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MAKE-OR-BUY THEORIES:
WHERE DO WE STAND?

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Make-or-Buy Theories: Where Do We Stand?[1]

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[*Abstract]* The aim of this paper is to discuss the state-of-the art and the directions for research on the make-or-buy problem. After thirty years of research efforts, we now have numerous contributions explaining different aspects of the nature and existence of the firm. The search for a unified theory, however, still remains, at a theoretical level, a challenge. The task is not easy, perhaps because the theory of the firm develops along two different strands, one analyzing the factors influencing the boundaries, and the other one relating to the internal structure; or because, even inside the same research strand, it is not really easy to grasp the similarities and differences between contributions that have followed one another in rapid succession over the last few years. This paper examines the theories concerning the make-or-buy problem, focusing on recent contributions that have tried to develop a unified framework and emphasizes the role of incomplete contracts as a common and significant trait of the theories discussed.

JEL CLASSIFICATION: D23, D83, L14, L21

1 Introduction

During the last thirty years a lively academic debate on the nature and existence of the firm has been ongoing. Starting from Coase's (1937) and Berle and Means' (1932) seminal works, the economic literature has slowly but progressively been enriched by contributions allowing us to grasp different aspects of the boundaries and internal structure of the firm. Nevertheless, we still cannot claim to have a comprehensive theory, that deals with all the aspects of the firm in a unified framework. In fact, we have moved from the black box neoclassical view, where the firm is depicted as just a production function, to a variegated set of theoretical models. Therefore, if the central issue raised by Coase in his 1937 article was the need to study the nature of the firm, a number of recent contributions seem to have put another important question on the agenda: the necessity to nest the different models in a unique analytical framework.

In this essay, through a look at the restricted ambit of the models dealing with the issues of vertical integration and the boundaries of the firm, we identify the common ground of those contributions in the analysis of the nature of contracts and, particularly, in the analytical perspective of contractual incompleteness. The paper's goal is not to provide a comprehensive survey of all the different interpretations of the firm, nor an answer to the complicated question of finding a unified model. More simply, we aim to illustrate the recent advances in the field and, more specifically, how the main contributions address the make-or-buy problem posed by Coase from the perspective of incomplete contracts. This choice, which delimits the literature to be examined, is motivated by the

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[1] Paper presented at the ENEF 2008 meeting "*Knowledge, organization and the firm*", Laboratory of Economics and Management, Scuola Superiore S. Anna, Pisa, 11-12 September 2008. The paper draws heavily on Nisticò (2008), *forthcoming*, which also provides a wider discussion of both theoretical models and empirical evidences.

fact that, in this ambit, over the last few years a number of interesting works (both theoretic and empirical) aimed at providing a synthesis of different models has appeared.

Interest in make-or-buy decisions has focused not just on the theoretical analysis, but has also produced a considerable amount of empirical studies aimed at verifying the predictions of the different theories, and also interesting extensions and applications of the theory of the firm models for the interpretation of recent important economic phenomena. Among these are included the de-verticalization of production and the tendency to international outsourcing of inputs and intermediate goods. In recent years we have seen an increase in awareness that the traditional trade theory is not sufficient to explain these phenomena because it has tended to neglect the analysis of contractual relationships between buyers and suppliers (Spencer 2005; Feenstra- Hanson 2005).

Obviously, restricting the subject necessarily implies leaving other -albeit relevant for studying the nature of the firm- issues out. We do not consider, for example, theories that deal with the problem of the complexity of internal coordination, or how bounded rationality and capabilities condition firm boundaries[2]. On the other hand, Holmstrom-Roberts (1998) highlight a complex of factors that the theories on the make or buy problem seem not to address, even though these factors play, in real experience, a not inconsiderable role:

"Our examples suggest that ownership patterns are responsive to, among other things, agency problems, concerns for common assets, difficulties in transferring knowledge, and the benefits of market monitoring. These suggestions are tentative, and we confess that they are mostly without a good theoretical foundation. They are offered in the hope of inspiring new theoretical research" (Holmstrom e Roberts 1998, p. 75).

The survey is organized as follows. In the second section we define the make-or-buy problem and in the third we identify the link between the contractual incompleteness and the theory of the firm. In the next sections we define the meaning the different theories of the firm give to contractual incompleteness and the role played by the asset specificity hypothesis, focusing on recent contributions that have tried to develop a unifying framework. Last, the paper briefly discusses the empirical evidence, highlighting how on this ground too the need to develop a unified theoretical framework has been noted. Some final considerations conclude the survey.

2. In search of a unified theory

After thirty years of research efforts, we now have numerous contributions explaining different aspects of the nature and existence of the firm. The search for a unified theory, however, still remains an unfulfilled challenge. While highlighting the difficulties encountered in understanding common ground, distinctions and potential combinations of seemingly similar contributions, Gibbon (2005) points out the importance of achieving an integrated formalized model. Garrouste and Saussier (2005) advocate a unified and formalized framework by showing how many theoretical approaches still coexist each of which providing just a partial answer on the nature of the firm, its boundaries, its internal organization. Bolton and Scharfstein (1998) throw down the challenge for achieving a theory of the firm able to deal both with the problem of analyzing firm boundaries and internal organization: they emphasize the fact that these two questions actually imply each other:

"What we lack and what we need is a more unified theory of the firm based on the insights of Coase and Berle and Means. We believe that one cannot fully answer Coase's question without understanding the issues raised by Berle and Means" (Bolton e Sharfstein 1998, p. 96).

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[2] Examples of these theories of the firm are: the resource-based theory, developed from Penrose's (1959) pioneering contribution; the evolutionary approach (Nelson-Winter 1982); the dynamic transaction costs analysis (Langlois 1992); the theory of the inseparability of the current or future governance from prior contractual commitments made by a firm (governance inseparability); theories concerning organization, incentives and internal delegation processes (Prendergast 2000; Gibbons 1998; Aghion-Tirole 997; Baker-Gibbons-Murphy 1999).

Now, what is the theory of the firm? Or, what should it be? And why has a unique theory of the firm not been developed?

In the Coasian view, the theoretical problem of the existence of the firm comes from the need to explain why the coordination of resources is sometimes carried out by the market, by means of the price mechanism, and sometimes by the firm, through the entrepreneur's authority. Which factors could explain the recourse to price instead of entrepreneurial authority? The answer to this question, which in the literature is referred to as the make or buy problem, is still not clear for economists.

From this perspective, Gibbons (2005) isolates the two basic issues a theory of the firm must define: *a*) what is "integration", in the sense of defining what determines that a transaction is carried on within one firm or between two independent firms; *b*) why integration matters, in the sense of specifying, within the same analytical framework, the costs and benefits of integration.

Nevertheless, the analysis of the trade-off between integration and market in the same analytical context, has actually been going on just starting from the property rights theory models (Grossman and Hart 1986; Hart and Moore 1990). As a result, a preliminary task in view of attaining a unified framework, should entail the re-examination of the different theories from the two criteria mentioned above.

The limits of the traditional economic model are not to be found, however, just in the lack of the analysis of the boundaries and nature of the firm as posed by Coase. The traditional (neoclassic) theory does not explain what happens inside the black box, how the firm's hierarchy is structured, which incentives motivate agents who operate within the firm, how property rights are allocated and the nature of the relationship between firms. Cyert and March (1963) began a trend of studies on decision making processes within the firm. Berle and Means (1932) raised for the first time a fundamental question about the separation between ownership and control: why should corporate managers act in the interest of investors? The analysis of agency problems and costs stemming from the divergence between the stakeholders' objectives and managers' is still now a central issue in corporate finance (Bolton and Scharfstein 1998). These aspects are not considered even in the Coasian literature, with the consequence that after thirty years of study the discipline is dominated by separate strands of research (Mariti 2004).

Thus it seems that the job of achieving a unified theory of the firm is by no means an easy one because "the theory of the firm has the difficult task of answering many questions":

"The theoretical challenge comes from the multifaceted phenomenon that can hardly be grasped by unique theory, leading to the multiplication of theoretical approaches that can be considered as a 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*" (Garrouste and Saussier 2005, p. 179, emphasis added).

How can we overcome this impasse? How can we reconcile the contrasting needs of a unified theory of the firm and the numerous theoretical issues to deal with?

Some authors propose to limit the problem *ex ante* by adopting a restricted definition of the theory of the firm. Of course restricting the ground of analysis does not lead, ipso facto, to a unified theory: to reach this aim requires the added effort of constructing a new model which takes into account the results achieved by each contribution. Hart (1989,1995) identifies the basic theoretic issue in the analysis of the boundaries of the firm[3]. Zingales (1998) mentions just two fundamental theories of the firm[4]. Holmstrom (1999) proposes a partial synthesis of the theory of the firm,

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[3] "Principal agent theory enriches neoclassical theory significantly, but still fails to answer *the vital question of what a firm is (or what determines its boundaries)* […] The point is that principal-agent theory tells us about optimal incentive schemes but not directly about organizational form. Hence, in absence of a parallel between the two (which turns out to be difficult to draw), the principal- agent theory, by itself, can make no prediction about the nature and extent of the firm" (Hart 1989, p.1759, emphasis added).

[4] By the first one the firm is a nexus of contracts (Alchian and Demsetz 1972), while by the second one the firm is a collection of physical assets that are jointly owned. The allocation of property rights is important because it confers the right of taking decisions in every circumstance unmentioned in the contract between parties (Grossman and Hart 1986;

integrating some issues regarding the internal organization into the new property rights model. Gibbons (2005) nests in a unique framework the elemental versions of four theories of the firm dealing with the make or buy problem. Whinston (2003) re-examines a number of well known empirical works and verifies whether they could be considered as valid empirical support for other theories of the firm, particularly for the property rights theory[5].

3. Incomplete contracts and the theory of the firm

Make or buy theories are based, more or less explicitly, on the contractual incompleteness hypothesis. A contract is incomplete if not all the economic aspects and the benefits accruing to the parties are specified unambiguously and correctly *ex ante* and if the actions of the parties concerned are not observable or verifiable (Hart 1987; Hart e Holmstrom 1987; Milgrom e Roberts 1990; Tirole 1999)[6].
Coase (1937, p. 391) calls attention to the inevitable incompleteness of long term contracts:

"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." [7]

Klein, Crawford and Alchian (1978) discern two long term contracts typologies: a) explicit contracts, enforced by government authority or some other outside institution; b) implicit contracts, enforced by the market mechanism, that is the loss of future affairs for the party that behaves in an opportunistic manner. It often happens that the first typology of contracts is "incomplete" because "every contingency cannot be cheaply specified in a contract or even known" (Klein, Crawford and Alchian 1978, p. 303); the second typology is *a fortiori* incomplete because there is no formal obligation under which the person who reneges might be legally sanctioned.
Contractual incompleteness is the analytical foundation of the new property rights theory too. In this approach many factors contribute to make contracts incomplete: first, some futures of the transaction could only become known *ex post* (Grossman and Hart 1986); second, the costs of specifying *ex ante* all the relevant states of the world might be too high; third, the actions of the parties could not be verifiable by a third external party (Hart-Moore 1999):

" We imagine that *the non contractible represents a special service* that will be required of a firm at date 1 and that *the type of service that is appropriate depends on the realization of a state of nature* " (Grossman and Hart 1986, p. 703n, emphasis added).

"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)*" (Hart and Moore 1999, p. 134, emphasis added).

Hart and Moore 1990). Starting from these two approaches, Rajan and Zingales (1998; 2001) propose a new definition of the firm as a network of specific investments that cannot be replicated by the market.
[5] Whinston discusses the results stemming from Monteverde and Teece (1982); Masten (1984) and Joskow (1985).
[6] If we leave the neoclassical world of perfect rationality and perfect and symmetrical information, contracts are inevitably incomplete. First, the limited rationality cause contractual voids: as a consequence of the difficulty of foreseeing future circumstances and processing information, as well as in reason of the costs of writing contracts, not all decisions are specified *ex ante*. Second, the fragmentary and asymmetry of information makes actions of the parties not perfectly observable and verifiable, so there is no certainty that agreement will be honoured and shirkers will be caught and eventually sanctioned. The effective possibility for honouring contracts depends, at least, on the institutional framework (legal system, judicial efficiency).
[7] Some recent empirical evidences confirm the incomplete nature of long term contracts and Coase's arguments. See, in particular, Crocker e Masten (1991), Crocker e Reynolds (1993) e Saussier (2000).

In the incentive system theory the impossibility of drawing up complete contracts also depends on the circumstance that the agent's actions are not observable (Baker, Gibbons and Murphy 2002; Gibbons 2005).

Furthermore, uncertainty is at the basis of the contractual incompleteness in the adaptation theory (Williamson 1975, 1991, 2002; Gibbons 2005; Baker, Gibbons and Murphy 2006).

Why has contractual incompleteness such a central role in the theory of the firm?

The aim of the contract, both formal (explicit) or informal (implicit or relational), is to safeguard the parties in the execution of transaction and how the surplus from the transaction will be shared out *ex post*. The more contracts are incomplete, the more these safeguards are inadequate. During the transaction, if new information emerges or certain conditions change there is room for *ex post* bargaining, and, if contractual voids exist, the result of the ex post bargaining process depends on each party's contractual power.

Among the factors affecting the relative contractual strength of the parties, a central role is played by the nature of the transaction. In the case of "standardized" transactions, involving the exchange of homogeneous goods, each party has an identical contractual power and the market mechanism is able to ensure efficient results: buyers and sellers are indifferent as regards who supplies and who demands the good and there are no barriers to exit from the relationship. In contrast, other transactions require the realization of investments that are in this sense "sunk" if the relationship should be interrupted prematurely. The more the irreversible investments are "specific", that is their value is significantly lower when employed in other uses than those to which they were originally devoted to, the more the parties consider it convenient to continue the relationship ("lock in" effect)[8]. Once specific investments are realized the market becomes a bilateral monopoly and the each party's payoff depends on their respective *ex post* contractual power. In a not yet competitive context, the free market exchange ends by not safeguarding adequately contractors as regards the surplus from the transaction and, accordingly, alternative modes of governance other than the market become relevant (Ménard 2005; Zingales 1998):

"Only in a world where some contracts contingent on future observable variables are costly (or impossible) to write ex-ante is there room for governance ex post. Only in such a world, are there quasi- rent that must be divided ex –post and real decisions that must be made. Finally, *only in a world of incomplete contracts can we define what a firm is and discuss corporate governance as being different from contractual governance*" (Zingales 1998, p.499, emphasis added).

In the following sections we shall see that the contractual incompleteness is the common trait of the theories of the firm dealing with the make-or-buy problem, whereas asset specificity hypothesis is only shared by some of them.

4 Transaction costs and incomplete contracts

Contracts are found to be incomplete because of transaction costs (Tirole, 1988). It is now recognised that a number of these costs are incurred *ex ante*- that is to say before the transaction takes place, in particular, the costs of foreseeing all the possible circumstances the parties may have to face throughout the course of the transaction, and specifying how to deal with them in the contract; nevertheless, other costs emerge *ex post*, that is to say after the transaction has taken place: the costs of monitoring and, where necessary, the costs of *ex post* bargaining and enforcing the contract.

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[8] The difference between the surplus generated by the specific relationship and the one that can be obtained in the best alternative transaction in the marketplace represents a "quasi-rent" (Klein, Crawford and Alchian 1978). Once specific investments are realized, each party might try to capture the quasi-rent, even threatening the other party to interrupt the relationship. This post-contractual opportunistic behaviour is known as "hold up". It must be considered that the realization of a specific investment is not the only factor that generates a quasi-rent. A second source is represented by "switching costs" involved in changing partner, consisting mainly of information, search and turnover costs. A third source is the lack of alternatives, that, in the case of interruption of the relationship, makes it costly to have the job finished by another contractor (Scoppa 2003).

According to Coase, the economic reasons for the existence of the firm stand exactly in the presence of transaction costs. It becomes evident that, starting from the pionering contributions in neo-institutional terms, the link between the theory of the firm, transaction costs and incomplete contracts has become well defined.

Coase's theory starts from a critical consideration of the resource allocation mechanism in economics, that seems to follow two alternative methods: outside the firm, carried out by the market price, and within the firm, carried out by entrepreneurs. Price coordination is conducted by means of the interaction of market demand and supply, whereas entrepreneurs' coordination is based on their authority in assuming and imposing decisions within firm. What determines if the price mechanism takes place instead of authority? Why is there any firm if coordination could be carried out by price alone? Can one coordination method reveal itself more efficient than the other one?

Coase's answers are based on the comparison between the costs of using the market mechanism and the costs of the internal coordination. In this theory, market transaction costs are essentially those "of discovering what the relevant prices are" and " the costs of negotiating and concluding a separate contract for each exchange transaction which takes place on a market"[9]. Coordination within the firm greatly reduces both information costs and contracting costs. Firms exist, therefore, because the internal coordination of resources allows transactions to be carried out at a lower cost than the price mechanism coordination.

Why, then, are not all transactions carried on by just one big firm? The reason is that, as firm gets larger it encounters diminishing returns to management. By increasing the number of internalized transactions, it may be, in fact, that the entrepreneur fails to allocate efficiently the factors of production and there will be a waste of resources. Therefore, "a firm will tend to expand until the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange on the open market or the costs of organizing in another firm" (Coase 1937, p.395).

As regards the two essential components of the theory of the firm as referred by Gibbons (*infra §2*), in Coase's analysis we can define: a) vertical integration (firm) as the governance structure where resources are coordinated by authority; b) the benefits of integration as the saving of the costs of using the market, whereas the costs of integration are identified with the costs of internal coordination. This theory does not examine in depth either the factors at the roots of the transaction costs, nor does it specify the nature and the sources of internal organization costs. As a result, the analysis of the trade-off between the firm and market remains rather vague. Garrouste and Saussier (2005, p. 180) describe the main limits of this theory as follows:

"The definition of the firm, viewed as the place where the coordination through prices is replaced by 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" .

Williamson (1985) specifies the nature and the sources of transaction costs, depending on the dimensions of the transaction (uncertainty, frequency and assets specificity) and on some aspects of human behaviour (limited rationality and opportunism). The efficient governance structure (market, hierarchy) appeals to the comparison between the sum of production and transaction costs in the marketplace, on one side, and the sum of production and transaction costs within firm, on the other.

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[9] Repeated transactions are generally regulated by means of long term contract, that, though, under uncertainty, bring the difficulties of foreseeing and specifying ex ante transaction characteristics in advance on a long term. For this reason, long term contracts, from one side, eliminate some contracting costs and, on the other side, they increase them both as a consequence of the necessary adaptation of the original agreements to the unforeseen contingencies as well as a result of variations in transaction characteristics.

In a similar way to the Coasian theory, transaction costs analysis developed by Williamson does not explore in depth the organizational dynamics and the added costs occurring inside the firm when a transaction is internalized (Saussier 2000).

Gifford (2004) extends the theory of Coase (1937) and Williamson (1985) by considering the endogenous transaction costs, or opportunity costs, of carrying out a new transaction. The latter depend on the fact that the entrepreneur has just a limited amount of attention to allocate to the different activities, and, in particular, to evaluating the internal contracts which the firm is already responsible for and to negotiating a new market transaction; the latter may become an internal contract or a market contract. The endogenous transaction costs are due, therefore, to the opportunity cost of negotiating and writing a new contract, calculated in terms of the demands on the entrepreneur's attention from internal contracts.

Gifford assumes that entrepreneurs can successfully evaluate the contracts for which they have *core competencies* and that the attention they allocate to a new contract determines its completeness and the attention it will demand in the future. As in Coase (1937), the analysis takes the point of view that contracts are incomplete due to "exogenous" transaction costs and asymmetric information. The decision by a firm to make or buy stems from, therefore, the evaluation of the optimal allocation of entrepreneurs' (limited) attention, that depends, in turn, both on the breadth of their core competencies and the completeness of the internal and market contracts:

> The relative completeness of contracts, the proportion of new contracts that are within the entrepreneur's core competencies, and the rate of deterioration in the returns to internal and market contracts also affect whether transaction are internal or over markets (Gifford, 2004, p. 19).

From the Coasian perspective, the model defines the firm (vertical integration) as the nexus of contracts under the entrepreneur's direction, but different from Williamson (1985) the unit of analysis is not the transaction, but the opportunity costs of allocating the entrepreneur's attention to alternative transactions:

> Assuming that the transaction is the unit of analysis ignores the opportunity costs of attention that can be allocated to another transaction. Transaction costs can be observed only when the firm as a whole is analyzed". (Gifford, 2004, p. 18).

The results of the model significantly depend on the assumption that the entrepreneur is responsible for the internal decision process and that there is no delegation processes able to reconcile the possibility of writing and negotiating new contracts with the efficient monitoring and evaluation of the ongoing contracts. In other terms, not only, as in the Coasian theory, is the internal organization of the firm not considered, but the whole analysis seems refers to a particular organizational form, where decisions are centred in the person of the owner-entrepreneur whose attention must be efficiently split between new and prior contracts.

5 Contractual voids and *ex post* opportunism

The view that contractual incompleteness leaves room for *ex post* opportunistic behaviours animates the so-called "rent-seeking" theory of the firm (Gibbons 2005), where the benefits and the costs of vertical integration are jointly considered in connection with the rent seeking activities. The latter consist in devoting resources, assuming decisions, taking actions that are socially unproductive but individually profitable because they allow parties to get a rent or to exert their own monopolistic power. They may occur both between firms, in the case that transaction is carried out in the marketplace, and within firms, when the transaction is internalized.[10] Integration can, therefore,

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[10]The rent seeking concept was expressed and formalized for the first time by Tullock (1980), whereas its explicit application to the theory of the firm is due to Gibbons (2005). See also Tullock (1993).

eliminate the rent seeking costs *between* organizations, but might lead to others taking place *inside* the firm.

As regards the benefits of integration, the analytical background is based on the theory of post-contractual opportunism (Klein, Crawford and Alchian 1978; Williamson 1971; 1979; 1985) that examines *rent seeking* between organizations. Analysis of the integration costs is inspired, on the other hand, by the influence costs theory (Milgrom and Roberts 1988; 1990), which considers *rent seeking* within organizations. In order to illustrate the rent seeking theory, we need , therefore, to briefly present these two key components.

5.1. *Quasi rents and post contractual opportunism.*

The post contractual opportunism theory focuses on the quasi-rent generated in consequence of certain attributes of the transaction. Klein, Crawford and Alchian (1978) concentrate on the role played by investments specificity in creating quasi rents and identify the advantages of vertical integration in preventing opportunistic behaviour called *hold up*. In the presence of assets specificity the division of ex post surplus in a market relationship governed by an incomplete contract depends on each party's contractual power in a no longer competitive marketplace[11]. As a consequence, the agents' fear that a weak bargaining position ex post might reduce their own share of the quasi rent generated by the relationship induces them to underinvest:

"Even if transactors are risk neutral, the presence of possible opportunistic behavior will entail costs as real resources are devoted to improve posttransaction bargaining positions in the event such opportunism occurs. In particular, *less specific investments will be made to avoid being 'locked in'*. In addition, the increased uncertainty of quality and quantity leads to larger optimum inventories and other increased real costs of production." (Klein, Crawford and Alchian 1978, p. 301, emphasis added).

This theory was inspired by a case study that became a canonical example in organizational economics: the relationship between General Motors, car producer, and Fisher Body, auto body manufacturer, at the beginning of 1900s[12]. This case shows how the formal contract alone might not be sufficient – just because it is incomplete – to properly safeguard agents against counterpart's ex post opportunistic behaviour.

The prescription of the model is that vertical integration eliminates inefficiencies from underinvestment. The model implicitly assumes, in fact, that the specific investment is alienable, so investment decisions after integration will be entirely controlled by firms which integrate.

Furthermore, the theory states that as appropriable quasi rents increase, so does the cost of carrying out transactions in the marketplace: hold ups are more likely when quasi rents are greater. Anticipating the possibility of the counterpart's opportunistic behaviour, parties will intensify contractual safeguards, causing transaction costs to increase. As a result, the higher the appropriable quasi rent, more likely vertical integration will be because transaction costs will be greater:

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[11] Before making specific investments, transactors can choose among several partners: for example, there may be many potential suppliers of a particular asset to a user. But, once a relationship specific investment is made, parties are linked to each other because the same investment has a lower value in alternative uses. This change from competitive market conditions to bilateral monopoly was defined by Williamson (1985) «the fundamental transformation».

[12] Around 1919, an unexpected large increase in the demand for closed metal bodies automobiles made necessary to revisit the early contract signed by General Motors and Fisher Body. Given the higher volumes of purchasing, General Motors requested a price reduction in body cars supply price, and the localization of the Fisher body plants adjacent to General Motors assembly plants, that is a specific investment necessary for production efficiency. Fisher Body refused both of them: an exclusive dealing clause whereby General Motors agreed to buy substantially all its closed bodies from Fisher, protected this latter from any other competitor; on the other side, locating close General Motors assembly plants would have weakened Fisher Body's ex post bargaining power because it would possibly have reduced its ability to supply other manufacturers and, therefore, its quasi rents (see Klein, Crawford and Alchian 1978; Zingales, 1998).
The General Motors – Fisher Body case has recently been the subject of detailed investigation that has produced many additional aspects of this specific relationship, sometimes criticising the interpretation of the case study told by Klein, Crawford e Alchian (cfr. Coase 2000; Freeland 2000; Casadesus Masanell – Spulber 2000). However, the purpose of this review is to describe how the interpretation above has inspired a theory of the firm.

"We can reasonably expect the following general empirical regularity to be true: the lower the appropriable specialized quasi rents, the more likely that transactors will rely on a contractual relationship rather than common ownership. And conversely, integration by common or joint ownership is more likely, the higher the appropriable specialized quasi rents of the assets involved " (Klein, Crawford and Alchian 1978, p. 307).

It is important to note that, notwithstanding the literature on post contractual opportunism attaching considerable importance both to specific investments and contractual incompleteness due to the complexity of precisely specifying all the features of the transaction, Klein, Crawford and Alchian (1978) consider that ex post opportunistic behaviours could also occur even if transactions are not especially complex, in so far as that they create "dependency" between parties. When this is the case, integration is again preferred to market relationships:

"As we shall see, the costs of contractually specifying all important elements of quality varies considerably by type of asset. For some assets it may be essentially impossible to effectively specify all elements of quality and therefore vertical integration is more likely. *But even for those assets used in situations where all relevant quality dimensions can be unambiguously specified in a contract, the threat of production delay during litigation may be an effective bargaining device. A contract therefore may be clearly enforceable but still subject to postcontractual opportunistic behaviour*". (Klein, Crawford and Alchian 1978, p. 301, emphasis added).

In considering the theory of post contractual opportunism Gibbons (2005) dwells, rather than on the underinvestment problem, upon the unproductive activities (*socially destructive haggling*) that could be considered to influence relations between organizations.

"In the rent seeking theory of the firm […] integration can stop socially destructive haggling over 'appropriable quasi-rents' (hereafter AQRs). […] The key idea is that, in the presence of AQRs, non-integration cannot avoid inefficient haggling because, while 'jointly (and socially) unproductive, it constitutes a source of private pecuniary gain", so integration (with dispute-resolution by fiat) will be more efficient" (Gibbons 2005, p.204).

Taking inspiration from the formalization of the rent seeking behaviour proposed by Tullock (1980), Gibbons considers a relationship between two firms, i and j, which generate an appropriable quasi rent QRA. In order to obtain this quasi rent, the two firms need to take a decision, d_i, d_j, that entails costs $c(d_i)$ and $c(d_j)$ [13]. Denoting with $P_i = d_i/(d_i + d_j)$ the probability that firm i gains the quasi rent, the expected payoff to party i of taking a decision aimed at the appropriation of QRA is:

$U_i (d_i; d_j) = P_i QRA - c_i(d_i)$.

The strategic interaction between the two firms, assuming symmetry both on the probability function P_i and the cost functions c_i, results in the Nash-equilibrium $(d^{EN}) = d_i = d_j$, so each firm has the same probability of capturing the quasi rent incurring the same cost $c(d^{NE})$. Gibbons indicates the total cost of rent seeking $2c(d^{NE})$ as a measure of the inefficiency of non integration.

By defining vertical integration as the mode of governance where one firm controls both decision rights, the benefits of vertical integration are that the firm that integrates captures all the QRA at a derisory cost. For example, if party i controls both decision rights, then i can choose $d_i = \varepsilon$ small enough and $d_j=0$. Consequently, $P_i = 1$ and i obtains the whole quasi rent at cost $c(\varepsilon) \sim 0$.

We have considered until now the analysis of the benefits of integration. What about, conversely, the costs of integration?

Post contractual opportunism theories do not shape this aspect, making in a more general way reference to the existence of "costs of bureaucracy" (Hart 1995). But, which factors lead to the costs of bureaucracy? Are they linked to *rent seeking*?

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[13] We can think of d_i and d_j as each firm's decision about resources to be destined to rent seeking activities.

By missing the analysis of the *downside* of vertical integration the theory shows a serious limit, because this weakens its predictive power: if integration were always preferable, when and why we should expect non integration to occur?

What we lack, in particular, is a parallel assessment of rent seeking, both between and within organizations. In fact, it is crucial to find the same sources for the costs and benefits of integration when reasoning about the *trade off* between firm and market as alternative modes of governance (Grossman e Hart 1986).

According to Gibbons (2005), the simple assumption that the costs of bureaucracy are independent of the costs of *rent seeking* hinders the effort to develop an unique theory of the firm:

"The theoretical disadvantage of assuming that the costs of bureaucracy are independent of the costs of rent-seeking is that such an assumption is inconsistent with the developing a unified theory of the firm. […] That is, if we are to have a unified theory of the firm in which the costs of bureaucracy are independent of the costs of rent-seeking, then we need a model that proves this independence, not an assumption that simply asserts it. (Gibbons 2005, p.219).

The influence costs theory

An example of *rent seeking* within organizations is represented by *influence* activities (Milgrom and Roberts 1988, 1990). Such practices typically occur in organizations where a central authority has the power to take decisions that affect the well-being of other organization members, in terms of income or other non monetary benefits. The latter are likely, thereafter, to undertake actions aimed at modifying the authority's decisions regarding their benefits (Milgrom e Roberts 1994; 1988). Influence activities might consist in making known certain individual characteristics, also manipulating the information members develop and provide in order to increase the possibility of influencing the decision maker; such manipulation can also take the form of suppressing unfavourable information. More in general, "internal" *rent seeking* practices are aimed at reaching a dominant position inside the organization.

Influence activities presuppose that communication channels are open between decision makers and the other members of the organization. This influence activity can be costly to the organization both in terms of degrading the quality of decision making and in diverting resources (such as time, effort, attention) of the organization's members from more productive activities (Milgrom and Roberts 1988; Kreps 1993). Nevertheless, institutional devices (incentive systems, *organizational design*) might exist inside organizations aimed at minimizing influence costs.

It is simplistic, however, to maintain that influence activity is just a source of costs to the organization: in effect, if on one hand it can involve distortions in decision making processes, on the other hand, given that the individuals most interested in a decision are at the same time the best informed as regards the available alternatives and their consequences, influence activity helps to spread information throughout the organization. By opening the communication channels the decision maker can collect a wider set of information, thereby running the risk of manipulation that may lead to inefficient decisions from the organization's point of view. As a result, the decision may invokes various institutional mechanisms (such as incentives, organizational design) to limit inefficiencies due to the influence activity[14].

Unlike the literature on *rent seeking* between organizations, influence costs models highlight the fact that vertical integration allows parties to concentrate on alienable decision rights, such as those regarding physical capital; while other decision rights remain under each party's own control even after integration and, for this reason, they are named "inalienable". Examples of such decision rights are those regarding decisions on agents' human capital investments or working effort (for example, the effort agents really devote to productive activity when their actions are not observable e/o verifiable).

5.3. The firm as a nexus of decision rights

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[14] Some examples of such institutional mechanisms can be found in Milgrom and Roberts (1988).

Gibbons (2005) presents a unified *rent seeking* theory considering the *make or buy* problem in terms of benefits and costs of integration that stem from *rent seeking* activity *inter* and *infra* firms, respectively.

Let U_i indicate party *i*'s expected *payoff* under non integration, and, unlike the previous sections, let us distinguish between alienable and inalienable decisions rights, and their respective costs:

$$U_i (di; dj; \lambda_i, \lambda_j) = P_i (d_i, d_j, \lambda_i, \lambda_j) QRA - c_i(d_i) - k_i(\lambda_i),$$

where, λ_i and λ_j are the inalienable decision rights that each party controls even after integration and k_i and k_j are the costs involved, respectively.

Under the assumption of symmetry on P_i, c_i and k_i, the model considers that the strategic interaction between the two firms yields $d_i = d_j = d_{NE}$ and $\lambda_i = \lambda_j = \lambda_{NE}$, so each party has ½ probability of capturing the quasi rent, but incurs costs $c(d_{NE}) + k(\lambda_{NE})$.

The *make or buy* decision must take into consideration that a marketplace transaction implies that each firm controls its own decision rights, both alienable and inalienable; while integration unifies the control of alienable decision rights, but not all the relevant decision rights: each party controls, instead, even after integration, its own inalienable decision rights (including *influence activity*), that is used to capture quasi rents. The aim of the model is to highlight that rent seeking occurs not only when transactions are carried out between organizations, but also within them; moreover, the model illustrates that the same source– the rent seeking activity – leads both to costs and benefits of integration.

Gibbons shows that *influence* costs are higher when the influencing party cares more about the decision. It follows that the efficient mode of governance stems from the comparison between the value each party confers to the decision.

The timing of the model consists in four phases: (1) two parties, *i* and *j*, negotiate over control of one single alienable decision right; (2) the parties simultaneously choose to exercise influence ("*lobbying*"), that can be interpreted as inalienable decision rights, λ_i e λ_j, at cost $k(\lambda_i)$ and $k(\lambda_j)$, respectively; (3) the parties publicly observe the signal arising from the *influence* activity (σ); (4) the party that has the control chooses a self-interested decision d; (5) each party receives its own payoff, depending from the decision d and the state of the world Θ).

The model works backwards. Suppose that party *i* has control of the alienable rights. In phase (4) *i* chooses decision d that maximizes utility $U_i (d, \Theta)$ given the signal (σ) observed in phase (3). Party *i* tries to extract whatever information the signal can provide, knowing that the other party is interested in producing σ in a favourable direction. So σ depends on λ_j. However, party *i* attempts to account for *j*'s influence activity by making conjectures on *j*'s behaviour ($\lambda_j^{\wedge}$). *i*'s optimal decision depends, therefore, both on the signal *i* observes and on conjectures regarding *j*'s influence activity: $d_i^* = d_i^*(\lambda_j^{\wedge}, \sigma)$. In phase (2) *j* chooses an *influence* activity (λ_j) in order to maximize her *pay off*, taking into account the decision party *i* will assume after observing signal σ and formulating a conjecture on *j*'s behaviour ($\lambda_j^{\wedge}$). We arrive, therefore, at a definition of *j*'s best response function to *i*'s conjecture: $\lambda_j^*(\lambda_j^{\wedge})$. In other terms, the party that does not have control optimally responds to the conjecture from the party with control on the former's *influence* activity. It is shown (Gibbons 2005, pp. 223 – 226) that the equilibrium value λ_j^* positively depends on the importance, that we denote with φ_j, *j* attributes to the difference between the *i*'s self interested decision and *j*'s ideal decision (φ_j)[15]. In phase (1), thereafter, if party *i* controls the alienable decision rights, the influence costs are $k(\lambda_j^*)$. Otherwise, if *j* controls, the influence costs are $k(\lambda_j^*)$, derived in the same way used to determine $k(\lambda_i^*)$. Given that $k(\lambda_j^*) > k(\lambda_i^*)$ if and only if (φ_j) > (φ_i), then it is efficient to allocate control to party *j* when (φ_j) > (φ_i): giving control to the party with

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[15] Likewise, the equilibrium level λ_i^* depends on the importance, that we denote as φ_i, *i* attributes to the difference between the decision taken and the ideal decision (φ_i).

the higher sensibility to the difference between the decision taken and ideal decision minimizes the *influence* costs and, therefore, *rent seeking* inefficiencies.

6. Non contractible *ex ante* investments

Contractual incompleteness stemming from the impossibility of specifying ex ante some features of the transaction lies at the basis of one of the early formalized theories of the firm, where the benefits and costs of integration are assessed in conjunction, known as the new property rights theory (Grossman and Hart 1986; Hart and Moore 1990; Hart 1995)[16]. The firm is depicted as a collect of assets; integration means to own the firm's (physical) assets and to acquire the "residual rights of control". The latter consist in the right to assume decisions on the use of the firm's resources in any circumstance not otherwise specified in the formal contract between parties.

"Following Grossman and Hart (1986), we identify the firm as the assets it possesses and take the position that ownership confers residual rights of control over the firm's assets: the right to decide how these assets are to be used except to the extent that particular usages have been specified in a initial contract." (Hart e Moore 1990, pp. 1120).

"We develop a theory of integration based on the attempt of parties in writing a contract to allocate efficiently the residual rights of control between themselves" (Grossman e Hart 1986, p.692).

This theory asserts that assets ownership affects the share of surplus firms in a transaction will receive ex post and, therefore, each firm's incentive to invest. In turn, firms' investments determine the total surplus. As a result, if it is important to maximize the investment of one contractor, then that party should own the assets, while if the investment of both parties are important, it is efficient to keep assets ownership separate (non integration).
Great emphasis is conferred, like in the transaction costs theory and the theory of post contractual opportunism, to assets specificity:

"Our analysis is consistent with and builds on the ideas developed by Williamson (1975, 1985) and Klein, Crawford, and Alchian (1978), as well as Grossman and Hart (1986). Williamson and Klein et al. made the important observation that firms matter when parties must make specific investments and, because of the impossibility of writing detailed long-term contracts, the quasi rents from these investments cannot be divided up appropriately in advance. Grossman and Hart argued that a change in ownership brings costs as well as benefits" (Hart e Moore 1990, pp. 1120).

There are, however, notable differences between the post contractual opportunism theory and the property rights one (Gibbons 2005; Holmstrom e Roberts 1998; Whinston 2003). First, the property rights theory considers a framework involving a more complex contractual incompleteness framework when it assumes that specific investments are non contractible *ex ante* because some futures of the transaction (such as the precise characteristics of the good or service exchanged) will be known only at a later time.

"This assumption can be understood if we imagine that the noncontractible represents a special service that will be required of a firm at date 1 and that the type of service that is appropriate depends on the realization of a state of nature" (Grossman e Hart 1986, p. 703 n.14).

The *rent seeking* theory instead assumes that specific investments are contractible *ex ante*[17].
Second, in the property rights models integration does not eliminate opportunism, whereas in the rent seeking theory integration is a mode of governance that eliminates the *ex post* opportunism of the parties (as happens, for example, with the integration of Fisher Body by General Motors), in the

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[16] On the differences between "new" and "old" property rights theory see Garrouste (2004).

[17] In the example quoted in the previous pages, it could be found that General Motors exactly defined what specific investment Fisher Body should have to realize and what characteristics the exchanged input should have had.

property rights theory the integrated firm's opportunism continues to manifest itself as a lower value of investment than the optimal one (Kreps 1993).

"We have emphasized the symmetry of control –namely, that when residual rights are purchased by one party they are lost by a second party- and this inevitably creates distortions. That is, *integration shifts the incentives for opportunistic and distortionary behaviour, but it does not remove these incentives*" (Grossman e Hart 1986, p. 716, emphasis added).

"Grossman and Hart argued that a change in ownership brings costs as well as benefits. Transferring ownership of an asset from party 2 to party 1 increases 1's freedom of action to use the asset as he or she sees fit and therefore increases 1's share of ex post surplus and ex ante incentive to invest in the relationship; but 2's share of ex post surplus and incentive to invest falls. Hence concentrating ownership in 1's hands will be good to the extent that 1's investment decision is important relative to 2's, but will be bad if the opposite is the case. *In this way, the costs and benefits of integration can be understood as two sides of the same coin*". (Hart and Moore 1990, p. 1120, emphasis added).

This result is linked to a peculiar kind of specific investment considered in the property right model we are examining: human capital investment, that is an inalienable investment[18]. Neverthless, as Holmstrom e Tirole (1989, p.72) highlight, the nature of resources involved in the transaction is an important aspect of organizational design:

"More interestingly, we note that the organizational design is quite sensitive to the nature of assets involved. In particular, the role of human capital as an inalienable asset is important. The ownership of human capital cannot legally be transferred and hence places particular constraints on contracting".

As regard the under-investment of the integrated firm, Gibbons (2005) makes an interesting parallel with the studies by Aghion and Tirole (1997) and by Baker, Gibbons e Murphy (1999) on the delegation of authority inside an organization, where it emerges that a cost of control by the principal is the loss of the agent's initiative on the delegated functions: analogously, in the property rights theory, the lower incentive to invest in human capital can be considered as a loss of initiative of the integrated firm.

In the post contractual opportunism theory, moreover, *ex post* bargaining is driven by the social unproductive activity of *rent seeking*, whereas in property rights theory it is assumed that *ex post* bargaining is efficient:

"In contrast to transaction cost economics, the standard property rights models assume that *all* bargaining, including any that occurs after investments are made, is efficient. Thus, everything turns on how ownership affects initial investments, but unlike Klein et al. (1978), it is essential that these investments are non-contractible" (Holmstrom and Roberts 1998, p.77, emphasis in original).

Finally, as we have said, the distinctive characteristic of the property rights theory consists in the analysis of the costs and benefits of integration on the basis of the same factors given by the residual rights of control, by comparing realized investments from parties under integration and non integration.

In Grossman and Hart's model, firms are *single-person*, that is firms managed by just a manager–owner. This theory does not analyze, therefore, the internal organization of the firm, neither does it address the issues of the delegation of authority and the firm's internal incentive mechanisms (absent from the model). Neither is there room for issues such as hierarchies nor questions concerning decision making authority inside the firm.

7 Multitask and imperfect monitoring

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[18] "The ex ante investments a_i are also supposed to be non contractable either because they are too complex to be described (they are multidimensional, not just dollar amounts) or because they stand for managerial effort decisions that are not verifiable (to third parties, such as the courts); for example, a_i might be manager i's effort in setting up a well-functioning firm" (Grossman e Hart, 1986, p.698).

The impossibility of observing and verifying the effort of managers and suppliers is at the origins of the contractual incompleteness in the *incentive system theory*.

This theory of the firm is "accidental", in the sense that it stems from an analytical framework outplace from the make or buy problem: the analysis of agency relationships in contexts characterized by multi-task and/or multi-instruments (Gibbons 1998, 2005; Holmstrom and Milgrom 1991).

To briefly illustrate this framework, consider an agent who signs a linear contract $w = s + bp$ to produce a good y, where w is the total compensation that the principal pays the agent, s is the fixed wage, b is the incentive intensity and p is a performance measure. Suppose that both y and p are linear functions of the agent's actions, a_1 and a_2: $y = f_1a_1 + f_2a_2 + \varepsilon$ and $p = g_1a_1 + g_2a_2 + \varphi$, where φ and ε are noise terms; f_i and g_i, i=1,2, are positive parameters and, in general, $f_i \neq g_i$. Given that w depends on the performance measure p, the agent will choose his actions in accordance with parameters g_i, without taking into consideration the fact that the principal's interest in the agent's action depends, instead, on parameters f_i[19]. For example, if g_1 is equal to zero, the action a_1 doesn't affect p and the agent will not have any interest in undertaking this activity, so she ends up to devoting her efforts to action a_2 only, even if the contribution of a_1 to production should be positive ($f_1>0$) [20]. This implies that from a *multi-task* perspective the principal must take into consideration the effects of the incentive contract on the agent's decision regarding the allocation of effort between the different tasks.

In the incentive system theory vertical integration means to own the physical assets employed. The easiest way to illustrate the *make or buy* problem in this analytical framework is to consider a transaction between an agent (firm *A*) and a principal (firm *P*), and an asset (alienable) that the agent uses in producing the output. If the agent owns the asset, he is an independent contractor and the relationship with the principal is a market transaction; if, on the contrary, the principal owns the asset, the agent is an employee and the relationship is vertically integrated. This theory assumes that the agent's actions are not observable and, thus, it is not possible to stipulate complete contracts.

To illustrate the model (Gibbons 2005), consider a risk-neutral agent who can choose between two actions, a_1 and a_2, and an asset that the agent uses in producing y. Now, the asset's value is $v = h_1a_1 + h_2a_2 + \xi$, where ξ is a noise term and h_i, $i = 1,2$, are positive parameters measuring the marginal contribution of each action on the value of the asset. The cost for the agent of undertaking the two actions is given by the function $c(a_1, a_2) = \frac{1}{2} a_1^2 + \frac{1}{2} a_2^2$. A and P sign a linear incentive contract $w = s + bp$, where p, φ, gi, b and s have the significance previously expressed. In general, $g_1 \neq h_1 \neq f_1$ and $g_2 \neq h_2 \neq f_2$.

Let us consider three scenarios. In the *first best* scenario, the action the agent chooses maximizes the expected total surplus of the transaction (ST^{FB}):

$$ST^{FB} = E(y + v) - c(a_1, a_2) = f_1a_1 + f_2a_2 + h_1a_1 + h_2a_2 - \frac{1}{2} a_1^2 - \frac{1}{2} a_2^2$$

. The *first best* actions are: $a^{FB}_1 = f_1 + h_1$ e $a^{FB}_2 = f_2 + h_2$.

The second scenario is vertical integration, where the principal owns the asset and the agent is an employee. The principal's payoff (π^I_P) is given by the output (y) plus the value of the asset at the

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[19] Baker (1992), Gibbons (1998), Holmstrom and Milgrom (1991, 1994), Holmstrom and Tirole (1991), Holmstrom (1999), Prendergast (1999) provide several examples and develop agency models in a *multi-task* perspective, whereas Cockburn, Henderson and Stern (1998) and Fehr and Schmidt (2004) provide interesting empirical evidence. The Cockburn, Henderson and Stern (1998) paper testes the multi-task incentive problems in the context of pharmaceutical industry, where research workers face a trade off allocating their time between "basic" or "fundamental" research activities and applied work (such as new drugs development). Fehr and Schmidt (2004) report on an experiment where the principal can choose which type of contract (a "piece rate contract" or a "bonus contract") to offer an agent who has to expend effort on two tasks. Tamborini (2006) applies a *multi-task* model to the university teaching contract, where the Faculty is the principal and the professor is the agent who is simultaneously engaged in two tasks: teaching and academic research.

[20] Analogous considerations can be formulated for g_2.

end of the production process (v) net of the agent's reward (w): $\pi^I_P = y + v - w$, whereas the agent's *payoff* (π^I_A) is equal to w net of the cost of undertaking the two actions, $c(a_1, a_2)$:

$$\pi^I_A = w - c(a_1, a_2) = s + b\,(g_1 a_1 + g_2 a_2 + \varphi) - \tfrac{1}{2}\,a_1^2 - \tfrac{1}{2}\,a_2^2.$$

The actions which maximize the agent's *payoff* are: $a^*_{1I}(b) = g_1 b$ and $a^*_{2I}(b) = g_2 b$. In the efficient contract parameter b must maximize the expected total surplus:

$$ST^I = E(y + v) - c(a_1, a_2) = f_1 a_1 + f_2 a_2 + h_1 a_1 + h_2 a_2 - \tfrac{1}{2}\,a_1^2 - \tfrac{1}{2}\,a_2^2 = (f_1 + h_1)g_1 b + (f_2 + h_2)g_2 b - \tfrac{1}{2}\,(g_1 b)^2 - \tfrac{1}{2}\,(g_2 b)^2.$$

Let b^{*I} denote the efficient contract slope in this scenario.

The third scenario is non integration: the agent owns the asset employed and the transaction is carried out in the marketplace. In this case, the agent's *payoff* is given by:

$$\pi^M_A = w + v - c(a_1, a_2) = s + b\,(g_1 a_1 + g_2 a_2 + \varphi) + h_1 a_1 + h_2 a_2 + \xi - \tfrac{1}{2}\,a_1^2 - \tfrac{1}{2}\,a_2^2.$$

The optimal actions by the agent are: $a^*_1{}^M(b) = g_1 b + h_1$ e $a^*_2{}^M(b) = g_2 b + h_2$. Hence, the efficient contract must have a value of b that maximizes:

$$ST^M = (f_1 + h_1)(g_1 b + h_1) + (f_2 + h_2)(g_2 b + h_2) - \tfrac{1}{2}\,(g_1 b + h_1)^2 - \tfrac{1}{2}\,(g_2 b + h_2)^2.$$

Let b^{*M} denote the efficient contract slope in this case.

The results above show that the optimal actions for the agent will be different in the three scenarios. The *make or buy* decision stems from the assessment of the form of governance that enables parties to reach the maximum total surplus.

Table 1 summarizes the results of the three scenarios and consider two examples from Gibbons (2005). In example A we have $y = a_1$, $v = a_2$, and $p = a_1 + a_2$; in the example B, we assume $y = a_1$, $v = a_2$, $p = a_1$.

Table 1 – Agent's optimal action in the three scenarios

	First best		Integration		Non integration	
Findings of the model	$a_1^{FB} = f_1 + h_1$	$a_2^{FB} = f_2 + h_2$	$a_1^I = bg_1$	$a_2^I = bg_2$	$a_1^M = bg_1 + h_1$	$a_2^M = bg_2 + h_2$
Example A	$a_1^{FB} = 1$	$a_2^{FB} = 1$	$a_1^I = b$	$a_2^I = b$	$a_1^M = b$	$a_2^M = b + 1$
Example B	$a_1^{FB} = 1$	$a_2^{FB} = 1$	$a_1^I = b$	$a_2^I = 0$	$a_1^M = b$	$a_2^M = 1$

In example A, the measure of the performance depends both on a_1 and a_2 and we have the particularity that $f_1 = g_1$ and $h_2 = g_2$. As a result, p is perfectly aligned with $(y + v)$ and the principal can induce the agent to choose *first best* actions ($a_1^{FB} = 1$, $a_2^{FB} = 1$) in the integration scenario by fixing $b = 1$ in the contract, so we have $a_1^I = 1$, $a_2^I = 1$. In example B, instead, we have the case where $f_1 = g_1$ and the performance measure is perfectly aligned with y, but not with $(y+v)$. It follows that the optimal form of governance is the non integration one, where the principal can incentivate the agent to assume the *first best* actions by fixing $b = 1$, so that $a_1^M = 1$, $a_2^M = 1$.

Asset ownership in this model is an incentive instrument: as we have said, if the agent owns the asset she has an incentive to preserve its value (asset ownership direct effect) and this effect changes the optimal incentive contract (asset ownership indirect effect).

The *make or buy* decision stems from the comparison between the surplus under integration, that depends on the vector of actions $[a^*_1{}^I(b); a^*_2{}^I(b)]$, and the surplus when the transaction is played out on the marketplace, that depends on the vector of actions $[a^*_1{}^M(b); a^*_2{}^M(b)]$. If the agent's ownership of the asset can provide incentives that cause difficulties for the principal in creating incentives through the contract, then integration is efficient:

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"Using asset ownership to provide the agent with incentives to increase asset value may or may not help the principal to influence the agent's incentives via contract. If the incentives from asset ownership hurt the principal's efforts to create incentives via contract, then the principal should own the asset (i.e., integration is efficient)" (Gibbons 2005, p. 207).

8. Incomplete contracts and international outsourcing

Further developments in the theory of the firm models concern the analysis of make-or-buy decisions as regards the international outsourcing of intermediate inputs.

Antràs (2003) aims to explain the empirical evidence by which capital-intensive goods are transacted within the boundaries of multinational firms, while labour-intensive goods are traded at arm's length. He combines the Grossman and Hart (1986) property rights view of the firm with the Helpman- Krugman (1985) model of international trade. Antràs (2003) shows that conferring to the latter the residual rights of control may not suffice to induce suppliers to undertake adequate levels of investment. When this is the case, final good producers will find it optimal to alleviate the underinvestment of their usual suppliers, due to the fear of incurring hold up problems, by contributing to their relationship-specific investments. The investment sharing, however, if it reduces the risk of hold up faced by suppliers, correspondently increases the risk faced by final good producers.

If the contribution of the final good producers to the supplier's investment is large enough it is shown that is efficient to confer the residual rights of control to the final good producer, thus giving rise to vertical integration. Hence, the attractiveness of vertical integration rises as the capital intensity of intermediate input production increases.

Antràs and Helpman (2004) extend this model by considering two sectors, characterized by high and low headquarter intensity, respectively, that are heterogeneous in the productivity of firms. The aim of the article is to investigate the effects of these productivity differences on international trade, foreign direct investments and firms' organizational choices. The model considers two countries: the North, where both final and intermediate good producers are localized and wages are higher, and the South, where wages are lower and intermediate-good producers only are located. Final good producers choose the organizational form, that is composed of the ownership structure (vertical integration or outsourcing) and the location (North or South) for the production of intermediate inputs. Only final good producers control the headquarter services production (*h*).

The choice of the organizational form entails two different kinds of trade-off. As regards the location, the final good producer trades off the benefits of lower wages in the South against the benefits of lower fixed organizational costs (such as the costs of supervision, quality control, accounting, and marketing) in the North.

The model shows that in sectors with low headquarter intensity, firms do not integrate, because outsourcing entails both lower fixed organizational costs than vertical integration and the benefit of not reducing supplier's incentives (the residual rights of control do not belong to the final good producer, hence, according to the logic of the property rights model, the supplier will not underinvest). Thus, the location choice depends on wage *and* fixed organizational costs differentials between countries. The model predicts that only high productivity firms, because of their higher revenues and the possibility of their facing higher fixed organizational costs, acquire intermediate inputs in the South; the least productive firms exit, whereas low-productivity firms outsource components in the North.

In the headquarter intensive sector the marginal product of headquarter services is high, hence underinvestment in *h* is costly and vertical integration is more attractive (under integration the final good producer gets the residual rights of control and has greater incentives to produce headquarter services because he gains a wider share of surplus). This means that, variable costs being equal, integration is always the preferred option. However, it is assumed that variable costs are lower in the South and, therefore, the choice of the organizational form stems from the comparison between the fixed organizational costs and the variable costs differentials, on one hand; and the comparison

between the quasi-rent the final good producer receives under vertical integration and the quasi rent from a relationship in the marketplace, on the other hand. It follows that in the headquarter intensive sector all four organizational forms may exist: outsourcing in the North and in the South; integration in the North and in the South.

Antràs (2005) combines the property rights theory of the firm with the "product cycle hypothesis" by Vernoon (1966). He presents a model in which the incomplete nature of contracts limits the international fragmentation of the production process. Furthermore, manufacturing moves from the North (where it is assumed that the institutional and legal system better enforce contracts) to the South (where wages are lower) first within firm boundaries (foreign direct investments) and only when the product is in an advanced development stage, in independent foreign firms. Analogously with Grossman-Hart (1986) the contractual incompleteness creates hold up problems and gives rise to suboptimal relationship specific investments by the parties involved in an international transaction. It follows that the product development manager of a northern firm chooses between domestic and overseas manufacturing trading off between the lower wage costs and the higher incomplete- contracting distortion in the South . This trade off leads to the emergence of product cycles. When the good is new, southern production is not attractive because the greater distortions caused by contractual incompleteness could negatively affect the development of the product and is not counterbalanced by the benefit from lower wages in the South. On the contrary, when the good is in the maturity stage, the benefits from lower wages well offsets the deficits in contract enforcement and, therefore, if wage differentials are high enough manufacturing is located in the South. The explanation of make-or-buy decision follows the logic of the property-rights-model. This model predict that it is efficient to give ex ante the residual rights of control to the party that undertakes the relatively more important investment for the transaction surplus. If the production of the final good requires a considerable amount of research work because the good is new or it is in the development stage, the investment from the production manager is less important than that of the development manager who has the task of developing and launching the new good on the market. In the initial stages of the life cycle the optimal choice is to give the residual rights of control to the firm where the R&D division is located (make). Conversely, when the good is mature, manufacturing and, therefore, the production manager's investment, became more important. In such circumstances it is preferable that the product development manager gives away the residual rights of control to the production manager. Therefore, the model predicts that when the product's maturity is high enough it is likely that transactions are carried on at arm's length (outsourcing). A further interesting development of these models could come from a more detailed analysis of the efficient arm's length arrangements that accompany international outsourcing decisions. As Menàrd (2004) observes, between vertical integration and arm's length transactions there are possible many "hybrid" arrangements that characterize, in reality, the various forms of governance in the international division of production[21].

Grossman-Helpman adopt an approach based on the incentive system theory to analyze the trade off between vertical integration and international outsourcing. The model considers two types of countries and firms: final good producers, heterogeneous as regards productivity, act as a principal and are localized in the North; and intermediate inputs producers, crucial for the production of the final good, who are multitask agents and are localized both in the North and in the South. The probability that the partner delivers suitable inputs positively depends on his effort in a variety of tasks. Final good producers face two important trade-offs concerning (*i*) the organizational form (vertical integration or outsourcing), and (*ii*) the proximity of the input's supplier location (in the North or in the South).

The model is based on a number of important assumptions: 1) the principal can observe the manager's effort on only a fraction of tasks and only if the manger is hired as an employee (vertical integration); whereas, if the agent is hired as an independent contractor (arm's length relationship)

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[21] According to Spencer (2005) the outsourcing models we examined (Antràs, 2005, 2003 and Antràs-Helpman, 2004) could better depict a joint venture than an arm's length relationship tout court.

no monitoring is possible; 2) if the relationship is arm's length, the input supplier bears the input's production costs, that will be sunk if the input will be not suitable for the acquiring firm. A trade off exists, therefore, between the greater monitoring of the manager's actions under integration and the stronger incentives the agent faces if he is an independent contractor. A third assumption is that the principal can better monitor a divisional manager's effort in a vertically-integrated firm located in the North than when the division is located in a different country, such in the case of FDI; even if in the South the production costs may well be lesser than in-house production near headquarters. It emerges, therefore, that there is a second trade off between the possibility of better monitoring in the North and lower production costs in the South.

Final good producers are heterogeneous in productivity. The model predicts that the highest and the least productive final good producers outsource from suppliers located in the South, whereas final good producers with intermediate levels of productivity integrate. The highest productive firms get higher revenues from final good production and exploit both the potentially high incentives of market relationships and the advantage of shifting the up-front costs of production to the independent contractor. In the opposite case, the very low productive firms, for reasons linked to their low revenues, find it necessary to exploit both the advantages of lower production costs in the South and the higher level of effort made by independent contractors. Intermediate productive firms can gain advantages from vertical integration or FDI: if the share of the agent's tasks monitored by the principal is high enough, the latter can obtain, through integration, similar results in terms of the agent's effort to outsourcing, without necessarily paying a bonus. Outsourcing in the North, however, is never profitable.

9. Adaptation and hybrid forms

The impossibility of stipulating complete contracts can also be due to uncertainty. This source of contractual incompleteness is at the basis of the adaptation theory of the firm, that compares firms and markets as regards their adaptive decision-making capabilities in environments where uncertainty is resolved over time (Williamson 1975; Gibbons 2005; Baker, Gibbons e Murphy 2006).
The idea that adaptation is an important dimension of organizations was launched by Simon (1951) in an analysis of the employment relationship. Under uncertainty the parties in a transaction can choose between two alternative strategies: *i*) to negotiate a decision before uncertainty is resolved; *ii*) to concentrate the decisional authority in a "boss" who assumes (self-interested) decisions when situations occur and uncertainty is resolved. Simon (1951) suggests that this latter strategy is usual in employment contracts. The above alternatives cause a *trade off* to emerge between flexibility and opportunism. In alternative *(i)* there is a contractual rigidity –for example, a fixed exchange price or the precise definition of a task – that has the advantage of preventing opportunistic behaviour but has the disadvantage of hindering flexibility and adaptation throughout the transaction; strategy (*ii*) has, instead, the advantage of allowing a more efficient contract adaptation, but it exposes actors to the risk of opportunistic behaviour by the "boss", whose decisions are self interested[22]. The latter alternative corresponds to a hierarchical mode of governance where the decisional authority is given to the boss.

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[22] According to Simon (1951, p. 294-295) two conditions make desirable an employment contract instead of a sales one: "We will call our employer *B* (for "boss"), and our employee *W* (for "worker") […] We will consider the set of all possible behavior patterns of *W* and we will let *x* designate an element of this set. […] Under what circumstances will they enter into a sales contract and under what circumstances an employment contract?" […] 1. *W* will be willing to enter an employment contract with *B* only if it does not matter to him "very much" which *x* (within the agreed-upon area of acceptance) *B* will choose or if *W* is compensated in some way for the possibility that *B* will choose an *x* that is not desired by *W* (i.e., that *B* will ask *W* to perform an unpleasant task). 2. It will be advantageous to *B* to offer *W* added compensation for entering into an employment contract if *B* is unable to predict with certainty, at the time the contract is made, which *x* will be the optimum one, from his standpoint. That is, *B* will pay for the privilege of postponing, until some time after the contract is made, the selection *x*".

Williamson (1975, 1991, 2002) extends to the firm's *make or buy* decision problem Simon's conclusion that many transactions are run efficiently inside the firm instead of the marketplace because the firm facilitates sequential adaptation to eventualities that will only be known in a second time.

According to Williamson the efficient mode of governance depends on: a) the degree of the asset specificity, that creates bilateral dependency; b) uncertainty, that increases the need of future adaptations of the ex ante agreements; c) a web of attributes that includes the level of incentives, administrative control and the contract law regime. Compared with the market, the firm presents weaker incentives; added administrative controls (such as monitoring and career rewards and penalties); the possibility of resolving internal disputes by fiat rather than arbitration; the recourse to "coordinated adaptation"[23].

Williamson compares the costs of governance of markets (*M*), hierarchies (*H*) and hybrids (*X*) as a function of asset specificity (*k*)[24]. Hybrids are different modes of governance from firms and markets (such as franchising, subcontracting, strategic alliances, cooperatives, various forms of long term contracting). They display intermediate values of adaptability, incentive intensity and administrative control when compared to the polar modes of markets and hierarchies[25]. By reason of bureaucratic cost differences, in the absence of asset specificity the market costs of governance are lower than those of hybrids and hierarchies: in symbols, $M(0)<X(0)<H(0)$. However, as asset specificity rises, the costs of coordinated adaptation in hierarchies rise less rapidly than the other organizational forms $[M'(k) >X'(k) > H'(k)]$. Within firms the adaptation process is less costly because a) resolving internal dispute by fiat saves resources; b) information can more easily be accessed and assessed; c) internal organization has access to additional incentive instruments based, other than bonus payments, on career reward and joint profit sharing (Williamson 1991; 2002). It follows that for low levels of asset specificity the firm is in a relatively disadvantageous position because the bureaucratic costs of internal organization exceed those of the market. The cost disparities between market and hierarchy diminish as asset specificity grows and become inverted when the transaction complexity reaches very high levels. For intermediate levels of asset specificity it is profitable to choose "hybrid" organizational forms. Menard (2004) extends the Williamson's schema to include and order the different modes of hybrid organization.

Gibbons (2005) proposes a simply description of the adaptation theory of the firm that, unlike Williamson's analysis, leaves asset specificity hypothesis out of consideration. This model considers a context of contractual incompleteness where parties cannot assume ex ante the first best decision that maximizes the surplus from a transaction, nor can they renegotiate ex post the initial decisions[26], so that the second best solution can be to concentrate authority in the hands of a "boss" who will assume decisions, presumably self-interested. The decision rights are contractible ex ante and are allocated ex ante, but they cannot be renegotiated ex post.

The relationship is run in four phases: in *t*=1 the parties (*A*,*B*) negotiate over control of a decision right; in *t* = 2, *A* and *B* observe the realization of the state of the world *s* ($s \in S$ with *S* finite); in *t* = 3 the party who has control assumes a decision *d* ($d \in D$, with *D* finite); in *t* = 4 the parties receive their payoffs, $U_i(s,d)$, where *i* =*A*,*B*.

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[23]Williamson distinguishes between "autonomous" and "coordinated" adaptation. The former term indicates the adaptation process run by the market through the price mechanism and the spontaneous interaction between market demand and supply, as depicted by Hayek (1945, pp. 527 – 528); the second term indicates the adaptation within internal organization, defined by Barnard "*as that kind of cooperation among men that is conscious, deliberate, purposeful*" (Barnard 1938, p.4). "*I submit that adaptability is the central problem of economic organization and that both Hayek and Barnard are correct, because they are referring to adaptations of different kinds, both of which are needed in a high – performance system.*" (Williamson 1991, p. 278). For a graphical analysis see Williamson (2002).

[25] For a deeper analysis of the characteristics and the governan*c*e of hybrids see Ménard (1996, 2004, 2005). See also Holmstrom e Roberts (1998); Williamson (2002).

[26] For example, because when the state is realized the decision needs to be taken rapidly, otherwise that opportunity and its value will be lost.

Let us fix as *benchmark* the first best decision, corresponding to the decision d^{FB} that maximizes the joint surplus of the parties: $d^{FB}(s) \equiv \text{argmax}_{(d \in D)} U_A(s, d) + U_B(s, d)$ and given rise to a total *payoff* equal to $TS^{FB}(s) \equiv U_A(s, d^{FB}(s)) + U_B(s, d^{FB}(s))$. Denote, therefore, $V^{FB} \equiv E_s[TS^{FB}(s)]$ the expected total surplus when the parties could choose the decision.

The model, however, states that the decision rights are allocated in the first period and that decisions are not contractible ex ante nor ex post when the state is realized. Hence, if party i has the decision rights and she observes the state of the world s, she will choose the decision $d_i^*(s)$ that maximizes her private benefit $U_i(s, d)$: $d_i^*(s) \equiv \text{argmax}_{(d \in D)} U_i(s, d)$.

This decision will determine a total surplus in the state s equal to $TS^i(s) = U_A(s, d^*_i(s)) + U_B(s, d^*_i(s))$. Let us indicate as $V^i = E_s[TS^i(s)]$ the total expected surplus from transaction if the party i has control of the decision rights. Leaving apart the special cases in which the parties' interests are perfectly aligned, V^i will be different from the first best (V^{FB}) as would arise if the parties could arrange to choose the decision $[d^{FB}(s)]$. The desirable form of governance will be, then, the one that allocate control of the decision right to the party which determines the highest: $V^G = \max\{V^A, V^B\}$, where $V^A = E_s[TS^A(s)]$ and $V^B = E_s[TS^B(s)]$. In particular, party A should have the control of the decision right if $V^A > V^B$, whereas B should have it if $V^B > V^A$. The optimal form of *governance* emerges from "contracting for control" (Deffains – Demougin, 2006).

This adaptation theory, even if does not involve the hypothesis of asset specificity, does involve a certain degree of bilateral dependency, even if this is not explicitly discussed in the model. As Gibbons (2005, p. 214) states:

> If the party i controls the decision right, there is some (unmodeled) reason why, after the state is realized in stage (ii), party j does not leave party i and deal instead with some new party k, thereby avoiding any consequences from the decision that party i will take in stage (iii).

Baker-Gibbons-Murphy (2006) develop the adaptation theory through games theory to explore if the optimal form of governance in a *relational setting* could differ from the one prevailing in a *spot setting*. In this model different kinds of decision right, as well as different forms of governance, are considered reminiscent of the Menàrd (2004) analysis of hybrids, characterized by a variety of contractual agreements that move the decision rights from one firm to another:

> There is indeed a great diversity of agreements among 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).

In practice, however, firms can and do transfer control without changing asset ownership, using contracts that move decision right across fixed firm boundaries (Baker-Gibbons-Murphy 2006, p.1)

The formal model is inspired by the contractual incompleteness approach of the new property rights theory and extends, as we said, Gibbon's (2005) model taking in consideration: (*i*) a multiplicity of parties, (*ii*) alienable decision rights, (*iii*) inalienable decision rights; (*iv*) the existence of relational contracts and (*v*) the repetition of the relationship over time[27]. Differing from the property rights theory, control in this analysis is not necessarily transferred by vertical integration, that is by modifying the firm's boundaries, but is also realized through contracts that allocate the decision rights among firms, giving rise to new and different forms of transaction governance. Furthermore, the importance of governance does not stem from the hypothesis that the parties have to realize specific investments but from the ex ante allocation of the decision rights,

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[27]Relational, or implicit, contracts, which are informal agreements, are also called self-enforcing being so rooted in the context where the relation takes place that they, even if cannot be enforced by a court, are observed on the basis of the importance the parties confer to their own reputation.

that are not contractible ex post for construction, thereby influencing adaptation once uncertainty is dissolved[28].

According to Baker-Gibbons-Murphy (2006), given that, as we have seen in the previous model, the expected total surplus produced by the optimal governance structure is lower than the *first best* one, $V^G = \max \{V^A, V^B\} < V^{FB}$, if the parties interact repeatedly over time, they can use a relational contract to implement a decision rule d^{RC} that enable them to reach a surplus higher than V^G and closer to V^{FB}. As we said, decisions and the state of the world are not verifiable by an external third party, therefore it is not possible to subscribe to a formal contract. However, the parties observe both the decision and the state of the world and, hence, they can use a relational contract, whose enforcement is based on each party's interest in preserving their own reputation. Given that the enforcement of a relational contract cannot be exogenous, the party i who has control can be tempted to renege the decision d^{RC} if the private benefit stemming from decision d_i^* is greater than the one gained by adopting the rule specified in the relational contract. A measure of the reneging temptation, denoted as $R_i\,(s)$, is given by:

$$R_i\,(s) = U_i\,(d_i^*(s),\,s) - U_i\,(d^{RC}\,(s),\,s),$$

where $U_i\,(d_i^*(s),\,s)$ is the *payoff* the party i obtains by assuming the self-interested decision and ignoring the relational contract; $U_i\,(d^{RC}\,(s),\,s)$ is the *payoff* the party i obtains observing the decision specified in the relational contract.

It can be shown (Baker, Gibbons e Murphy 2006, pp. 29-36) that the parties will adopt decision d^{RC} if and only if i's maximum reneging temptation is less than the present value of the surplus produced by the decision taken in the relational contract in the infinitely repeated game. Formally:

$$R_i \equiv \max_s R_i\,(s) \leq (1/r\,)[V\,(d^{RC}) - V^G\,],$$

where R_i is i's maximum reneging temptation, r is the interest rate per period in the repeated game, $V\,(d^{RC}) = E_s[TS^{RC}] = U_A\,(s,\,d^{RC}) + U_B\,(s,\,d^{RC})$ is the expected total surplus from assuming the decision specified in the relational contract and $[V\,(d^{RC}) - V^G\,]$ is the surplus increment generated by the relational contract.

In conclusion, the optimal governance structure for implementing a given decision rule specified in a relational contract is the governance structure that minimizes the maximum temptation to renege on the decision rule (Baker-Gibbons-Murphy 2006, p. 7).

10. Complexity, property rights and incentives

Recent *make-or-buy* decision models interweave some aspects from different theories of the firm.

The analysis of Tadelis (2002) about *make-or-buy* decisions presents certain elements in common with the greater part of the theories examined in the previous sections. In this model contractual incompleteness is connected with the transaction's complexity, that is with the difficulty of providing a *comprehensive* description of the good to be traded, and the contractual completeness is inversely proportional to the project's complexity. The benefits of vertical integration stem, therefore, from the possibility of ex post efficient adaptation, that is the greater flexibility the internal organization of production (*make*) offers as compared with arm's length relationships (*buy*) when changes in the original project are needed: the latter are more likely the more the contract is incomplete. Flexibility leads to savings on the transaction costs due to the renegotiation of agreements, that also represents an important aspect in the Coasian view of the firm and in the adaptation theory.

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[28] If decision were contractible ex post, excluding other transaction costs, the Caose theorem would apply: the ex post decision will be efficient and the ex ante allocation of decision rights will become irrelevant.

As in the property rights theory, vertical integration means acquiring the ownership of the physical resources needed for the production of the good to be exchanged, but the benefits and costs of vertical integration are considered apart from the hypothesis of asset specificity, even if the model does not exclude that this condition can be a source of friction when it becomes necessary to realize *ex post* changes:

The analysis above seems to ignore relationship specificity. In fact, by integration I explicitly considered the case in which the assets and facilities are general (e.g., floor space, simple tools, and standard equipment). Ownership of even general assets should help a downstream unit in case of negotiation break down, the source of *ex post* friction in my model. Nonetheless, the model does assume a role for specificity: it causes friction when *ex post* changes are needed (Tadelis, 2002, p. 436).

The model assumes that the advantages of vertical integration consist principally in the mitigation of the "fundamental transformation" problem posed by Williamson[29]. It is assumed that asset ownership (vertical integration) reduces the problem of replacing the contractual counterparty if the negotiation breaks down because it confines the search for a new partner to finding capable people to do the job, without involving the search for the physical resources needed to process the production. Instead, the costs of vertical integration are due to the difficulty in providing *cost reducing* incentives to the counterpart. This happens because, as highlighted when discussing the incentive system theory, if the agent is an employee (that is he uses the principal's assets) and the contract incentivates him to reduce costs he will do so at the expense of abusing the asset, lowering the principal's benefit. Furthermore, if the principal has residual rights of control, he can decide, as emphasized by the property rights theory, to change ex post the resource allocation and, therefore, make it difficult for the agent to reduce costs. The model predicts that when firms are more likely to produce internally complex goods (*make*), the upstream unit will face weaker incentives; while when firms are more likely procure through the market (*buy*) simple products, the upstream unit will face stronger incentives.

This model has the advantage of taking into consideration some important results of different theories of the firm – in particular transaction costs, property rights and incentive systems theories. Notwithstanding this, the costs and benefits of vertical integration do not emerge as a result of the model, but are merely assumed on the basis of the results of other theoretical contribution. Furthermore, the costs and benefits of vertical integration have, for construction, different origins and, hence, their comparison does not take place inside a unified analytical framework.

Baker-Hubbard (2003) combine some insights from the *multitask* theory (Holmstrom-Milgrom, 1991, 1994) and from the property rights theory, and develop a model applied to the firm's *make-or-buy* decisions in trucking services. The model predicts that if the trucker has to provide a wide combination of transportation services, it is efficient that shippers own the trucks (vertical integration): consistent with the Hart-Moore theory (1990), the ownership of physical resources should lead indirectly to control human resources. On the contrary, the use of the market, should prevail when the agent's effort toward identifying complementary hauls in order to match supply and demand (trucks and hauls) is particularly valuable [30]: according to the Holmstrom-Milgrom theory, resource ownership provides strong incentives to the agent to identify profitable uses for trucks and favours service-intensive trucking in which drivers' jobs involve more than just driving trucks. A third aspect concerns the adoption of different types of on-board computer, such as those called *trip recorders*, that allow fleet owners to monitor the actions of drivers *ex post*, and those improving the service organization because they allow owners to track the truck's location in real time (*EVMS-electronic vehicle management systems*). The model predicts that the adoption of

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[29] It must be noted that, as we said, while in the transaction costs theory the shift from competitive market conditions to a bilateral monopoly happens as a consequence of the asset specificity, in this model this condition turns out not to be necessary.

[30] The matching problem is particularly important in trucking because individual shippers rarely have demands that fill trucks. This give importance to the carrier's search for complementary hauls (Baker-Hubbard 2003, p. 554).

improving organizational technologies (because they help to match supply and demand) should entail two types of change: less shipper ownership of trucks and a smaller range of agent's services. Improved monitoring technologies should lead shippers to integrate and increase the range of agent's services. The relation between informational improvements provided by different types of on-board computers and ownership structure (trucking services integration or outsourcing) is empirically tested[31].

Feenstra-Hanson (2005) develop a model of international *outsourcing* where insights from both property rights and incentive theories are considered. Their work refers to the *export processing* activities in China, for which a foreign firm contracts with a Chinese factory manager to assemble intermediate inputs into a final product. Ownership of the processing firm could be local (Chinese) or foreign (foreign buyer firm), and control over input sourcing could reside under the control of the factory manager or the foreign firm[32]. Giving the foreign firm factory ownership enhances its *outside options* if the transaction relationship with the local manager prematurely breaks down and strengthens its incentive to invest in strategic functions, like marketing. Similarly, control over input-processing increases local manager's *outside options* because the local manager can utilize these inputs to process goods for other clients and this opportunity increases his incentive to effort.

The model aims to identify the optimal ownership structure: who should own the plant and who should have the control over input decisions? In the same logic as the property rights theory, the separation between ownership of the factory and control over input decisions is optimal when both parties invest equally in the project, while when both the value-added in processing activities by the local manager, on one hand, and investment specificity, on the other hand, are high, the optimal solution is to give balanced incentives to each party. On the contrary, when added-value in processing activities are low and marketing investments (investment specificity) are relatively more important, the model shows that the optimal solution is to give the same party ownership and control.

11. The empirical evidence

Along with theoretical models, in the last thirty years a rich set of empirical studies has been accumulated dealing with the determinants of the firm's make-or-buy decisions.

Although a comprehensive review of the empirical studies is outside the aim of this essay, it is interesting to note that, on this ground too, the need to develop a unified theoretical framework has been noted[33]. Lafontaine-Slade (2007) explore whether a cross-fertilization of different approaches is possible, highlighting how tests on one theory might shed light on other vertical integration models too. Some authors (Holmstrom-Milgrom, 1994; Holmstrom-Roberts, 1998; Holmstrom,

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[31] See section 11. Baker-Hubbard (2004) find that independent and integrated carriers differ as concerns the adoption of different typologies of on-board computer, with the former utilizing EVMS more frequently and the latter trip recorder technologies.

[32] Export processing activities in China can be run in two different ways: a) the pure assembly regime, for which a foreign firm supplies input materials to a factory in China, which plays a relatively passive role, receiving orders and delivering processed goods to the foreign client; b) the import and assembly regime, where the Chinese processing factory plays a more active role: it imports materials of its own accord and takes ownership of these materials during processing; it controls the export of processed goods, even if it does not usually invest in marketing and in the sale of the good to end users. These two regimes imply important distinctions as regards the responsibility of the factory manager in China and the control rights over imported materials. In the pure assembly regime the Chinese factory manager has a marginal role in searching for inputs and in other upstream activities, while the foreign buyer of the processed goods owns the materials used in processing. Without the foreign buyer's consent, the Chinese factory cannot use the imported materials to satisfy demand from other clients. In the second regime, on the contrary, the factory manager plays a central role in searching for materials and he owns inputs and can use them to process goods for other clients.

[33] Among the most recent survey of the empirical evidence on make-or-buy decisions see David-Han (2004); Klein (2005); Carter-Hodgson (2006); Lafontaine-Slade (2007); Macher-Richman (2008).

1999) state that many empirical research works on forward integration in marketing and commercialization are consistent not only with the transaction cost model, but with multitasking theory too. Whinston (2003) examines the predictions of the theory by Grossman-Hart (1986) and Hart-Moore (1990) to assess if the rich evidence supporting the cost transaction theory could tell us something about the empirical relevance of the property rights approach. Bucker-Hubbard (2001), verify that ownership structure in the trucking sector reflects non only insights from the Grossman-Hart-Moore theory, but also elements highlighted by the incentive system theory. Carter-Hodgson (2006) remark on the importance of an empirical research programme aimed at testing jointly different theoretical approaches.

Most of the evidence on *make-or-buy* decisions is connected with the transaction costs theory[34]. According to Joskow (2005) the large body of empirical research that this approach has inspired is stimulated by its production of testable hypotheses. In this ambit, the relationship between vertical integration and asset specificity is the most tested aspect, although some studies have inspected the relationship between vertical integration and other transactional features than asset specificity[35]. However, the great emphasis on asset specificity posed by the early transaction cost economics empirical studies has been decreasing over time and several more recent researches use this theory to explain vertical integration decisions without have recourse to that hypothesis (Klein 2005).

In order to measure asset specificity many *proxies* have been used as the specific case required: for example, material inputs complexity was considered as a *proxy* of physical asset specificity (among these works we find Masten, 1984; Masten-Meehan-Snyder, 1989, 1991; Lieberman, 1991; Lyons, 1995); human asset specificity was assimilated to *know-how* accumulation (Anderson-Schmittlein, 1984; John-Weitz, 1988; Hanson, 1995; Masten-Meehan-Snyder, 1991; Woodruff, 2002, to quote a few) or engineering design effort (Monteverde-Teece, 1982); the input-suppliers' location in proximity of buyer firms was considered an index of the site specificity (as in Masten, 1984; Joskow, 1985, 1987, 1988, 1990; Spiller, 1985; Masten-Meehan-Snyder, 1989; Saussier, 2000); the high share of production dedicated or sold to a single firm has been used as an index of dedicated assets investments (as in the research by Monteverde-Teece, 1982; Lieberman, 1991; Acemoglu *et al*., 2005; Joskow ,1985, 1987, 1988; 1990). In general these studies confirm the predictions of transaction costs theory, for which asset specificity makes vertical integration more likely.

Notwithstanding the centrality of asset specificity hypothesis in the early empirical studies testing transaction cost economics, some more recent researches don't consider this feature as a key element in make-or-buy decisions. (Pirrong, 1993; Martinez, 2002; Nickerson-Silverman, 2003, to quote some). Pirrong (1993) and Martinez (2002) focus attention on the loss that parties in a transaction could suffer as consequence of delivery delays and other small contractual hazards that occur even in the absence of asset specificity. Nickerson-Silverman (2003) note that the attitude of trucking firm to use their own vectors (vertical integration) rather than independent carriers reflects the need for coordination between truckers and shippers, and the latter's need to protect their trademark. As Klein states (2005, p. 452):

None of these studies denies that physical asset specificity and site specificity are important determinants of vertical relations, only that same cases of vertical control can be explained without reference to them, or to hold up problems at all. At present, these results appear as exceptions to a more general rule. Still, an accumulation of such anomalies could challenge the key underlying structure of the transaction cost approach.

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[34] Macher- Boerner (2008) calculate that the number of empirical studies dealing with the transaction cost economics is over 900, a wide share of which concerns vertical integration. David-Han (2004) examine 304 statistical tests contained in 63 articles on the transaction costs approach, although not all are focused on the nature of the firm. Carter-Hodgson (2006) select a sample of 27 studies that have had major influence in the academic debate on make-or-buy.

[35] See, among others, Crocker-Reynolds (1993) and Walker-Weber (1984) who highlight the role of uncertainty in *make-or-buy* decisions.

The evidence concerning hybrid organization forms is impressive too. Initially used in the field of organization and management studies, empirical research on hybrids rapidly extended, after the pioneering study by Eccles (1981), to economic analysis [36]. These works support the idea that some hybrid forms, such *subcontracting* and *networks of firms*, based on long-term agreements among legally autonomous entities, lead to a more efficient coordination than markets without a unified ownership.

Despite copious evidence testing the prediction of transaction cost economics, there are few works aimed directly at the empirical validation of the property rights theory. Some authors attribute this lack of attention to the fact that initially the property rights theory was interpreted as a formal one dealing with the transaction cost economics, hence the empirical validation of the former, should shed also light on the latter (Lafontaine-Slade 2007). However, as mentioned previously, today many authors agree that the two theories have different implications and predictions[37]. This is proved by the fact that some research that does not confirm the predictions of the transaction cost economics supports, instead, the property rights theory. For example, from Acemoglu *et al*. (2005) it emerges that relationships between firms are likely to be vertically integrated (backward integration) when downstream production is more technologically intensive than upstream input production, a finding supporting the prediction of backward integration of the property rights theory. At the same time, this study shows that the upstream technological intensive inputs do not imply backward integration: according to the transaction cost economics the high level of inputs' specificity should lead to vertical integration; the property rights model instead suggests, given the importance of the supplier's investment, that it does not confer the residual rights of control to the input buyer firm.

Lafontaine-Slade (2007) verify that the results from some studies of manufacturer/retailer or *franchisor/ franchisee* relationships, could be interpreted in the light of the property rights theory's predictions, especially the negative relation found between vertical integration and the franchisee's effort in making the business successful (Anderson-Schmittlein, 1984; Martin, 1988; Lafontaine, 1992; Lafontaine-Bhattacharyya, 1995; Woodruff, 2002). When the complexity of downstream activity increases, the agent's effort in facing unforeseen contingencies becomes more important and, therefore, the agent's investment productivity rises. In accordance with this finding, the property rights theory predicts non integration if, as stressed so far, the marginal productivity of each party's investment is equally important. Feenstra-Hanson (2005) apply their model of international *outsourcing* to the case of Chinese manufacturing processed goods trade. The empirical evidence shows that the most common outcome is to have foreign factory ownership but Chinese control over input purchase.

There is also relatively little evidence regarding the predictions of the multitask and incentive systems theory on *make-or-buy* decisions. Whereas in the empirical research aimed to validate transaction cost economics is prevalent the intermediate input supplier/buyer relationship and asset specificity plays a central role, the evidence on the *multitask* theory principally refers to downstream relationships, between manufacturing firms and retailing agents. In the latter asset specificity is less relevant and projecting an efficient incentive system, in which the features of the different agent's tasks are taken in consideration, is the central question.

Slade (1996) examines the contracts stipulated between gasoline refining firms and gasoline retailing stations in the city of Vancouver, generally managed by an independent agent from the oil company. Agency relationships in gasoline retailing are multi-dimentional, because the agent carries on, other than the task of selling gasoline, other services such as car repairs, general stores, restaurant and food services, for which he is the residual claimant. This variety in supply services is accompanied by a corresponding variety of contractual agreements. This study, abstracting from the asset specificity hypothesis, explores how the characteristics of the gasoline retailing station affect

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[36] For a survey and an assessment see Menàrd (2004).
[37] See, among others, Lafontaine – Slade, 2007; Whinston, 2003; Gibbons, 2005.

the choice of the contract and demonstrate that a certain regularity exists in observing non integration if the second activity is not strictly complementary to gasoline retail: given that the agent has strong incentives to carry on the second activity, for which he is the residual claimant, if the incentives related to the first task -attributed to him by the principal- are weak and the two activities are not complementary, the agent will concentrate his effort only on the second one; as a result, it makes sense to create high-powered incentives also for the first activity[38]. On the contrary, if the two activities run by the agent are highly complementary, Slade observes that vertical integration is more likely.

Yeap (2006) considers the relationship between ownership structures and production activities in restaurant chains, where the decision on buying or *franchising* the single restaurant depends on the complexity and variety of the production. Vertical integration is more likely in cases where an unsuitable processing of some of the agent's tasks could have a detrimental impact on the chain as a whole.

Baker-Hubbard (2003) test a make or buy model in trucking where are considered both Grossman-Hart (1986) and *multitask* (Holmstrom-Milgrom, 1994) theories' findings. Two different ownership structures are considered: in the first one shippers own trucks for hauls (vertical integration) whereas in the second one shippers contract with for-hire carriers (market relationship). In particular, this study examines how the adoption of different classes of on-board computers between the end of eighties and nineties influenced the shippers' decisions on *make-or-buy*. It was found that the usage of on-board computers improving the shippers' possibility of monitoring truckers, making vertical integration more likely; whereas on-board computers allowing improvements in coordination (because they provide information on the truck's location and allow an efficient *matching* between demand for trucking services and supply) push shippers toward for-hire carriage.

12. Conclusions

This paper discussed the state-of-the art and the directions for research on the make-or-buy problem. After thirty years of research efforts, we now have numerous contributions explaining different aspects of the nature and existence of the firm. The search for a unified theory, however, still remains a theoretical challenge. The task is not easy, perhaps because the theory of the firm develops along two different strands, one analyzing the factors influencing firm's boundaries, and the other one relating to the internal structure of the firm; or because, even inside the same research strand, it is not really easy to grasp the similarities and differences between contributions that have quickly followed one another over the last few years.

This paper examines the theories concerning the make-or-buy problem, focusing on recent contributions that have tried to develop a unified framework. It emphasizes the role of incomplete contracts as a common and significant trait of the theories discussed.

Starting from the early neo-institutionalist contributions, the incomplete nature of the contracts has a key role in the explanation of the factors affecting the trade-off between firm and market: in the Coasean view, vertical integration is due to the existence of transaction costs, that are responsible for contractual incompleteness; in the rent seeking theory of the firm, contractual voids leave room for *ex post* opportunistic behaviour, both in the shape of underinvestment, and of socially inefficient haggling aimed at the appropriation of the quasi rent; the new property rights

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[38] Slade (1996, p. 469-470) formalizes the notion of high/low powered incentives considering a linear contract of type $w = s + bp$ (see section 7): when two contracts with the same expected value are compared, the one with the highest value of b and the lowest value of s is defined "high-powered". For $b=0$, the agent receives a fixed wage, whereas when $s=0$ and b is the price paid to the agent, the transaction is arm's length and the agent is a *residual claimant*.

theory explicitly poses the contractual incompleteness hypothesis at the basis of the models on costs and benefits of vertical integration: contractual incompleteness is due to the difficulty of specifying ex ante all the features of the relationship. In the multitask theory of the firm too, the impossibility of drawing up complete contracts depends on the circumstance that the agent's actions are not observable. Furthermore, uncertainty is at the basis of contractual incompleteness in the adaptation theory.

The paper highlights, then, how the asset specificity hypothesis is fundamental for just a subset of make-or-buy theories. Instead of that hypothesis it is possible to consider a more general condition of bilateral dependency as a common trait of the theories examined, that anyway generates a quasi-rent, but this could originate from different factors: the existence of switching costs, the absence of outside options, the necessity of assuming decisions or taking actions rapidly, not to mention, of course, asset specificity. Some studies underline the importance of bilateral dependency not just as regards the comparison between firm and market as efficient modes of governance, but also as concerns the understanding of the role and the nature in a market economy of the so-called hybrid forms, halfway between markets and hierarchies (make and buy).

In the last few years, advances in the theory of the firm have realized the importance, with reference to the trade off between firm and market, of analyzing the costs and benefits of vertical integration within the same analytical framework. Following this research direction, the paper examines several approaches to the make-or-buy problem discussing both established models and some recent contributions that take a step towards a unified framework.

The rent seeking theory faces the problem in terms of benefits and costs of vertical integration stemming from rent seeking. Rent seeking occurs both inside the firm, as noted by the influence costs theory, and between firms, as highlighted by the literature on post contractual opportunism. In the unified model, the firm is depicted as a nexus of decision rights and the efficient mode of governance minimizes the rent seeking costs.

The new property rights theory is the first formalized make-or-buy model where benefits and costs of vertical integration are jointly assessed. The firm is identified as the assets it possesses and ownership confers residual rights of control over the firm's assets. Furthermore, ownership affects the incentive of parties to invest and, therefore, the total surplus from any transaction. The efficient mode of governance is the one where the total surplus is maximized (second best) or, as a result, that one which confers asset ownership on the party whose investment is relatively more important in producing the surplus from transaction.

The incentive system theory considers the trade-off between firm and market taking in consideration that each party's behaviour depends on the incentives to allocate their effort to several activities (multi-task). As in the latter model, vertical integration is identified as asset ownership. The distinctive point of the incentive theory is that ownership is also an incentive instrument: the owner has an incentive to devote attention to the assets he possesses. Therefore, ownership creates incentives affecting the payoffs of the parties and interacting with incentives considered in the formal contract. Vertical integration is the efficient mode of governance when the agent's asset ownership hurts the principal's efforts to create incentives via contract.

Some recent contributions extend the property rights theory; others link it to the multitask theory in order to analyze make-or-buy decisions in an international outsourcing context.

The adaptation theory compares firm, market and hybrid forms of governance as regards their own adaptive decision making in contexts where events will become known only at a later time. According to the first model, the efficient mode of governance is assessed by looking at asset specificity. The second model, apart from the asset specificity hypothesis, considers an uncertain environment where decisions are not contractible and parties can negotiate ex ante property rights allocation, but they do not negotiate them ex post (that is when uncertainty is resolved). The efficient allocation of property rights is the one which allocates (self-interested) decision making authority to the party that maximizes the expected total surplus. The third model introduces in this framework the possibility for parties to subscribe to relational contracts.

Other recent contributions interlink several aspects from different established make-or-buy models.

Last, the paper briefly discusses the empirical evidence, highlighting how on this ground too the need to develop a unified theoretical framework has been observed.

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