) investigates the conditions under which transaction cost and capabilities considerations interplay in shaping organizational boundaries and competitiveness. He argues that this interaction is significant whenever there are informational problems, not only regarding transactional knowledge and contract incompleteness, but also regarding technical and productive knowledge. In short, transaction costs and capabilities considerations interplay whenever transactional and productive knowledge are costly, and when some relevant productive knowledge is tacit and non-transmittable. This interaction is highly magnified in the presence of uncertainty. In these conditions, agents' behaviour is characterized by myopia and other cognitive anomalies.[24]

If productive and transactional knowledge on the cost is available and if an absorptive ability to interpret and use this knowledge is required, then the arrangement of transactions requires the development of internal and external capabilities on transactional and contract-design knowledge. The development of these capabilities, which is grounded in specific learning processes, appears to be an appropriate response to the existence of transaction costs due to informational problems.

Decisions on which activities to conduct internally and which to contract out are linked to the choice as to which distinctive abilities and skills should be developed within the firm and which should be developed outside. Internalizing technologically separable processes through vertical integration involves the development of in-house learning processes aimed at creating the productive knowledge needed to perform the internalized processes. Internalization implies a reorganization that brings about changes in the division of labour and knowledge. Outsourcing, on the other hand, requires specific learning processes. In particular, outsourcing entails the development of:

a. internal capabilities to bargain, design suitable contracts, control quality, and enforce contracts; and

tion costs with Penrose's view. He writes: «I do not regard her views as an alternative view to mine in 'The nature of the firm' but as a necessary addition to it».

23. Knight (1921, pp. 211, 251) was the first to introduce the concept of non-tradable entrepreneurial knowledge. For a recent discussion on this, see Niman, 2004, pp. 274-275.

24. For discussion and references on cognitive anomalies, see Morroni, 2006, pp. 65-70.

b. external capabilities to educate suppliers, potential licensees and franchisees.[25]

The consideration of cognitive matters offers an insight into the different reasons underlying vertical integration or safeguards in contractual relationships. For instance, co-specialization represents an idiosyncratic investment exposed to the transfer of knowledge possessed by some partners to various competitors. In order to capture all the benefits that accrue from the development of productive knowledge and keep relevant information inside the firm, it may be in the firm's interest to hire individuals «on a more permanent basis rather than secure the use of their services through a contract».[26] In other circumstances, vertical integration may instead be motivated by the difficulty of developing suppliers' knowledge. For example, when Ford adopted the moving assembly line, in accordance with Tayloristic labour organization, the main problem, according to a cognitive perspective, «was [...] the difficulty of changing the suppliers' conception of their own business, and persuading them of the obsolescence of many of their existing capabilities» (Loasby, 1999, p. 97). The characteristics of capabilities possessed by firms operating in different intermediate stages of the productive filière (or cluster) influence the level of integration. Consider, for instance, two vertically adjacent stages of production *A* and *B*. If markets transfer knowledge inefficiently and production at stage *B* requires access to the knowledge utilized in stage *A*, stages *A* and *B* will be integrated within the same firm (Grant 1996, pp. 119-120). Whenever learning works better in a unified organization than in two autonomous firms and whenever this is also essential for the development of capabilities on which the firm's competitive advantage is grounded, then a strong incentive for integration arises. Conversely, whenever learning works worse in a unified organization than in two autonomous firms, there is an incentive to keep the firms autonomous. In other words, integration or disintegration may prevail according to the governance structure that fosters learning and the creation of capabilities.

A reduction in transaction costs may have different effects on the level of integration according to the degree of correlation of capabilities along the various vertically adjacent stages. If capabilities are highly correlated along the productive filière, then a reduction of transaction costs will not lead to substantial disintegration. In contrast, if capabilities are weakly correlated along the value chain, a reduction of transaction costs will lead to substantial disintegration (Jacobides and Winter, 2005, figure 1).

On the other hand, transaction costs mould the trajectories of capability de-

25. Baron and Kreps, 1999, p. 9; Foss, 2002, pp. 160-161; Foss and Eriksen, 1995, p. 44-ff.; Loasby, 1994.

26. Niman, 2004, p. 278. See also Heiman and Nickerson, 2002, p. 97-ff.

velopment. Low transaction costs may favour external specialization in single activities and social division of labour, while high transaction costs may induce the development of capabilities within the firm. We underscore that including capabilities-based considerations in the analysis of organizational boundaries enables us to analyze multiproduct firms in both a *vertical* sense, regarding the production of some of their inputs, and a *horizontal* sense, concerning output differentiation (Dosi and Marengo, 2007, p. 497).

In conclusion, when asymmetric information and heterogeneous knowledge concern not only transactions, but also production activities, then transaction costs and capabilities considerations can be seen as largely complementary, while organization settings and production techniques appear to be interdependent.

3.2. Hybrid forms of collaboration among firms

The interaction between capabilities and transaction considerations plays an important role in hybrid forms of collaboration among firms – intermediate between markets and hierarchies – such as long-term supply relationships, strategic alliances, franchising, collective trademarks, symbiotic arrangements, equity crossholdings, joint ventures, partnerships, consortia, supply chain systems, business associations, and networks that may guarantee an effective interface between the parties. Hybrids are organizations composed of «legally autonomous entities doing business together, mutually adjusting with little help from the price system, and sharing or exchanging technologies, capital, products, and services, but without a unified ownership» (Ménard, 2004, p. 348). George Richardson has emphasized that networks of firms exist because of the need to coordinate closely complementary but dissimilar activities. «This coordination cannot be left entirely to direction within firms because the activities are dissimilar and cannot be left to the market forces in that it requires the matching, both qualitative and quantitative, of individual enterprise plans» (Richardson, 1972, p. 142). When such positive complementarities are present, economies of scale may be attained by splitting the production of intermediate products between small, specialized firms. In effect, «hybrid organizations exist because partners need to develop coordination, which requires interdependent investments».[27]

27. Ménard, 2004, p. 357; cf. Spiller and Zelner, 1997, p. 562-ff. Ménard bridges some capabilities and transaction cost considerations. He takes into account both the possibility that contracts may be subject to unforeseeable revisions due to uncertainties and also the existence of asymmetries in resources and information as the main incentive to pool assets (Ménard, 2004, pp. 352-357). See also Ménard, 2009, 2010.

When complementarities are highly specific, "the interface between purchaser and supplier" has to be actively managed because the supplier needs to understand the purchaser's requirements in detail and the purchaser needs to understand and enhance the supplier's capabilities (Loasby, 1994, p. 299). Different firms have different firm-specific capabilities and ongoing inter-organizational exchange facilitates the transfer and building of technical and productive knowledge. In this context, durable inter-firm collaboration consisting of bilateral or multilateral structures may mitigate transaction costs and may be more effective than the pure price mechanism or single unified ownership. Lasting connections among firms enable them to benefit from the advantages of both integration and specialization.[28]

In some circumstances, hybrid forms of collaboration among firms may be more suitable than vertical integration. For instance, even in the presence of high transaction costs, the attempt to integrate complementary activities that are not truly similar, inasmuch as they are based on distinct technologies and may require different styles of management, «is likely to produce lower quality or higher costs, or both» (Loasby 1994, p. 299). In this case, a possible response to high transaction costs might be forms of collaboration among firms rather than unified ownership. Co-specialization among complementary producers entails the co-development of capabilities to reduce possible misunderstandings.

With the increasing need for knowledge in production activities, the knowledge relevant to the solving of problems tends to dwell in a variety of individuals who do not necessarily belong to the same firm. Therefore, under heterogeneous abilities, inter-organizational exchange based on long-term relationships favours the development of firm-specific capabilities, fosters innovative activity, and helps to cope with changing environments.

In many hybrid forms of collaboration among firms, internal capabilities stretch beyond the boundaries of the firms' in-house production so that staff can relate to suppliers of equipment, knowledge, and components (Brusoni, Prencipe and Pavitt, 2001, p. 598). Evidence from applied studies on franchise systems and durable inter-firm collaboration among Japanese manufacturing firms has shown a significant level of investments in specific human assets. Such investments are designed partly with the aim of enhancing the learning processes needed to master the different technologies adopted in specialized sub-units of the firms, but also for the purpose of training the staff assigned to manage the external relationships, who have to command the multiple technologies adopted by the partners who produce various components or provide services.[29]

28. Brusoni, Prencipe and Pavitt, 2001, p. 597; De Jong and Nooteboom, 2000, p. 3.
29. Ménard, 2004, p. 356. For empirical evidence on this, see, for instance: Brusoni, Prencipe and Pavitt, 2001; Gambardella and Torrisi, 1998; Lafontaine and Shaw, 1999; Mowery, Oxley and Silverman, 1998; Takeishi, 2001.

3.3. Relationship between incentives and the development of knowledge

To conclude, let us consider recent advances in the analysis of the relationship between incentives and the development of knowledge. Marengo and Pasquali (2010) make an interesting and novel attempt to bridge the gaps between the incentive-based and the knowledge-based theories of the firm by presenting a computational model that studies the interplay between learning, incentives, and the allocation of decision rights. With very few exceptions, not many studies focus on the relationship between the development of knowledge and incentive structures because the incentive-base literature has practically ignored learning processes within firms, making the implicit assumption that technical and productive knowledge is acquired without cost, while knowledge-based contributions have dealt only very marginally with incentives, implicitly assuming that incentive structures play little or no role in the development of capabilities.

In their computational model, Marengo and Pasquali consider a firm that has to make decisions on a set of n policies $P = \{p_1,p_2,...,p_n\}$. For simplicity, they assume that each policy may take only two values $p_i \in \{0, 1\}$ and therefore the set of policies is formed by the 2^n vectors of n binary elements. We will call this set of 2^n policy vectors X and one generic element thereof $x_i = [p^i_1,p^i_2,...,p^i_n]$ (Marengo and Pasquali, 2010, p. 8). The authors show that when the learning processes are not significant, the allocation of decision rights and incentives are largely substitute. However, when learning is at stake, the organizational structure and the incentives may become complementary.

They study two possible cases with three agents and a principal under given assumptions.[30]

In the first case, the principal knows the set of efficient policies. In this situation the aim of the principal can be achieved through an appropriate design of the organizational structure (decision rights distribution). The same result could be obtained by adopting a monetary incentive. Therefore, in this first case, monetary incentives and the allocation of decision rights are substitute.

On the other hand, in the second case, the principal does not know the appropriate course of action and tries to learn which policies are efficient from environmental feedback. This situation determines a trade-off between align-

30. In particular, Marengo and Pasquali (2010) assume the following:
a. the principal has to make decisions regarding a set n of policies to be adopted;
b. agents have control over policies;
c. the principal and the agents hold different preferences regarding policies; and
d. incentives are needed to induce an agent to accept a policy profile preferred by the principal which ranks lower in the agent's order of preference.

ing the agents' decisions to the principal's preferences or leaving agents freer to choose policies according to their own idiosyncratic preferences. If, by means of appropriate incentives and/or organizational structures, the principal optimizes the alignment, he/she will have his/her preferred policies efficiently implemented, but agents who may hold better models of the environment and could implement policies with higher performance may be forced into the straitjacket of the principal's vision. Alternatively, if the principal implements looser incentives and organizational structures that divide decision rights less finely and gives greater freedom to the agents to implement their own preferred policies, he/she may learn that some of the agents' ideas may actually perform better in the environment but, conversely, he/she may lose control of the organization which may ultimately be geared by some agents towards serving their own interests (Marengo and Pasquali, 2010, p. 20).

The results of the simulation run by Marengo and Pasquali (2010) can be summarized as follows:

a. in environments with low complexity, a fine decomposition of the decision rights and medium-low powered incentives is more efficient;
b. in complex environments with low competitive pressure, learning is enhanced if decision rights are concentrated under the control of one or very few agents and the incentives are medium powered;
c. with significant competitive pressure, the division of decision rights and the role of incentives acquire increasing importance. In this last case the provision of decision rights and the incentives are complementary.

Clearly, this model is very basic and leaves room for the research of other relevant issues, for instance, the possibilities for agents of the learning processes and the cost of hiring agents in relation to their span of control over possible policies. However, in connecting incentives to the development of productive knowledge, the model provides a fruitful perspective that bridges the most interesting features of the two main streams of research analyzed in the review.

References

Aghion P., Dewatripont M., Rey P. 2004. Transferable control. *Journal of the European Economic Association*, 2 (1): 115-138.

Alchian A.A., Demsetz H. 1972. Production, information costs, and economic organization. *American Economic Review*, 62 (5): 777-795.

Alonso R., Dessein W., Matouschek N. 2008. When does coordination require centralization?. *American Economic Review*, 98 (1): 145-179.

Alt J.E., Shepsle K.A. (eds.) 1990. *Perspectives on Positive Political Economy*. Cambridge University Press: Cambridge (UK).

Antonelli C. 2005. The economics of governance: the role of localized knowledge in the interdependence among transaction, coordination and production, in Green K., Miozzo M., Dewick P. (eds.) *Technology, Knowledge, and the Firm: Implications for Strategy and Industrial Change*. Edward Elgar Publishing: Cheltenham.

Argyres N., Mayer K.J. 2007. Contract design as a firm capability: an integration of learning and transaction cost perspectives. *Academy of Management Science*, 32 (4): 1060-1077.

Baker G., Gibbons R., Murphy K.J. 2001. Bringing the market inside the firm?. *American Economic Review, Papers and Proceedings*, 91 (2): 212-218.

Baker G., Gibbons R., Murphy K.J. 2002. Relational contracts and the theory of the firm. *Quarterly Journal of Economics*, 117 (1): 39-84.

Baker G., Gibbons R., Murphy K.J. 2008. Strategic alliances: bridges between 'islands of conscious power'. *Journal of the Japanese and International Economies*, 22 (2): 146-163.

Barney J.B. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17 (1): 99-120.

Baron J.N., Kreps D.M. 1999. *Strategic Human Resources. Frameworks for General Managers*. J. Wiley & Sons: New York.

Blau P., Scott R. 1962. *Formal Organisations: A Comparative Approach*. Chandler Publishing: San Francisco.

Bolton P., Scharfestein D.S. 1998. Corporate finance, the theory of the firm, and organizations. *Journal of Economic Perspectives*, 12 (4): 95-114.

Brusoni S., Prencipe A., Pavitt K. 2001. Knowledge specialization, organizational coupling, and the boundaries of the firm: why do firms know more than they make?. *Administrative Science Quarterly*, 46 (4): 597-621.

Bull C. 1987. The existence of self-enforcing implicit contracts. *Quarterly Journal of Economics*, 102 (1): 147-159.

Carter R., Hodgson G.M. 2006. The empirical tests of transaction cost economics on the debate on the nature of the firm. *Strategic Management Journal*, 27 (5): 461-476.

Coase R.H. 1937. The nature of the firm. *Economica*, 4 (16): 386-405.

Cohendet P., Llerena P., Marengo L. 2000. Is there a pilot in the evolutionary firm?, in Foss N.J., Mahnke V. (eds.) *Competence, Governance, and Entrepreneurship. Advances in Economic Strategy Research*. Oxford University Press: Oxford (UK).

De Jong G., Nooteboom B. 2000. *The Causal Structure of Long-term Supply Relationships. An Empirical Test of a Generalized Transaction Cost Theory*. Kluwer Academic Publishers: London.

Dosi G., Nelson R.R., Winter S.G. 2000. Introduction: the nature and dynamics of organizational capabilities, in Dosi G., Nelson R.R., Winter S.G. (eds.) *The Nature and Dynamics of Organizational Capabilities*. Oxford University Press: Oxford (UK).

Dosi G., Marengo L. 2007. On the evolution and behavioural theories of organizations: a tentative roadmap. *Organization Science*, 18 (3): 491-502.

Dosi G., Faillo M., Marengo L. 2008. Organizational capabilities, patterns of knowledge accumulation and governance structures in business firms: an introduction. *Organization Studies*, 29 (8/9): 1165-1185.

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

Foss N.J., Eriksen B. 1995. Competitive advantage and industry capabilities, in Montgomery C.A. (ed.) *Resource-Based and Evolutionary Theories of the Firm: Towards a Synthesis*. Kluwer Academic Publishers: Boston.

Fujimoto T. 2000. Evolution of manufacturing systems and ex post dynamic capabilities: a case of Toyota's final assembly operations, in Dosi G., Nelson R.R., Winter S.G. (eds.). *The Nature and Dynamics of Organizational Capabilities*. Oxford University Press: Oxford (UK).

Gambardella A., Torrisi S. 1998. Does technological convergence imply convergence in markets? Evidence from the electronics industry. *Research Policy*, 27 (6): 445-463.

Garrouste P., Saussier S. 2005. Looking for a theory of the firm: future challenges. *Journal of Economic Behavior & Organizations*, 58 (2): 178-199.

Gibbons R. 2005. Four formal(izable) theories of the firm?. *Journal of Economic Behavior and Organization*, 58 (2): 200-245.

Grant R.M. 1996. Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17 (Winter Special Issue): 109-122.

Green K., Miozzo M., Dewick, P. (eds.) 2005. *Technology, Knowledge, and the Firm: Implications for Strategy and Industrial Change*. Edward Elgar Publishing: Cheltenham.

Grossman J., Hart O. 1986. The costs and benefits of ownership: a theory of vertical and lateral integration. *Journal of Political Economy*, 94 (4): 691-719.

Halonen M. 2002. Reputation and the allocation of ownership. *The Economic Journal*, 112 (481): 539-558.

Hart O. 1989. An economist's perspective on the theory of the firm. *Columbia Law Review*, 89 (7): 1757-1774.

Hart O. 1995. *Firms, Contracts, and Financial Structure*. Clarendon Press: Oxford (UK).

Hart O. 2008. Reference points and the theory of the firm. *Economica*, 75 (299): 404-411.

Hart O. 2009. Hold-up, asset ownership, and reference points. *Quarterly Journal of Economics*, 124 (1): 267-300.

Hart O., Moore J. 1990. Property rights and the nature of the firm. *Journal of Political Economy*, 98 (6): 119-158.

Hart O., Moore J. 2007. Incomplete contracts and ownership: some new thoughts. *American Economic Review*, 97 (2): 182-186.

Hart O., Moore J. 2008. Contracts as reference point. *Quarterly Journal of Economics*, 123 (1): 1-47.

Hart O., Holmstrom B. 2010. A theory of firm scope. *Quarterly Journal of Economics*, forthcoming.

Heiman B., Nickerson J.A. 2002. Towards reconciling transactions cost economics and the knowledge-based view of the firm: the context of inter-firm collaboration. *International Journal of the Economics of Business*, 9 (1): 97-116.

Holmstrom B. 1999. The firm as a sub-economy. *Journal of Law, Economics, and Organization*, 15 (1): 74-102.

Holmstrom B., Tirole J. 1991. Transfer pricing and organizational forms. *Journal of Law, Economics, and Organization*, 7 (2): 201-228.

Holmstrom B., Milgrom P. 1991. Multitask principal-agent analyses: incentive contracts, asset ownership, and job design. *Journal of Law, Economics, and Organization*, 7 (1): 24-52.

Holmstrom B., Milgrom P. 1994. The firm as an incentive system. *American Economic Review*, 84 (4): 972-991.

Holmstrom B., Roberts J. 1998. The boundaries of the firm revisited. *Journal of Economic Perspectives*, 12 (4): 73-94.

Jacobides M.G., Winter S.G. 2005. The co-evolution of capabilities and transaction costs: explaining the institutional structure of production. *Strategic Management Journal*, 26 (5): 395-413.

Jesen M., Meckling W. 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. *The Journal of Financial Economics*, 3 (4): 305-360.

Kalantardis C. 2004. *Understanding the Entrepreneur. An Institutionalist Perspective*. Ashgate: Aldershot.

Klein B. 1996. Why hold-ups occur: the self-enforcing range of contractual relationships. *Economic Inquiry*, 34 (3): 444-463.

Klein B., Crawford R., Alchian A. 1978. Vertical integration, appropriable rents, and the competitive contracting process. *Journal of Law and Economics*, 21 (2): 297-326.

Klein P.G. 2005. The make-or-buy decision: lessons from empirical studies, in Ménard C., Shirley M. (eds.) *Handbook of New Institutional Economics*. Springer: Dordrecht.

Knight F.H. 1921. *Risk, Uncertainty, and Profit*. Houghton Miffling: New York.

Kogut B., Zander U. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3 (3): 383-397.

Kreps D.M. 1990. Corporate culture and economic theory, in Alt J., Shepsle K. (eds.) *Perspectives on Positive Political Economy*. Cambridge University Press: Cambridge (UK).

Lafontaine F., Shaw K. 1999. The dynamics of franchise contracting: evidence from panel data. *Journal of Political Economy*, 107 (5): 1041-1080.

Lafontaine F., Slade M. 2007. Vertical integration and firm boundaries: the evidence. *Journal of Economic Literature*, 45 (3): 629-685.

Langlois R.N., Yu T.F., Robertson P. (eds.) 2002. *Alternative Theories of the Firm*. Edward Elgar Publishing: Cheltenham.

Leoncini R., Montresor S., Vertova G. 2006. Dynamic capabilities between firm organization and local development: a critical survey. *Economia Politica*, 23 (3): 475-502.

Leoncini R., Lombardi, M., Montresor S. 2009. From techno-scientific grammar to organizational syntax. New production insights on the nature of the firm, draft.

Loasby B.J. 1994. Organisational capabilities and interfirm relations. *Metroeconomica*, 45 (3): 248-265.

Loasby B.J. 1999. *Knowledge, Institutions and Evolution in Economics*. Routledge: London.

Mailath G.J., Nocke V., Postlewaite A. 2004. Business strategy, human capital and management incentives. *Journal of Economics and Management Strategy*, 13 (4): 617-633.

Marengo L., Dosi G. 2005. Division of labor, organizational coordination and market mechanisms in collective problem-solving. *Journal of Economic Behavior and Organization*, 58 (2): 303-326.

Marengo L., Pasquali C. 2010. How to get what you want when you do not know what you want. A model of incentives, organizational structure and learning, draft.

Ménard C. 2004. The economics of hybrid organizations. *Journal of Institutional and Theoretical Economics*, 160 (3): 345-376.

Ménard C. 2009. Oliver Williamson and the logic of hybrid organizations, in Morroni M. (ed.) *Corporate Governance, Organization and the Firm. Co-operation and Outsourcing in the Global Economy*. Edward Elgar Publishing: Cheltenham.

Ménard C. 2010. The governance of hybrid modes of organization, draft, forthcoming.

Montgomery C.A. (ed.) 1995. *Resource-Based and Evolutionary Theories of the Firm: Towards a Synthesis*. Kluwer Academic Publishers: Boston.

Morroni M. 2006. *Knowledge, Scale and Transactions in the Theory of the Firm*. Cambridge University Press: Cambridge (UK).

Morroni M. 2007. Complementarities among capability, transaction and scale-scope considerations in determining organizational boundaries. *Technology Analysis & Strategic Management*, 19 (1): 31-44.

Morroni M. (ed.) 2009. *Corporate Governance, Organization and the Firm. Co-operation and Outsourcing in the Global Economy*. Edward Elgar Publishing: Cheltenham.

Mowery D.C., Oxley J.E., Silverman B.S. 1998. Technological overlap and interfirm cooperation: implications for the resource-based view of the firm. *Research Policy*, 27 (5): 507-523.

Niman N.B. 2004. The evolutionary firm and Cournot's dilemma. *Cambridge Journal of Economics*, 28 (2): 273-289.

Penrose P., Pitelis C. 2002. Edith Elura Tilton Penrose: life, contribution and influence, in Pitelis C. (ed.) *The Growth of the Firm. The Legacy of Edith Penrose*. Blackwell: Oxford (UK).

Pisano G. 2000. In search of dynamic capabilities: the origins of R&D competence in biopharmaceuticals, in Dosi G., Nelson R.R., Winter S.G. (eds.). *The Nature and Dynamics of Organizational Capabilities*. Oxford University Press: Oxford (UK).

Pitelis C.N., Teece D.J. 2009. The (new) nature and essence of the firm. *European Management Review*, 6 (1): 5-15.

Rantakari H. 2008. Governing adaptation. *Review of Economic Studies*, 75 (4): 1257-1285.

Richardson G.B. 1972. The organization of industry. *The Economic Journal*, 82 (327): 883-896.

Shane S. 2003. *A General Theory of Entrepreneurship. The Individual Opportunity Nexus*. Edward Elgar Publishing: Cheltenham.

Simon H.A. 1951. A formal theory of the employment relationship. *Econometrica*, 19 (3): 293-305.

Simon H.A. 1982. *Models of Bounded Rationality. Volume Two. Behavioral Economics and Business Organization*. The MIT Press: Cambridge (Mass.).

Spiller P.T., Zelner B.A. 1997. Product complementarities, capabilities and governance: a dynamic transaction cost perspective. *Industrial and Corporate Change*, 6 (3): 561-594.

Takeishi A. 2001. Bridging inter and intra-firm boundaries: management of supplier involvement in automobile product development. *Strategic Management Journal*, 22 (5): 403-433.

Teece D., Pisano G., Shuen A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, 18 (7): 509-533.

von Tunzelmann N. 2009. Competencies versus capabilities: a reassessment. *Economia Politica*, 26 (3): 435-464.

Whinston M.D. 2001. Assessing the property rights and transaction-cost theories of firm scope. *American Economic Review, Papers and Proceedings*, 91 (2): 184-188.

Whinston M.D. 2003. On the transaction cost determinants of vertical integration. *Journal of Law, Economics, and Organization*, 19 (1): 1-23.

Williamson O.E. 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. Free Press: New York.

Williamson O.E. 1985. *The Economic Institutions of Capitalism*. Free Press: New York.

Williamson O.E. 2000. The new institutional economics: taking stock, looking ahead. *Journal of Economic Literature*, 38 (3): 595-613.

Williamson O.E, Wachter M., Harris J. 1975. Understanding the employment relation: the analysis of idiosyncratic exchange. *Bell Journal of Economics*, 6 (1): 250-278.

Witt U. 2007. Firm as realizations of entrepreneurial visions. *Journal of Management Studies*, 44 (7): 1125-1140.