

Department of Industrial Economics and Strategy  
Tryk: Handelshøjskolens Reproduktionsafdeling  
Oplag: 60  
ISBN: 87-7869-021-8  
ISSN: 0905-0841  
WP: 98-2  
Februar 1998

# Economic Organization and the Accumulation of Rent-Earning Assets

by

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Prepared for  
Nicolai J Foss and Paul L Robertson, eds.  
*Resources, Technology, and Strategy*  
(in preparation)

## I. Introduction

The title of this paper may appeal to both economists of organization and to resource-based scholars, although they are likely to entertain divergent expectations about its contents. For those mainly interested in economic organization, expectations probably will be directed toward a question such as, “How do we secure incentives to invest in accumulating assets with a given and well-known rent earning capacity?”. The interesting aspects of this question would depend on the assumed information cost constraints on contracting for such an investment. On the other hand, for those economists and management scholars mainly interested in resource-based perspectives on firms, the title probably would be interpreted as a label covering discussions of issues such as “How may rent-earning assets be accumulated as for example, joint-product of the activities taking place within the firms?”, “How may differences in historic circumstances and accumulation capacity between firm explain the rents generated from those assets?” and “How may such assets best be explored?”.

I may disappoint both parties. The title conceals an unorthodox idea that to my knowledge has not been present in the economics of organization, nor in the resource-based approach. The idea is that organizing transactions within the boundaries of the firm may reduce cost of conducting experiments relative to a situation in which such experimentation would have to take place across markets.

With “experiments” I have something much broader in mind than the activities performed by the R&D function. Those I have in mind are the many trials and errors involved in setting up a smoothly running production system consisting of many interdependent specialized tasks. Of course, such experimentation is only needed if there is uncertainty with respect to the best way of operating technically interdependent production systems. Due to such “technological uncertainty”, as we may call it, firms start *different* kinds of experiments and follow *different* paths of learning. This, in turn, may explain long lasting differences between firms, thus establishing a link to the analysis of competitive advantage. Moreover, from the resource-based perspective (Wernerfelt 1984; Barney 1991; Peteraf 1993; Dierickx and

Cool 1989), we know that the assets that are likely to be sources of sustainable rents and above normal profits are the outcomes of ambiguous and uncertain assets accumulation processes. The results of path-dependent learning processes would often seem to qualify here.

Uncertainty in any deep (e.g., Knightian or Shacklian) sense is not an assumption which characterizes the majority of modern contractual theories of firms (e.g., Williamson 1985; Hart 1995). Indeed, I shall argue that most of the contractual theories of firms are based on what Stephen Littlechild (1986) has called the neo-classical and the Austrian market models – models that encompass risk, information costs and ignorance, but *not* uncertainty. That is to say, it is taken for granted that the best uses of productive assets are already known. Information costs may make contracting over all the relevant characteristics of assets impossible or may constrain contingent contracting and cause *ex post* contractual hazards. Economic organization is then mainly a question of providing the transacting parties with proper incentives so that joint surplus can be maximized. Such relatively weak constraints on rationality allow the researcher to pinpoint exactly what kind of organization of transactions is optimal, given the constraints introduced in the model. The nature of the contractual problems which can be solved by the founding of firms leaves room for only very limited differences between firms. Firms, of course, may solve incentive problems related to investments in rent-earning assets, but they are not vehicles for *generating* such assets (Langlois and Foss 1997).

The dynamic transaction cost theory developed Langlois and Robertson (1995), as well as Coase's (1937) original work (as I interpret this), are exceptions to the rule. I interpret these explanations of firms as being based more on what Littlechild (1986) calls a radical subjectivist market model – a model which allow for much greater degrees of uncertainty and thus larger differences between firms. Relying on radical subjectivist arguments gives a richer picture of what firms are and what they do. It opens the door more fully for issues of entrepreneurship, experimentation, learning, and coordination in an uncertain world. This bring me back to the title of this paper. The content of the paper really is an argument for the importance of uncertainty in explaining the existence of firms. *The organization of transactions within*

*the boundaries of firms thus depends on the transaction costs involved in reducing uncertainty by accumulating knowledge from conducting systematic experiments.* This conception of firms also provides a bridge between contractual and resource-based perspectives on firms because, as indicated, the knowledge accumulated from experiments may be a source of long-lasting rents.

In section II, I discuss contractual theories of the firm, and I argue that they all, except for dynamic transaction cost theory and Coase's original story, are based on market models encompassing at most ignorance. Section III provides a reinterpretation of the Coasian notion of firms and it is argued that the Coasian firm reduces the transaction costs associated with conducting experiments needed to discover the true opportunity costs from different uses of productive assets. In section IV, I introduce the resource-based view of firms and explain why accumulation of knowledge on how to organize production may be a rent-earning asset.

## **II. Contractual theories of firms: a perspective from the theory of market processes**

Contractual theory takes the transaction as the unit of analysis and proceeds to ask why anonymous market exchange in some situations is replaced by more complex forms of contracts (Williamson 1985). One of the fundamental assumptions of contractual theories is that there is an efficiency rationale behind transacting parties choice of economic organization. A choice between market transactions and transactions organized within firms therefore depends on the efficiency gains from moving transactions within the realm of firms (or *vice versa*).

Contractual theories embrace a relatively *broad spectrum* of theories about different sources of the costs of transacting and this is reflected in the many different explanations of firms as solutions to contractual problems. Within this broad strand of literature one can identify at least two distinct traditions (Foss, 1994). The first is mainly static, taking most inputs and outputs as given. The second one is more

dynamic; for example, slightly more provision is made for uncertainty is introduced. Representatives of the first, static tradition is the nexus of contract and measurement cost approaches (Alchian and Demsetz, 1972; Jensen and Meckling, 1976; Fama, 1980; Jensen, 1983; Cheung, 1983; Barzel, 1982, 1985, 1989). Representatives of the slightly more dynamic tradition is the literature on governance mechanisms (Williamson, 1973, 1985) and incomplete contracts (Grossman and Hart, 1986; Hart 1989; Hart and Moore 1990). In addition to the streams mentioned by Foss (1994), there is the dynamic transaction cost theory developed by Langlois and Robertson (1995).

In my opinion, the difference between 1) the static contractual theories, 2) the more dynamic contractual theories, and 3) the dynamic transaction cost approach reflects a fundamental underlying difference in how they conceive of the workings of the economic process. For example, is there a dynamic contracting process, so that renegotiations are allowed for (as in Williamson's work), or is everything basically settled from the beginning (as in agency theory)?

The framework suggested by Stephen Littlechild (1986) for distinguishing between different economic theories of the market process helps clarify the differences between the different transactions costs theories. The framework consists of three different "ideal type" models of market processes, distinguished by "...how the decision makers perceive of the world, how these perceptions change over time, how these additional information may be sought, and how the decision maker can limit his exposure to uncertainty" (Littlechild, 1986, p.27). Based on these criteria, Littlechild identifies the following three ideal models:

1. the neoclassical model (Frydman, 1982);
2. the Austrian model (Kirzner, 1973,) and
3. the radical subjectivist model (Shackle, 1972).

The static contractual theories resemble the neoclassic market process model in assuming "*that the form the future can take is known in advance*" (Littlechild, 1986, p.28; emphasis in original). The static market model corresponds to the measurement cost (Barzel, 1989; Cheung, 1983), the agency (Jensen and Meckling, 1976; Fama and Jensen 198 ) and team

production (Alchian and Demsetz, 1972) theories of firms. In the static transaction cost theories, the future holds no surprises, just as in the neoclassical model. This means that contracting is comprehensive and that all uses of assets are well known to economic agents. Not all relevant information is available to the economic agents, but by searching they may obtain more. Information may, for example, be lacking on valued attributes of assets (Barzel, 1997) or, in the case of humans, the effort they exert (Alchian and Demsetz, 1972; Jensen and Meckling 1976). Prices therefore may not perfectly reflect value, creating problems of excessive sorting, inefficient levels of performance and under-investment in durable production assets. Some of these problems may be reduced if the organization called the firm is created.

For example, in order to realize economies of scale many individuals may be needed to work on the same piece of equipment. However, high information costs make it difficult to determine in advance how much the operation of each individual contributes to the wear and tear of the equipment. This creates a situation where there will be insufficient incentives to invest in maintenance. According to Barzel (1989), one way of controlling such problems is to use a fixed wage contract in which workers are remunerated for their time rather than their output. But since a worker who receives a fixed wage for a fixed period of time has no incentives to identify the tasks needed for an effective operation of equipment, managers have to specify and monitor the task to be performed. Voila! the firm arises and solves a market failure problem.

A similar problem arises when team production is involved (Alchian and Demsetz, 1972). In this case, costs of measuring effort may create externalities, as each team member has an incentive to shirk, thereby reducing his cost of contributing, while only shouldering part of the costs in terms of lower output. Again, the solution is to set up an organization in which a specialized monitor is appointed with the rights to meter effort, receive the residual income from these activities, to alter membership of the team and to sell all the these rights.

In both of these cases, a firm (a specialized monitor) is an efficient solution relative to markets. Under market contracting, it is argued, the monitor will not be able to know

so much about the inputs (at the same costs) as in firm-like organization.<sup>1</sup> This must (plausibly) imply that the monitor may more easily learn the relevant characteristics of a careful or hard-working individual when he is associated with the team for a longer period rather than for a short period. Differences in monitors' abilities to learn how to monitor most effectively may explain why some monitors earn an above-normal profit (a Ricardian rent) on their effort. However, if the ability to perform low cost monitoring cannot be passed on to a successor at low costs, there can be no long lasting superior profits to the firm (in the sense of lasting much longer than a "generation").

What Foss (1994) has called a more dynamic transaction cost approach seems closer to what Littlechild has termed "the Austrian market process model". Here the problem is neither uncertainty nor risk, but ignorance:

"Tomorrow" is a vector of which the agent knows some components but not others; he or she knows there will be other components, but not what they will be. Consequently, the agent cannot form a probability judgment of the likelihood of their occurring (ibid p.29).

Thus, in such a world, tomorrow may bring about "discoveries" of improved materials or techniques, and contracting will be incomplete. Such discoveries may influence the value of rights over assets in ways which were not foreseen at the time of contracting. The allocation of rights to determine the use of the assets thus becomes crucially important. As Littlechild points out: "It is now relevant to consider which party is best able to "predict" and respond to such unexpected change – or, perhaps, which party is most optimistic or apprehensive about the possibility of such a development" (ibid, p.35). Some agents may have natural ownership advantages, in the sense that they are better able to discover better ways of using assets. But rights to use assets may also be

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<sup>1</sup> However, Alchian and Demsetz (1972) do not really explain why the service of monitoring are more efficiently acquired in a firm rather than by market contracting. They state: "All of these tasks [measuring output performance, apportioning rewards, observing the input behavior of inputs] are, in principle, negotiable across markets, but we are presuming that such market measurement of marginal productivity and job reassignments are not so cheaply performed for team production" (p.782). For this reason market competition for a place on the team does not sufficiently discipline team members. Potential team members cannot detect teams where shirking is a serious problem and even if they did find such a team they would have the same incentives to shirk as the person they replaced given the high cost for other team members in metering each other's effort.

valuable to the original owner, because it is the best way of securing one-self against hold-up where transactions involve specific assets.

It is this latter problem which is at the center of the more dynamic transaction costs theories. Thus, Williamson (1975, 1985), Klein, Crawford, and Alchian (1978) and Hart (1995) all put great emphasis on how uncertainty makes it difficult to enforce one's rights over assets. According to this literature, unforeseen events may alter the relative value of assets or specific properties of valuable assets have to be discovered and therefore cannot be included in contracts. In the context of specific assets, this may result in *ex post* transaction costs as contracts have to be renegotiated, and/or in the lack of proper incentives to undertake efficient transaction specific. Again firms arise to solve market failures.

For Williamson (1975, 1985), the choice between market or firm depends on the extent to which transactions are characterized by asset specificity, frequency and uncertainty, given opportunism and bounded rationality (and, hence, incomplete contracting). The assumption of "uncertainty" is according to Williamson no hindrance to researchers in forming a predictive theory of economic organization, since all that is needed is "... that the factors responsible for differences among transaction be identified and explicated" (1985, p.52). In other words, one must assume that if the critical characteristics are well known to and easily identifiable by economic agents, they will in fact tend to choose the optimal governance structures.<sup>2</sup>

The only problem is how agents know the kind of uncertainty they are facing. Certainly, it cannot be fundamental uncertainty, since in that case decision makers would have no expectations of possible disturbances in the conditions surrounding the

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<sup>2</sup> Evolutionary explanations provide an alternative to intentional explanations of differences in governance structure. In fact, Williamson suggests the existence of some evolutionary mechanism which is responsible for the predominance of some modes of governance relative to others, depending on the circumstances under which the transaction take place. However, he is not very explicit about the links between contractual relations, of which firms may have many, and the selection process. In addition, it does seem to be a rather static selection model (close to the Alchian (1950) selection model, where all firms are assumed be identical with respect to their propensity to grow) he has in mind; one in which variation in governance structure is given from the outset along with the potential contractual hazards which might make one governance structure more efficient than another. Moreover, it is necessary that there is a persistent search for ways of improving contractual arrangements. See Winter (1971) for a discussion of evolutionary process as mechanisms of global optimization.

transaction. It must be that individuals, as described by Littlechild, at least “knows some components [of tomorrow’s vector of events] but not others” or that “he or she knows there will be other components, but not what they will be”. This could be a situation in which decision makers vaguely anticipate the possibility of major changes in prices which could require renegotiations of contract terms. Due to the “uncertainty” surrounding such negotiations, agents may expect strategic behavior (misrepresentation of information, withholding of information, etc.) as parties try to capture rents from specific assets. In this case, transactions are best organized within the boundaries of firms.

In Williamson’s scheme, firms are “ultimate courts of appeal”, where top-management possess rights to decide the uses of assets, and where opportunism may result in termination of contracts without access to complementary physical assets.<sup>3</sup> Now, within the hierarchy, managers may reduce incentives to take advantage of information asymmetries by switching from the high-powered incentives of payment for output (characterizing market transactions) to the low-powered incentives of fixed payment for time. This, however, creates a need for more monitoring of effort and other incentive schemes relative to contract based on high-powered incentives. In the Williamsonian scheme, firms therefore could differ with respect to the internal structure and incentive schemes and thereby differ in profits due to more effective means of economize on control and measurement costs. However, if, given the assumed “uncertainty”, it is possible to predict the optimal governance structures for different kinds of transactions, why should it not also be possible to predict the optimal internal organization of firms? This would leave only slight differences between firms facing the same contingencies. In other words, it is hard to rationalize firm differences within this body of thought.

In what Hart (1995) calls the property right theory of firms, the joint surplus is assumed to be known with accuracy, and ignorance is only present as an assumed lack

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<sup>3</sup> As explained by Williamson (1985, p.155): “To be sure, divisions also engage in obfuscation and cover-up against internal auditors. Division managers cannot, however, take the physical assets they have accumulated through cost overruns and flee. Termination with and without assets makes a difference”.

of ability to specify the exact nature of the object over which one contracts. Since contracts cannot be enforced, an agent will have greater incentives to undertake a transaction specific investment in his human capital if he also possesses residual user rights over complementary physical assets. This is because he then avoids being held up by an owner of complementary physical asset for a share of the residual income his investment can produce.<sup>4</sup> Firms are defined by the physical assets over which an legitimate owner has formal residual user rights. In the Hart (1995) model, firms could differ with respect to the specific and quasi-rent earning assets they hold. However, since uncertainty is so limited, there is no reason to believe that the values of assets are not reflected in their market prices and that firms therefore have no chance of acquiring assets at lower price than their value. Firms reduce uncertainty in only one dimension: they provide a guarantee for a certain share of the residual income of investments in human capital. Firms do not enable the discovery of the nature of the object over which one contracts; such discoveries take place independently of whether or not firms exists.

The last market process model is the radical subjectivist model. It differs from the Austrian one by introducing *new alternatives* between which agents may choose; it stresses “..the imagination needed to create the alternatives between which decisions are made, and hence the inevitable uncertainty associated with the outcome of decisions” (ibid, p.29). This notion of the market process, allowing for genuine entrepreneurship, creativity and experimenting, is akin in some ways to the dynamic transaction costs theory presented in Langlois and Robertson (1995). In their perspective, firms are seen primarily as responses to problems of coordinating interdependent tasks, typically arising from systemic innovations. Faced with fundamental uncertainty and asymmetric information, the firm “... can more cheaply redirect, coordinate, and where necessary create the capabilities necessary to make the innovation work” (Langlois and Robertson, 1995, p.3

It is the capacity to coordinate activities rather than ownership that is at the center

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<sup>4</sup> If he enters into a team of other individuals holding specific human capital, the optimal ownership structure is one where the person best able to influence the income stream generated by all assets hold the rights over the physical asset,s since this ownership structure ensures the greatest gains from investments in human capital.

in this conception of firms. Individual firms are characterized by their intrinsic core of resources which are “idiosyncratically synergistic, inimitable, and non-contestable” and therefore not transferable across markets. Firms may also control a number of ancillary capabilities which they have either created in-house or acquired over markets. In the short run, the boundaries of the firm depend on the relative production costs of a firm relative to other firms and the transaction costs involved in securing such ancillary capabilities over markets.

Langlois and Robertson (1995) argue that if firms were operating in an environment similar to that envisioned in the Austrian market model, transaction costs would gradually be reduced as individuals learn how to detect shirking and moral hazard and because they learn about the contingencies relevant to contracts. Therefore, in the long run, one should expect a more narrow scope of the firm. On the other hand, one should also expect a gradual improvement of a firm’s capabilities as more activities become routinized and this would result in an expansion of its boundary. However, other firms also improve their capabilities and these are easily accessed through market contracts. This reduces the advantages from in-house production. Now, due to the routinization of activities, firms may be faced with a situation in which they have excess capacity relative to the full use of their capabilities (see also Penrose, 1959). If costs of transacting in capabilities were low, firms would sell some of this capacity. However, dynamic transaction costs, which consist of “... costs of persuading, negotiating, coordinating, and teaching outside suppliers” may be too high. As a result, firms diversify into new but in some respects similar activities.

However, as Langlois and Robertson point out, “[o]ne of the principal determinants of the appropriate form of business institution is the nature of economic change that institution must confront” (p.3) – a situation which only arises in an environment similar to that envisaged in the radical subjectivist market model. Economic change arises as economic agents discover new profit opportunities. However, market contracting may not be an efficient means for taking advantage of a new profit opportunity and especially not if the entrepreneur who discovers the opportunities has to contract for adaptations of complementary capabilities to his needs. The entrepreneur may then find it too costly to inform owners of these capabilities of the idea and to

persuade them to invest in such an endeavor, one for which not much is known about the vector of possible outcomes. Dynamic transaction costs thus create a need for control over assets

In the dynamic transaction costs theory, there is clearly room for prolonged differences between firm. Firms primarily differ with respect to their intrinsic core of capabilities (routines, culture and other answers to coordination game situations). The intrinsic core change as they learn more about the nature of tasks they undertake and as they discover new profit opportunities. In relatively stable environments, there may be some overlap in what firms are good at, but never a complete overlap. Within the theory, persistent differences in profits between firms could be seen as being based on slight differences in the context in which solutions to coordination games have evolved, or because no one in the firms knows in advance the best solutions to coordination problems and therefore develop different approaches. Moreover, firms may differ in their ability to cope with uncertainty; that is, they may be in control of the right capabilities at the right time so that they quickly can take advantage of emerging profit opportunities.

So far I have not mentioned the seminal contribution by Coase (1937) to the theory of the firm. In the following section I present a reinterpretation of this paper, in which I argue that firms exist because they reduce the costs of discovering the unknown or not well-understood components of the vector of events which make up “tomorrow”. In particular, they discover the best way of coordinating interdependent tasks. Moreover, I argue that the vector of events to be discovered gradually change as firms see opportunities for economic gains from further specialization in production, thus creating *new* coordination problems. This interpretation may in many way resemble that presented in the dynamic transaction costs perspective. There are, however, a number of important differences that I would like to point out before I turn to the reinterpretation of “The Nature of the Firm”.

*First*, in line with Coase (1937), I conceive of firms and also markets as alternative means of coordinating activities and thus the uses of assets. This view of markets seems to me to be neglected in the static and more dynamic versions of contractual theories.

Within these perspectives, markets are primarily treated as vectors of prices, and competition is conceptualized as a relatively cheap way of disciplining the users of resources, given that transaction costs (or rather measurement costs) are not too high. The dynamic transaction costs theory seems to have adopted a similar view of the market. Here costs of transacting are all discussed in terms of market failure due to high measurement costs or costs of ensuring against breach of contracts. The role of the market and the relevance of price signals in directing uses of resources seem to be taken for granted except in two cases. The most obvious is in the case of inventions where no prices can indicate the potential benefits of the endeavor and where judgment of the value of investments have to be based entirely on the information provided by the innovator. However, once the invention has proved its worth, these dynamic transaction costs will vanish – except for the costs of transferring the capabilities now developed within the innovating firm. The less obvious case is where it is assumed that prices cannot provide solutions to coordination games and that capabilities therefore substitute for price coordination. However, not all solutions to coordination games evolve within boundaries of firms as defined by the unified ownership of assets; so we still need a theory which will explain when solutions to coordination problems are most efficiently reached within firms.

The Coasian notion of markets and firms differs from the dynamic transaction costs perspective in one important aspect: it is assumed that prices are not given, but have to be *discovered*. Prices as information reflecting the opportunity costs of different uses of assets can then be discovered either in a market process or by managers within the boundaries of firms. Firms and markets are thus alternative modes of coordination and the substitution of one for the other depends on the costs of using the price system relative to managed coordination. Coase also points out when coordination by management is likely to be more efficient than pure market coordination.

*Secondly*, based on Coase (1937) I will argue that sometimes the discovery of the relevant (shadow) prices requires experimenting with different way of organizing activities. Ownership of assets and labor contracts reduce the costs of performing such experiments. The outcomes of such experiments result in the accumulation of information on important interdependencies in productive activities and components as

well as on different ways of sequencing activities. This knowledge is an important part of firms' capabilities, along with norms, codes of conduct and routines which also guide behavior and solve coordination problems. However, there are important differences between experimentally accumulated knowledge and norms, codes and some routines, in that a stock of experimental knowledge is more easily produced within a firm as defined by unified ownership over assets, while the evolution of norms, codes of conduct etc. may depend more on the duration of the relationship, and may thus develop between firms as well as inside firms.

### **III. A reinterpretation of the “Nature of the Firm “**

In this section, I interpret Coase's analysis of the nature of the firm in terms of property rights theory as developed by Coase (1960, Alchian (1965), Cheung (1983) and Barzel (1997). I argue that Coase's notion of firms can be viewed as a solution to problems of coordination in situations where user rights over assets cannot be perfectly specified and allocated in manners which ensure the functionality of technologies.

Such situations may occur because individuals have only limited computational capacity (bounded rationality), making it too difficult for them to specify user rights in ways that completely solve problems of interdependencies, or because they face uncertainty in the sense that they lack ability to imagine “...the alternatives between which decisions are made” (Littlechild, 1986, p.29). This kind of uncertainty (which characterizes the radical subjectivist market model) arises if there is a possibility of inventions that change the set of alternatives between which economic agents can choose and thus also the structure of prices.

However, I argue that increased specialization can also be a source of such uncertainty. This is because technological interdependencies between subdivided tasks typically only become apparent after the act of specializing. Specialization then may result in problems such as bottlenecks and uneven development of components for which new solutions have to be imagined. Based on Coase (1937, 1991), I argue that one of the reasons why managed coordination may be

advantageous relative to price coordination is because the former reduces costs of learning in the coordination of technological interdependent tasks.<sup>5</sup>

### ***Coase on the nature of the firm***

Coase (1937) uses coordination costs to explain why in an economy of specialized production, markets and firms co-exists as alternative modes of coordination. The reason for the existence of firms, he explains, is that there are costs of using the price mechanism, and that “[t]he most obvious cost of “organizing” production through the price mechanism is that of *discovering* what the *relevant prices* are” (Coase, 1937, p.21; my emph.). With high market cost (later termed transaction costs), the market mode of coordination is substituted by a firm mode of co-ordination based on managerial decisions. But as pointed out by Coase, the advantages of the firm mode over the market mode diminish as marginal costs of coordination increase with more tasks being coordinated within the boundaries of a firm and this leaves room for competition between firms for the coordination of specialized tasks.

While Coase (1937) does not explicitly suggest that uncertainty is a reason why there may be costs of discovering the relevant prices, uncertainty seems to play an important role in explaining the need of open-ended contracts, such as employment contracts. According to Coase an employment contract is preferred if

... 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 (Coase, 1937, p. 21).

Stated in the terminology of property rights theory (Barzel 1997), there are high costs of specifying *the valued attributes of assets* in all future states, and this results in rights over valued attributes of assets being left unspecified. When the coordination between inputs is influenced by changes in external contingencies which cannot be

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<sup>5</sup> It should be mentioned that problems that arise from technological interdependencies may not be the sole reason for the existence of the Coasian firm.

specified *ex ante*, continuous redirection of resources and re-planning taking advantage of the dimensions of time and place of assets will be necessary in order to avoid bottlenecks.

High costs of discovering the relevant prices is a necessary but not a sufficient factor in explaining why firms emerge, since "... this cost may be reduced but it will not be eliminated by the emergence of specialists who will sell this information" (Coase 1937, p.21). Firms exist only if there is also "... costs of negotiating and concluding a separate contract for each exchange transaction which takes place on a market (ibid, p.21).

An arbitrageur holding stocks of assets makes his money from superior knowledge about the value of the unspecified attributes of time and place (Hayek 1945; Barzel 1997). The employment contract may be interpreted as a providing a stock of labor services, which, within limits (Simon 1951), can be allocated to different uses by the direction of a arbitrageur in response to unforeseen contingencies.

Now, arbitrageurs only need to bear the cost of stocks if they cannot appropriate the benefits of their knowledge of time and place by selling this information. Two factors may explain why it is not always feasible to sell information about time and place dimensions of assets. First, there is the well-known problem of information as a public good which, if revealed before the transaction, cannot be protected from capture (Arrow,1962). Secondly, negotiations may take longer time than direction by orders, and because of this, opportunities for profitable action may be bygone.

In "The Nature of the Firm", Coase uses the employer-employee relationship as the archetype of the firm where managers' rights to direct resources within certain limits fills in the holes in the open-ended employment contracts. Later on Coase (1991) has remarked that already at the time when he wrote "The Nature of the Firm", he was aware that the analogy between the employment contract and the firm could give an incomplete picture of the nature of the firm. Coase (1991) points to an amendment to the original article, when he draws attention to a lecture note from

1934 in which he states that “... a full firm relationship will not come about unless several such contracts are made with people and for things which cooperate with one another” (Coase, 1991, p.64). This amendment can be interpreted to mean that managerial decisions fill the holes of open-ended contracts in cases where coordination of large number of factors which cooperate with each other is required. This is exactly the situation with technological interdependencies between many tasks.

To sum up, firms exist only if there is both high costs of discovering the relevant prices *and* if these costs cannot be reduced by contracting for this information. The latter case may be particularly relevant where interdependencies between many resource owners make it costly to rearrange tasks to take advantage of new information on states of the world. Firms then save transaction costs by substituting *many* independently determined contingent contracts for managed directions.

Coase (1937), like virtually all other later theorizing on the firm, takes the costs of coordinating various tasks as well as the extent of specialization in the economy as given, and proceeds to analyze why not all transactions among specialized agents are coordinated in either firms or in open markets. However, costs of coordination between tasks may crucially depend on the degree of specialization. Self-management of more tasks may be an alternative to specialization which reduce over-all costs of production in cases where coordination between many specialized tasks proves very costly. The degree of specialization therefore depends on the marginal costs of coordinating increasingly specialized tasks and the marginal benefits from specialization.

### ***Specialization in production, technological uncertainty, and the role of firms***

As Smith pointed out in *The wealth of Nations*, specialization in production is one of the main sources of productivity improvements. Specifically, he ascribes productivity gains to improvements in a worker’s ability to perform a task as it is

repeated more often, the time that is saved from avoiding having to switch from one task to another, and an improved ability of workers to identify labor saving innovations. However, there are also costs of specialization.

Specialization may, for example, result in bottlenecks where complexity and interdependent activities make it difficult to specify how best to sequence various activities, where the introduction of more specialized tools and equipment creates capacity utilization problems due to technical indivisibilities, or where agents' innovativeness result in an uneven development of tools, equipment and components. Basically these problems arise when those who deliver parts or carry out activities are not aware of the need for mutual adjustment.

From a property rights perspective, these problems can be ascribed to imperfectly specified rights over assets as production tasks are subdivided. This is because it is difficult to specify all valued dimensions of assets *prior to* specialization, since many of the valued dimensions of assets only become apparent from *experimenting* with the use of assets. Even if important dimensions can be specified, it may still be difficult to allocate these rights in ways which ensure the best use of assets. This may, for example, be the case with the time and place dimension of assets where non-optimal allocations result in excess stocks of intermediate products or in idle assets. In fact, with a great deal of interdependence in a complex system, the best time and place to use an asset depend on the specification of the uses of all other assets which are needed in the production.

Solving problems that arise from technological interdependencies is an important source of innovative improvements<sup>6</sup> (as pointed out by Rosenberg, 1976 and Sahal, 1981). However, such innovations do not emerge because of increased specialization, but because of learning in coordination. The question then arises: what institutional set-up best provides for experimentation and accumulation of experience in coordination? I argue that the Coasian firm provides a low cost way

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<sup>6</sup> Problems of bottlenecks and uneven development of components exist even with self-sufficiency, since individuals producing for their own needs may be unaware of how best to carry out an activity or to develop the technologies they use. Specialization in production, however, is likely to magnify the problems.

of discovering solutions to coordination problems of bottlenecks and uneven development of components relative to pure market transactions. The Coasian firm arises not only in response to problems of adapting to unforeseen outside contingencies but also as a response to technological uncertainty of the sort described here. In fact managed coordination is important even if there are no unforeseen contingencies which require adjustment in tasks.

For managed direction of resources to be efficient, it is required that managers are at least as qualified in discovering the relevant prices (that is, finding the highest valued uses of assets) as independent contractors would be.<sup>7</sup> Otherwise, costs of transacting may be saved at the expense of efficiency in the use of resources. If managers are better able to determine the valuable uses of resources compared to other agents, managers have a natural ownership advantage over resources. Such an advantage explains the single person firm, but not necessarily why managers hire employees who are prepared to take orders within certain limits in order to take advantage of this knowledge. “Managers” could as well rent the labor time of other agents in return for the exercise of a certain well specified task.

The argument here is that managers stand a good chance of acquiring superior information about the relevant prices of rights over assets which make up a complex technology. From the literature on incremental innovations, it is apparent that the solution to problems of bottlenecks and uneven development in components are based on learning by doing in production and development (Rosenberg, 1976; Sahal, 1981). This experience from learning by doing is probably *more easily* accumulated within the boundaries of firms.

One of the reasons one might expect this learning to be less costly within the

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<sup>7</sup> Coase (1937) mentions “... increasing opportunity costs due to the failure of entrepreneurs to make the best use of the factor of production” (p.23) as one of the factors which set a limit to the efficient size of a firm. He also assumes that “..the costs of losses through mistakes will increase with an increase in the spatial distribution of the transactions organized, in the dissimilarity of the transactions, and in the probability of changes in the relevant prices. As more transactions are organized by an entrepreneur, it would appear that the transactions would tend to be either different in kind or in different places” (p.25). Managers, in other words, have limited capacity to “discover the relevant prices” and this increases mistakes as more and more dissimilar transactions are organized in a firm.

boundaries of firms may be that managers who hold residual rights over assets, including rights to re-define and reallocate specific rights, are able to conduct experiments without continuously having to re-negotiate contracts which have more or less unforeseen outcomes. This saves time and ink-costs.<sup>8</sup> Managers are then able to create “controlled” experiments in which they only change some aspects of the tasks in order to trace the effects of some specific re-arrangements of rights. Setting up a controlled experiment may be more difficult across boundaries of firms and in particular if interdependencies exist between many different firms and if, due to high information costs, it is difficult to specify all the tasks which must not be changed. Coordinating interdependent tasks within the boundaries of a firm may provide managers with a more complete picture of the nature of interdependencies – information which is not only important in relation to eliminating bottlenecks, but also in relation to avoiding problems of uneven development of components by setting up interface standards and other more permanent solutions.

So far, I have argued that relative to markets, firms may economize on the transaction costs of learning the best way of coordinating technological interdependent systems. Now, once a firm has discovered how to coordinate some specialized tasks, there would be little advantage from managed direction relative to market transacting, and coordination by order contracts would substitute for coordination by management.<sup>9</sup> However, such specialization between firms would give way to economic gains from *further* specialization in tasks, and this in turn would create new uncertainty and new opportunities for reducing coordination costs by experimenting. In other words, there will be an ongoing process of specialization in tasks, learning in coordination and specialization between firms and new ways of coordination will continuously be imagined by managers/entrepreneurs.

In the introduction to this paper I indicated that the above re-interpretation of the Coasian firm could provide a bridge between the contractual theories of firms

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<sup>8</sup> In this connection wage contracts may be an efficient way of sharing risks from experimenting.

<sup>9</sup> Managed direction could still be advantageous in cases where adaption of interdependent production systems to unforeseen contingences were called for.

and the resource-based perspective. In the next section I discuss the nature of such a bridge.

#### **IV. The resource-based perspective: the nature of rent-earning resources**

The term “resource-based perspective” refers to a number of recent publications in strategic management, taking their lead from Wernerfelt (1984) and Rumelt (1984). The resource-based perspective is primarily a theory of firm-specific resources as sources of competitive advantage. Firms are perceived of as bundles of more or less unique resources, competencies and capabilities which taken together determine firm profitability and the direction of profitable growth. The important theoretical as well as normative questions in the resource-based perspective are: when do firms earn long-lived rents from their valuable resource? When are rent-earning resources likely to have productive value in excess of their hire price?, and, How may firms best capture the rent-earning potential of valuable resource?<sup>10</sup>

As argued by Foss (1996), the resource-based perspective encompass a more formal version, building (at least to some extent) on equilibrium analysis (e.g. Barney, 1986; Lippman and Rumelt, 1982; Peteraf, 1993; Dierickx and Cool, 1989) and a more appreciative and process-oriented version, as presented by, for example, Prahalad and Hamel (1990). In spite of its comparative static type of analysis, the more formal version of the resource-based perspective also features arguments related to causal ambiguity and history-specific learning processes as important explanatory factors of differences between firm with respect to the resources they control. One may say that the resource-based perspective, though firmly based in economic theory, tends to rely on real-time explanations of how differences emerge between firms with respect to the

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<sup>10</sup> The latter question may imply some overlap between the contractual and the resource-based perspective, since the economic organization of transactions in assets with rent-earning potential certainly may have implication for the realization of rents as well as who earns the rents. When access to rent earning resources is secured- for example, through acquisition- the rents they yield may in principle be captured in numerous ways, such as selling the resource on a market, renting it or using the resource in-house (Dierickx and Cool, 1989). In practice, it is the latter option that has primarily interested resource-based researchers.

resources they control.

One of the distinguishing features of resource-based theory is its emphasis on the specific characteristics of resources rather than on market conditions which are common to all firms in an industry. In fact, a central assumption in the resource-based perspective is that sustained above-normal profit is linked to resources through their rent-earning potential. Barney (1986, 1991) listed 5 necessary and sufficient conditions which will ensure the firm sustainable economic advantages from its resources. In order to yield sustainable rents, resources have to be:

1. *Valuable*, that is, they enable a firm to implement strategies that exploit opportunities or neutralize threats in the environment (Barney 1986, 1991).
2. *Rare*, and therefore in a position to generate Ricardian rents;
3. *Imperfectly imitable*, making them sources of long lasting rents;
4. *Not substitutable by other resources*, and
5. *Obtained at a price below their value*, so that firms can earn above normal return on their resources.

If there is a bridge between a contractual and a resource based theory of firms it must be because the economic organization of activities have implication for the creation of assets which fulfill the above characteristics. In section III, I explained how a Coasian firm may provide a benefit (i.e. improved efficiency) relative to pure market transacting by reducing costs of systematically experimenting with the coordination of production activities, and how such experimentation may lead to improved knowledge of how to coordinate specialized interdependent tasks (a production capability). Now, the accumulation of such an intangible resource as a production capability may also be a joint product of the activities taking place within the boundaries of firms. For example, the coordination capacity afforded by routines, norms, and codes of conduct is probably to a large extent a joint product of ongoing production activities. However, the coordination capacity afforded by such a stock of resources does not explain the emergence of firms. Therefore, in order to search for a bridge between resource-based and contractual theories, I focus attention only on the accumulation management knowledge of coordination. The

question to be discussed is: can management knowledge in coordination be a source of rent and long-lasting competitive advantage?

### ***The rent-earning capacity of management knowledge in coordination***

Knowledge of how to organize production is valuable to society if it reduces costs of producing valued goods. However, this does not explain why organizers of firms invest in productive assets in order to accumulate such knowledge. In other words, investments in the organization of firms must be motivated by a profit opportunity. According to Lippman and Rumelt (1982), resource heterogeneity creates "... incentives for investing in the risky exploration of new methods and the search for new value".

In section III, I argued that one of the reasons why firms emerge is to reduce cost of experimentation when faced with uncertainty as to how best to co-ordinate activities. Precisely because of the uncertainty, we expect organizers of firms to hold different expectations of the true opportunity costs of different uses of the same productive assets and thus conduct different experiments.

Now, resource heterogeneity is a necessary but not a sufficient condition for long-lasting competitive advantage. The resources also have to be inimitable and acquired at a price below their value. The first condition hinges on how easily the relevant resources can be replicated and here the concepts of "isolating mechanism" and "resource-position barrier" (Rumelt 1984, Wernerfelt 1984, respectively) are the essential theoretical concept for explaining the sustainable rents. An isolating mechanism/resource-position barrier may make the source of rent strictly inimitable or uncertainly imitable, depending on whether or not the resource is protected by enforceable rights to the exclusive use of the unique resource or by barriers consisting of:

1. cognitive constraints to imitation of success;
2. time disadvantages to imitators, or
3. economic disadvantages to imitators

Resources such as patents on inventions or ownership of a rich mineral deposit may be strictly inimitable while such resources as production or market experience, routines, culture may be inimitable due to the above mentioned imitation barriers. Below I discuss how these different imitation barriers may apply to assets stocks of management knowledge in coordinating productive activities.

### ***Cognitive constraints to imitation of success***

First, there is causal ambiguity acting as a cognitive constraint to blockage imitation. Causal ambiguity is “the basic ambiguity concerning the nature of the causal connections between actions and results” (Lippman and Rumelt 1982, p.420). The ambiguity disguises which factors are responsible for superior performance (Reed and DeFillippi 1990). This is an important simultaneous source of barriers to imitation and to above-normal profit on accumulated assets.

The latter is important, since even if valuable rent-earning resources can be protected from imitation, they may not necessarily be sources of absolute advantage in terms of high profits. According to Barney (1986), the unique and valuable resources also have to be under-evaluated (acquired at a price below their value). Barney argues that firms only possess under-evaluated resources because strategic factor markets<sup>11</sup> are imperfect. Resources obtained in a perfect strategic factor markets -that is to say, factor markets in which the price and discounted value of the resource coincide- will not earn above normal profit, even if the implemented strategies create imperfect product markets. Firms that are either lucky or have superior insight may gain a competitive advantage by obtaining valuable resources at a price below their value.<sup>12</sup>

This implies that if accumulation of management knowledge of coordination

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<sup>11</sup> A strategic factor market is defined as “a market where the resources necessary to implement a strategy are acquired”.

<sup>12</sup> Wernerfelt (1984) identifies imperfections with the different levels of bargaining power possessed by firms. Barney's line of arguments also shows that superior bargaining power only can be a source of above normal profit if the resources underlying the bargaining power were acquired at a price below their value.

requires a certain amount of investment in experimenting and building-up of skills, we may assume that in a perfect factor market the superior effectiveness in coordination is gained at an expense which coincide with the extra revenue from low production costs. However, Lippman and Rumelt (1982) argue that uncertainty (ambiguity) may account for under-valued resources. In a formal model, they show that an “irreducible uncertainty” which creates different expectations regarding the creation of a new product function may act as a barrier to the elimination of all profit opportunities in production activities. They further prove the existence of an equilibrium where no firms expects to gain from further investments in imitative activities and where not all rents are competed away.

In the reinterpretation of the Coasian firm, as I have developed it in section III, technological uncertainty or causal ambiguity is an important factor explaining the existence of firms. However, I argue that by experimenting in managed coordination firms reduces this uncertainty. Therefore, the above expectation equilibrium may only consist of very few firms with very complex and interdependent production systems. However, this result depends strongly on the assumption about the kind of uncertainty facing firms. The Lippman and Rumelt model is based on a model similar to the Austrian market model and for differences to be long lasting in such a setting, uncertainty has to be irreducible. However, irreducible uncertainty does not explain why firms emerge.

### ***Time disadvantage to imitators***

Dierickx and Cool (1989) have pointed out that many of the resources over which firms have control are not acquired on factor markets, but are “..the cumulative result of adhering to a set of consistent policies over a period of time” (ibid. p. 1506). This applies to, for example, investments in reputation for quality, toughness in retaliation, and R&D capabilities as well as to investments in management knowledge of coordination. Such resources are often unique and also inimitable because of time disadvantages to imitators. This can be caused either by history-specific path-dependent resource accumulation or by time barriers to resource

accumulation. Organizational culture, for example is intrinsically bound up with a firm's unique history and heritage (Barney 1986, 1991) which cannot be copied. Time barriers to accumulation may be caused by time compression diseconomies, asset mass efficiencies and interconnectedness of asset stocks (Dierickx and Cool 1989). These disadvantages to imitators arise because it takes time to accumulate knowledge and because efficiency in accumulation depends on prior accumulated resources or the stock of complementary resources.<sup>13</sup>

Accumulation of management knowledge in coordination may be characterized by both history specificity (as when firms start different kinds of experiments), time compression diseconomies, and asset mass efficiency (as when new knowledge is more easily accumulated when building on a stock of existing knowledge), and interconnectedness of asset stocks (as when there are complementarities between learning taking place in different areas).

In response to Dierickx and Cool, Barney (1989) have pointed out that the strategic factor market argument applies also to assets accumulated within in the boundaries of firms, since there is also costs of internal accumulation of assets. Therefore, only in the face of uncertainty may internally accumulated assets produce above normal returns.

As regards the accumulation of management knowledge of coordination firms may have different expectations of how much to invest in order to discover the best way of coordinating some specific tasks and they may start with different kinds of experiments and this explains differences in their stock of management knowledge. However, once “the solution” is found it may be very difficult for the successful firm to avoid diffusion of such knowledge. In fact, part of the success is being able to transmit this knowledge to suppliers. The long lasting benefits of being ahead in accumulating management knowledge has to be found in the successful firm's ability to move down the learning curve at a faster pace than competitors by gradually improving coordination and by continuously taking advantages of new

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<sup>13</sup> Dierickx and Cool (1989) argues that “..to the extent that new product and process developments find their origin in customer requests or suggestions (Von Hippel, 1978), it may be harder to develop technological know-how for firms who do not have an extensive service network” (p. 1508).

opportunities for specialization of tasks as they apply their accumulated stock of management knowledge on new problems. In other words sustained competitive advantage of economic organization of production activities within the boundaries of firms depends on the continuous introduction of new opportunities for taking advantage of accumulated management knowledge. As in a world resembling that of the radical subjectivists market model, these continuous opportunities are created endogenously to the production and learning process taking place in firms.

### ***Economic disadvantage to imitators***

As some firms move faster down the learning curve than their competitors they enjoy at least temporary profits as they are protected by the mechanism, I have called “economic disadvantages to imitators”. Wernerfelt (1984) focuses on resource-position barriers as isolation mechanisms. These barriers protect the kind of resources where firms-mover advantages translates into a barrier to entry.

## **V. Conclusion**

I have argued that the Coasian firm may be interpreted as a solution to contractual problems which arise with increased specialization. Specifically, the Coasian firm reduces the transaction costs involved in accumulating assets of knowledge of coordination. Now, once firms have learned how to coordinate interdependent activities management costs must be reduced and this gives way for more specialization and more learning. Whether or not some of the activities previously organized within the boundary of a firm are spun-off depend on the costs of transferring this knowledge<sup>14</sup>, as explained in dynamic transaction costs theory (Langlois and Robertson 1995), as well as on the benefits from releasing more managerial resources to take advantage of further specialization. It is the

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<sup>14</sup> Some of the coordination knowledge may be embodied in equipment and made more easily transferable. Firms may do this purposively to make their knowledge imitable or transferable in order to release management resources for purposes where they expect higher pay-off of that factor.

opportunities for economic gain from further specialization which continuously re-introduce technological uncertainty and the need for management. With continuous uncertainty, there is room for continuous differences between firms with respect to their accumulated management knowledge of coordination as well as possibilities for long lasting competitive advantages from such a stock of knowledge.

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