



# Looking for a theory of the firm: Future challenges

Pierre Garrouste<sup>a,b</sup>, Stéphane Saussier<sup>a,c,\*</sup>

<sup>a</sup> Centre d' ATOM, University of Paris, 1 Pantheon, Sorbonne, 106-112 Bd. De l'Hopital,  
75647 Paris Cedex 13, France

<sup>b</sup> University of Lumière, Lyon 2, France

<sup>c</sup> ADIS, University of Paris, 11 Sceaux, France

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## Abstract

In this paper we present the main developments of the theories of the firm rooted in Coase's [Coase, R.H., 1937. The nature of the firm. *Economica*, New Series 4, 386–405] seminal article. We show that the two important topics of the nature and boundaries of the firm, as well as the internal organization of the firm, give place to essential contributions. We present those contributions and their limits and then their possible developments. Finally we introduce the papers of this issue.

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## 0. Introduction

What is a firm? Since the seminal article of Coase on the nature of the firm (Coase, 1937), this question has been brought to the attention of a growing number of economists who are looking for a theory of the firm. Since the beginning of the 1970s much progress has been made, yet despite the important literature on the subject, this question remains an empirical as well as a theoretical challenge.

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\* Corresponding author. Tel.: +33 1 44078321; fax: +33 1 44078320.

*E-mail address:* saussier@univ-paris1.fr (S. Saussier).

The empirical challenge comes from the difficulty of obtaining a complete picture of the phenomenon since firms have a large spectrum of governance structures that are more or less formal, and they move from the hierarchy to outsourcing and from outsourcing to internalization (Ménard, 2004). The theoretical challenge comes from the multifaceted phenomenon that can hardly be grasped by a unique theory, leading to the multiplication of theoretical approaches that can be considered as complements or substitutes, depending on the questions they seek to answer. In fact, the theory of the firm has the difficult task of answering many questions. First, the nature and the boundaries of the firms. Why are some transactions internalized while others are externalized, and yet others are both internalized and externalized? Second, the internal structure of the firm. How is the firm organized? How is production organized? What are the incentives, controls and internal hierarchies? Third, the relations between the firms and the market. Are firms, in fact, substitutes for the market? What are the limits of the firms?

In this article, we first recall the main issues concerning the theory of the firm. Looking back to Coase's article that specifies what the theory of the firm should be with respect to what questions the theory should answer (Part 1), we will specify how existing alternative theoretical frameworks depart from Coase's paper and to what extent they sometimes become substitutes, or complements, when it comes to defining what a firm is and its boundaries (Part 2). We then discuss the question of internal organization of firms (Part 3) before discussing, in the last part of the paper, what the leading future challenges are and how papers of this special issue may help in the task of proposing a unique framework for the theory of the firm (Part 4).

## 1. The nature of the firm years later

Many (if not all) existing theoretical frameworks available to analyze firms use the seminal article of Ronald Coase as a background (Coase, 1937). This article, written in 1935,<sup>1</sup> points out the need to incorporate transaction costs in the analysis of contractual decisions. Coase (1960) later reaffirms this in his paper in what was called the "Coase Theorem" specifying that without transaction costs, institutional choices are not an issue.

The nature of the firm article has long been viewed as offering tautological propositions concerning the driving forces behind the explanation of the choice of a particular organizational arrangement (Coase, 1988). As Williamson (1975, p. 3) wrote, in regard to Coase's paper, "Transaction costs are appropriately made the centerpiece of the analysis but these are not operationalized in a fashion which permits one to assess the efficacy of completing transactions as between firms and markets in a systematic way".

Nevertheless, it is only fair to recognize that if the analysis of Ronald Coase were not based on clear assumptions giving rise to a precise definition of what a firm is and clear propositions regarding when to substitute coordination on the market by coordination in the firm, many of the premises of the theory of the firm were already present.

*Bounded rationality* of entrepreneurs is discussed and mobilized in order to explain the limits of the firm. As noted by Coase (1937, pp. 394–395), "It may be that as the transactions

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<sup>1</sup> The article was written in 1935 and published in 1937 (Coase, 1988).

which are organized increase, the entrepreneur fails to place the factors of production in the uses where their value is greatest, that is, fails to make the best use of the factors of production”. In other words, “A firm will tend to be larger the less likely the entrepreneur is to make mistakes” (p. 396). Furthermore, Coase pointed out that the “dissimilarity of the transactions” (p. 397) will increase the costs of organizing a transaction within a firm.<sup>2</sup>

Furthermore, the role of *uncertainty* is claimed, explaining why depending on sectoral consideration, firms may be more or less present (p. 392). This leads Coase to propositions very near those advanced many years later by transaction cost economics. For example, considering the use of long term contracts, Coase stated that “owing to the difficulty of forecasting, the longer the period of the contract is for the supply of the commodity or service, the less possible, and indeed, the less desirable it is for the person purchasing to specify what the other contracting party is expected to do” (p. 391). This statement is not far from the analysis of contractual incompleteness level made recently by Crocker and Masten (1991), Crocker and Reynolds (1993) or Saussier (2000).

Lastly, Coase considered how a change in the *institutional environment* may affect the decision to create firms, considering how “if we consider the operation of sales tax, it is clear that it is a tax on market transactions and not on the same transactions organized within the firm. Now since these are alternative methods of “organization” – by the price mechanism or by the entrepreneur – such a regulation would bring into existence firms which otherwise would have no *raison d’être*” (p. 393).

All this clearly shows how advanced Coase’s analysis was. Nevertheless, we may believe Coase’s answer to the question of why firms exist, but other issues are left undecided at the end of his 1937 work. *The definition of the firm*, viewed as the place where the coordination through prices is replaced by the coordination through authority, is vague. Many aspects of such authority relationships may occur on the market as well. The *internal organization of the firm* is not analyzed by Coase. The *relationships between markets and firms* are also inadequately analyzed. Lastly, the *refutability* of Coase’s approach has been questioned based on the impossibility to assess transaction costs for alternative contractual choices, leaving the door open for ex post rationalization. These issues are still on the top of the agenda of theories of the firm even if recent developments have tried to overcome such weaknesses.

## 2. Looking for a definition of what a firm is: different possible paths

The first question a theory of the firm should be able to answer is what a firm is and how does it differ from other organizational choices. In other words, what are the properties that make firms more valuable in certain circumstances as compared to other alternative organizational choices? And what are the properties of the alternative organizational choices that cannot be replicated by the firm and that explain the limits of the firms?

The scope of the firm is perhaps the most important point a theory of the firm needs to deal with because it refers directly to the nature and boundaries of the firm. According

<sup>2</sup> This argument is very near the core arguments of the resource-based view of the firm.

to Coase (1937), the existence of the firm is due to the existence of transaction costs, and the firm's boundaries are defined by a simple calculus. The firm stops growing when at the margin, the external transaction costs equal the internal ones. The fact that Coase is considered as the father of a (re)birth of the analysis of the firm can be seen through the fact that, first of all, the authors dealing with the scope of the firm refer to Coase (1937) as a seminal paper in this domain and, second, that they are all trying to solve his problem more or less differently.

The “natural” follower and improver of the Coasian approach is, without a doubt, Williamson.<sup>3</sup> The New Property Rights Theory of the firm as well as the Incentives Theory bring different answers to the Coasian questions and propose much more formalized conceptions of the scope of the firm. All these approaches concerning the question of a firm's boundaries are clearly more substitutes than complements.

### *2.1. The firm defined as a low incentive arrangement to solve coordination problems*

Due to coordination problems that may arise on the market, the firm may be viewed as a way to access coordination mechanisms that are superior, in some special situations, to those available on the market. That is the view taken by the transaction cost theory.

In the transaction cost economics framework, the firm is viewed as being very distinct from the market since markets and hierarchies have different access to fiat (Williamson, 1996 versus Alchian and Demsetz, 1972) and a differential exists with respect to bureaucratic costs. More precisely, the firm is described mainly as a coordination mechanism in which low-powered incentives, extensive administrative controls, and its own dispute settlement machinery (courts will often refuse to hear intrafirm disputes, the effect of which is to make the firm its own court of ultimate appeal) are present. More recently, considerations of differential probity have been examined (Williamson, 1999) in the context of transactions where failures of loyalty and real time responsiveness could undermine integrity.

The main idea developed by transaction cost economics is that the firm, with its distinctive capabilities, is able to govern transactions of particular kinds for which markets are not suitable by reducing/controlling more strongly opportunistic behaviors and transaction costs that may arise as soon as economic actors are in a dependency relationship (Joskow, 2005). However, such control is at the expense of high transaction costs (e.g. higher transaction costs than on the market with transactions characterized by a lower level of asset specificity) coming from the loss of incentive intensity (e.g. bureaucratic costs).

As far as the boundaries of the firm are concerned, Williamson improved the Coasian analysis when he accurately defined the nature and sources of transaction costs.<sup>4</sup> The difference he made between the environmental factors (uncertainty, frequency of transactions, and asset specificity) as well as the behavioral ones (bounded rationality and opportunism)

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<sup>3</sup> Even if Coase clearly does not agree with the central place given to asset specificity and hold-up issues in the transaction cost economics framework (Coase, 1988).

<sup>4</sup> It should be noted here that transaction cost economics mainly looked for transaction costs on the market, making the assumption that “substantially the same factors that are ultimately responsible for market failures also explain failures of internal organization” (Williamson, 1973, p. 316; Williamson, 1996).

introduced some analytical methods of distinguishing why market, hierarchy, and eventually hybrid forms are selected.

The firm is “needed” (by means of a selection process<sup>5</sup>) when transaction costs on the market are prohibitive. The firm appears as a flawed method to reduce those costs. The scope of the firm is then based on a much more precise analytical background than it is in the strictly Coasian perspective. What is very interesting is that even if the transaction cost economics approach is not linked with formal models, it offers an “empirical success story” in the sense that many empirical tests flourished and confirmed propositions on make or buy issues (Masten, 1999; Boerner and Macher, 2002) or contractual choices (Masten and Saussier, 2002).

Nevertheless, the theory is appealing for an “underdeveloped” theory of intrafirm organization since it explains the changes that occur as soon as a transaction is internalized (Grossman and Hart, 1986; Holmström, 1999). The need to refer to bureaucratic costs and the impossibility of selective intervention as well as the assumption that transaction costs inside the firm are generated by the same sources on the market<sup>4</sup> reveals one weakness of this theoretical framework (Gibbons, 2005).

As far as formalization is concerned, the Property Rights Theory and the Incentive Theory seem to be much more favored even if the manner in which they analyze the scope of the firm apparently seems very poor. Furthermore, they challenge the definition of the firm given by the transaction cost theory.

## 2.2. *The firm defined as a collection of assets*

Instead of considering a theory of the limits of the markets and a theory of the limits of the firm, one may look for a definition of the firm that would permit an assessment of the firm’s boundaries in an integrated framework. This is the view taken by the incomplete contract theory (or the new property rights theory; see Garrouste, 2004).

The incomplete contract theory proposes a unified framework to explain both the limits of the market and the firm. The incomplete contract theory challenges the fact that we need to use, on the one hand, the hold-up problem to explain the limits of the market and, on the other hand, the existence of bureaucratic costs to explain the limits of the firm.<sup>6</sup>

<sup>5</sup> Transaction cost economics is based on the assumption that market forces are strong enough to sort efficiently contractual choices so that exchange relationships observed in practice can be explained in terms of economizing on transaction costs. In this respect, transaction cost economics is at the same time a normative and a positive tool. Empirical literature takes as given an economizing framework, assuming that from what we actually observe, we can draw inference about efficient contractual choices (see Masten, 1993 for a discussion on this issue). This is naturally a strong assumption that may be challenged and that seems more or less plausible depending on what data are collected in which sector. Furthermore, that is an assumption that may be challenged empirically by collecting data concerning a firm’s performance.

<sup>6</sup> The incomplete contract theory has long been considered a perfect formalization of the transaction cost theory, but it is clearly not the case (see Joskow, 2005; Gibbons, 2005; Saussier, 2000). After defining how different these two approaches were (Williamson, 1988), the evolution of Williamson’s point of view on this issue is not totally foreign. He pointed out that “It is noteworthy that Grossman and Hart (and related papers of this kind) work from transaction cost economics premises – albeit with terminological differences. Thus, Grossman and Hart employ the terms noncontractibility and nonverifiability rather than bounded rationality. And they refer to

Defining the firm as a collection of assets that it owns (Grossman and Hart, 1986, p. 692), the theory focuses on ownership as the purchase of the residual rights of control that exist as soon as we consider incomplete contracting. The idea is that firm boundaries define the allocation of residual rights. These rights, when an incomplete contract is signed *ex ante* and may be completed *ex post*, modify the *ex post* bargaining position of an asset owner and thereby increase his incentives to make relationships specific investments.

Models developed in this theoretical framework generally assume information symmetry between contracting parties. Furthermore, the theory challenges the idea that bounded rationality is needed for the analysis of organizational choices (Hart, 1990). Contractual incompleteness is only due to external constraints (Kreps, 1996), namely bounded rationality or asymmetric information situations of third parties in charge of the enforcement of contracts. In such incomplete contracts no previously unexpected contingency can arise to disrupt the contract's fulfillment (e.g. there is no uncertainty). Incompleteness is postulated rather than actually explained by models. The incomplete contract theory sheds light on the impact of contractual incompleteness, but is of no help in understanding differences in contractual-completeness levels, nor does it measure the extent to which these levels result from the parties' goodwill. Contractual incompleteness is exogenous and does not result from a trade-off made by economic actors (Saussier). As Hart and Moore (1999, p. 134) pointed out, an incomplete contract is analyzed as one where "the parties would like to add contingent clauses, but are prevented from doing so by the fact that the state of nature cannot be verified (or because states are too expensive to describe *ex ante*)." Generally, this theoretical framework predicts an all or nothing solution: the contract is complete or totally incomplete (i.e. no contract is signed).<sup>7</sup>

Nevertheless, such a theoretical approach sheds some light on the firm's boundaries. The incomplete contract theory (maybe because it is more formalized) has a richer set of predictions than the transaction cost theory concerning the make or buy decision. While the transaction cost theory is concerned mainly with the size of the quasi-rent generated by specific investments, the incomplete contract theory focuses on the marginal returns of non-contractible investments that give rise to a richer set of predictions. That is why the verifiability status of investments, their nature (self-investments versus cross-investments, Che and Hausch, 1999) and the verifiability/observability status of asset specificity levels appear crucial.

What is central in the transaction cost theory is not so much the amount or the level of asset specificity, but the size of the appropriable quasi-rent that is generated by the specificity of assets and their amount. The incomplete contract theory points out that as long as such investments are observable and verifiable, the quasi-rent generated by such investments might not be appropriable (if uncertainty is low) and might generate other effects than those predicted by the transaction cost economics framework. Furthermore, the incomplete

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"relationship-specific investments" rather than asset specificity. Unanticipated state realizations, and the need to adapt thereto, are what pose contractual strains in their model. So uncertainty makes an appearance" (Williamson, 1990, p. 16). He since returned to his original position, arguing how different the two approaches are (Williamson, 2000, 2002).

<sup>7</sup> Nevertheless, recent developments of the incomplete contract theory shed some lights on this issue (Hart, 2004).

contract theory does not suppose a monotone relationship between the size of the surplus and the probability of integration (Hart, 1988). Who owns the assets, their marginal returns and also the direction of the integration matter, contrary to the transaction cost economics framework.

Nevertheless, this richer set of predictions is at the expense of recognizing that testing the incomplete contract theory is bound to be a much more demanding task with regard to data collection (Baker and Hubbard, 2001). Propositions are nearly untestable (Whinston, 2003).

Furthermore, the same critique already addressed to transaction cost economics may be readdressed to the incomplete contract theory: namely, where is the theory of intrafirm organization? (Holmström, 1999). The incomplete contract theory has little room for organizational structure, delegation of authority, or hierarchy (more on this later; see Hart and Moore, 2000; Aghion and Tirole, 1997, and Hart and Holmström, 2002 for developments on this subject).

Lastly, it is clearly a theory of the firm without a manager (Holmström, 1999; Gibbons, 2005). It describes owner–manager firms better than large companies as acknowledged by Hart and Holmström. Decision-makers are also owners of the firm's assets. Many of the firms' internal incentives mechanisms are not studied and may complement or substitute incentives created by the repartition of the assets of a firm (Holmström, 1999). This point is more accurately studied by the incentive theory of the firm.

### *2.3. The firm defined as a collection of assets and internal incentive mechanisms*

One way to go a step further in a unified theory of the firm would be to mix incentives resulting from the distribution of property rights and incentives resulting from internal organization strategies.

Holmström takes this view of the firm, arguing that the method of designing incentives inside the firm is connected to the repartition of ownership and other elements. More precisely, internal incentive design can benefit greatly from the control of a wider range of instruments often accessed through the ownership of an asset. For this reason, internal incentives strategies and ownership of assets are connected.

In this respect “We cannot claim to fully understand either the internal organization of firms or the operation of markets by studying the two in isolation. We need to analyze how they interact as organizations; how they compete as well as complement each other in matching individuals with tasks and in providing proper individual incentives for carrying out those tasks” (Holmström, 1999, p. 100).

In fact, as Holmström recognized, “The strength of the property rights view is that it articulates so clearly the role of market incentives and how they can be altered by shifts in asset ownership. But it says nothing about the incentives that can be created within firms. The real challenge is to understand how the two forms of organization complement each other as well as compete with each other as mechanisms for influencing individual incentives” (Holmström, 1999, p. 76–77). “Indeed the very fact that workers can exit a firm at will and go to other firms, and that consumers and input suppliers and other trading partners can do likewise, limits the firm's ability to exploit these constituents” (Holmström, 1999, p. 90). This leads us to consider that markets and firms are not mere substitutes but

also complements. The role of the market in the firm appears as it influences the level of outside options for agents. In this view, the firm is no longer considered as emerging from where the market failed, with no role for the market in explaining organizational choices.

#### *2.4. The firm defined as a collection of capabilities historically constructed*

When looking for a coherence of the firm, linking internal and external strategies of the firm, it is somewhat necessary to take into account the capabilities and knowledge of the firm coming from its past choices and accumulated experience. Previous theories lack learning processes both at the individual and organizational levels.

Although they are distinct approaches, the evolutionary theory and resource-based view of the firm are knowledge-based explanations of it. They have in common: (a) behavioral assumptions (learning and rule-guided behavior) and (b) their belief that knowledge and capabilities represent the firm's critical and distinctive resources. The competence perspective advocates that firms have to build specific knowledge to be able to conduct complicated procedures and carry out complicated tasks. This raises the question of what the difference between the market and the firm is when it comes to building knowledge. Where does the superiority of the firms come from?

Actions taken by firms are based on routines and capabilities that represent where the firm's distinguishing competences reside. What makes the firm better suited to develop knowledge is based on three arguments. First, knowledge is the result of learning and experience. Second, since it is the result of learning, it is context (local) and path-dependent (historical). Finally, it is partly tacit, and the organization is partly unaware of its existence because it is embedded in organizational routines and individual skills (Nelson and Winter, 1982; Cohen et al., 1996). For this reason, knowledge can be transferred only to a third party who has some absorptive capacity, that is, someone who has already accumulated the required knowledge to understand and integrate the transferred knowledge. If it did not have this absorptive capacity, the transfer would be too costly to implement.

The consequence is that this common identity lowers the cost of communication for future research and learning: "As an activity becomes more specific to the firm, it increasingly accesses and develops a common organizational communication code that both codifies knowledge and facilitates its efficient dissemination and protection" (Poppo and Zenger, 1999, p. 857). Firms are therefore viewed as a governance structure that possesses advantages in generating firm-specific language and routines that yield valuable capabilities. When knowledge is tacit and difficult to transfer, using independent contractor relationships for developing new knowledge may become very costly in terms of transactions and maybe even impossible independently of any opportunistic behavior: "The key is that some of each person's knowledge necessarily remains private, as established by the bounded-rationality corollary. Honest persons . . . may disagree about the best course of joint (or even individual) action, or the division of gains. (. . .) The person's "discovery" may produce lengthy and costly negotiations, which include efforts to convey to the others both the originator's analysis and the knowledge on which it is based. Because of irreducible individuals, adoption of the innovation may not be automatic" (Conner and Prahalad, 1996, p. 483). Whereas under the cover of the hierarchy, communication can be easier and disagreement can easily be settled through authority. Transaction cost theory confines the role of organizations to

one of restricting the scope for opportunism as compared to the market. This is not the view defended by the competence perspective (Moran and Ghoshal, 1996).

In summary, hierarchy, through the formation of routines, may enhance efficiency as compared to the market. This is especially true regarding the activities that are specific to the firm. Therefore, activities that require human specific investments should be internalized due to the enhanced governance efficiency when specific assets are needed, especially because firms have advantages and more capabilities than the market to develop these specific human assets. In other words, transaction costs inside the firm do not increase with human asset specificity, but rather decrease. This makes a difference with the transaction cost economics view and generates a proposition that is clearly in competition with the transaction cost view of the firm (see Masten, 2002; Plunket and Saussier, 2003 for more on this issue).

Nevertheless, it is hard to feel comfortable with these explanations. They are not totally adequate since knowledge and routines may also be developed on the market especially if you consider that opportunistic behaviors of economic agents and incentive issues have to be pushed to the background (Foss, 1996). If these approaches try to take into account capabilities, knowledge and the learning process to explain why firms exist, we must note the poverty of the analysis when it comes to the question of incentives. The individuals seem to have a natural tendency for cooperation. As an example, Kogut and Zander (1996, p. 506) assume that “firms provide the normative territory to which members identify”. The firm identity improves the way coordination, communication and learning take place. The set of incentives are not explicitly analyzed. The fact that members of the firm are integrating the firm identity is supposed to be a kind of natural outcome. The fact that incentives are not taken into account is a drawback shared by all the evolutionary theories of the firm. Indeed the reason is simple. In this perspective, a firm is defined by its routine (Nelson and Winter, 1982), which is then the unit of selection of the evolutionary process. Since a unit of selection is defined as an entity characterized by the fact that all its elements cooperate, there is an implicit assumption that all the members of a firm have to cooperate. The problem of the incentives is then avoided,<sup>8</sup> as it needs to be.

In addition to the questions regarding the nature and the boundaries of the firm, the theory of the firm should also be able to cope with the question of internal organization.

### 3. Looking at how firms are internally organized

The internal organization of the firm is traditionally not a main issue for economists even if Radner (1992) shows that the analysis of hierarchies is an important topic, not only for management science, but also for economics. Coase (1937) presents the idea that the firm is defined by the authority of one kind of agents over the other, but Simon (1951) is the first attempt to propose a precise definition of authority. Radner (1992) and Ménard (1994) add to Simon’s conception a distinction between authority and hierarchy.

When analyzing organizational structure, the first problem economists have to deal with is answering the question of the foundations, the nature of hierarchy. In fact, the answers

<sup>8</sup> “The second, ‘problem-solving’, archetype, on the contrary, censors the incentive-alignment issue (in a sense, all agents are ‘angels’ where their motives are concerned).” (Marengo et al., 1999, p. 4).

depend on the underlying conceptions of the nature of the firm. When the firm is defined on the assumption that there is an identity between the property rights of the assets and the rights to decide on the use of those assets, then the problem is analyzing the reason why it is of interest to the principal who owns the assets to delegate to an agent who will have the right to decide on the use of the assets. In this framework hierarchy is founded on the idea that there is an identity between authority and ownership.

When the firm is defined in terms of incentives, communication or realization of tasks, the hierarchy is defined in a much more functionalist way. As an example, the team theory assumes that a hierarchy exists to solve the problem of the decentralization of information and information processors. Hierarchy can also be considered as the locus of the distribution and expression of power inside the firm (Marglin, 1974) as well as the reason for the existence of leadership (Witt, 2003).

Another important matter is the analytical construction of the hierarchy. The hierarchy is set up based on what tools and what are the resulting solutions (flat or deep hierarchy, delegation or communication, acquisition or transmission of knowledge, etc.)?

Finally, it can be useful to look at the static and dynamic methods of analyzing the internal organization of firms. From a dynamic perspective, some scholars emphasize the role of learning in its relationship with the promotion process (Baker et al., 1994; Gibbons and Waldman, 1999).

After a quick look at the distinction between authority and hierarchy, we present successively the conception that based the analysis of hierarchy on the relationship between ownership and the interest of delegating decision rights and the approach that considers hierarchy as solving communication problems inside the firm. This last, recently developed, approach takes into account the idea that hierarchy should solve the problem of dispersion of knowledge. We emphasize the answers these conceptions provide to the questions of ‘why’ and ‘how’.<sup>9</sup>

### 3.1. Authority and hierarchy

Simon was the first one to attempt to clarify the notion of authority. If B is the employer and W the employee, let  $x$  be a set of all the possible tasks W can perform. Accordingly, “B exercises an authority over W if W permits B to select  $x$ . That is, W accepts authority when his behaviour is determined by B’s decision. In general, W will accept authority only if  $x_0$ , the  $x$  chosen by B, is restricted to some given subset (W’s ‘area of acceptance’) of the possible values.” (Simon, 1951, p. 294). Ménard (1994) defines authority in the same way but he distinguishes it from the notion of hierarchy.<sup>10</sup> If  $A$  is a set of actions and  $I$  and  $J$  two classes of agents, “ $i, i \in I$ , is in a hierarchical relation to  $j, j \in J$ , if  $i$  refers to the goals defined by  $j$  rather than to his own goals when it comes to the choice of  $a, a \in A$ , and if the decisions of  $j$  prevail over those of  $I$  when there are uncertainties, ambiguities, or even

<sup>9</sup> We cannot be exhaustive nor present all the contributions that propose an analysis of the organizational structure. We focus only on the two most important aspects of this literature.

<sup>10</sup> Radner (1992) proposes a definition of hierarchy as being a *ranked tree*. Ménard’s definition is, in fact, exactly the same. However, Radner (1992) defines formal authority as based on the relationship ‘superior to’ that makes authority an asymmetric notion whereas, according to Ménard (1994) it is a symmetric one.

conflicts.” (Ménard, 1994, p. 235). A hierarchy permits us to define a partition on the set or agents by means of a partial order. An agent can have a predecessor (the agent belonging to the first level) in the hierarchy and a successor (the agent belonging to the last level). These definitions show that authority is a symmetric notion whereas hierarchy refers to an asymmetric, non-negotiable reality.

It is important to stress here, first, that authority is not necessarily based on objective characteristics such as ownership or the right to decide. It can be based on subjective and “interactive” variables such as the capacity to persuade, leadership (Witt, 2003), Knight’s capability of judgment, and so on. Second, authority is not necessarily a transitive binary relation whereas hierarchy is and defines a partial order on a given set. As an example, Aghion and Tirole (1997) dealt with authority, analyzing the relationships between managers and employees, although Hart and Moore (2000) proposed a model of hierarchy that analyzed the properties of an order defined by the relationships between a set of individuals and a set of assets.

### 3.2. Asset ownership and hierarchy.

The main literature developed considers that hierarchy is founded on the fact that ownership gives the owner of an asset the authority regarding the use of this asset. This literature either assumes that ownership and the right to decide are two faces of the same coin and cannot be separated or considers that ownership and the right to decide can be distinguished. The main representatives of the first point of view are the New Property Rights Theory of the firm (NPRT) that identifies ownership with the right to decide on the use of an asset<sup>11</sup> and the Incentives Theory that considers the manager-employee authority relationship. The second way of dealing with the relationship between ownership and the right to decide puts an emphasis on delegation and its characteristics. We first present the literature concerning delegation in its relationship with hierarchy and authority before looking at the recent NPRT works regarding the internal organization of the firm.

#### 3.2.1. Hierarchy and delegation

Jensen and Meckling (1992) consider that the capitalist economic system that “grants the alienability of decision rights to decision agents” solves two main problems: the rights assignment and the control ones. The first problem is linked to the determination of who makes the decision and the second to the possibility of assuring that an agent is contributing to the objectives of an organization. Accordingly alienation solves these two problems because “a right is alienable if its owner has the right to sell a right and to capture the proceeds offered in the exchange” (Jensen and Meckling, 1992, p. 251). On this basis, because of the existence of *specific knowledge* (that is, knowledge costly to transfer), delegation can be a solution, and hierarchy is then defined based on the idea, first, that ownership implies alienability, and second, that the owner of an asset can have some interest in giving another agent with specific knowledge concerning the best way to use this asset the right to decide on its use. In fact, Jensen and Meckling try to answer the problem first addressed by Hayek

<sup>11</sup> Recently, however, some authors distinguish between ownership and the rights to decide (cf. Matouschek, 2002).

(1945) concerning the dispersion of knowledge in society and the way this dispersion of knowledge can be managed. In a very Hayekian way of thinking, they assume that specific knowledge is difficult (e.g. costly) to transfer. Contrarily, general knowledge is easy to transfer. Due to his limited abilities the principal cannot gather all the information needed to make an informed decision on the use of all the assets he has to manage. He then has an interest in “colocating decision responsibility with the knowledge that is valuable in making particular decisions” (Jensen and Meckling, 1992, p. 262). However, the agents to whom the CEO gives the right to decide how to use some assets have their own objective functions, and those functions can be different from the CEO’s one. On this basis, they conclude that for the principal (the manager-owner) there is a trade off between giving the right to decide on the use of an asset to the agents who know the best way to use it and the agency costs that this decentralization induces.

Hart and Moore (2000) are completing an analysis of hierarchy by trying to analyze it as a multi-level system (as in Simon) whereas Jensen and Meckling (as well Aghion and Tirole, using a different conception as a basis; see below) are reducing their analysis to a two persons game. They start from the idea that an assets’ owner can decide to delegate the right to decide on those assets because his capabilities for finding the best way to use them are limited or too costly (time consuming). Since their subordinates have the same constraints in terms of capabilities and time, a command chain can be set up. They analyze the characteristics of an optimal hierarchy with a set of agents that may possibly decide on the use of a set of assets. On the basis of certain assumptions,<sup>12</sup> they obtain some interesting results: (1) the highest is the rank of an agent in the command chain on an asset; the lowest is his probability of having an idea on the use of this asset and (2) the criss-cross hierarchies are sub optimal. It is interesting to note that the owner delegates automatically to the agent who is just below him in the command chain, and all the agents at the different levels of the hierarchy delegate in the same way until they reach the bottom of the chain. There is no choice when it comes to the agent to whom another agent delegates. In this kind of model there is, in fact, no explicit incentives system. The problem is to define the characteristics of an optimal hierarchy but not to determine the optimal hierarchy as defined by an optimal incentive system.

### 3.2.2. Authority and delegation

The idea that authority and delegation can be related when dealing inside the firm is perfectly in line with the incentives theory of the firm. In fact, the main idea is to look at the relationships between a principal and an agent when the principal is the owner of a set of assets and he has the possibility (or the constraint) of choosing between deciding how to use this set of assets and delegating this use to the agent. Aghion and Tirole offer a perfect example of this kind of literature. They distinguish two kinds of authority. “Authority may be conferred by the ownership of an asset, which gives the owner the right to make decisions concerning the use of this asset”, but “This *formal authority*, however, needs not confer *real authority*, that is an effective control over decisions, on its holder.” (Aghion and Tirole,

<sup>12</sup> The assumptions are the following: an individual who wants to realise a task on a set of assets needs to have access to all the elements of this set; no externalities; no interactions between the individuals in terms of having an idea for the use of an asset; no renegotiations ex post; negotiations cost less at t=0 with no outcome constraints.

1997, p. 2). The point of departure is very similar to that of Jensen and Meckling's in the sense that ownership and decision rights can be separated. However, Jensen and Meckling assume a trade off between the costs of agency and the costs of centralization. According to Aghion and Tirole, the trade off between delegation and 'integration' is also defined in terms of incentives. They assume that the agent and the manager have congruent utility functions and that there is an asymmetry of information concerning the agent's effort to search for the best project to implement. They show that delegation, as compared to the 'integration' of decisions, makes the principal's search for information less important and the agent's more important. The principal can then delegate the decision to use the assets to the agent. Accordingly, delegation is then neither solving a problem of "bounded rationality" nor defining a relationship between the probability and the right to have an idea on the use of an asset, as is the case in the Hart and Moore model. The manager, as well as the agent, is rational, and there are no differences between the probabilities of having ideas for the use of an asset (and not a set of assets). It is a simple *problem of incentives with asymmetry of information*.

### 3.2.3. *Ownership without delegation.*

Until recently, the NPRT, although it assumes the essential role of ownership, was unable to offer a response in regard to the problems of the scope of the firm (Holmström and Roberts, 1998) and its internal organization.<sup>13</sup> According to Hart and Holmström (2002), if the NPRT allows for the determination of the boundaries of the firm, this applies to the owner-managed firms only and not to large companies. In fact, the main idea of the NPRT is that ownership and the rights to decide are assimilated. The fact that the problem for the NPRT is to determine what party has the *residual rights of control* over a set of assets which define who can or cannot use this set of asset is making the decision problem trivial because it is not possible to transfer the residual rights of control. In order to solve this difficulty, Hart and Holmström propose an extension of the NPRT models. They first define the unit of production as the basic element that corresponds to an activity. It is owned by a boss, and he has a manager and possibly workers. The unit of production can be managed by the boss or a manager. The key modification of the NPRT basic models is the assumption that 'decisions can be transferred only through ownership, and are not even ex post-contractible' (Hart and Holmström, 2002, p. 2). They further assume that 'each unit generates two kinds of benefits: monetary profit and private (non transferable) benefits in the form of job satisfaction for those working in the unit' (ibid, p. 3). They then propose two models in order to answer not only the question of the incentives to invest ex ante but also of who makes the investments. The first is a two-unit model based on a yes-or-no choice (in terms of the coordination of activities). The second introduces an outsourcing decision. Such an approach, which introduces an analysis of the scope of the firm in the NPRT, is a first step towards the introduction of a conception of the internal organization of the firm.

<sup>13</sup> Hart and Moore (2000) could be seen as a NPRT contribution to the internal organization of the firm. In fact, it is not easy to defend such an idea because the model is based on the idea that the allocation of ownership is given and is not determining the way delegation is organized. In another way the place in the command chain does not depend on the allocation of property rights (but for the owner).

The main problem the NPRT continues to face is the assumption that the residual right of control is not transferable.

All these conceptions emphasize the idea that there is a trade off between delegating or not, depending on the importance of agency costs, the efficiency of incentives for the agent to search for relevant information, the probability for a subordinate to have an idea for the use of a set of assets, or incentives.

These analyses implicitly suppose, first, that it is possible to define accurately some property rights for a set of assets, and second, that ownership is equivalent to the right (alienable and then transferable) to decide on the use of this set of assets. When the assets are not contractible (human or intangible assets), it may be impossible to use this way of dealing with organizational structure. A solution is, however, to say that property rights on a tangible set of assets give the owner of these assets the right to exclude others as potential users of this set and then, that property rights give some indirect authority on human assets (Hart, 1995). This solution excludes situations where property rights cannot be precisely defined or possibly transferred, as is the case when the main important assets are human ones. In this case, alienation is impossible. Rajan and Zingales (2001) attempt to solve this problem. They assume that when *critical resources* cannot be protected by property rights, a deep (or vertical) hierarchy is not able to avoid the possibility that the subordinates may expropriate the entrepreneur (that is the individual who ‘possesses’ these critical resources). When the cost of the expropriation is low, a flat hierarchy is a better solution for the entrepreneur. In this situation, the entrepreneur motivates his subordinates by taking the commitment to give them a part of the rent coming from the production based on the use of these critical resources. Conversely, if the cost of expropriation is high, a deep hierarchy is possible because it is too costly for a set of subordinates to compete with the entrepreneur.

All these conceptions do not essentially consider the way information and knowledge circulate inside the firm. However, the firm is a locus where information is exchanged in a different way than it is on the market, and it can be interesting to look at the consequences of this reality on the way firms are internally organized. It is *la raison d’être* of the following section.

### 3.3. Hierarchy, communication and dispersion of knowledge

The first person to define the firm on the basis of the relationship between knowledge and decision rights is undoubtedly Knight (1921). His distinction between risk and uncertainty implies that people with the highest capabilities of judgment make the decisions because they are accepted by others as entrepreneurs.<sup>14</sup> Another influential scholar who introduced the idea that coordination and knowledge need to be linked is Hayek. His distinction between specific and general knowledge made him consider that because specific knowledge is difficult if not impossible to transfer, the only way of ascertaining coordination of actions based on specific knowledge was to let the market do the job. However, as Jensen and Meckling show, there is nothing to assure that the market is able to move decision rights to the

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<sup>14</sup> Coase, (1937) challenges this conception of the firm.

agents with the relevant knowledge and that those agents will use the decision rights properly (p. 252). It is the reason why they combine alienation with the attributes of knowledge (see earlier reference). More generally, Hayek does not demonstrate that the market is *always* better than organizations. This is why the idea that organizational structure can be analyzed in terms of communication gives rise to important literature. The following tradition conceives the firm as solving a problem of coordination between individuals assimilated to elementary information processors. In this perspective, knowledge is defined as information, acquired information or processed information.<sup>15</sup> If knowledge or information is dispersed and is more or less costly to transfer, then the coordination of individuals (seen as information processors) is problematic. If individuals can have different views of the world, even if they are not willing to give false information concerning their real vision of the world,<sup>16</sup> the fact that knowledge is heterogeneous and imperfect makes the problem of their coordination a real and important one.<sup>17</sup> The conceptions of the organizational structure of the firm, as based on a problem of communication, can be divided in two main approaches. The first approach assumes that individuals inside the firm share the same objectives or consider that the incentives problem is not essential. The second is trying to analyze the communication problem when individuals have different utility functions.

### 3.3.1. *Hierarchy and teams*

The first attempt to base the organizational structure on communication problems was by [Marshak \(1954\)](#) and [Marshak and Radner \(1972\)](#). It does not take into account the problem of incentives as do the conceptions presented in the previous section. As an example, the team theory of these authors, an important contribution to this kind of analysis, assumes that individuals share the same objectives. According to Radner, the basic assumption that supports the analysis of hierarchy is that in modern corporations there is an important decentralization of information processors as well as information. The first problem is linked with the fact that decision-making needs a great number of elementary processors of information distributed among different levels. The main issue is then to find an efficient architecture that reduces the number of processors as well as “the delay between the receipt of information by the organization and the implementation of decisions” ([Radner, 1992](#), p. 1400). *Hierarchical networks* seem then to be the best kind of architecture. The decentralization of information is due to the fact that many different decisions are to be made and “it is totally impractical for them to be put out by the same processor, and as a function of the same information” ([Radner, 1992](#), p. 1402).

To sum up, the team theory assumes that all the individuals who belong to the same team have the same incentives and its problem is then to find the best decision function given the decentralization of information.

In a quite similar perspective, [Garicano \(2000\)](#) analyzes the best way possible to match the individual’s knowledge and the tasks that the firm has to realize without considering the

<sup>15</sup> An alternative conception of information and knowledge is given by [Langlois and Garrouste \(1997\)](#).

<sup>16</sup> If individuals give false information on their vision of the world, the problem is more complicated because it integrates a moral hazard dimension.

<sup>17</sup> As we will see below, in a dynamic perspective, the more knowledge is homogeneous the less the cost of coordination but the less there will be a possibility for the organization to learn.

problem of incentives. He shows that a specialization process takes place inside the firm. The argument is based on the identification of a trade off. The employees can learn how to perform tasks they do not know how to do, or they can ask for help from those who do know how. The problem is that when the employers are in the process of learning, they are not working, and when they ask for help, those who help are not working. There is then a trade off between the acquisition and transmission of knowledge. This trade off is solved by means of a specialization process: some people inside the firm will specialize in the performance of productive activities and others will help them. The point here is to find a trade off between learning (acquiring knowledge) and transmitting knowledge in order to coordinate tasks and knowledge. The coordination problem to be solved is the following: given an ordered set of tasks and a set of (possibly evolving) knowledge, how is it possible to combine the two?

The Garicano hierarchy contains two blocks. Aoki (1986, 2004)<sup>18</sup> proposes a comparison between centralized and decentralized hierarchies. Aoki (1986), for example, attempts to compare the internal organization of firms of the US and Japan. Accordingly, two ways of managing communication can be identified. The first is vertical, based on a top-bottom organization of the firm. The top management makes the decisions and the information needed to make these decisions effective is found progressively going down the hierarchy of the firm. The workers are specialized and cannot modify the way the decisions are applied. Aoki considers this kind of information management as a characteristic of the US firms. Inversely, the Japanese firms are horizontally organized in terms of the way information circulates, and the “workers are rotated among various jobs with some frequency within, as well as beyond, workshops” (Aoki, 1986, p. 972). More recently he tries to define the best way of combining operational and informational hierarchies (Aoki, 2004). His conclusion is that conventions are needed to know what kind of combination is preferred, depending on the situation the firm faces.

### 3.3.2. *Communication and interactions inside the firm*

Kreps (1990) originated the idea that in order for the repeated interactions between agents to be stable they need to be based on a reputation effect. Suppose we have two sets of agents with different interests. The reputation effect assures ex ante a set of agents (employees) that ex post the other set (employers) will not act against their interests even if ex ante the context of the actions was not foreseeable. The corporate culture is based on the existence of this reputation effect. Even if the employees and the employers do not have the same interests, the hierarchical authority is accepted by the employees because they know that the employers are respecting certain rules or principles of actions.

Bolton and Dewatripont (1994) developed a conception of organizational structure that is based on the idea that there is a trade off between specialization and communication costs. More recently, Dessein (2002) mixed delegation and communication in order to define a

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<sup>18</sup> We do not present Aoki's (1984) attempt to analyze the firm on a cooperative game theory basis. In this book Aoki analyzes the firm on the basis of the relationships between the shareholders, the manager and the employees. In fact, it seems to be one of the first attempts to combine the analysis in terms of communication and incentives (see below). However, his main works concerning the internal organization of the firm essentially start with the problem of communication.

trade off between two kinds of hierarchy, the first based on delegation of decision and the second built on the communication of information. In fact, the idea is to solve a problem that is similar to one of Jensen and Meckling. The difference is that Dessein does not answer the question of why an agent has the power to delegate or not. Accordingly, inside the firm knowledge is dispersed among the different levels of the hierarchy. The problem the manager faces is whether he delegates or not. The terms of the trade off are the following: if knowledge is dispersed, the manager can motivate the agents who have some knowledge to communicate to him and then make the decision, or he can delegate to these agents the right to make the decision. The first solution induces a loss of information due to the fact that the agents' private information is soft whereas the second provokes a loss of control. The resulting trade off depends principally on the bias, or the parameter of dissonance, between the principal and the agents in terms of preferences. These contributions do not assume the team theory idea that individuals share the same objectives. It considers interacting individuals with no identical interests or objectives, and the problem is to find an equilibrium or, if multiple equilibria exist, to sort them in order to select one.

In a very different way, some scholars emphasize the relationship between the internal organization of a firm and its problem solving capabilities. The basic assumption is to conceive of an organization as a problem solver. A problem can be decomposed (or quasi-decomposed) into sub-problems, and it is possible to map the way a problem is solved with the way it can be decomposed. [Marengo et al. \(1999\)](#) and, in this volume, Marengo and Dosi define a hierarchy on the basis of the decomposability of a problem into sub-problems and evaluate its efficiency in terms of the congruence of the decomposition this hierarchy induces. The idea is then to combine some incentives aspects with the way individuals or a set of individuals deal with the problem of the dispersion of knowledge.

#### **4. Issues still on the agenda and research avenues**

In this paper, we recall several questions that the theory of the firm should be able to answer. Starting with Coase's paper on the nature of the firm, we stressed that this paper is more than Coase simply asking the right questions. It also gives a preliminary framework for the theory of the firm. Nevertheless, 70 years later, there is still no unified theory of the firm. As we discussed, many competing theoretical frameworks coexist, with only partial answers concerning the nature of the firm, its boundaries, and its internal organization.

The collection of papers in this special issue is concerned with these topics. As it stands, existing theories emphasize different trade-offs and are based on particular assumptions that sometimes make a good formalization of promising ideas difficult. Robert Gibbons' paper is an assessment of how it is possible to propose a formalization for four different "formalizable" theories of the firm. Pointing out how the transaction cost theory and the incomplete contract theory are different, a distinction that is now accepted (see [Kreps, 1996](#); [Saussier, 2000](#); [Whinston, 2003](#)), he stresses the fact that there may exist two theories of the firm in Williamson's work, both being formalizable. He also tries to take a step toward an integrative framework that the theory of the firm crucially lacks to overcome a situation in which several competing and complementary frameworks coexist.

Such an integrative framework is quite difficult to construct since a unified theory of the firm must be able to cope with internal and external organizational choices and make hypotheses regarding the complementarities of such choices. Such complementarities are often pushed to the background by empirical studies and may explain some (astonishing) results (Masten and Saussier, 2002). In their paper, Foss and Laursen try to go a step further in this direction. They are interested in the internal organization of the firm and the way this internal organization is linked to payment schemes. They test the propositions of Prendergast (2002), taking into account the fact that the organizational structure and reward mechanisms may be complementary mechanisms to avoid moral hazards in the firm. In other words, the choice of how to remunerate agents is one that is complementary to a host of other issues of organizational design, as stressed by Holmström (see Section 2 of this paper). Their results are consistent with this view and may explain the tenuous trade-off between risk and uncertainty, even if such complementarity is somewhat difficult to assess econometrically (see Holmström and Milgrom, 1994; Athey and Stern, 1998).

Besides the question of make-or-buy and the way production is organized internally, there remains the question of how firms organize cooperation with other firms should they decide to externalize production. What we mean is that it is difficult to imagine a theory of the firm that would not be connected with a theory of interfirm cooperation, since the firm, cooperation and market appear to be substitutes, sometimes even complements (Many empirical studies point out the fact that firms often decide to make and buy at the same time. This is especially true in franchising agreements; see Lafontaine and Shaw, 2005; Pénard et al., 2003, 2004). In their paper, Wuyts, Colombo, Dutta, and Nootboom are interested in the way firms diversify cooperation. Arguing that firms look for diversity in order to learn and at the same time are reluctant to enter into cooperation with other firms when the degree of their knowledge or skills is different, the authors develop the notion of optimal cognitive distance and propose two empirical tests of hypotheses derived from their theoretical framework.

The transaction costs conceptions of the firm are market-oriented and are only interested, to a lesser degree, in the way the firms solve problems (technological as well as transactional). Marengo and Dosi present a contribution that may be considered as a Simonian challenge to the ‘only transactional’ theories of the firm. The main idea is to complete (in a conceptual as well as formal way) Simon’s works on the problem of decomposability of problems and to combine them with the question of the choice of a coordination structure. They develop a formal theory of decomposability and near decomposability. This conception of the firm (that is similar to Langlois and Robertson’s theory of modularity) permits them to appraise the relationships between coordination structure and characteristics of problem solving (in terms of the capacity to decompose them). As an example, they challenge the accepted idea that in a very complex situation decentralized coordination is the best solution.

What is often lacking in the theories of the firm, as seen in the first two sections, is an analysis of the role of the entrepreneur. The manager is traditionally not conceived as possessing particular characteristics. The Austrian conception of the firm gives the entrepreneur an essential role (Kirzner, 1973; Witt, 2003). Such a conception is based on a real break with the mainstream conception of the firm. In his contribution, Casson shows that it is possible to introduce the role of the entrepreneur in what he calls the “orthodox theory” in order to

facilitate the construction of an integrated theory of the firm. He develops two main ideas. The first one is that the entrepreneur has some essential characteristics that make him more optimistic, self-confident, and risk-averse. The second is that the environment is characterized by an important volatility and that it is costly to get information in order to try to solve the shocks associated to this volatility. Consequently, the entrepreneur is a market-maker with a specific role and responsibility as contractor as well as manager of information. According to Casson, these aspects can be introduced to improve the traditional theory of the firm.

The way firms are organized internally is often lacking in theories of the firm. This is crucially connected to their organization structures and the way they solve problems internally by collecting information. Hierarchical organization may help in this respect to organize human capital. Garicano and Hubbard propose a model of optimal hierarchical structure of knowledge intensive production where knowledge must be acquired on the job. Furthermore, they make the assumption that agents have heterogeneous learning costs. Their model tries to emphasize that such a hierarchical structure may imply positive sorting with respect to human capital. They collected data concerning law firms in order to investigate this issue further.

Overall, this set of papers highlights drawbacks and progresses to be made for a unified theory of the firm. Improving formalization in order to derive precise propositions, taking care of complementarities between organizational choices and taking care of the cognitive limits of economic agents are several paths to achieve this goal.

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