

DANISH **R**ESearch **U**NIT FOR **I**NDUSTRIAL **D**YNAMICS

DRUID Working Paper No. 98-19

**Firms and the Coordination of Knowledge:
Some Austrian Insights**

by
Nicolai J Foss
September 1998

Firms and the Coordination of Knowledge: Some Austrian Insights

by

Nicolai J Foss

RESPECT

Department of Industrial Economics and Strategy

Copenhagen Business School

Nansensgade 19,6

1366 Copenhagen K

Denmark

esnjf@cbs.dk

Revised draft, August 13, 1998

Abstract

This paper argues that Austrian economics allow us to identify a number of weak spots in the modern economics of organization. Thus, neither the dispersion of tacit and subjectively knowledge in organizations, nor the entrepreneurial discovery process are comprehensively treated in this body of thought. Thinking about these issues in the context of the firm leads to a different, but perhaps complementary perspective on economic organization.

Acknowledgments

The comments of Thraínn Eggertson, Kirsten Foss, Bart Nooteboom and Viktor Vanberg are gratefully acknowledged.

Keywords

Austrian economics, the theory of the firm, dispersed knowledge, coordination

JEL Classification

B15, B25, L22, D81

ISBN(87-7873-057-0)

Contents

I. Introduction	7
II. Some Basic Parables in the Theory of Economic Organization	9
III. An Austrian Starting Point.....	14
IV. Austrian Insights and the Theory of the Firm: A Catalogue of Entry-points	20
V. Towards an Austrian Theory of the Firm.....	24
VI. Conclusion	30
References	33

“... from time to time it is probably necessary to detach one’s self from the technicalities of the argument and ask quite naïvely what it is all about” (Hayek 1937: 56)

I. Introduction

In line with the motto for this paper, which is drawn from Hayek’s 1936 presidential address to the London Economic Club, I want to “quite naïvely” make some rather simple points about the theory of the firm, or, broader, the theory of economic organization. Moreover, my points are related to Hayek’s in not only being simple, about knowledge and Austrian in flavor, but also in not being generally recognized.

Briefly summarized, the points are as follows. Although proponents of the modern economics of organization (principal-agent, incomplete contracts, transaction cost economics) can point to many scientific advances, this body of theory has a number of weak spots that relate to the treatment of knowledge. Of course, one should rationally expect *any* theory to have weak spots of various types; what is at issue concerns the character of the weak spots; for example, is there a problem with the internal logic of the theory, or is it rather a matter of explanatory and predictive weaknesses?

I shall argue in this paper that there are weak spots in the modern economics of organization on all these scores. For example, with respect to the internal logic of the modern economics of organization, one may argue that the assumption that agents can foresee expected pay-offs from a relation (can perform dynamic programming, Kreps 1996), even when they have no knowledge about the character of the good that they intend to trade (e.g., in an R&D joint venture) is dubious. And with respect to the explanatory and predictive weaknesses, I shall argue that the neglect of (truly dispersed) knowledge – a key theme in Austrian economics (e.g., Hayek 1937, 1945) – is a distinct weakness.

Some of those who deem the (latter) weak spots destructive for the whole enterprise of organizational economics opt for an alternative “knowledge-based” theory of the firm (e.g., Demsetz 1988), while others believe that it is possible to complement and extend organizational economics, and others (usually organizational economists) again believe that given sufficient time, the modern economics of organization will ultimately be able to treat knowledge-related issues more fully. It is not my aim in this paper to try to settle these

thorny debates. Rather, I shall ask what Austrian economics has to offer with respect to conceptualizing and addressing the basic issues.¹

The nature of the weak spots may be illustrated by means of a broad example, namely the economic analysis of large, diversified firms. The analysis of the internal organization of such firms, such as what has become known as the “M-form”, is cast almost entirely in terms of reducing incentive conflicts, that is, choosing the right profit and cost centers, and constraining rent-seeking efforts on the part of hierarchical subordinates (Williamson 1985; Milgrom 1988). However, another, knowledge-based, interpretation is possible (Foss 1997; Sautet 1998): In this story the advantages of the M-form may have more to do with the knowledge-related advantages of changing the internal division of labour. The division of labour promotes the growth of knowledge (Loasby 1994), so that some types of knowledge may only be achieved by certain organizational arrangements. For example, the M-form frees top-management of daily operational control, so that they become more able to specialize in the sort of overall, strategic judgment that both Frank Knight (1921) and Edith Penrose (1959) in different ways highlighted in their theories of the firm. In other words, the M-form may promote a growth of knowledge that simply couldn’t take place under other organizational arrangements, such as the U-form. Organizational structures thus both constrain and enable processes of entrepreneurial discovery.

However, discovery processes also need to be organized. Again, the modern economics of organization is, too put it nicely, much too parsimonious in its explanatory approach. Surely, the role of incentives in coordinating knowledge and learning processes should not be neglected (although it has been so far), but there is more to coordination than this. For example, the role of management and leadership has been almost completely side-stepped (appearing at most under the guise of “*ex post* governance”) (Langlois 1998) and so has the coordinating role of routines, capabilities, and shared cognitive constructs (e.g., “culture”) (Ghoshal, Moran and Almeida-Costa 1995; Langlois and Foss 1998).

The design of the paper is the following. I begin by briefly reviewing the modern theory of economic organization (section II, “Some Basic Parables in the Theory of Economic Organization”). From an Austrian point of view, this theory(ies) is (are) characterized by

¹ I shall not in this paper go into the potential contribution of evolutionary economics (Nelson and Winter 1982), for example, in the form of the evolutionary theory of the firm (e.g., Foss 1993; Dosi and Marengo 1994). However, there is clearly a significant overlap between an Austrian and an evolutionary perspective on the firm.

side-stepping a number of coordination problems. While section III (“An Austrian Starting Point”) discusses the nature of these coordination problems, section IV (“Austrian Insights and the Theory of the Firm: A Catalogue of Entry-points”) discusses non-standard coordination problems in the context of firm organization. Finally, section V (“Towards an Austrian Theory of the Firm”) briefly discusses how we may tell an alternative story of the existence of the firm, based on Austrian ideas.

II. Some Basic Parables in the Theory of Economic Organization

A. From Coordination to Cooperation Problems

There is probably only a single theme that runs through all contributions to the theory of economic organization, or, more narrowly, the theory of the firm. This is the theme of coordination, reflecting that the broad essence of organization is indeed coordinated response to volatility of whatever type and source. However, coordination has a number of meanings. One meaning that has become prevalent in the modern economics of organization is that of mitigating the effects of incentive-conflicts. Thus, incentive-conflicts are ubiquitous and opportunism doesn’t disappear because of, notably, vertical integration (Hart 1995). What vertical integration and various other contractual arrangements may do is simply to change the incentives to engage in opportunistic behavior. This sort of coordination, which may be termed “incentive coordination”, thus solves “cooperation problems”.²

To illustrate, we can in an abstract manner think of economic agents as choosing game forms and equilibria thereof for regulating their trade. Efficiency requires that if agents can find a game form and an equilibrium thereof that allows them to do better, they will do so. For example, we may think of two agents that confront the following two possible games, each one being a simple coordination game.³

² In much of the game theory literature it is conventional to distinguish between coordination games and cooperation games (of which the prisoners’ dilemma game is an instance). In the former, the pay off space of the game is such that at any equilibrium point, not only does no player have any incentive to change his behavior (given others’ behavior), but no player wishes any other player to change as well. In cooperation games, any player has an incentive to change his behavior, given other players’ behavior. Because of this, for any equilibrium, there is some pure strategy n-tuple that is Pareto superior. In this paper, however, I use “coordination problems” to cover both types of interaction problems.

³ The example follows Wernerfelt (1994).

		Game 1				Game 2	
		B				B	
		x	y			x	y
A	x	1, 1	0, 0	x	1, 1	0, 0	
	y	0, 0	2, 2	y	0, 0	3, 3	

In this situation, Pareto efficiency requires that agents choose game 2 and play the (3,3) equilibrium. In such simple situations, problems of economic organization are normally taken to be absent, because of the absence of any incentive conflicts. However, it is easy to see that a slight modification of pay-offs, as in game 3, may spell trouble, and introduce a need for incentive coordination.

		Game 3				Game 4	
		B				B	
		x	y			x	y
A	x	2, 2	0, 0	x	2, 2	0, 0	
	y	0, 0	4, 1	y	0, 0	4-u, 1+u	

The problem here is that the Pareto criterion is too weak to select a unique equilibrium, since both the (2,2) and (4,1) outcome may be equilibria on this criterion. Now, obviously the (4,1) equilibrium has a higher joint surplus than the (2,2) equilibrium, and therefore it will be in A's interest to bribe B to play the y-strategy. If u , the bribe, lies between 1 and 2, the equilibrium corresponding to both A and B playing y will be efficient, and, hence, be chosen. Thus, efficiency now implies that the agents agree on (contract on) maximizing and somehow splitting the joint surplus. In this situation a market failure occurs when bribes cannot be sustained in equilibrium. This may be dependent on the timing of the game. For

example, if A gives B the bribe before the game begins, B will not choose the y-strategy, which means that A will decide not to give B any bribe. Or, A may promise B to pay the bribe after game, but B will realize that this will not be in A's interest, and will still choose the x-strategy. Although the (2,2) equilibrium is still efficient, it is not joint-surplus maximizing.

These market failures may be remedied through contractual means; for example, A may agree to pay B a compensation if he does not pay u, or B may agree to pay A a compensation if he does not choose the y-strategy after receiving u. However, such contracts may not always be feasible. Contracts fail in the sense that they cannot completely safeguard against the reduction of surplus/loss of welfare stemming from incentive conflicts (given risk preferences). Contract failure may take various forms.

B. Incomplete Contracts

Notably, contracts may be *incomplete* in the sense that some contingencies are left out for whatever reasons, such as information costs, the limitations of natural language, the unavoidable emergence of genuine novelties, etc. In the context of the example above, A may be confronted with a contingency that is not covered by the contract, refuse to pay B the bribe, and B can do nothing about it. Or, while it may be possible for partners to agree on contract terms, these may not be enforceable by a third party, such as a court. In the latter case, contract terms are said to be "non-verifiable". Or, the costs of contracting may outweigh the gains. In all of these cases, it may not be possible to sustain the first-best outcome, that is, the one that unambiguously maximizes joint-surplus.

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 think of an innovation project), and because of this there is no point in writing a contract. Call the gains from trade $v(X)$, where X is a non-contractible⁴ 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 is assumed to be split 50 : 50 (Nash bargaining solution). 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 the basic hold-up problem (of Williamson 1985 and others): 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 be no hold-up problem, since then the seller could have reaped not $\frac{1}{2} v'(X)$, 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; the pattern depending on the characteristics of the assets (e.g., whether they are complementary), on whose assets are most important to the joint 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 turn on the trade-off between incentives for the buyer and the seller.

The incomplete contracts theory has given rise to some debate within the mainstream literature on the firm. 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 (Tirole 1998). Relatedly, there has been some

⁴ Because the investment is unverifiable. In the literature, “effort” and “investment” are conflated, because both are taken to be unverifiable.

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 (Maskin and Tirole 1997).

However, these are, as it were, *internal* debates. In the following section, I discuss what is, from an Austrian point of view, problematic with the modern economics of organization. To anticipate matters somewhat, here are some of these points:

- The treatment in the literature of incompleteness and its sources strikes one as odd. Thus, as we have seen, incompleteness is introduced by assuming that certain things are not observable or verifiable or both (Moore 1992: 180). Of course, this has distinct 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 Shacklian uncertainty (Shackle 1972) rather than asymmetric information.
- Agents are assumed to be able to perform dynamic programming, that is, be able foresee the pay-offs from their relation, even if they don't know at all the physical characteristics of the good they are trading (Tirole 1998) and even if unanticipated events occur.⁵ Thus, the parties to a contract can correctly anticipate the distribution of utility, but cannot describe the sources of that utility.
- Only incentive coordination is considered. In the context of the examples above, game no. 4 is the ruling paradigm. But surely, we can imagine interesting coordination problems that don't turn on incentive problems.
- There is absolutely no notion of an entrepreneurial discovery process going on. Everything, except for a few variables, is assumed to be common knowledge, so that what is worth discovering is assumed to have been discovered already.

The bottomline is that in the modern economics of organization, knowledge is not truly dispersed or uncertain, coordination problems are trivialized, and there is therefore no need for the entrepreneurial discovery process. One may press the charge that the modern

⁵ Of course, the motivation for this assumption is that otherwise the whole theory falls apart. As Moore (1992: 180) comments: "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). However, Maskin and Tirole (1997) point out that there is a tension between the assumption of dynamic programming and the presence of transaction costs: if agents can in fact perform dynamic programming then transaction costs (of describing actions or the nature of goods) in advance will not restrict the set of outcomes that contracts can implement.

economics of organization has not truly absorbed the main messages of the socialist calculation debate (see Lavoie 1985): that knowledge is dispersed, subjectively held and tacit, and that there is more to the efficient allocation of resources than providing managers with the right incentives. At this stage it is pertinent to turn to Austrian economics, and ask which parables about economic organization *it* can tell.

III. An Austrian Starting Point

A. Subjectivism: the Differentia of Austrian Economics

It is quite difficult to summarize in a nutshell what is the essence of Austrian economics (but see Boettke 1994), not the least because Austrians are likely to disagree about this (cf. Vaughn 1994). Some argue that the crucial concept is that of “market process” (Kirzner 1992). However, one’s view of the market process is derived from underlying notions of individual behavior (Foss and Foss 1998). Thus, I shall take Austrian economics to be primarily distinguished from mainstream economics by its much more thoroughgoing *subjectivism* – what is sometimes called “radical subjectivism” (O’Driscoll and Rizzo 1985). Thus, it is not only a matter of accepting the subjectivism of preferences; it is a much more radical matter of stressing the subjectivity of beliefs, expectations, plans, etc. – of recognizing with Lachmann (1978) that “different people hold different thoughts”.

Plain as this may seem to be, it nevertheless has far-reaching consequences for how we think about human action and interaction (cf. also Loasby 1991). Notably, action in such a perspective must necessarily involve learning, because of the inability to foresee future knowledge. Moreover, because of the surprise element, learning must involve more than Bayesian updating of priors (cf. Denzau and North 1994); it must also involve setting up new interpretive frameworks for handling new types of problems⁶. Action – including entrepreneurial action – is mediated by such mental constructs. In sum, this radical perspective on action would seem to imply that the essence of economic behavior is not merely maximizing, but perhaps rather consists in understanding the environment, defining what are the relevant variables in that environment, making sense of incoming information, generating procedures which can help solving problems, and, finally, actually taking action,

⁶ In other words, learning is dynamics in the space of representations, whereas Bayesian “learning” is mere information processing.

perhaps in a standard maximizing (“Robbinsian”) manner (cf. Nooteboom 1992; Choi 1993).

In Austrian circles, it has been much debated whether this view is “nihilistic” in the sense that it removes the basis for asserting that there is an inherent tendency to equilibrium in the market (Vaughn 1994). However, the perspective taken here is that it is exactly by taking a subjectivist starting point that we are able to see and conceptualize problems that have disappeared from the focus of mainstream economics, particularly mainstream organizational economics – such as truly dispersed knowledge and the fact that agents typically hold different mental constructs (paradigms, theories, ideologies, images, codes, cultures...) for making sense out of reality (Nooteboom 1992; Choi 1993; Denzau and North 1994).⁷ The constructive aspect of a subjectivist perspective is that it leads directly to a concern with the coordination of subjectively held and formed plans, and to an appreciation of the institutions that may promote a tendency toward plan-coordination, among which, I shall argue, are firms.⁸ Moreover, not only is attention focused on coordination problems and institutions that alleviate these problems; the set of coordination problems and corresponding institutions is also considerably broader than the set considered in mainstream economics, including the modern economics of organization. Thus, the issue is not merely one of incentive-compatibility, which is the predominant form that plan-consistency takes in the modern economics of organization; it is also one discovering knowledge (i.e., overcoming *sheer* ignorance) and aligning mental frameworks.

B. The Subjectivist Challenge

Subjectivism, as only too briefly summarized in the preceding section, clearly poses a challenge. It poses a challenge by radicalizing the Hayekian knowledge problem of how to make best use of dispersed knowledge. It is not just that we don’t know what we don’t know (to refer to Kirzner’s (1973, 1992) angle on the issue). It is also that we know that novelties will emerge – but know that we cannot know the precise contours of those novelties. And it is that we know that agents are likely to hold different interpretive frameworks; knowledge is not

⁷ Perhaps one may add Schumpeterian entrepreneurship, genuine uncertainty and Shacklian surprise (Shackle, 1972).

⁸ Related points have been made by Loasby (1991) and Nooteboom (1992), although from different starting points.

just dispersed knowledge, it is dispersed *subjective* knowledge.

As already mentioned, a key debate in the modern Austrian school concerns whether order, in the sense of a strong tendency to a coordinated state, can be presumed to exist in a system of dispersed, subjectively held and tacit knowledge, when we cannot rely on such constructs as the Walrasian auctioneer, common knowledge assumptions or “rational expectations” to do the job. Applied to the economics of firms, and paraphrasing Hayek (1945), the subjectivist challenge may be formulated thus: How is rational firm organization possible when we *cannot assume from the outset* that

- all contracting action can be compressed into one initial grand contract, as in the principal/agent paradigm – because of the occurrence of novelties;
- principals know all the possible actions that are open to agents – because of the division of knowledge;
- agents, for example, division managers in a firm, hold the same cognitive constructs – because of different subjective perceptions of reality;
- decision rights are efficiently assigned – because entrepreneurial activity may discover better assignments;
- agents can perform dynamic programming and perfectly foresee their pay-offs (or at least the distribution thereof) – because of the occurrence of novelties;
- etc.,

but must think of these as either non-permissible abstractions (e.g., the complete contracting assumption) or as *explananda* rather than data (e.g., the efficient assignment of decision rights).

In short, the radical subjectivist challenge consists in portraying coordination problems as a good deal more complicated and messy than they are portrayed in the modern economics of organization. In the latter, there has been a clear tendency to focus on situations where everything is coordinated, but for a single variable or relation (cf. Crawford and Haller 1990: 571; Furubotn and Richter 1997: chapter 10). For example, in the canonic principal-agent set-up, the principal knows the range of courses that are open to the agent, his preferences and the probabilities distribution of the stochastic variable that impinges on the agent’s output. His only problem is that he cannot observe the agent’s effort. However, he is able to design a

second-best incentive scheme (at no contracting cost). In this set-up, and in virtually all other organizational economics models, any process of entrepreneurial discovery is completely suppressed by assumption. Knowledge is not truly dispersed.

C. Coordination Problems and Knowledge Problems

Fundamentally, many coordination problems can be (and are) suppressed in a neoclassical world, because it is assumed that there 1) is an isomorphism between the real world and an agent's image of it, 2) that agents only differ with respect to decision-making capabilities in terms of how fine or coarse their information partitions are, 3) that information partitions are given, and 4) that genuine knowledge gaps, such as mistakes and surprises, can be ruled out (Dosi and Marengo 1994). If indeed these assumptions hold, it is hard to argue that rational, interacting agents should persistently hold different images of the world. In such a setting, coordination problems are, if certainly not entirely eliminated then much reduced in importance. The economic problem may reduce (at least in small-scale settings) to giving people who already are on "the same wavelength", as it were, the right incentives – that is, the problem studied in virtually all of the modern economics of organization. To be sure, this is not at all wrong or illegitimate. It works very well for a number of purposes. But it does suppress understanding of those aspects of economic organization that have to do with the coordination of knowledge and plans and which cannot be reduce to incentive-alignment issues. To repeat, there are (many) coordination problems that go beyond the simple paradigmatic one portrayed in game no. 4 above. For example, we can have a completely simple symmetric coordination game (game no. 5):

		Game 5	
		B	
		x	y
		A	x
y	0, 0		2, 2

It is well-known that there is nothing in classical game theory to help us predict the outcome in this situation,⁹ and that one has to rely on ad hoc constructions (at least relative to classical game theory) – such as focal points or appeal to mediators (Schelling 1960: 144) – for rationalizing a particular outcome. Something similar may of course be said of any particular outcome from a repeated prisoners' dilemma game because of the folk theorem.

Let us here neglect that from the point of view of the theory of the firm, this seeming arbitrariness could be an advantage rather than a problem because it helps us make some sense of, for example, firm heterogeneity and path-dependence, and proceed to noting that representations of game theory problems, whether in extensive or normal form, obscures some rather fundamental problems: How do players come to know the pay-offs? Each other? Available strategies? Will they hold the same views of the pay-offs? Of each other? Of the available strategies? How, indeed, do they know which game, and type of game, they play?¹⁰ These difficulties are simply suppressed by assuming from the outset that players have commonly known, identical beliefs about each others' strategies, and that those beliefs are consistent with some equilibrium in the game. Given this assumption, the analyst then proceeds to examine the design of incentive schemes, the sharing of the surplus from a relation, the support of certain outcomes by implicit contracts, etc. However, this is not unproblematic for the basic reason that a number of underlying real difficulties of coordination have been side-stepped.

The bottomline of this is that in much of game theory there is precisely the conflation between the objectively existing and subjectively perceived that Hayek criticized so strongly more than sixty years ago (Hayek 1937). Ironically, one possible reason for the strong upsurge in the popularity of game theoretical models in the last 10-15 years may have to do with the circumstance that these models seemingly solve the coordination problem: People calculate (instantaneously) their way to equilibrium. But as we have seen (by means of game no.5), this is not always possible. And, more generally, the coordination problem of course isn't solved at all, merely side-stepped. While this sort of thinking-your-way-to-equilibrium may have some plausibility for simple non-symmetric coordination games with

⁹ For example, the usual refinement techniques are not helpful here.

¹⁰ Such problems figure rather seldom in game-theoretical economic discourse. There is of course a growing literature on behavioral game theory (Camerer 1997) and some work on learning how to cooperate in simple coordination games (Crawford and Haller 1990; Van Huyck, Battalio and Beil 1990), but for a monograph-length discussion one seems to have to go to social psychology (Keylley and Thibaut 1978)!

few players,¹¹ it becomes increasingly implausible as we increase the number of available strategies, players, and equilibria. And while we also know that when simple pure coordination games are repeated, the players will, through trial and error, home in on an equilibrium (Crawford and Haller 1990), the game itself may change during play. For example, the players may discover some “particular circumstance of time and place” (Hayek 1945) that affects the pay-offs a require that they restart play. Both when the number of players expand and when the presumed “data” of the game change, we increasingly confront the Hayekian knowledge problem:

The peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess. The economic problem of society is thus not merely a problem of how to allocate “given” resources – if “given” is taken to mean given to a single mind which deliberately solves the problem set by these “data”. It is rather a problem of how to secure the best use of resources known to any of the members of society, for ends whose relative importance only these individuals know. Or, to put it briefly, it is a problem of the utilization of knowledge which is not given to anyone in its totality (Hayek 1945: 78).

As later Austrian contributions have clarified, if we cannot rely on all agents’ fully informed maximizing rationality to hold the world together, as it were, something else must substitute. From Kirzner’s (1973) point of view, the problem is not just that we know that knowledge is dispersed; it is more fundamentally that we don’t know what we don’t know. In his view, we have to rely on the entrepreneurial process of discovery to find out for us.¹² To some extent, however, the Hayekian knowledge problem is alleviated by the presence of numerous, largely spontaneously grown, institutions – a theme intimately connected with Hayek’s own work (e.g., Hayek 1973). It is these insights, I submit, that may be applied to understanding firm organization. The following sections discuss this in more detail.

¹¹ However, see Huyek, Battalio and Beil (1990) for some experiments in pure coordination games that demonstrate that even in very simple interaction situations, coordination failure may arise.

¹² Others may wish to add that selection forces also maintains a certain coherence (e.g., Nelson and Winter 1982).

IV. Austrian Insights and the Theory of the Firm: A Catalogue of Entry-points

A. The Firm in Austrian Economics

It is necessary to tackle a seeming paradox here. Austrian economics is normally taken to be first and foremost a theory of the *market* process. In contrast, Austrian economics is not seen as containing a theory of the firm, and one seeks in vain for any details about firm organization in the Austrian literature.¹³ A basic reason for this neglect is easy to discern¹⁴: in the view of the Austrians, economics – and social science in general – is about tracing the unintended consequences of intentional human action (Hayek 1952; Lachmann 1978). And unintended consequences, in the view of the Austrians, are only manifest in large-scale, complex systems characterized by a substantial division of knowledge, notably whole economies. Smaller scale systems, such as firms, per implication have no room for unintended consequences, and thus is not really the domain of the inquiry of the economic scientist (but of course of the management and organization scholar).

Bearing in mind that this is a rational reconstruction, one may argue that a problem with this view is that we are never really told *when* a social system is so large that it is sufficiently complex to produce non-trivial unintended consequences. Moreover, because this is not made clear, it is not fully recognized either that the boundaries of complexity may be moved, as it were, by organizational and institutional means (e.g. Williamson 1970) – that is, by organizational innovations introduced by entrepreneurs. As this indicates there is in fact a potential for apply key Austrian ideas on the organization of the process of knowledge utilization and creation from the classic works of, particularly, Hayek, Lachmann and Kirzner are as applicable to the understanding of firm organization as they are to the understanding of markets. The following sub-sections discuss some of these ideas.

¹³ Most work on the theory of the firm that has an Austrian flavor has been done by “fellow-travellers”, for example, Langlois (1992), Loasby (1991), Witt (1998), and Foss (1994a, 1997). However, (very) recently, younger Austrians have begun to apply Austrian ideas to the theory of the firm, for example, (Peter) Klein (1996), Cowen and Parker (1997) and Sautet (1998). The line of inquiry in the present paper is, however, different from these contributions.

¹⁴ Foss (1994a, 1997) provide more reasons.

B. Firms, the Division of Knowledge, and Emergent Rules

In contrast to markets, firms are planned by identifiable historical individuals with the purpose of earning a profit and they normally operate under a designed framework, such as a mission statement, a formal organization structure, etc.¹⁵ They are set in motion, as it were, by conscious intention and are therefore “pragmatic” institutions in the sense of Menger ([1883] 1985). However, the distinction between “pragmatic” and “organic” systems really only refer to the origins of these systems. Thus, systems with an organic origin may become heavily regulated and systems with a pragmatic origin may develop spontaneous elements (e.g., the results of the rent-seeking efforts of bureaucrats in a government hierarchy). Similarly, firms may develop strong “organic” elements, such as its corporate culture and often corporate strategy as well (Mintzberg 1994), a point which is trivial to most analysts of corporate behavior but has gone virtually unnoticed (or, at least untreated) in the modern economics of organization.¹⁶

The parallel goes further, for firms may confront knowledge problems of a magnitude comparable to those which confront the social planner in a socialist economy. At least giant firms (ABB, Philips, GM, IBM, etc.) certainly face a knowledge dispersal problem of almost the same caliber as the general societal knowledge dispersal problem.¹⁷ To such firms, Hayek’s point about the necessity of decentralization seems quite pressing indeed¹⁸:

If we can agree that the economic problem of society is mainly one of rapid adaptation to changes in the particular circumstances of time and place, it would seem to follow that the ultimate decisions must be left to the people who are

¹⁵ Indeed, Vanberg (1994) talks in this connection of the firm’s “constitution”.

¹⁶ Kreps (1990) is an outstanding exception. Notice that I am not saying that these “organic” elements are orderly; merely that they may arise in an unintended manner.

¹⁷ For an elaboration of this point, see Ghoshal, Moran and Almeida-Costa 1995). Smaller firms also confront coordination problems, although there is probably a monotone (but probably not linear) relationship between the size of firms and the severity of coordination problems.

¹⁸ There is, in fact, a literature that explicitly addresses how to handle the knowledge dispersal problems that exist in, typically, multinational firms (see, e.g., Bartlett and Ghoshal 1989). This literature explicitly begins by rejecting the idea that top-management in large firms, such as ABB, can simply centralize all the relevant knowledge and issue in a top-down fashion the relevant commands to different business units. This is seen as plainly absurd; and the arguments advanced in favor of this judgment are closely related to Austrian arguments against central planning (e.g., Lavoie 1985): the size, complexity and partially tacit character of the relevant knowledge, in addition to the need for flexibility and local adaptation, makes centralization not only inefficient, but genuinely impossible. Firms must resort to other means to handle dispersed knowledge; however, for a given set of means (bonuses, monitoring, divisionalization, matrix organization, etc.), there is a limit to how large and how complex the firm’s “stock” of knowledge can be.

familiar with these circumstances, who know directly of the relevant changes and of the resources immediately available to meet them. We cannot expect that this problem will be solved by first communicating all this knowledge to a central board which, after integrating all knowledge, issues its orders (Hayek 1945: 83-84).

Hayek's point, of course, is that a "central board" is not at all necessary: a market system, meaning a system with alienable property rights, promotes a tendency towards allocating property rights to those who can make best use of them and the entrepreneurial market process ensures that there is a tendency towards a state where the best use is indeed made of these rights.

This point has been reflected in much recent management thinking (Semler 1989; Meyer 1994; Nonaka and Takeuchi 1995). Characteristically, one best-seller was called *Internal Markets: Bringing the Power of Free Enterprise INSIDE your Organization* (Halal, Geranmayeh, and Pourdehnad 1993), and the recent strong emphasis on cross-functional teams that are given extensive decision rights and where payment is based on team-output reflects the recognition that it is to some extent possible to combine "high-powered" incentives with efficient utilization of local knowledge in firms. Indeed, in some recent, and explicitly Austrian, work on these issues, the very distinction between firms and markets is argued to be insubstantial (Cowen and Parker 1997). According to these authors, the coordination problems solved by firms and markets are essentially similar, and firms cannot realize production possibilities that cannot be realized by markets. It is worth discussing this issue in some more detail.

C. Types of Coordination, Rules and Order

Hayek's (1945) discussion of the powers of spontaneous coordination by the price system represents one prominent interpretation of the word "coordination". It is immediately clear that while we may imagine instances of such spontaneous coordination taking place inside firms, firms characteristically don't rely on purpose-neutral spontaneous coordination by the price-mechanism. For example, although transfer pricing tries to mimic the beneficial effects of the market process, it is very much a directed process (Hirshleifer 1956). And as Daniel Klein (1997) reminds us, there is another sense of the word "coordination" – one that is perhaps best associated with the work of Thomas Schelling (1978). Here coordination is typically *smaller*

scale than in the market settings discussed by Hayek, and coordination is *intentional* (again somewhat in contrast to Hayek) and desired by the interacting parties.¹⁹ Two agents trying to coordinate their actions so that they will meet at the same place (which hasn't been agreed upon in advance), and both choosing the same attractor ("the focal point") for their actions (e.g., the town hall, a central square...), exemplifies this type of coordination.

While Klein is right in stressing the difference between these two coordination problems (Hayekian and Schelling coordination problems, respectively), they both relate to the notion of dovetailing plans and both appeal to background institutions in rationalizing the emergence of dovetailing plans. The interesting distinction (in the context of the theory of the firm) relates rather to the distinction between rules and order (dovetailing plans), the latter depending crucially on the former. If we begin by rejecting the presumption that management can centralize dispersed and tacit knowledge, two basic modeling strategies define the extremes that are available for explaining how firms may achieve internal plan consistency:

1. *Rational design*: The codes, conventions, rules, routines, cultures, focal points, etc. that coordinate local decisions and plans are designed by top-management. In other words, management is presumed to know the basic game(s) that is (are) being played and can rationally influence its (their) outcome(s).
2. *The organization as an adaptive network*: Initially, agents basically don't know what they and others are doing, but fall back on naive adaptive learning procedures and over time they may home in on some sort of equilibrium (absorbing state or the like) consisting of stable decision rules.

From an Austrian point of view, none of these modeling strategies seem, at least initially, very attractive: while the first strategy suffers from a "pretense of knowledge" (Hayek 1974), the second one plays down rationality too much. The rational design modeling strategy has characterized much of the managerial literature on "culture", while in economics the codes through which agents communicate (and sometimes also their decision-rules) have similarly

¹⁹ In an extended discussion of organizations, Hayek (1973: 48-49) points out that to some extent "... every organization must also rely on rules and not only on specific commands. The reason here is the same as that which makes it necessary for a spontaneous order to rely solely on rules: namely that by guiding individuals by rules rather than by specific commands it is possible to make use of knowledge which nobody possesses as a whole". However, according to Hayek, rules in the context of organizations are a) not as abstract as the rules governing a spontaneous order, b) not tacit but explicit (note that this may be partly contested, e.g., by pointing to work on organizational culture and symbolism), and c) are rules for the performance of assigned tasks.

been taken as part of the organizational design problem (e.g., Hurwicz 1972). The basic problem with this is that the designer needs to undertake much pre-play communication in order to establish the optimal codes and decision rules²⁰ – but limited communication and knowledge is the starting point of the whole exercise.²¹ This problem does suggest a role for *grown* (and not only constructed) coordinative conventions/routines/rules in firms, but the second modeling strategy (as exemplified by Dow 1990) goes too far, at least from an Austrian point of view, in ascribing too little rationality and alertness to agents; as in the case of modeling strategy no. 1), modeling strategy no. 2) suppresses the entrepreneurial process of discovery by assumption.

Most importantly, none of these modeling strategies tell us much that help us to discriminate between different types of economic organization. In the case of the rational design modeling strategy, designers are supposed to be able to design rules (e.g., pricing rules) for both markets and firms; in the case of the adaptive network modeling approach, all types of economic organization (firms, markets, hybrids, whole economies, social institutions...) are seen as “organization” and the approach basically doesn’t allow us to discriminate. This may indeed also be seen as the conclusion that follows from an application of the insights of the socialist calculation debate to firm organization: Socialist planners cannot integrate and utilize dispersed and tacit knowledge, and so can’t business managers. Therefore, firms must rely on market mechanisms in order to survive, but what then is the difference between firms and markets? One way of solving the conundrum is the Gordian one of denying that there is any essential difference (e.g., Alchian and Demsetz 1972; Cowen and Parker 1993). The following section tries to tell a different story.

V. Towards an Austrian Theory of the Firm

A. The Challenge of Dispersed, Subjective Knowledge (Once More)

The constraints on our discussion is found, again, in the division of knowledge, specifically in management’s inability to centralize all dispersed, subjectively held, and tacit knowledge inside the firm. An implication of this is that, in general, employees will have a more fine-grained understanding of their environments than their bosses. In addition, they are likely to also know more about the realizations of their action sets (Minkler 1993). As Sautet (1998)

²⁰ Technically, he must know the complete range of possible realizations of the agent’s private information.

²¹ Thus, this modeling strategy may be criticized along lines that are closely akin to the Austrian arguments during the socialist calculation debate (Lavoie 1985).

points out, management therefore confronts a “double Hayekian knowledge problem”: it is not just that it doesn’t know what it doesn’t know in the *market*; it is also the case that it doesn’t know what it doesn’t know about the firm’s *employees*.

The practical implication is that because an employee has finer and wider knowledge of the realization of his action set than his boss, he may arrive at different conclusions as to how certain events that are relevant to the firm should be handled and what their consequences may be. There is, therefore, a powerful argument that the agent should possess extensive decision rights (of course, balancing the benefits from this against the agency costs of additional decentralization). But if this the case, then why have firm organization? Driven to its logical extreme, an emphasis on local knowledge thus easily leads to a denial of the need for firms (Jensen and Meckling 1992; Cowen and Parker 1997). In fact, in the absence of incentive conflicts, first-best allocations would seem to be always obtainable by the market mechanism; firms cannot realize any production possibilities that cannot be reached by markets.

However, for the rest of this paper, I shall argue that this conclusion is too hasty, and is likely to only hold true (if at all) in a static context. In a dynamic context, firms may have distinct advantages relative to markets in terms of their superior planning ability. Given that a main message of Austrian economics is that there are strong inherent limitations to planning, this may indeed sound as a strange conclusion to reach in a paper with an Austrian orientation. However, there are different meanings of planning, and some of these are fully compatible with an Austrian point of view.

B. Planning and Directed’ness

The notion of planning that I suggest that we don’t rely on is that criticized in economics by the Austrians and in business administration by Mintzberg (1994). But the fact that we cannot have fully informed and detailed top-down planning that mobilizes and incorporates all dispersed, subjective and tacit knowledge in a firm doesn’t mean, of course, that we cannot have some sort of planning (Hayek 1946). First, note that many firms actually regularly do carry out strategic planning exercises, and continue to do so, which suggests (if not proves) that such exercises may have some sort of value.²² That value may exactly be that although

²² Admittedly, strategic planning may have fallen somewhat out of favor relative to its heydays in the 1960s and 1970s. However, the type of planning that has fallen out of favor is precisely the detailed, top-down planning, so strongly criticized by Mintzberg (1994).

nobody believes that all dispersed, subjectively held and tacit knowledge can be mobilized, a regular strategic planning exercise may indeed make clearer to management what sort of knowledge is present in the organization and which learning processes are going on locally (say, in a foreign subsidiary). For example, this knowledge may be used for the purpose of transferring superior practices to other parts of the organization. Indeed, there is a strong argument that it is precisely the ability to transfer at low cost successful practices that gives multinational firms a competitive edge not only over domestic firms but also over the market (Bartlett and Ghoshal 1989). More generally, note that such a directed planning exercise, as well as a subsequent knowledge-transfer, are activities that firms can normally do much more efficiently than markets capable of.²³

Second, planning can mean simply choosing some sort of policy, however broadly defined, to emergent events, where the policy in question concerns the coordination of those activities that are affected by the emergent events. As Brian Loasby (1976: 134) argues, we should in fact look to emergent events in order to find a rationale for 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.

Unfortunately, Loasby doesn't really make clear why markets cannot handle "incomplete specification". However, an answer was provided a long time ago by Richardson (1960) and Malmgren (1961) who suggested that markets are particularly bad (relatively speaking, of course) at handling emergent events in the context of complementary activities.²⁴ That markets have problems handling complementarities (which is often the form that organizational interdependencies take) has been a recurrent theme in the modern economics of organization (e.g. Hart 1995). However, here the problems are seen to stem from incentive conflicts; it is the mutual hold-up threat that is the problem. Richardson and Malmgren, in contrast, held a

²³ Limited types of planning may be exercised in a market context in firm networks and other types of cooperative relations.

²⁴ Lachmann (1956: 54) hinted at something similar: "... we have to distinguish between two types of capital complementarity: *plan complementarity*, the complementarity of capital goods within the framework of one plan, and *structural complementarity*, the over-all complementarity of capital goods within the economic system. The first type of complementarity is brought about *directly* by entrepreneurial action. The making and revision of such plans is the typical function of the entrepreneur ... Our second type of complementarity is, if at all, brought about *indirectly* by the market".

coordination perspective on these problems: in a competitive market, absent communication and forward markets, agents wouldn't have a clue about how to coordinate their actions. Planning, in their conception, may be a superior mechanism for handling these problems.

*C. Coherence and Flexibility: the Firm in a World of Radical Uncertainty*²⁵

Planning, to recapitulate, may be understood as no more than defining and having a policy to emergent events (actually, "leadership" may be a better word here, cf. Calvert 1992). But we have to tackle the problem of how one can speak of a "policy to emergent events"; isn't this a contradiction in terms, for the simple reason that what is unanticipated cannot be planned for?

A similar problem was discussed (though in a somewhat different context) some years ago by Richard Langlois (1986) in a splendid but neglected paper. He argued that the crux of the matter is that most events have both foreseeable and unforeseeable aspects, or in the terminology of philosopher-sociologist, Alfred Schütz, that they have "typical" and "unique" features (Langlois 1986: 182). Typification is an aspect of the way in which agents (including firms) perceive their environment (O'Driscoll and Rizzo 1985). Typical features are those elements of the environment that are stable, while the unique features are non-repeatable and idiosyncratic. While we can often clearly foresee typical features, we often have to let time pass before we can fill in the unique features. As Coase (1937: 21) explained this is indeed the essence of the employment contract:

It may be desired to make a long-term contract for the supply of some article or service ... Now, 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 ... Therefore, the service which is being provided is expressed in general terms, the exact details being left until a later date ... When the direction of resources ... becomes dependent on the buyer in this way, that relationship which I term a "firm" may be obtained.

It is also the mix of typicality and uniqueness in most actual events that makes it possible, after all, to have a "policy to emergent events". For example, the firm may have an implicit contract

²⁵ Apologies to Langlois (1986).

(or “corporate culture”) that solves incentive coordination problems by signaling to employees that management will not opportunistically take advantage of them in the case of unforeseen events, although nothing specific is being said (or can be said) about the event. Likewise, we can have shared interpretive schemes that solve other types of coordination problems by allowing employees to categorize unexpected events as being of the same overall type and therefore reacting in a coordinated manner. Here, there is the creation of a “convergence of expectations” that Malmgren (1961) saw as a primary benefit of firm organization, but only convergence of expectations with respect to typical features (cf. also O’Driscoll and Rizzo 1985).

It is on the level of deciding in a broad way how to react to unexpected contingencies that management can “plan”. It can influence and steer the evolution of implicit contracts and interpretive schemes that are flexible enough to accommodate unforeseen events, *and* that help agents coordinate their interdependent activities. As this suggests, several interrelated coordination problems are present. Which actions (strategies) should be picked in the face of an emergent event? Which game should be played? How is the pay-off structure of the relevant coordination game made known to agents? How are agents induced to choose the right actions. Moreover, there are both cognitive qualities and incentive aspects to these coordination problems; for example, the problem of adapting to an unexpected event has the cognitive dimension of categorizing and interpreting the event, and it may also have the incentive dimension of avoiding that one the parties to a contractual relation utilizes the unexpected contingency to effect a hold-up.

Many coordination problems are likely to contain such a mix, and the various problems may to some extent be thought of as *hierarchical*. It is obvious why it should be so. As Calvert (1992: 12) points out, the ongoing interactions of real life, for example, inside large firms, are not simple repeated games. There is unlikely to be an exact correspondence between players, strategies and outcomes in various “repetitions” of “the game”. Instead, there is a Hayekian division of knowledge, implying that players are likely to have incomplete (or none at all) information about other players, previous plays, etc. In this situation, there is likely to be multiple equilibria, but, unfortunately, behavior that is appropriate for play in one equilibrium may be inappropriate for another equilibrium; equilibrium strategies are not interchangeable. The problem of selecting the right equilibrium is clearly a higher-order coordination problem.

Thus, one may think of the act of choosing which coordination game to play, of making sense out of new events (and communicating this), etc. as more fundamental coordination problems than the problem of inducing agents to make specific actions within an already well-understood decision situation. The higher in the hierarchy a coordination problem is placed, the more abstract is the solutions(s) likely to be. This is related to Lachmann's (1971: 81) discussion of the limits of social engineering:

In a society in which it is generally known that frequent change of undesigned institutions is inevitable, the designers of designed institutions may deliberately confine their activity to designing a framework which leaves room for a good deal .. of change ... In such a society it might be said that the undesigned institutions which evolve gradually ... accumulate in the *interstices* of the institutional order. The interstices have been planned, though the sediments accumulating in them have not and could not have been.

Applied to the firm and the activity of management, we may think *management* in an Austrian perspective as consisting of solving (or helping to solve) "lower-level" coordination problems, while *planning* (or leadership) is the higher-level activity of selecting "precedents" or "focal points" that may assist in management as well as in judgment exercised on the shop floor. Thus, the top-manager's task is inherently rather circumscribed. It is mostly a matter of choosing the right interstices. To quote again from Lachmann (1971: 13):

[T]he central problem of the institutional order hinges on the contrast between coherence and flexibility, between the necessarily durable nature of the institutional order as a whole and the requisite flexibility of the individual institution ... the relative immutability of some institutions is always a necessary prerequisite for the relative flexibility of the rest.

The importance of "relative immutability", as Langlois (1986: 187) points out, is that a stable high-level environment is conducive to the division of labor, and therefore, we may add, to the growth of knowledge. Genuine uncertainty is reduced and allow agents to concentrate on fewer tasks in which they can therefore accumulate more knowledge. Some measure of flexibility, on the other hand, is still required in the face of the fact that not only are unexpected contingencies emerging from the external environment, the firm itself generate emergent events through collective learning, management experimentation, R&D, etc. (Kirsten Foss 1998). To optimally combine "relative immutability" with "flexibility" is indeed a

“central problem” not only of the design of an institutional order, but certainly also of organization design (cf. also March 1988).

For example, problem-solving capability (“flexibility”) (including innovative efforts) may be supported by a shared understanding (“relative immutability”) of the nature of the businesses the firm is in, such as may happen when corporate mission and vision statement become not only “corporate” but also “personal”. The danger, of course, lies in the possibility of shared knowledge becoming so constraining that the benefits of diversity are lost.

VI. Conclusion

“If I have ... shown not only that the answer to this question is not obvious but that occasionally we do not quite know what it is, I have succeeded in my purpose” (Hayek 1937: 56)

The aim of this paper has been to apply a well-known Austrian theme – the division of knowledge – to a somewhat unusual context, namely firm organization and theories thereof. I have argued that much of the modern economics of organization can be criticized by means of much the same arguments that were employed by the Austrians during the socialist calculation debate. Thus, truly dispersed, subjectively held and tacit knowledge are suppressed in the modern economics of organization. It is easy to point to a number of reasons, of both methodological and more substantive nature, why this is so.

From the methodological point of view, the model-builder (which nowadays means most economists of organization) may point out that we are dealing here with hard-to-model phenomena. Anyone who has invested some resources in familiarizing herself with contract theory will know how even seemingly simple interaction situations can lead to the most mind-boggling mathematical exercises. To the formalist, it is surely better to forget about all the seeming additional mess introduced by the Austrians and concentrate on simple, clear-cut incentive-conflict problems.²⁶ From the more substantive point of view, if we take seriously the division of knowledge, it is hard to find room for firms; firm organization

²⁶ He may also wish to introduce the charge of ad hoc’ness. However, this is hardly a justified charge coming from a proponent of the economics of organization, since organizational economics approaches are shot through with ad hoc’ness (e.g., the assumption in principal-agent theory that principals have all the bargaining power, the use of Shapley values in the incomplete contracts literature, etc.).

seems to evaporate in the face of the superior powers of markets to utilize local knowledge (Jensen and Meckling 1992).

In response to these objections, one may argue, first, that Austrian issues, such as dispersed knowledge, entrepreneurship and emergent rules, certainly are given to formal modeling (e.g., Littlechild and Owen 1980; Dow 1990; Crawford and Haller 1990). The problem is not that they cannot be modeled; it is rather that most modern economists of organization follow a methodological convention that dictates a very specific and arguably narrow modeling heuristic – that all issues of economic organization must be cast in the incentive-conflict mold – to the exclusion of alternative modeling heuristics.²⁷ It may be argued that in the absence of incentive conflicts, the first-best solution is always obtainable, but this can only be upheld if all other coordination problems are already assumed away.

With respect to the second point, I have argued in this paper that firm organization may actually have advantages relative to markets and may exist for this reason. Not only can firms demonstrate a degree of “directedness” that is not in general available to markets, they can also develop local norms, interpretive schemes, etc. that solve particular coordination problems for a subset of the economy’s input owners. Although, I have refrained from extending this basic story to other issues of economic organization, such as the issue of the boundaries of the firm, intuitively, there is much in Austrian economics that is helpful for understanding this issue. For example, the problems of managing dispersed knowledge indicate that there are truly knowledge-related determinants of the size and boundaries of the firm. However, telling that story is attempted in another paper (Foss 1998).

²⁷ An example of an alternative approach is Wernerfelt (1997) who models the choice of organizational form as a matter of choosing the gameform that best economizes with communication costs.

References

- Alchian, Armen A. and Harold Demsetz. 1972. "Production, Information Costs, and Economic Organization," *American Economic Review* 62: 772-795.
- Bartlett, Christopher and Sumantra Ghoshal. 1989. *Managing Across Borders: The Transnational Solution*. London: Hutchinson.
- Boettke, Peter. 1994. *The Elgar Companion to Austrian Economics*. Aldershot: Edward Elgar.
- Calvert, Randall L. 1992. "Leadership and Its Basis in Problems of Social Coordination," *International Political Science Review* 13: 7-24.
- Camerer, Colin. 1997. "Progress in Behavioral Game Theory," *Journal of Economic Perspectives* 11: 167-188.
- Choi, Young Back. 1993. *Paradigms and Conventions*. Ann Arbor: Michigan University Press.
- Coase, Ronald H. 1937. "The Nature of the Firm," *Economica* (N.S.) 4: 386-405.
- Cowen, Tyler and David Parker. 1997. *Markets in the Firm: A Market Process Approach to Management*. London: The Institute of Economic Affairs.
- Crawford, Vincent P. and Hans Haller. 1990. "Learning How to Cooperate: Optimal Play in Repeated Coordination Games," *Econometrica* 58: 571-595.
- Demsetz, Harold. 1988. "The Theory of the Firm Revisited," *Journal of Law, Economics, and Organization* 4: 141-161.
- Denzau, Arthur T. and Douglass C. North. 1994. "Shared Mental Models: Ideologies and Institutions," *KYKLOS* 47: 3-31.
- Dosi, Giovanni and Luigi Marengo. 1994. "Some Elements of an Evolutionary Theory of Organizational Competences," in Richard W. Englander. *Evolutionary Concepts in Contemporary Economics*. Ann Arbor: University of Michigan Press.
- Dow, Gregory K. 1990. "The Organization as an Adaptive Network," *Journal of Economic Behavior and Organization* 14: 159-185.
- Foss, Kirsten. 1998. "Technological Interdependencies, Specialization and Coordination: A Property Rights Perspective on The Nature of the Firm," *DRUID Working Paper*.
- Foss, Nicolai J. 1994a. "The Theory of the Firm: The Austrians as Precursors and Critics of Contemporary Theory," *Review of Austrian Economics* 7: 31-64.
- Foss, Nicolai J. 1994b. *The Austrian School and Modern Economics: Essays in Reassessment*. Copenhagen: Copenhagen Business School Press.
- Foss, Nicolai J. 1996. "Firms, Incomplete Contracts, and Organizational Learning," *Human Systems Management* 15: 17-26.
- Foss, Nicolai J. 1997a. "Austrian Insights and the Theory of the Firm", *Advances in Austrian Economics* 4: 175-198.
- Foss, Nicolai J. 1997b. "On the Rationales of Corporate Headquarters," *Industrial and Corporate Change* 6: 313-339.
- Foss, Nicolai J. 1998 "Market Process Economics and the Theory of the Firm," forthcoming in Ron Sanchez, ed. *Beyond the Boundaries of the Firm*. Elsevier.

- Foss, Kirsten and Nicolai J. Foss. 1998a. "The Knowledge-Based Theory of the Firm: Some Organizational Economics Foundations," *Working Paper 98-5*, Department of Industrial Economics and Strategy, Copenhagen Business School.
- Foss, Kirsten and Nicolai J. Foss. 1998b. "The Market Process, Firms, and Property Rights," *mimeo*, Copenhagen Business School.
- Furubotn, Eirik and Rudolf Richter. 1997. *Institutions and Economic Theory: the Contribution of the New Institutional Economics*. Ann Arbor: The University of Michigan Press.
- Galunic, Charles and Simon Rodan. 1996. "Resource Recombinations in the Firm: Knowledge Structures and the Potential for Schumpeterian Innovation," *Working Paper 96/75/OB*, INSEAD.
- Ghoshal, Sumantra, Peter Moran and Luis Almeida-Costa (1995), "The Essence of the Megacorporation: Shared Context, not Structural Hierarchy", *Journal of Institutional and Theoretical Economics* 151: 748-759.
- Halal, William E., Ali Geranmayeh, and John Pourdehnad, eds. 1993. *Internal Markets: Bringing the Power of Free Enterprise INSIDE Your Organization*. New York: John Wiley.
- Hart, Oliver. 1995. *Firms, Contracts, and Financial Structure*. Oxford: Oxford University Press.
- Hayek, Friedrich A. 1937. "Economics and Knowledge," in idem. 1948. *Individualism and Economic Order*. Chicago: University of Chicago Press.
- Hayek, Friedrich A. 1945. "The Use of Knowledge in Society," in idem. 1948. *Individualism and Economic Order*. Chicago: University of Chicago Press.
- Hayek, Friedrich A. 1946. "The Meaning of Competition," in idem. 1948. *Individualism and Economic Order*. Chicago: University of Chicago Press.
- Hayek, Friedrich A. von. 1948. *Individualism and Economic Order*, Chicago: University of Chicago Press.
- Hayek, Friedrich A. von. 1973. *Law, Legislation, and Liberty, Vol.1: Rules and Order*, Chicago: University of Chicago Press.
- Hayek, Friedrich A. von. 1974. "The Pretence of Knowledge," in idem. 1978. *New Studies in Philosophy, Politics, Economics, and the History of Ideas*. London: Routledge and Kegan Paul.
- Hirshleifer, Jack. 1956. "On the Economics of Effective Intracompany Pricing," *Journal of Business* 29: 172-184.
- Hurwicz, Leonid. 1972. "On Informationally Decentralized Systems," in Charles B. McGuire and Roy Radner. *Decision and Organization*. Amsterdam: North-Holland.
- Jensen, Michael C. and William H. Meckling. 1992. "Specific and General Knowledge and Organizational Structure," in Lars Werin og Hans Wijkander, eds. 1992. *Contract Economics*. Oxford: Blackwell.
- Kelley, Harold and John W. Thibaut. 1978. *Interpersonal Relations: A Theory of Interdependence*. New York: John Wiley.
- Kirzner, Israel M. 1973. *Entrepreneurship and Competition*. Chicago: University of Chicago Press.
- Kirzner, Israel M. 1992. *The Meaning of the Market Process*. London: Routledge.

- Klein, Daniel B. 1997. "Convention, Social Order, and the Two Coordinations," *Constitutional Political Economy* 8: 319-335.
- Klein, Peter. 1996. "Economic Calculation and the Limits of Organization," *Review of Austrian Economics* 9: 3-28.
- Kreps, David M. 1990. "Corporate Culture and Economic Theory," in James Alt and Kenneth Shepsle, eds. *Positive Political Economy*. Cambridge: Cambridge University Press.
- Kreps, David M. 1996. "Markets and Hierarchies and (Mathematical) Economic Theory," *Industrial and Corporate Change* 5: 561-595.
- Lachmann, Ludwig M. 1956. *Capital and Its Structure*. Kansas City: Sheed Andrews and McNeel.
- Lachmann, Ludwig M. 1971. *The Legacy of Max Weber*. London: Heineman.
- Lachmann, Ludwig M. 1976. "From Mises to Shackle: An Essay on Austrian Economics and the Kaleidic Society," in Don Lavoie, ed. 1994. *Expectations and the Meaning of Institutions: Essays in Economics by Ludwig Lachmann*. London: Routledge.
- Lachmann, Ludwig M. 1978. *Capital, Expectations, and the Market Process*. Kansas City: Sheed Andrews and McNeel.
- Langlois, Richard N. 1986. "Coherence and Flexibility: Social Institutions in a World of Radical Uncertainty," in Israel M. Kirzner, ed. 1986. *Subjectivism, Intelligibility, and Economic Understanding: Essays in Honor of Ludwig M. Lachmann*, London: Macmillan.
- Langlois, Richard N. 1992. "Orders and Organizations: Toward an Austrian Theory of Social Institutions," in Bruce Caldwell and Stephan Boehm, eds. 1992. *Austrian Economics: Tensions and New Directions*, Boston: Kluwer.
- Langlois, Richard N. 1998. "Personal Capitalism as Charismatic Authority: the Organizational Economics of a Weberian Concept," *Industrial and Corporate Change* 7: 195-214.
- Langlois, Richard N. and Foss, Nicolai J. 1998 "Capabilities and Governance: The Rebirth of Production in the Theory of Economic Organization," forthcoming in *KYKLOS*.
- Langlois, Richard N, and Paul L. Robertson. 1995. *Firms, Markets, and Economic Change: A Dynamic Theory of Business Institutions*. London: Routledge.
- Lavoie, Don. 1985. *Rivalry and Central Planning*, Cambridge: Cambridge University Press.
- Littlechild, Stephen and Guillermo Owen. 1980. "An Austrian Model of the Entrepreneurial Market Process," *Journal of Economic Theory* 23: 361-379.
- Loasby, Brian J. 1976. *Choice, Complexity, and Ignorance*. Cambridge: Cambridge University Press.
- Loasby, Brian J. 1991. *Equilibrium and Evolution*. Manchester: Manchester University Press.
- Loasby, Brian J. 1994. "Organisational Capabilities and Interfirm Relations," *Metroeconomica* 45: 248-265.
- March, James G. 1988. *Decisions and Organizations*, Oxford: Basil Blackwell.
- Maskin, Eric and Jean Tirole. 1997. "Unforeseen Contingencies, Property Rights, and Incomplete Contracts," *unpublished manuscript*.

- Menger, Carl. (1883/1985). *Investigations into the Method of the Social Sciences with Special Reference to Economics*. New York: New York University Press.
- Meyer, Christopher. 1994. "How the Right Measures Help Teams Excel," *Harvard Business Review* (May-June): 95-103.
- Milgrom, Paul. 1988. "Employment Contracts, Influence Activities and Efficient Organization Design," *Journal of Political Economy* 96:42-60.
- Mintzberg, Henry. 1994. *The Rise and Fall of Strategic Planning*. New York: Prentice-Hall.
- Nelson, Richard R. and Sidney G. Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge, Mass.: The Belknap Press.
- Nonaka, Ikujiro and Takeuchi. 1995. *The Knowledge-Creating Company*. Oxford: Oxford University Press.
- Nooteboom, Bart. 1992. "Towards a Dynamic Theory of Transactions," *Journal of Evolutionary Economics* 2: 281-299.
- O'Driscoll, Gerald P. and Mario Rizzo. 1985. *The Economics of Time and Ignorance*. Oxford: Blackwell.
- Penrose, Edith T. 1959. *The Theory of the Growth of the Firm*. Oxford: Oxford University Press.
- Richardson, George B. 1960. *Information and Investment*. Oxford: Oxford University Press.
- Sautet, Frederic. 1998. *An Entrepreneurial Theory of the Firm*. Ph.d.-dissertation, New York University.
- Schelling, Thomas. 1960. *The Strategy of Conflict*. Cambridge, MA: Harvard University Press.
- Schelling, Thomas. 1978. *Micromotives and Macrobehavior*. New York: Norton.
- Schotter, Andrew. 1981. *The Economic Theory of Social Institutions*. Cambridge: Cambridge University Press.
- Semler, Ricardo. 1989. "Managing Without Managers," *Harvard Business Review* (Sept.-Oct.).
- Shackle, George L.S. 1972. *Epistemics and Economics*. Cambridge: Cambridge University Press.
- Tirole, Jean. 1998. "Incomplete Contracts: Where Do We Stand?," forthcoming in *Econometrica*.
- Vanberg, Viktor. 1992. "Organizations as Constitutional System," *Constitutional Political Economy* 3: 223-253.
- Van Huyck, John, Raymond Battalio, and Richard Beil. 1990. "Tacit Coordination Games, Strategic Uncertainty, and Coordination Failure," *American Economic Review* 80: 234-248.
- Vaughn, Karen I. 1994. *Austrian Economics in America*, Cambridge: Cambridge University Press.
- Wernerfelt, Birger 1994. "An Efficiency Criterion for Marketing Design," *Journal of Marketing Research* 31: 462-470.
- Wernerfelt, Birger. 1997. "On the Nature and Scope of the Firm: A Adjustment Cost Theory," *Journal of Business* 70: 489-514.
- Williamson, Oliver E. 1970. *Corporate Control and Business Behavior*. Englewood Cliffs: Prentice Hall.

- Williamson, Oliver E. 1985. *The Economic Institutions of Capitalism*. New York: The Free Press.
- Williamson, Oliver E. 1996. *The Mechanisms of Governance*. Oxford: Oxford University Press.
- Witt, Ulrich. 1998. "Imagination and Leadership: The Neglected Dimension of the (Evolutionary) Theory of the Firm," *Journal of Economic Behavior and Organization*

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 resource-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 resources. 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.

DRUID Working Papers

- 96-1 **Lundvall, Bengt-Åke:** The Social Dimension of the Learning Economy. (ISBN 87-7873-000-7)
- 96-2 **Foss, Nicolai J.:** Firms, Incomplete Contracts and Organizational Learning. (ISBN 87-7873-001-5)
- 96-3 **Dalum, Bent and Villumsen, Gert:** Are OECD Export Specialisation Patterns Sticky?' Relations to the Convergence-Divergence Debate. (ISBN 87-7873-002-3)
- 96-4 **Foss, Nicolai J.:** Austrian and Post-Marshallian Economics: The Bridging Work of George Richardson. (ISBN 87-7873-003-1)
- 96-5 **Andersen, Esben S., Jensen, Anne K., Madsen, Lars and Jørgensen, Martin:** The Nelson and Winter Models Revisited: Prototypes for Computer-Based Reconstruction of Schumpeterian Competition. (ISBN 87-7873-005-8)
- 96-6 **Maskell, Peter:** Learning in the village economy of Denmark. The role of institutions and policy in sustaining competitiveness. (ISBN 87-7873-006-6)
- 96-7 **Foss, Nicolai J. & Christensen, Jens Frøslev:** A Process Approach to Corporate Coherence. (ISBN 87-7873-007-4)
- 96-8 **Foss, Nicolai J.:** Capabilities and the Theory of the Firm. (ISBN 87-7873-008-2)
- 96-9 **Foss, Kirsten:** A transaction cost perspective on the influence of standards on product development: Examples from the fruit and vegetable market. (ISBN 87-7873-009-0)
- 96-10 **Richardson, George B.:** Competition, Innovation and Increasing Returns. (ISBN 87-7873-010-4)
- 96-11 **Maskell, Peter:** Localised low-tech learning in the furniture industry. (ISBN 87-7873-011-2)
- 96-12 **Laursen, Keld:** The Impact of Technological Opportunity on the Dynamics of Trade Performance. (ISBN 87-7873-012-0)
- 96-13 **Andersen, Esben S.:** The Evolution of an Industrial Sector with a Varying Degree of Roundaboutness of Production. (ISBN 87-7873-013-9)

- 96-14 **Dalum, Bent, Laursen, Keld & Villumsen, Gert:** The Long Term Development of OECD Export Specialisation Patterns: De-specialisation and “Stickiness”. (ISBN 87-7873-014-7)
- 96-15 **Foss, Nicolai J.:** Thorstein B. Veblen: Precursor of the Competence-Based Approach to the Firm. (ISBN 87-7873-015-5)
- 96-16 **Gjerding, Allan Næs:** Organisational innovation in the Danish private business sector. (ISBN 87-7873-016-3)
- 96-17 **Lund, Reinhard & Gjerding, Allan Næs:** The flexible company Innovation, work organisation and human resource management. (ISBN 87-7873-017-1)
- 97-1 **Foss, Nicolai J.:** The Resource-Based Perspective: An Assessment and Diagnosis of Problems. (ISBN 87-7873-019-8)
- 97-2 **Langlois, Richard N. & Foss, Nicolai J.:** Capabilities and Governance: the Rebirth of Production in the Theory of Economic Organization. (ISBN 87-7873-020-1)
- 97-3 **Ernst, Dieter:** Partners for the China Circle? The Asian Production Networks of Japanese Electronics Firms. (ISBN 87-7873-022-8)
- 97-4 **Richardson, George B.:** Economic Analysis, Public Policy and the Software Industry. (ISBN 87-7873-023-6)
- 97-5 **Borrus, Michael & Zysman, John:** You Don’t Have to Be A Giant: How The Changing Terms of Competition in Global Markets are Creating New Possibilities For Danish Companies. (ISBN 87-7873-024-4)
- 97-6 **Teubal, Morris.:** Restructuring and Embeddeness of Business Enterprises-Towards an Innovation System Perspective on Diffusion Policy. (ISBN 87-7873-025-2)
- 97-7 **Ernst, Dieter & Guerrieri, Paolo:** International Production Networks and Changing Trade Patterns in East Asia: The case of the Electronics Industry. (ISBN 87-7873-026-0)
- 97-8 **Lazaric, Nathalie & Marengo, Luigi:** Towards a Characterisation of Assets and Knowledge Created in Technological Agreements: Some evidence from the automobile-robotics sector. (ISBN 87-7873-027-9)
- 97-9 **Ernst, Dieter.:** High-Tech Competition Puzzles. How Globalization Affects Firm Behavior and Market Structure in the Electronics Industry. (ISBN 87-7873-028-7)

- 97-10 **Foss, Nicolai J.:** Equilibrium vs Evolution in the Resource-Based Perspective: The Conflicting Legacies of Demsetz and Penrose. (ISBN 87-7873-029-5)
- 97-11 **Foss, Nicolai J.:** Incomplete Contracts and Economic Organisation: Brian Loasby and the Theory of the firm. (ISBN 87-7873-030-9)
- 97-12 **Ernst, Dieter & Lundvall, Bengt-Åke:** Information Technology in The Learning Economy – Challenges for Developing Countries. (ISBN 87-7873-031-7)
- 97-13 **Kristensen, Frank Skov.:** A study of four organisations in different competitive environments. (ISBN 87-7873-032-5)
- 97-14 **Drejer, Ina, Kristensen, Frank Skov & Laursen, Keld:** Studies of Clusters as a Basis for Industrial and Technology Policy in the Danish Economy. (ISBN 87-7873-033-3)
- 97-15 **Laursen, Keld & Drejer, Ina.:** Do Inter-sectoral Linkages Matter for International Export Specialisation? (ISBN 87-7873-034-1)
- 97-16 **Lundvall, Bengt-Åke & Kristensen, Frank Skov.:** Organisational change, innovation and human resource Development as a response to increased competition. (ISBN 87-7873-036-8)
- 98-1 **Præst, Mette.:** An Empirical Model of Firm Behaviour: A dynamic Approach to Competence Accumulation and Strategic Behaviour. (ISBN 87-7873-037-6)
- 98-2 **Ducatel, Ken.:** Learning and skills in the Knowledge Economy. (ISBN 87-7873-038-4)
- 98-3 **Ernst, Dieter.:** What Permits Small Firms to Compete in High-Tech Industries? Inter-Organizational Knowledge Creation in the Taiwanese Computer Industry. (ISBN 87-7873-039-2)
- 98-4 **Christensen, Jens Frøslev.:** The Dynamics of the Diversified Corporation and the Role of Central Management of Technology. (ISBN 87-7873-040-6)
- 98-5 **Valente, Marco.:** Laboratory for Simulation Development. (ISBN 87-7873-041-4)
- 98-6 **Valente, Marco.:** Technological Competition: a Qualitative Product Life Cycle. (ISBN 87-7873-042-2)

- 98-7 **Lam, Alice.:** The Social Embeddedness of Knowledge: Problems of Knowledge Sharing and Organisational Learning in International High-Technology Ventures. (ISBN 87-7873-043-0)
- 98-8 **Jørgensen, Kenneth M.:** Information Technology and Change in Danish Organizations. (ISBN 87-7873-044-9)
- 98-9 **Andersen, Esben Sloth:** Escaping Satiation in an Evolutionary Model of Structural economic Dynamics. (ISBN 87-7873-045-7)
- 98-10 **Foss, Kirsten:** Technological Interdependencies, Specialization and Coordination: A Property Rights Perspective on The Nature of the Firm. (ISBN 87-7873-046-5)
- 98-11 **Andersen, Poul H.:** Organizing International Technological Collaboration in Subcontractor Relationships. An Investigation of the Knowledge-Stickyness Problem. (ISBN 87-7873-047-3)
- 98-12 **Nymark, Søren:** Billeder af strategi i forandringsrige organisatoriske omgivelser: 3 cases fra DISKO studierne. (ISBN 87-7873-048-1)
- 98-13 **Andersen, Esben Sloth:** The Evolution of the Organisation of Industry. (ISBN 87-7873-050-3)
- 98-14 **Foss, Kirsten & Foss, Nicolai J.:** The Market Process and The Firm: Toward a Dynamic Property Rights Perspective. (ISBN 87-7873-051-1)
- 98-15 **Lorenz, Edward.** Societal Effects and the Transfer of Business Practices to Britain and France. (ISBN 87-7873-053-8)
- 98-16 **Ernst, Dieter.** Catching-Up, Crisis and Industrial Upgrading. Evolutionary Aspects of Technological Learning in Korea's Electronics Industry. (ISBN 87-7873-054-6)
- 98-17 **Kaisla, Jukka.** The Market Process and the Emergence of the Firm: Some Indications of Entrepreneurship Under Genuine Uncertainty. (ISBN 87-7873-055-4)
- 98-18 **Laursen, Keld.** Do Export and Technological Specialisation Patterns Co-evolve in Terms of Convergence or Divergence?: Evidence from 19 OECD Countries, 1971-1991. (ISBN 87-7873-056-2)
- 98-19 **Foss, Nicolai J.:** Firms and the Coordination of Knowledge: Some Austrian Insights. (ISBN 87-7873-057-0)

Information for subscribers.

Subscription price for 1997 is 600 DKR (about 20 papers). The rate for single issues is 40 DKR. It is possible to make a commitment to an exchange of papers from related departments or research teams. All correspondence concerning the DRUID Working Papers should be send to.

Pernille Wittrup
Fibigerstræde 4
DK-9220 Aalborg OE
Tel. 45 96 35 82 65
Fax. 45 98 15 60 13
E-mail: druid-wp@business.auc.dk