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Incomplete Contracts and Economic Organization: Brian Loasby and the Theory of the Firm

By
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Abstract

The paper begins by providing a brief overview and discussion of the modern economics of organization, concentrating in particular on the work of incomplete contract theorists. I then turn to a discussion of Loasby's view of the firm and incomplete contracts. The point here is that while Loasby begins from the same recognition as modern incomplete theorists, that contractual incompleteness is a necessary component of a theory of the firm, the causes and consequences of contractual incompleteness are widely different. Thus, Loasby sees incompleteness as a distinct virtue because it allows for organizational learning, whereas incompleteness in the modern economics of organization is seen as a distinct problem because it opens the door to incentive conflicts. I end by speculating on how Loasby's non-mainstream ideas on economic organization may be related to some relatively mainstream ideas about alternative gameforms and real options.

Keywords

Incompleteness, economic organisation incentives, Theory of the firm.

JEL-classification
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I. Introduction

The theory of the firm – or broader, of economic organization – is without much doubt one of the most important and rapidly growing subject areas in contemporary economics. It has attracted the foremost symbol manipulators of the mainstream and has also drawn considerable attention from economists of more heterodox stripes. Moreover, and appropriately in the present context, it has for a long time been one of Brian Loasby's favorite subjects.

The basic features of the emergence of the theory of the firm in its modern sense[1] are well-known: after a long neglect, Ronald Coase's (1937) seminal contribution was re-discovered and his analysis was given a new lease on life in the beginning of the 1970s by Oliver Williamson (1975) and Alchian and Demsetz (1972), two contributions that are often seen as founding different streams of Coasean thought on the firm (e.g., Alchian and Woodward 1988). To this standard view of the modern history of the theory of the firm should, however, be added important breakthroughs in formal mainstream economics, such as work on mechanism design and, almost simultaneously, the first spate of work on the principal-agent problem (Wilson, Spence, Zeckhauser, Groves), followed by various extensions of the principal-agent model by Mirrlees, Holmström, Grossman and Hart and others, and leading, somewhat indirectly, to what is sometimes called "the property rights" or "the incomplete contract framework" (Grossman and Hart 1986; Hart 1995).

Formal mainstream work on contracts and organization is seldom mentioned in accounts of the modern history of the theory of the firm (such as Alchian and Woodward 1988), which tend to be written by non-formal economists. However, at least in economics (management studies is another matter), it is the modern outgrowth of these earlier formal influences that are seen as constituting the theoretical *avantgarde* – not really the more verbal work associated with such writers as Williamson, Alchian and Demsetz and others.[2] This is not to claim that modern formal work has done significantly much more than to cast earlier

[1] Meaning a theory of the existence, boundaries and internal organization of the firm.

[2] Moreover, it tends to be this sort of work that goes into the textbooks; see, for example, Milgrom and Roberts (1992).

"intuition" in formal garb[3]; but to the mainstream economist, this sort of heuristic progress is virtually identical to scientific progress. If one wants to reach mainstream economists, it is often necessary to relate to the latest instances of heuristic progress within the mainstream.

I shall be concerned in this paper with a subject area that has been among the hotter ones recently – for example, it has been the subject of recent Clarendon Lectures (Hart 1995) and Walras-Bowley Lectures (Tirole 1994) –, namely incomplete contracts. Incomplete contracts are *ex ante* contracts that do not embody contingencies that fully informed agents with perfect foresight who did not face contracting costs would have included in the contracts. How and why incomplete contracts matter to economic organization is a theme that has been increasingly refined in a relatively recent and highly formal literature that perhaps in many ways owes more to the early formal influences mentioned above than to the work of less formal theorists such as Williamson or Alchian and Demsetz.

I do not mean to imply here that the theme of incomplete contracts is a completely recent one. On the contrary, Brian Loasby has for more than two decades emphasized the importance of incomplete contracts and deserves credit as being one of the first economists to consistently do so. For example, in *Choice, Complexity, and Ignorance* (1976) (henceforth, *CCI*), the discussion again and again centers on "[t]he imperfectly-specified contract which characterizes the firm" (p.135), and contractual incompleteness is imaginatively tied to questions relating to bounded rationality, genuine uncertainty, flexibility, etc. As Loasby makes clear, such questions

> "... cannot even be posed in the language of general equilibrium theory; for such theory not only requires all problems to be properly defined, but requires them all to be specified at the outset. There is no place for the unexpected. But these are precisely the questions which arise naturally from the analysis of the firm ... The firm exists because it is impossible to specify all actions, even contingent actions in advance; it embodies a very different policy to emergent events. Incomplete specification is its essential basis: for complete specification can be handled by the market" (1976, p.134).

[3] In fact, it may not even have done this, as David Kreps (1996, p.562) indicates, referring to Williamson (1975): "If *Markets and Hierarchies* has been translated into game theory using notions from information economics, it is a very poor translation".

These and other similar observations place Loasby among Coase, Simon and Williamson, that is, the first economists to emphasize the connections between bounded rationality/limited foresight, contractual incompleteness, and the rationale of the firm.

However, while Coase, Simon and Williamson are acknowledged to have laid the groundwork for modern work on incomplete contracts, Loasby is not, and for a very good reason: he has entertained a distinctly non-orthodox perspective on contractual incompleteness. I plan in this paper to discuss Loasby's view and to contrast it with other views, specifically modern formal work on contracts, particularly that represented by "the property rights" or "the incomplete contracting framework" (Grossman and Hart 1986; Hart and Moore 1990; Hart 1995).[4] Loasby is in overall agreement with this literature on the importance of incomplete contracts to the understanding of conomic organization, but on closer inspection the differences are rather fundamental. To put it briefly (and somewhat simplistically), whereas Loasby is concerned with the organization of knowledge, the modern economics of organization (including the incomplete contracts literature) is concerned with the organization of incentives and property rights.

In the incomplete contracts view, the importance of incompleteness for economic organization derives from the circumstance that it allows for the possibility of hold-ups that may cause inefficient levels of investment in relation-specific assets. This has resulted in a clear and formal (if somewhat ad hoc) theory of, among other things, the boundaries of firms, these being defined in terms of ownership rights to physical assets. Loasby's view does not utilize the analytical machinery employed by formal economists, and transmits a rather different message: In his view the importance of incompleteness is related, not to incentive conflicts, but to the building of capabilities through organizational learning. Because of its inherent flexibility, a structure of incomplete contracts allows for this to take place which more complete contract would not. Thus, we can imagine rational, forward-looking agents choosing governance structures of various sorts, not necessarily because these are the ones that best protect knowledge-based rents against opportunistic proclivities, that is, reduce

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[4] A literature upon which Loasby himself has commented, namely in his 1995 review of Milgrom and Roberts (1992). Of course, there are also many discussions in Loasby's work of Williamson whose work in some respects is closely related to, and in fact has partly inspired, the work of the incomplete contract theorists.

transaction *costs*, but because they are expected to generate higher knowledge-based *benefits* than other governance structures.

The design of the paper is the following. I begin by providing a brief overview and discussion of the modern economics of organization, concentrating in particular on the work of incomplete contract theorists. I then turn to a discussion of Loasby's view of the firm and incomplete contracts. The point here is that while Loasby begins from the same recognition as modern incomplete theorists, that contractual incompleteness is a necessary component of a theory of the firm, the causes and consequences of contractual incompleteness are widely different. I end by speculating on how Loasby's non-mainstream ideas on economic organization may be related to some relatively mainstream ideas about alternative gameforms and real options.

II. Organizing Incentives and Property Rights: The Modern Economics of Organization

A. From Agency Theory to Incomplete Contracts Theory

Although modern formal theories of organization are partial equilibrium theories, and although they emphasize bilateral aspects of transactions, they have a foundation in general equilibrium theory, both historically and conceptually (Hart and Holmström 1987; Milgrom and Roberts 1992; Guesnerie 1994). In a sense, the Arrow-Debreu model is a contractual model with the specific property that it demonstrates the conditions that must obtain for all problems of organization to be trivial (in the sense that ownership is of no consequence). The recognition in the 1960s that all Arrow-Debreu states of nature may not be observable (rather, verifiable) formed the basis for work on moral hazard, and the situation in which states of nature are known to agents, but not to the auctioneer, formed the basis for work on adverse selection. Much formal work in the last two decades has consisted of incorporating these ideas in general equilibrium models in a consistent way, and of examining their welfare and policy implications (see the overview in Guesnerie 1994).

In the same period of time, ideas built on this work, and normally marketed as "the principal/agent paradigm", has increasingly gained momentum as a strong economic

approach to organization (see the non-technical accounts in Miller 1992 and Milgrom and Roberts 1992. Although the principal/agent literature has provided many valuable insights into, for example, internal organization and the rationales of specific contract provisions, it fails, however, as an explanation of the existence and boundaries of the firm.

First, many relationships within the firm (or even between firms and owners) are not directly determined by formal contracts but by the parties' expectations of each others roles and behavior. This leads to the idea of implicit contracts, and in turn to the idea of incomplete contracts, in which many contingencies are not explicitly covered by the contract. Second, the principal-agent paradigm fails to discriminate between alternative types of economic organization: from a principal-agent perspective, a contract between an employer and an employee may be completely the same as a contract between a firm and a supplier, although legal matters differ and although different ownership arrangements are evidently involved. In other words, the principal-agent analysis carries no implications for ownership.[5] Fundamentally, the inability of the principal/agent literature to really come to grips with ownership, and, therefore (according to incomplete contract theorists), with the issue of the boundaries of the firm, must be ascribed to the assumption that contracts are comprehensive in the sense that contracts specify all parties' obligations in all future states of the world. Ownership only has a role when contracts can be incomplete in the sense that there are contingencies on which *ex ante* efficient contracting would turn that do not turn up in the *ex ante* contract.

As recent research has clarified, of the early research on the economics of the firm, it was the stream associated with Williamson (1975) and with Klein, Crawford and Alchian (1978), with its emphasis on specific assets and incomplete contracts, that held the key to explaining the existence and, particularly, the boundaries of the firm.[6] In a historical, this recent research – here generically called "the incomplete contracts literature" – may be seen as an outgrowth of principal-agent theory and related formal work on contracts, *applied to* the insights of Williamson and Klein, Crawford and Alchian. Their basic ideas, particularly the

[5] The same goes for the (largely non-formal) research tradition, often called "the nexus of contracts" theory, founded by Alchian and Demsetz (1972), and close in spirit to the principal/agent literature.

[6] Rather than the informal nexus of contracts view started by Alchian and Demsetz (1972) or formal work on the principal-agent problem.

paradigmatic "hold-up situation", are now understood in the following way. One begins with the idea that many contracts are incomplete. In the literature, it is recognized that contracts may be incomplete for the following reasons: 1) the limitations of natural language; 2) the parties inadvertently failed to contract about an issue; 3) information processing costs/bounded rationality, which may make it rational to leave out certain issues/contingencies; and 4) asymmetric information, which may make some issues non-verifiable (rather, very costly to verify to a jury/court) or cause problems when the information remains private ex post.

Since complete contingent contracts cannot be written, parties to a contract may find it necessary to renegotiate their contracts after the contract has been signed, either because they encounter states of nature about which the contract is silent or where the contract specifies inefficient terms. It is assumed, however, that the outcome of the renegotiation process can be foreseen at the time of drafting contracts and that the process does not involve costly bargaining (hence, is efficient). Nevertheless, the very fact of the possibility of renegotiation may be sufficient to cause inefficient levels of investment in relation-specific assets.

Consider a bare bones version of the Grossman-Hart-Moore model (Grossman and Hart 1986; Hart and Moore 1990; Hart 1995). Here a buyer and a seller find it impossible to provide, in advance, an exact description of the goods they wish to trade (one may perhaps think of an innovation project), and because of this, it is claimed, there is no point in writing a contract. The terms of trade will therefore have to be determined when the nature of the exchanged goods can be ascertained. Call the gains from trade ("the surplus") $v(X)$, where X is a non-contractible[7] and specific investment that the seller has to undertake at a private cost of $c(X)$ in order to be able to sell to the buyer and which must therefore be undertaken before trade. v will be split 50 : 50. v as well as the splitting rule can be perfectly foreseen.

In choosing his level of investment, the seller will equate his marginal cost, $c'(X)$, to his marginal benefit, $\frac{1}{2} v'(X)$. Thus, for every extra unit of increase in social benefit, only 50 percent of this goes to the seller. This is seen in the literature as a sort of representation of

[7] Because the investment is unverifiable. In the literature, "effort" and "investment" are conflated, because both are taken to be unverifiable.

the basic hold-up problem[8]: the buyer may be argued to hold up the seller ex post by appropriating half of the (marginal) surplus. Of course, if a complete long-term contract had been written, there would no hold-up problem, since then the seller could have reaped not ½ v' (X), but v' (X), and his incentives would be consistent with the maximization of the social surplus. But since this is impossible, something else must substitute. This "something" are ownership rights, or more precisely residual control rights, that is, the rights to control (make "implementation decisions") the use of assets in states of nature that are not described in the contract. The interest then centers on which pattern of ownership rights lead to the most efficient outcome.

In the Grossman and Hart (1986) analysis, parties to a contract can each make two decisions, first, a decision on investment levels, and, second, an "implementation" decision, which is taken after the investment decision and which can be transferred to the other party. To repeat, the latter type of decision concerns the right to determine the use of physical assets in states of nature that are not covered by the contract (residual decision rights). These rights matter because they are sources of power in situations where contracts are incomplete. For example, in a situation where a firm confronts an unexpected rise in the demand for its product, it may want its supplier to undertake an increase in supply, which, in turn, is unexpected to the supplier and not covered by the contract between the two firms. If the firms are separately owned, the owners/management of the supplier firm may threaten to make both the firms assets and their own labor unavailable for the uncontracted-for supply increase, whereas if the supplier is a division in the buying firm, it cannot threaten to make the assets unavailable. Because of these differences in ownership-induced bargaining power, the division of the surplus may be quite different in the two cases, which, in turn, feeds back into investment. Which ownership arrangements (should the supplier own the buying firm or *vice versa* or should they be independent?) will be efficient depends, for example, on the degree of complementarity between assets, so that "strictly complementary" assets should lead to integration.[9] It may also depend on whose assets are most important to the joint

[8] Although surely not one that captures the many subleties of the analysis of Klein, Crawford and Alchian (1978) or Williamson (1985).

[9] "Strictly complementary" is defined as the situation in which asset A yields no return in the absence of asset B and *vice versa*. In the literature, complementary assets are always tacitly seen as being specific too, although this clearly need not be the case. As Loasby (1995a) points out, there is also no recognition

surplus, and on who is most responsive to incentives, since ownership by one of the parties will attenuate the incentives of the other party. The bottomline is that the efficient ownership arrangements primarily turns on the trade-off between incentives for the buyer and the seller.

In sum, the incomplete contract literature tells a precise (if static and rather ad hoc) story about the boundaries of the firm, something no previous theorizing of the firm arguably has been capable of doing in a convincing way (Langlois and Foss 1997). It does so by equating ownership of assets with the boundaries of the firm. The theory is more than just a story of asset ownership, however, for the employment relationship, and the distribution of bargaining power associated with this relation, becomes a matter of who owns assets (the boss) and who does not (the employee). This reasoning is now rather widely regarded as *the* best mainstream bid for a theory of the firm, and may perhaps win Professor Hart a Nobel Prize.[10] However, as is also partly recognized within the mainstream, the theory is certainly not completely unproblematic (Tirole 1994; Kreps 1996; Tirole and Maskin 1996). I briefly consider some of these problems in the following section.

B. Problems in Incomplete Contracts Theory: Preserving Closure

The incomplete contracts theory has given rise to some debate within the mainstream. For example, it has been argued that property rights are not always necessary for reaching efficient outcomes, but that various cleverly designed rules for sharing the joint surplus can under certain conditions substitute for property rights, so that we come back to the principal-agent tradition (see the discussions in Tirole 1994; Maskin and Tirole 1996) (I return to this). Relatedly, there has been some uneasiness about the supposedly less rigorous and more ad hoc type of modeling that characterizes the incomplete contracts literature relative to the principal-agent literature.

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in the literature that strongly complementary assets may be dis-similar, and that their management may therefore best be undertaken by separate firms.

[10] Indeed, among high-brow mainstream economists, Williamson's work is now regarded as little more than precursor of the Hart-Grossman-Moore analysis, handicapped by its neologisms and verbal style of discource, rather than the basic work upon which much of the modern, formal analysis really rests. See Kreps (1996) for an attempt to show how relatively little of Williamson's rich analysis has been captured by the incomplete contracts literature.

Indeed, it certainly is easy to make sport of much of the incomplete contracts literature in this regard. If the evolution of mainstream economics really is a story of the gradual and successful banishment of "free parameters" and all sorts of ad hoc assumptions, as we are sometimes told, then to what stage of evolution does the incomplete contract literature belong? The motivation of such questions is that the literature would seem to be rich in rather specific and not completely warranted assumptions on which the conclusions are completely dependent, such as the prohibition of *ex ante* contracting over investment levels.

Most importantly, in the context of a paper written in honor of Brian Loasby, the treatment in the literature of incompleteness and bounded rationality strikes one as odd but perhaps not surprising (see also Radner 1996). As has been noted by a contributor to the literature, existing models "... have introduced incompleteness rather through the backdoor, by assuming that certain things are not observable or verifiable or both" (Moore 1992, p.180). Now, this has certain advantages from a modeling point of view, but may not capture the essence of the matter, because the fundamental reason for contractual incompleteness may indeed be bounded rationality in the sense of being unable to foresee future events. However, if this is really the case, "... then our standard notions of hold-up may be suspect. If parties cannot foresee certain events, let alone anticipate how surplus would be divided in the event of renegotiation, then how is this likely to affect the size and nature of their specific investments?" (ibid). Of course, there is the possibility of relying more explicitly on reputation mechanisms in order to reduce the foreseeability-problem, but this is not a route that the literature seems intent on taking (but see Kreps 1996).

In a related context Loasby (1995a) points out that including bounded rationality, and perhaps genuine uncertainty, clearly also complicates efficiency analysis of alternative governance structures.[11] Thus, "... the recognition of ignorance changes the logic of choice" (Loasby 1976, p.74). It may bring us into evolutionary modes of thinking (Dow 1987; Kreps 1996) and a completely different view of agency and of modeling.

It may install a proper place for bounded rationality, for true ignorance, for Shacklean surprises (Earl 1996), and it may, notably, give more room for transaction costs (which only enter in the guise of the inability to write complete contracts).

[11] For a related discussion in the context of Williamson's transaction cost economics, see Dow (1987).

Needless to say, there have been different ways to try to eliminate the problem that Moore identifies in the quotations above, and so avoid being drawn into (what mainstream theorists see as) a quagmire of indeterminacy (Radner 1996). For example, Hart (1990, p.699) argues that a solution to the problem is when "... the parties can *conceive* of the various contingencies and dimensions of an action, but cannot write them down in a clear enough way that an outside arbiter, such as a court can *verify* them". This really amounts to reducing bounded rationality to a private information issue.[12] That such a solution must be preferred stems from the fact that for the reasoning of the incomplete contract literature, "... it is actually very important that agents have a high degree of *computational* ability" (ibid.), quite in contrast to the basic message of Herbert Simon's writings. Thus, even though parties to a contract cannot write a contract that avoids hold-up problems, that is, cannot write down date 0 contingent statements, they have perfect foresight about the consequences of their inability to do this (on this, see also Dow 1987 and Kreps 1992). Indeed, Maskin and Tirole (1996) argue that the transaction costs of describing or foreseeing in advance possible states of nature does not necessarily compromise optimal contracting, *provided* agents can probabilistically forecast their possible future pay-offs (even if other aspects cannot be foreseen), that is, agents can perform dynamic programming. They provocatively call this "the irrelevance theorem", and what is irrelevant, of course, are transaction costs.

Whether it makes any sense at all sense to assume that parties to a contract can correctly anticipate the distribution of utility, but cannot describe the sources of that utility is an interesting question, but not one that will occupy me further. I shall end this section by noting that having tried to find theoretical room for the firm, mainstream theorists have to their horror discovered that this seem to bring them directly into the realms of ignorance, surprise, and genuine uncertainty. At least two strategies are possible in this situation: to suppress these disturbing factors, and thus preserve neoclassical closure, or to try tackle them head on and make them an integral part of the theory of the firm (see Earl 1996). So far, mainstream economists have preferred the first option. In the next section, I consider the work of an economist, whose work on the firm has from the beginning placed ignorance, surprise, and genuine uncertainty centrally in the analysis of economic organization.

[12] And as Hart notes: "The conclusion I draw from this discussion is that bounded rationality in the classic Simon (1957) sense is not essential for a theory of organizations" (1990, p.699).

III. Organizing Knowledge: Brian Loasby on Firms and Incomplete Contracts

A. Overall

At the face of it, Loasby's work on the firm would seem to begin from a recognition that is very similar to that of incomplete contract theorists:

> "The firm exists because it is impossible to specify all actions, even contingent actions in advance; it embodies a very different policy to emergent events. Incomplete specification is its essential basis: for complete specification can be handled by the market" (Loasby 1976, p.134).

It is not difficult to understand why contractual incompleteness should be an often recurring theme in Loasby's work: combine his early interest in organizations and organization theory with the basic ideas of three of his patron saints, namely Ronald Coase, George Shackle and Friedrich Hayek, and an interest in contractual incompleteness would seem to follow almost naturally. Let me explain.

Coase, of course, is the first economist at all to make a point out of contractual incompleteness (not even Knight had done this); Shackle was the prophet of the unexpected, and the unexpected and contractual incompleteness are closely related phenomena; and, at least as Loasby interprets Hayek's work, the latter's main interest was in understanding how a market system adapts to unexpected change. Following Hayek and other Austro-evolutionary writers, Loasby has consistently maintained that the economic problem is essentially one of how to best adapt to Shacklean surprises, which, to a large extent, is a matter of institutions, including contracts. This theme has recently become prominent in Oliver Williamson's thinking (Williamson 1996), but only in the context of the focus on incentive conflicts characteristic of most of the post-Coase literature on economic organization.

In contrast, Loasby has entertained a distinctly non-orthodox perspective on contractual incompleteness, which is seen as important, not because it provides leeway for opportunism, but because it is a part of the enabling structures of firms that permit the building-up of new capabilities. Indeed, one may here say that Loasby has done much more than merely

emphasizing the importance of contractual incompleteness. He has combined the insights of the above three economists with the ideas and insights of four of his other patron saints, namely Marshall (economic evolution as a process of increasing differentiation and organization of this), Menger (unintended consequences, reserves), Penrose (learning processes, capabilities) and Richardson (the organization of capabilities), to arrive at a rich theory of economic organization that begins "... not with the Walrasian problem of efficient allocation among people ... but with the problem of knowledge" (Loasby 1995a, p.482). I present and discuss the overall aspects of this view in the rest of this section.

B. "Choice, Complexity and Ignorance": Incomplete Contracts and Organizational Structure and Learning

The first full statements in Loasby's work of the issues under consideration here can be found in *CCI*. That book roams very wide indeed, but there are certainly connecting principles in it. Most fundamentally, it is a book about organizing knowledge; about how economic agents organize their knowledge, and about how economists organize their knowledge about the knowledge-organizing activities of economic agents. Its fundamental premise, I would argue, is that "... the recognition of ignorance changes the logic of choice" (p.74). This premise would seem to be founded on the basic Popperianism that is present in *CCI*, and which Loasby has never left. Fundamentally, if all knowledge is conjectural and all data are theory-laden, including the knowledge and data of economic agents, surprises may take place, learning will be of the trial-and-error variety (rather than Bayesian updating of priors), interpretive frameworks will matter, reserves will have a function, etc. Thus, the recognition of ignorance opens the door to alternative conceptualizations of behavior on the individual level. Moreover, it provides a room for institutions and phenomena that have traditionally been hard to press into a general equilibrium mold, notably money, learning – and the firm.

As argued in the previous section, although modern formal organizational economics theories are partial equilibrium theories, they have a foundation in general equilibrium theory, both historically and conceptually (Hart and Holmström 1987; Guesnerie 1994). There are at least three different ways of modifying the basic competitive model, so that we can explain aspects of economic organization. These are increasingly radical, brings the model increasingly close to reality, and increasingly sacrifices formal rigor.

The *first* is to introduce asymmetric information, and focus, for example, on the costs of aligning objectives among a principal and an agent. The relevant costs here are merely costs of observing post-contractual performance. As we saw in the previous section, the highly formal literature that has been constructed around this basic idea is somewhat limited; for one thing, it cannot explain the existence of the firm, since it fails to discriminate among alternative ownership forms.

The *second* procedure is to introduce bounded rationality; people simply do not have the wits to imagine and make provisions for all relevant future contingencies. In terms of costs, bounded rationality considerations point to the costs of drafting contracts: because the costs of imagining all possible relevant contingencies, making provisions for these, putting them down on paper in a clear language, etc. are prohibitive, many contracts are necessarily left incomplete. As we saw in the preceding section, the implications of this are quite far-reaching; among other things, we become able to tell a convincing story – *via* the concepts of residual rights and ownership – of the boundaries of the firm. We also saw, however, that this more realistic route to a theory of economic organization sacrifices some formal rigor.

The *third* possibility, which may seem quite related in its implications to the second, is to "... recognize the pervasiveness of uncertainty, not just in the form of unknown probability distributions, but in the sense of Frank Knight (1921) and George Shackle (1972), of uncompleteable lists of contingencies, and indeed of doubts about the structure of many decision-situations" (Loasby 1994, p.6). Although the recognition of "the pervasiveness of uncertainty" may seem to have the same implications for contracts as the recognition of bounded rationality, namely that many contracts are left incomplete, there is a difference. For to Loasby, "the recognition of ignorance changes the logic of choice" in a way more profound than does the recognition of bounded rationality.

In most versions of the idea of bounded rationality problem situations are given, and the only way in which the standard decision theoretic set-up has been changed is through the recognition of limited computational power on the part of decision makers (Radner 1996). To Loasby, recognizing the existence of ignorance means that problems are not pre-defined, that means-ends structures have to be set up by decision makers; indeed, that the essence of decision-making lies in making sense of the environment, defining which problems should be

solved, how and when, etc. (Dosi and Marengo 1994). It is this radical possibility that Loasby uses. As he explains

> "Starting from a basis of general equilibrium theory, we have argued that the firm offers a possible substitute for the market system when the information required for the working of that system is costly to acquire and use. The argument becomes even stronger when we recognize that some of the information *cannot exist*. Whether it is a viable substitute depends upon the costs and quality of decision-making within the firm, including its ability to select the more important interdependencies. *Its basic methods of operation must be different from those of the market. It must recognize and define those problems with which it proposes to deal, and it must attempt to learn as it goes along, not only what are the relevant data, but what are the rules of the game*" (p.78; my emphasis).[13]

As Loasby clarifies in later work (although the embryo of the idea is certainly present in the 1976 book), the problems that firms "define" may be seen as being framed by the *paradigm* of the firm (Loasby 1983, 1986). Here Loasby draws on the work of Thomas Kuhn for constructing a sophisticated constructivist perspective on the firm that is more related to work of, say, organization theorist Karl Weick (1995) than to what almost any other economist has written on the subject of the firm.[14] Indeed, one of the fascinating aspects of *CCI* lies in its attempt to combine key idea from organization theory with key ideas in the theory of the firm. Here, too, Loasby has been a pioneer, for (excepting Williamson's work) it is only very recently that economists have seen a need to relate to the work that organization theorists have been doing for many years. The organization theory theme is directly related to the incomplete contracts theme:

> "The imperfectly-specified contract which characterizes the firm implies an imperfectly-specified structure, the central concern and dilemma of organisation theory" (p.135),

[13] That the firm is, among other things, a cognitive entity, has become an important theme in contemporary evolutionary economics (e.g., Dosi and Marengo 1994) and organizational learning theory (Cohen and Sproull 1996). Here, too, "... the question of how problems are defined becomes a key question in the analysis of firms" (Loasby 1976, p.88).

and we are told that Cyert and March (1963) "... extend Coase's notion of the firm as a set of imperfectly specified contracts by viewing it as a coalition on imperfectly-specified terms" (p.140). Unfortunately, Loasby's interest in organization theory seems to have diminished somewhat, and his works are no longer littered with references to Simon and March, Cyert and March, etc. Instead, he has increasingly turned his interest to an area that arguably lies closer to the interests of the modern strategy scholar than to that of the organization scholar, namely *capabilities*.

C. Later Developments: Capabilities, Learning, and Reserves

When writing *CCI*, Loasby did not make much use of the concept of capabilities although it had been applied in the context of the theory of economic organization by G.B. Richardson (1972) a few years earlier in a paper that is cited in the book. Relatedly, Penrose's work – surely the single most important precursor of the capabilities perspective – is not centrally placed at all in *CCI*. However, Loasby has made good use of the concept later on, not to speak of Penrose's work, and is indeed today one of the key contributors to the emerging capabilities perspective.

Like Loasby did in *CCI*, contributors to the capabilities perspective emphasize that firms are cognitive entities, but they develop this conceptualization in rather different ways. Thus, some begin from bounded rationality and other aspects of cognition and build up a theory of firm-specific knowledge – that is, capabilities (e.g., Kogut and Zander 1992; Dosi and Marengo 1994). Other contributions simply begin from the empirical generalization that in general productive knowledge is neither explicit nor freely transferable (e.g., Langlois, 1992; Foss, 1993; Langlois and Foss, 1996), without going into the reasons for this in detail.

In what is arguably still a key contribution to the capabilities perspective, and one that has very often been cited by Loasby, Nelson and Winter (1982: chapter 4 & 5) choose the former strategy: they explicitly begin with an analysis of individual skills and builds up from this analysis to an analysis of firm-specific intangible assets what they call "routines". The acquisition of skills is a matter of learning by doing and the accumulation of tacit knowledge through the experience

[14] Penrose's use of Boulding's concept of "the image", and her concept of the firm's "productive opportunity set", which comprises all of the productive opportunities that the firm's entrepreneurial team can see and believe they can take advantage of, are, however, rather closely related concepts.

of particulars. It therefore opens the door for specialization, routinization, and predictability; however, the other side of the coin is increased inflexibility. This analysis – drawn from the behavioralist theory of the firm (Cyert and March, 1963) and the work of Michael Polanyi (1958) – is then used as both as a convenient analogy and a micro-foundation for elaborating the idea of organizational knowledge. As Nelson and Winter say, "Routines are the skills of an organization". More precisely, routines are shared rules of conduct that produce sequences of collective actions over time. Such routines codify organizational and productive knowledge, and are maintained and augmented through application in productive tasks. Like skills, they are partly tacit and imply a certain measure of inflexibility. Thus, firms are repositories of partly tacit and socially produced and reproduced organisation and production knowledge, a basic conceptualization of the firm that is also the one adopted in Loasby's recent work, although with some interesting twists.

Because of the role of chance, history and lock-in to specific learning domains in the process of knowledge-building, firms' knowledge-bases are strongly path-dependent and different across the population of firms. Different knowledge-bases are associated with different efficiencies, and therefore yield differential rents when deployed to product markets. Thus, the capabilities perspective forms the basis of theory of firm strategy.[15] However, although the perspective certainly helps us understanding the sources of competitive advantage and persistent heterogeneity, it may be criticized for saying relatively little about the process of building new capabilities. Similarly, it is somewhat unclear how this emerging literature relates to the modern economics of organization (including the incomplete contracts view) (see the discussion in Langlois and Foss 1997 and Foss 1997c).

Much of Loasby's recent work may in fact be seen as addressing both of these two weaknesses in the capabilities perspective, and addressing them, in fact, in a unified way. Following his basic Popperian approach to knowledge and learning, capabilities are seen as what we may call "collective (but firm-specific) conjectures", and as developing and changing in a Popperian way through tests in the market place (although this is of course is subject to the usual Duhem-Quine problem) (Loasby 1995b). Now, capabilities also have the characteristic that they give the firm

[15] See the contributions reprinted in Foss (1997).

the power to act effectively in a *range* of possible futures[16]; they embody some measure of flexibility, because they are what Loasby (1991), with a bow to Carl Menger's analysis of liquidity, calls "reserves".

Thus, while Loasby has not changed his fundamental view of incomplete contracts as institutions that support flexibility – a view first set out in *CCI* – he has now more explicitly tied this view to considerations of organizational flexibility and learning. A paraphrase of his view may be the following: Because firms are actors in a kaleidic world (Earl 1996), they often need to reshuffle existing capabilities (use their capabilities-as-reserves) and grow new ones. Incomplete contracts, in this view, is part of the organizational structure that allows the flexible carrying out of these processes.[17] Markets lack the directedness/intentionality that characterize firms, so firms have an advantage in many instances of qualitative coordination (coordination that goes beyond price), particularly when the activities to be coordinated are closely complementary (Richardson 1972). Moreover, firms can combine directedness with the flexibility afforded by incomplete contracts.

There are difficulties with this view which are not completely resolved in Loasby's writings; for example, markets can often grow and structure capabilities as well as firms can – so when will markets carry out this task and when will firms? This, however, has been addressed by, for example, the Loasby-inspired work of Richard Langlois (e.g., 1998) and Langlois and Paul Robertson (1995), where a main point is that vertically integrated, entrepreneurial firms will tend to organize the process of structuring of capabilities when economic change is "radical" and in a sense unfamiliar to the economic system. As this suggests, it is possible and fruitful to build on Loasby's overall vision of the firm in a market economy. In the next section, I suggest a few other ways in which this vision may be furthered.

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[16] At least this goes for what is often called "dynamic capabilities", which are the capabilities to introduce innovations and to effectively adapt to changed circumstances in the market. See Teece, Pisano and Shuen (1997).

[17] For elaboration on this, see Foss (1997b).

IV. Discussion: Toward a Loasbian Theory of the Firm

A. Loasby' View vs The Modern View on Incomplete Contracts

In spite of huge differences, incomplete contract theorists and Brian Loasby begin from the same starting point: The recognition that contractual incompleteness is a necessary condition for explaining the existence and boundaries of the firm. But they treat both the causes and the consequences of contractual incompleteness differently: while to incomplete contract theorists, incompleteness is tied to incentive conflicts, to Loasby it provides room for organizational learning; to the former, the firm is an efficient allocation of property rights to capital assets, to Loasby the firm is first and foremost a cognitive, learning entity. Indeed, he tends to oppose the two views; "a firm", he says, "... is a social institution for enhancing capabilities rather than reducing transaction costs" (1995b, p.20).

While I personally have doubts about the meaningfulness of opposing the two views of the firm, it may pay off as a research strategy to suppress all incentive conflicts and focus only on pure coordination issues (cf. also Bolton and Dewatripont 1994; Radner 1996). I take this to be the research strategy favored by Loasby (for further evidence, see Loasby 1995a). Accordingly, in the following pages such conflicts are suppressed, for example, by appeal to reputation or supergame arguments (Kreps 1996). Given this, we may produce a short-list of points that a Loasbian approach to the firm should incorporate. Thus, the theory should

- be dynamic in the sense that flexibility and learning are treated (whereas both are neglected in the mainstream theory of the firm);
- make contact to the literature on firm capabilities (which is not done in the mainstream literature);
- put emphasis on flexibility and knowledge-accumulation as parts of the *rationales* of firms (*contra* the mainstream literature); and
- not make use of concepts such as "opportunism", "moral hazard" and the like (again *contra* the mainstream literature).

In the following, I shall briefly and tentatively suggest that we do have some basic tools and insights that may help us build a theory of the firm that meets these desiderata; tools and

insights that do not turn on incentive conflicts, opportunism, and which may be used to develop a perspective on economic organization that is more true to Loasby's emphasis on flexibility and learning in an uncertain world than the incentive-conflict perspective is. Nevertheless, these are relatively mainstream tools and ideas, centering on game-theory and real options. While the following is low-brow theory (rather, loose suggestions), it may be read as a call for high- (or middle-) brow theorists to turn their symbol-manipulating skills to Loasbian ideas.

B. Loasby's View on Economic Organization I:

Adaptation and Communication in Alternative Game-Forms

While Loasby's view of incomplete contracts and the firm is far away from the contemporary, dominant view, it does link up with an older tradition, begun by Ronald Coase (1937) and represented in the work of, for example, Simon (1951) and Malmgren (1961) (Foss 1996b; Langlois 1998). Here the firm is defined by the employment relationship and firms' primary *raison d'etre* lies in their superior adaptability and coordinative ability (for some productive tasks), where this is rationalized by pointing to the presence of hierarchical direction in the context of open-ended employment contracts. In this tradition it is the more basic coordination problem of making activities, individual efforts, learning processes, strategies, etc. mesh (particularly under the impact of various disturbances) that is highlighted, *rather than* the logically secondary problem of, for example, controlling and influencing the level of efforts (as in principal-agent theory) once everything is in place, as it were. It is, in short, a *coordination view* of the firm rather than an incentive-conflict view.[18] And the underlying idea seems to be that within the firm it is possible to generate more and, in some sense, richer coordinative activity than can be obtained in markets, and that firms may indeed exist because of this coordination gain (Malmgren 1961). This view has not been extensively developed, particularly not by formal theorists, perhaps because it does not appear to them to convincingly explain 1) why authority in firms should be different from authority in markets (cf. Alchian and Demsetz

[18] For recent pertinent work from different perspectives, see Demsetz (1988), Langlois and Robertson (1995), Radner (1996), Segal (1996), Casson (1997) and Wernerfelt (1997).

1972), and 2) why firms should be able to obtain richer coordinative activity than can be obtained in markets.

A possible clue, however, may lie in the fact that, as Loasby (1995c) points out, coordination and *communication* are two closely related phenomena. For example, in the context of a productive task, only a subset of the agents involved in the task (e.g., the managers) may be able to observe the changes in the state of the environment that influence the outcome of the task. Adapting the task will typically require communication. *In principle*, this communication may take place inside a firms as well as across the market interface, but the conjecture is here – *pace* Grossman and Hart (1986) – that the size of communication costs may influence the choice of governance structure.[19]

Accordingly, a pertinent place to begin the search for non-incentive-conflict determinants of economic organization may be with work on communication and communication costs. With the exception of Leonid Hurwicz' (1972) work on decentralization and work on teams (e.g., Radner 1995; Bolton and Dewatripont 1994), this has not been given much attention in mainstream economics. However, Hurwicz suggested that we on look on different types of economic organization as different gameforms, characterized by different communication requirements. This may actually be a quite fertile idea, not just on the societal level which Hurwicz was interested in, but also with respect to the firm/market choice (cf. Kreps 1996; Wernerfelt 1997).

As a starting point, we may think generally of governance mechanisms (here restricted to only firms and markets) as gameforms in which players adapt to changes in the environment (the latter term being interpreted broadly) (Williamson 1996) and communicate about these changes (Wernerfelt 1997). In general, adaptations have to do with reacting to new learning and unexpected opportunities. This includes both changes that are "outside" the gameform (husband receiving call on the market from housewife), and changes that are "inside" it, such as learning that is directly stimulated by interaction between employees and employers (the hierarchy gameform).

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[19] In a similar vein, Demsetz (1988) suggests that direction of the less knowledgeable by the more knowledgeable may constitute an independent rationale for the firm. And Segal (1996) argues that an understanding of the nature of the managerial task necessitates that attention be paid to communication costs.

The conjecture here is that different gameforms will be systematically characterized by different levels of (fixed and variable) costs of making adaptations (cf. Wernerfelt 1997). For example, a player goes to the local market, bargains for various goods, and while he is there, his wife unexpectedly calls him on the cellular phone and asks him to buy more groceries than are on the shopping list. In this case, the price of each adaptation will be an outcome of the haggling process associated with each good that the player buys.

The opposite extreme, of course, is the gameform known as the hiearchy in which the employer and the employee avoid "... the costs of negotiating either an extremely complex agreement or a series of short term contracts" (Loasby 1994b, p.252). Instead, the parties negotiate a once-and-for-all wage contract. In this context, authority is simply a voluntary agreement that one of the parties should tell the other what to do (as in Coase 1937 and Simon 1951), probably sustained by some sort of implicit contract (Kreps 1996).[20] Obviously, this gameform requires the least bargaining over prices of the two gameforms considered and also has the lowest variable costs of adaptation, but is characterized by high fixed costs (because of the fixed wage). In the case of the market gameform, the variable/fixed cost proportion is the inverse. *In other words, when choosing gameforms for regulating their trade, players confront a trade-off between fixed and variable costs of communicating/adapting.*

What can we say about which sort of transactions will be governed by these two gameforms? First, high frequency transactions would seem to be biased towards the hierarchy gameform. But frequency alone will not suffice as a characterization of hierarchical transactions (many market transactions are high frequency); something else is needed. This is where the capabilities considerations that have been so prominent in Loasby's writings over the years may enter the scene.

To many writers on capabilities, as we have seen, the import of the concept of capabilities clearly lies in their *limitations*. Because of what are essentially cognitive limitations, firms must specialize. To Richardson (1972), for example, firms will tend to bring activities that are "similar" in-house and avoid integrating "dis-similar" ones, even if they are "closely

[20] This simple understanding of hiearchy does away with the Alchian and Demsetz (1972) critique.

complementary"[21], and Coase (1937) much earlier had hinted that an important factor limiting the size of firms was "the dissimilarity of transactions". As a follower of both Coase and Richardson put it:

> "The more heterogenous the transactions assimilated by the firm, the greater the cost. Although economic interdependence, direct or indirect, is universal, that interdependence varies in kind and degree throughout the system. Where the linkage between activities begin to thin out and transactions become more heterogenous, the cost of assimilating such transactions begin at some point to exceed the gain to be had" (Malmgren 1961, p. 420).

It is not entirely clear what is meant here by transactions being "heterogenous", but one obvious interpretation, and the one that is adopted here, is that transactions are heterogeneous when they are somehow linked to heterogenous activities and underlying heterogeneous capabilities (Richardson 1972).

The emphasis on heterogeneity and interdependence provides a link to the earlier discussion about communication in alternative gameforms. For one understanding of heterogeneity of transactions (activities, capabilities), and of heterogeneity as a determinant of specialization, surely has to do with communication costs. Heterogeneous transactions may be heterogeneous precisely because (or, in the sense that) communicating about them is costly. For example, firms avoid bringing entirely dissimilar transactions (activities, capabilities) in-house because this implies that they incur substantial communication costs when trying to coordinate these activities under the impact of changes in the environment.

The other side of the coin is that firms (the hierarchical gameform) may have coordinative advantages relative to the market gameform for certain classes of transactions, namely those that are similar to what the firm is already doing, because communication costs in the firm may be smaller than in the market for these transactions. The relative reduction in communication costs is brought about by the continuity of association among input owners that characterizes the hierarchical gameform and which supports the development of a "shared context" (Ghoshal et al. 1995), a shared "image" (Penrose 1959), "convergent

[21] These will be handled through inter-firm relations.

expectations" (Malmgren 1961), a "paradigm" (Loasby 1986), a "corporate culture", or whatever we decide to call what is essentially the same thing.

There are two main messages of this extremely sketchy analysis. The first is the substantive one that economic organization, including the existence and boundaries of the firm, may (partly) reflect economizing on communication costs, not only because there is a link between frequency and communication costs, but also because the heterogeneity of transactions may influence communication costs. While it is relatively easy to think of and model frequency, heterogeneity of transactions may be more tricky. One suggestion could be to think of a distribution of some relevant knowledge-based characteristic of transactions, the variance of that distribution being one determinant communication costs. This leads into the other message, namely modelling issues. The conjecture here is that rather elementary ideas on communication costs, alternative gameforms, etc. may be used to formally address Loasby's non-orthodox ideas on the firm. The next section also pursues this theme, but in a different context and with less of an emphasis on imcomplete contracts.

C. Loasby's View on Economic Organization II: Real Options

Already in *CCI* (1976, p.65), Loasby suggests that the firm should be considered, like money, as a substitute for a group of contingent claims markets, and as we have seen he has now come to view the firm as set of *reserves* (Loasby 1991b, 1994a&b). But as he also argues, markets may seen in much the same way:

> "Both firms and markets are devices for creating and preserving the possibility of future transactions; they are intangible and complex capital assets which are valuable precisely because the future is not predictable enough to justify present commitments" (1994b, p.8),
>
> and
>
> "The firm is a response to structural uncertainty. If there are no adequate markets for contingent commodities because no-one knows how to specify the appropriate contingency sets, then the remedy is to create option sets in the firm of reserves" (1994a, p. 252-253).

In this view of institutions-as-reserves, what would primarily seem to distinguish firms and markets is that whereas ongoing markets are undesigned institutions that embody options for future contracts, ongoing firms are designed institutions that embody contracts for future options. In the case of markets, competition and exit possibilities preserve flexibility; in the case of firms, incomplete contracts assist flexibility.

The notion that firms should have some flexibility to respond to future uncertainties has much intuitive appeal, but until recently it has been hard to conceptualize in economic terms. However, the inclusion of ideas about the valuation of financial options into the context of valuing non-financial investment projects may be helpful here (Sanchez 1993; Dixit and Pindyck 1994). I therefore here suggest that one possible understanding of Loasby's ideas on institutions-as-reserves is to say that both firms and markets have *option value*, in the sense of, for example, Dixit and Pindyck (1994). In other words, firms and markets may (also) be seen as portfolios of real options. I here concentrate on the conceptualization of the firm as a portfolio of real options, and briefly describe some consequences of this view for the theory of economic organization.

With respect to the flexibility issue, firms may be flexible in terms of, for example, *which products* they wish to produce, *when* they will produce (and develop and market) these products, and *how* the production (and sale and marketing and development) of the products should be *organized*. Because an option is a right to choose whether or not to take an action now or at some future time, this means that we can speak, referring to these three sets of choices, of product options, timing options, and implementation options (in the terminology of Sanchez 1993). For example, what Penrose (1959) calls the firm's "productive opportunity set" – which encompasses all of the opportunities that the firm's management can see and can (but doesn't have to) take advantage of – clearly constitutes a set of real product options. In principle, these real options can be valued, using the same tools that have been developed in the context of financial options.

The advantages of this overall view is that it gives some discipline to loose notions of flexibility, particularly in the context of the firm strategy field. Thus, an options perspective indicates, for example, that optimal flexibility is not maximum flexibility, since the costs of acquiring "maximum" flexibility are unlimited. Optimal flexibility corresponds to the plan of action that enables the firm to acquire the set of options that maximizes the net present value

of the firm. The contention here is that the options view not only has implications for firm strategy, but also has implications for the theory of economic organization, as indicated, but not spelled out by Loasby. For example, an options view on economic organization better helps us, I suggest, to recognize the benefit aspects of firms, hybrids and markets, something that may sometimes have been neglected in some quarters of the contractual approach to firm, because of its near exclusive concern with transaction *costs*.

A possible starting point is supplied by Loasby's suggestion that we should look upon ongoing (and well-developed) markets as embodying options for future contracts. Moreover, we should also remember his point that "Firms and markets are clearly partial substitutes; but it is no less important to recognize that they are also complements" (Loasby 1994a, p.8). Translated into the terminology used here, an ongoing, well-developed market provide *options to wait* and *options to abandon* to firms: they allow firms to defer the acquisition of inputs and make it contingent on an actual, future need, and they allow firms to get rid of unconsumed inputs (Sanchez 1993, p.272). The capability to use markets intelligently in this way may be an important source of competitive success, as the work of Casson (1997) indicates, and as the cases of NIKE and IKEA confirm.

Likewise, participating in networks and other sorts of interfirm arrangements may increase the number of real options available to firms, for example, by providing better access to other firms' capabilities (thus allowing the firm to extend its technological capabilities and generate more product options), to "thin" input markets, and to "the collective capabilities of the participants" (Loasby 1994b, p.263). In other words, networks may provide options (of both the timing and the product diversity) that are not easily obtained in more "normal" markets. "The consequence" of such networks, says Loasby (ibid.), "is a pool of resources, constituting a greater variety of reserves than can be accommodated within the necessary constraints of a single firm".

The other side of the coin thus is that internalization forfeits the option to wait to acquire inputs; it cuts off the firm from a contingent deferral of the commitment to incur the cost of inputs. From this perspective, firms should internalize only a few inputs that are exceptionally difficult to obtain through markets or networks and are capable of generating superior options values for the firm. Capabilities would often seem to have precisely these

characteristics. Some consequences for economic organization, telegraphically stated, of the options perspective are:

- In an real options/flexibility perspective, optimal economic organization/the efficient boundaries of the firm maximizes the options value of the firm. This is considerably broader (but may incorporate) the idea that optimal economic organization minimizes transaction costs.
- From the perspective of the firm, the efficient proportion between market and hierarchy depends on "a vision of possible futures" (Loasby 1994, p.253), including a vision of which products the firm can produce in the future, which inputs are necessary for producing these products, and an estimate of whether input markets can be expected to be well-behaved or not (Sanchez 1993, p.276).

V. Conclusion

My aim in this paper has been to discuss Brian Loasby's work on incomplete contracts as they relate to the theory of the firm, to contrast this view with the modern mainstream view, and to finally suggest that we may use some basic ideas and insights in game theory and real options theory to put some conceptual meat on Loasby's non-orthodox ideas. This latter suggestion, however, has been far from fully developed here; I have rested content with providing simple sketches.

The overall message is that with respect to the theory of the firm, at least, there should be room for some potentially dialogue between open-minded mainstream theorists and open-minded heterodox economists. Loasby's view of firms and incomplete contracts is very different from that of mainstream contractual theorists, and we have seen that the latter have valiantly tried to avoid being drawn into the difficulties (and challenges) that bounded rationality, genuine uncertainty and ignorance creates for the analysis of economic organization. However, there is increasing recognition among some mainstream researchers that Loasbian issues, such as flexibility and learning, may be important determinants of the choice of institutional forms (e.g., Bolton and Dewatripoint 1994; Wernerfelt 1997). Let me end by quoting, as support of this view, two of the leaders of formal mainstream work on organizations:

> "The incentive based transaction costs theory has been made to carry too much of the weight of explanation in the theory of organizations. We expect competing and complementary theories to emerge – theories that are founded on economizing on bounded rationality and that pay more attention to changing technology and to evolutionary considerations (Milgrom and Roberts 1988, p.450).

Surely, Brian Loasby's work on the theory of the firm may be an important source of inspiration for the emerging "competing and complementary theories ... founded on ... bounded rationality ... and ... evolutionary considerations".

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Danish **R**esearch **U**nit for **I**ndustrial **D**ynamics

The Research Programme

The DRUID-research programme is organised in 3 different research themes :

- The firm as a learning organisation

- Competence building and inter-firm dynamics

- The learning economy and the competitiveness of systems of innovation

In each of the three areas there is one strategic theoretical and one central empirical and policy oriented orientation.

Theme A: The firm as a learning organisation

The theoretical perspective confronts and combines the ressource-based view (Penrose, 1959) with recent approaches where the focus is on learning and the dynamic capabilities of the firm (Dosi, Teece and Winter, 1992). The aim of this theoretical work is to develop an analytical understanding of the firm as a learning organisation.

The empirical and policy issues relate to the nexus technology, productivity, organisational change and human ressources. More insight in the dynamic interplay between these factors at the level of the firm is crucial to understand international differences in performance at the macro level in terms of economic growth and employment.

Theme B: Competence building and inter-firm dynamics

The theoretical perspective relates to the dynamics of the inter-firm division of labour and the formation of network relationships between firms. An attempt will be made to develop evolutionary models with Schumpeterian innovations as the motor driving a Marshallian evolution of the division of labour.

The empirical and policy issues relate the formation of knowledge-intensive regional and sectoral networks of firms to competitiveness and structural change. Data on the structure of production will be combined with indicators of knowledge and learning. IO-matrixes which include flows of knowledge and new technologies will be developed and supplemented by data from case-studies and questionnaires.

Theme C: The learning economy and the competitiveness of systems of innovation.

The third theme aims at a stronger conceptual and theoretical base for new concepts such as 'systems of innovation' and 'the learning economy' and to link these concepts to the ecological dimension. The focus is on the interaction between institutional and technical change in a specified geographical space. An attempt will be made to synthesise theories of economic development emphasising the role of science based-sectors with those emphasising learning-by-producing and the growing knowledge-intensity of all economic activities.

The main empirical and policy issues are related to changes in the local dimensions of innovation and learning. What remains of the relative autonomy of national systems of innovation? Is there a tendency towards convergence or divergence in the specialisation in trade, production, innovation and in the knowledge base itself when we compare regions and nations?

The Ph.D.-programme

There are at present more than 10 Ph.D.-students working in close connection to the DRUID research programme. DRUID organises regularly specific Ph.D-activities such as workshops, seminars and courses, often in a co-operation with other Danish or international institutes. Also important is the role of DRUID as an environment which stimulates the Ph.D.-students to become creative and effective. This involves several elements:

- access to the international network in the form of visiting fellows and visits at the sister institutions
- participation in research projects

- access to supervision of theses
- access to databases

Each year DRUID welcomes a limited number of foreign Ph.D.-students who wants to work on subjects and project close to the core of the DRUID-research programme.

External projects

DRUID-members are involved in projects with external support. One major project which covers several of the elements of the research programme is DISKO; a comparative analysis of the Danish Innovation System; and there are several projects involving international co-operation within EU's 4th Framework Programme. DRUID is open to host other projects as far as they fall within its research profile. Special attention is given to the communication of research results from such projects to a wide set of social actors and policy makers.

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