

# “Coase vs Hayek”: Economic Organization in the Knowledge Economy

**Nicolai J Foss**

*LINK*

Department of Industrial Economics and Strategy  
Copenhagen Business School  
Howitzvej 60; 2000 Frederiksberg; Denmark  
njf.ivs@cbs.dk  
<http://www.cbs.dk/staff/njf.html>

*12 September, 2000*

*5 January 2001*

*30 May 2001*

*21 August 2001*

## **Acknowledgments**

I am grateful to Kirsten Foss, Bruno Frey, Anna Grandori, Geoff Hodgson, Klaus Meyer, Margit Osterloh, Edwin Rühli, Ron Sanchez, seminar audiences at Universität Zürich, The Norwegian Business School, Bergen, Copenhagen Business School, Universität Freiburg, and two referees for comments on earlier versions of this paper.

# "Coase vs Hayek": Economic Organization in the Knowledge Economy

## **Abstract**

Many writers argue that economic organization will be strongly transformed in the emerging knowledge economy. Thus, authority relations will wither, or at least undergo significant changes; legal and ownership-based definitions of the boundaries of firms will become irrelevant; and there will be very few or no constraints on the set of feasible combinations of coordination mechanisms, as manifested in the increasing proliferation of "new organizational forms." The increased importance of specialist knowledge and the strategic imperative of rapidly adjusting to constantly changing contingencies mean that firms lose power over employees and that knowledge-based networks that cut across the boundaries of firms become as, or more, important as intra-firm relations. The present paper critically deals with these claims, beginning from the basic idea that they may be analyzed as turning on the implications for the Coasian firm of the Hayekian notion that the distributed and subjective character of economically relevant knowledge is a strongly binding constraint on the use of planned coordination. Based on organizational economics, it is argued that efficiency reasons for the existence of authority under Hayekian distributed knowledge may be given; that the increasing importance of knowledge assets does not render legal and ownership-based notions of the boundaries of the firm irrelevant; and that coordination mechanisms will also cluster in certain, predictable combinations in the emerging knowledge economy.

# I. Introduction

During the last decade, management academics have strongly stressed the role of organizational factors in the process of building knowledge-based strategies that will bring sustained competitive advantage (Nonaka and Takeuchi 1995; Grant 1996; Myers 1996; Brown and Eisenhardt 1998; Day and Wendler 1998).<sup>1</sup> Arguably, this emphasis is also reflected in managerial practice. Thus, firms are argued to adopt "network organization" (Miles and Snow 1992) and engage in "corporate disaggregation" (Zenger and Hesterly 1997), so as to become "information age organizations" (Mendelsson and Pillai 1999) that may build the "dynamic capabilities" required for competing in the knowledge economy. These changes with respect to the organization of economic activities take place in tandem with changes in the composition of inputs toward knowledge inputs, an increase of the "knowledge-content" in outputs, a stepping up of innovative activity, an increasing differentiation of demand, increasing globalization, and increasingly inexpensive networked computing — changes that are taken to indicate the emergence of the "knowledge economy" (Halal and Taylor 1998; Prusak 1998).

The present paper is an attempt to address economic organization in context of the emerging knowledge economy. Thus, it asks what are the implications for our understanding of issues relating to the scope and organization of alternative governance structures of the (presumed) facts that industries are becoming increasingly "knowledge-intensive,"<sup>2</sup> that an increasing share of the workforce is constituted by "knowledge workers," that commercially useful knowledge becomes increasingly distributed and needs to be accessed from several sources, many lying outside the boundaries of firms, etc.? In generic terms, I discuss the implications for the Coasian firm of the Hayekian notion that the distributed and subjective character of economically relevant knowledge is a strongly binding constraint on the use of planned coordination. Hence, the title of the paper.

Admittedly, significant analytical complexity is involved here. Moreover, any discussion of economic organization in the context of the emerging knowledge economy is unavoidably somewhat harmed by the lack of robust and clear definitions of, as well as a solid empirical knowledge base about, the "knowledge economy." However, understanding economic organization in the context of the emerging knowledge economy is an important challenge — for three reasons. *First*, it arguably concerns important real tendencies and phenomena with respect to economic organization — which so far have only received sporadic attention from economists of organization.<sup>3</sup> *Second*, it goes right to the heart of the crucial and

---

<sup>1</sup> However, the pedigree of this goes back a long time, including, for example, Burns and Stalker (1961).

<sup>2</sup> For empirical evidence, see Tomlinson (1999).

<sup>3</sup> By the "economics of organization" reference is made to principal-agent theory, incomplete contract theory, and transaction cost economics. Thus, on this definition, proponents of resource-based, knowledge-based, capabilities or evolutionary theories of the firm are not economists of organization.

perennial issues in the theory of economic organization, challenging us to rethink issues such as, What are the limits to resource allocation by means of authority? What do we mean by authority? What defines the boundaries of firms? How do we distinguish an independent contractor from an employee? These “classic” questions are pertinent ones, because it is an underlying theme in much recent work on economic organization in the knowledge economy that authority relations, the boundaries of firms and the way in which mechanisms for coordinating economic activities will undergo significant change under the impact of knowledge that is complex, controlled by specialists and distributed in character. *Third*, and closely related to the previous point, some writers on the knowledge economy (e.g., Boisot 1998; Helper, MacDuffie and Sabel 2000) argue that existing approaches to the economics of organization, such as transaction cost economics, are not capable of providing an adequate explanation of economic organization in the knowledge economy. To illustrate:

... firms are increasingly engaging in collaborations with their suppliers, even as they are reducing the extent to which they are vertically integrated with those suppliers. This fact seems incompatible with traditional theories of the firm which argue that integration is necessary to avoid the potentials for hold-ups created when non-contractible investments are made (Helper, MacDuffie and Sabel 2000: 443).

The following arguments and positions are developed in the paper. Admittedly, it is a justified complaint that post-Coasian organizational economics so far has not comprehensively addressed economic organization in the context of the knowledge economy. However, the insights developed in this body of thought are actually quite useful for framing the issues. Moreover, they help to temper — by making clear the limits of — more extreme claims about organization in the knowledge economy. Among such claims are that authority relations will strongly diminish in importance or at least change significantly in character (Zucker 1991); that ownership-based and legal definitions of the boundaries of firms will become increasingly irrelevant for understanding the organization of economic activities (Helper, MacDuffie and Sabel 2000); and that constraints on the space of feasible combinations of coordination mechanisms will be very significantly relaxed (Miles et al. 1991). In the following, such claims are all addressed and framed in the context of organizational economics, so as to examine their reach.

However, this does not mean that organizational economics can survive confrontation with the knowledge economy in a completely unchanged form. On the contrary, much work needs to be done with respect to understanding the importance of knowledge assets (cf. also Holmström and Roberts 1998), distributed knowledge (Aghion and Tirole 1997; Foss 1999), and environmental complexity (Athey et al. 1994) for organizational design.<sup>4</sup> Still, however, many of the basic insights and ideas survive and are very useful for the understanding of economic

---

<sup>4</sup> It is also true that organizational economics needs to develop a better understanding of external and (particularly) internal hybrids (Zenger 1997; Foss 2000a).

organization in a knowledge economy, including new organizational forms.<sup>5</sup> Thus, the basic aim of this paper is not theory building *per se*. It is rather to engage in a dialogue with those management academics who have written on organization in the emerging knowledge economy, and in this context to examine the reach of organizational economics.

## II. Economic Organization in the Knowledge Economy: Preliminary

In this section, some recent claims about how the advent of the knowledge economy will change economic organization are reviewed. In order to focus the discussion, six “interpretive propositions” are identified. These are intended to summarize influential, recent ideas on 1) the changing role of knowledge in production, 2) economic organization in the knowledge economy, and 3) how 1) and 2) are connected.

### **Some Recent Claims about Economic Organization in a Knowledge Economy**

Many disciplines, fields and sub-fields are involved in the ongoing discussion of efficient organization in the context of the emerging knowledge economy. Nevertheless, a number of distinct themes are discernible in much of the debate. Overall, a consensus seems to be emerging that tasks and activities in the knowledge economy need to be coordinated in a manner that is very different from the management of traditional manufacturing activities, with profound transforming implications for the authority relation and the internal organization and boundaries of firms. There are several reasons for this.

Because of the increasing importance in knowledge-intensive industries of combining knowledge inputs, sourcing knowledge for this purpose, and keeping sourcing options open, knowledge-based networks (Harryson 2000) increasingly become the relevant dimension for understanding the organization of economic activities. Such networks typically cut across the legal boundaries of the firm, for example, in the sense that inter-firm communication channels may have much greater bandwidth than intra-firm channels or that inter-firm coordination requirements are more severe between firms than within firms.<sup>6</sup> Networks are

---

<sup>5</sup> The paper thus provides a partial response to Daft and Lewin’s (1993) question, “Where are the theories of the ‘new organizational forms’?”.

<sup>6</sup> From such a position, the legal boundaries of the firm will only coincide with the boundaries of knowledge-based networks if considerations of appropriability, imposing a strong need for protecting knowledge, completely dominate considerations of sourcing knowledge from networks. More likely, however, the boundaries between markets and firms are fading into insignificance as generalized reciprocal knowledge exchange in communities of practice and other network forms, as well as hyper-competitive conditions, make knowledge protection issues less relevant: What will matter for long-run competitive advantage will not be the extent to which, for example, technical capabilities can be protected from imitation, but the dynamic capability to continuously source, integrate and recombine diverse knowledge inputs (D’Aveni 1994; Grant 1996).

particularly useful organizational arrangements for sourcing and transferring knowledge because of the costs of pricing knowledge (in a market) or transferring it (in a hierarchy) (Powell 1990: 304; Liebeskind et al. 1995: 7). The increased reliance on knowledge networks tends to erode authority-based definitions of the boundaries of the firm, because authority increasingly shifts to expert individuals who control crucial information resources and may not be employees of the firm. As Zucker (1991: 164) argues:

While bureaucratic authority is by definition located within the firm's boundaries, expert authority depends on the information resources available to an individual, and not on the authority of office. Thus, authority may be located within the organization ... but when an external authority market can provide information that leads to greater effectiveness, then authority tends to migrate into the market.

To the extent that important knowledge assets are increasingly controlled by employees ("knowledge workers") themselves, traditional authority relations are fading into insignificance. This is partly a result of the increased bargaining power on the part of knowledge workers (stemming from the control over critical knowledge assets) (Coff 1999), and partly a result of the increasingly specialist nature of knowledge work (Hodgson 1998a). The specialist nature of knowledge work implies that principals/employers become ignorant about (some of) the actions that are open to specialist agents/employees, thus making the exercise of authority through direction increasingly inefficient. The combined effect of the increased importance of knowledge assets that are controlled by knowledge workers themselves and of the increasingly specialist nature of knowledge work is to wreck the traditional economist's criterion of what distinguishes market transactions from hierarchical transactions (Zingales 2000). Thus, whether direction by means of order giving (Coase 1937; Simon 1951; Williamson 1985; Demsetz 1991) and backed up by the ownership of alienable assets (Hart and Moore 1990) obtains or not is increasingly irrelevant for understanding the organization of economic activities in a knowledge economy (Grandori 2000).

Not only does the emerging knowledge economy profoundly change the authority relation, and the boundaries of firms; it also influences the design of firms' internal organization, that is, their allocation of decision rights. As Miles et al. (1997: 7) argue:

Each major era in business history has featured a particular form of organization. Early hierarchical, vertically integrated organizations have largely given way to network organizations that link the assets and know-how of numerous upstream and downstream industry partners. A number of leading companies today are experimenting with a new way of organizing - the cellular form. Cellular organizations are built on the principles of entrepreneurship, self-organization, and member ownership. In the future, cellular organizations will be used in situations requiring continuous learning and innovation.

By suggesting that radical internal hybrids, “built on the principles of entrepreneurship, self-organization, and member ownership,” are emerging as stable organizational modes, this quotation (and others like it) suggests that mechanisms for coordinating economic activities are more combinable, and that the set of stable discrete governance structures is larger, than what is conventionally assumed in much of organization theory and in the economics of organization (e.g., Coase 1937; Williamson 1996).<sup>7</sup> These new governance structures are increasingly often referred to as “new organizational forms” (Daft and Lewin 1993; Zenger and Hesterly 1997). To the extent that new organizational forms represent new ways of combining mechanisms that have traditionally been seen as characteristic of governance structures that are polar opposites, they also exemplify the fading boundaries between markets and firms (Helper, MacDuffie and Sabel 2000).

### What Are We Talking About? Six Interpretive Propositions

In order to meaningfully discuss economic organization in a knowledge economy, there is a need for some conceptual clarification and some focusing of the issues. Most fundamentally, it is necessary to define the aspects of the knowledge economy that are most obviously relevant for an understanding of economic organization. Existing treatments emphasize such dimensions as increased knowledge content of outputs and the composition of inputs, hyper-competition and therefore the paramount importance of learning, decreasing corporate size, the importance of IT innovations, increasing differentiation of demand, increased general environmental complexity, increasing importance of networks for the transfer and production of knowledge, etc. (e.g., D’Aveni 1994; Nonaka and Takeuchi 1995; Grant 1996; Miles et al. 1997; Boisot 1998; Matusik and Hill 1998; Leadbetter 1999; Coombs and Metcalfe 2000; Zingales 2000).

Needless to say, dealing with all of this as it impacts on economic organization is a task of forbidding complexity. A narrowing of the issues is required. In order to do so, I submit that for *the purposes of understanding economic organization*, recent claims about the impact of the knowledge economy on organization may usefully be narrowed down to two basic propositions about knowledge in production and four basic propositions about economic organization.<sup>8</sup> The first set of assertions both turn on the increased importance of specialist knowledge:

**Proposition 1:** Because of the increased need for diverse, specialized knowledge in production, commercially relevant knowledge is becoming increasingly distributed in the Hayekian sense (e.g., Coombs and Metcalfe 2000).<sup>9</sup>

---

<sup>7</sup> See Grandori (2000) for a sophisticated argument that because both organization theory and organizational economics have put too much of an emphasis on discrete, stable, “consistent” governance structures, and too little on more micro-analytic coordination mechanisms (e.g., price, norms, authority, teams, etc.), the number of ways in which such mechanisms may be combined has been strongly under-estimated.

<sup>8</sup> The possible risk of constructing a strawman is admitted, and discussed in the Conclusion.

<sup>9</sup> “Distributed knowledge” is knowledge that is not possessed by any single mind and which may be private and tacit, but which it may nevertheless be necessary to somehow mobilize for

**Proposition 2:** Because of the increased importance of sourcing specialist knowledge, knowledge assets controlled by individual agents (“knowledge workers”) are becoming increasingly important in production (e.g., Boisot 1998).

For convenience, settings in which Propositions 1 and 2 hold true are characterized as “Hayekian.” Further narrowing of the issues is produced by the three following (related) propositions about economic organization in a knowledge economy — all of which may be found in recent writings:

**Proposition 3:** In the emerging knowledge economy, authority relations will become increasingly inefficient and insignificant means of allocating resources (e.g., Semler 1989; Hodgson 1998a).

**Proposition 4:** The boundaries of firms blur because of the increasing importance of knowledge networks that transcend those boundaries. Thus, while legal and ownership-based definitions of the boundaries of the firm may formally be made, they will be increasingly irrelevant from an economic (and strategic) perspective (e.g., Zucker 1991; Helper, MacDuffie and Sabel 2000).

**Proposition 5:** Coordination mechanisms will be combined in new, innovative ways, suggesting that these mechanisms are inherently combinable and not limited to being necessarily clustered in certain discrete governance structures (e.g., Grandori 1997; Helper, MacDuffie and Sabel 2000).<sup>10</sup>

Although these propositions are rather open-ended, they are open to theoretical treatment (and in principle to empirical test as well). Moreover, so is the final proposition:

**Proposition 6:** The effects described in Propositions 3 to 5 are driven by changes in the way in which knowledge enters into the productive process, as described in Propositions 1 to 2.

The strategy that I follow in the ensuing pages is that of critically discussing Proposition 3 to 6, taking Propositions 1 and 2 as *given* (i.e., accepted). In other words, I discuss the typically Coasian themes of authority, the boundaries of the firm, and the combinability of coordination mechanisms in the context of the

---

the carrying out of a productive task (Hayek 1945). Many writers have argued that such distributed knowledge is of increasing importance in an innovation-rich, knowledge-based economy (e.g., Ghoshal, Moran and Almeida-Costa 1995; Hodgson 1998a; Coombs and Metcalfe 2000). Grant (1996: 378) argues that Hayekian distributed knowledge is crucial to the understanding of organizational capabilities: “Although higher-level capabilities involve the integration of lower-level capabilities, such integration can only be achieved through integrating individual knowledge. This is precisely why higher-level capabilities are so difficult to perform.”

<sup>10</sup> By “coordination mechanisms” reference is made to a wide set of mechanisms for allocating resources, such as authority, norms, teams, prices, contracts, voting, etc. For an innovative overview, see Grandori (2001).

typically Hayekian setting in which knowledge is distributed and subjectively held (see *Figure 1*).

XXXXXXXXX *Insert Figure 1* XXXXXXXXX

The strategy is to discuss the role (if any) of authority in Hayekian settings, examine the connections between authority and ownership, and finally discuss how authority and ownership constrain the malleability and combinability of coordination mechanisms. Thus, as will become clear, the themes of authority, ownership, and the malleability of coordination mechanisms are strongly connected. These themes are addressed *seriatim* in the following.

### III. Authority in the Economics of Organization

The following is a discussion of the notion of authority as it appears in a few, crucial organizational economics contributions. The reason for focusing on what economists of organization have said about authority is that these scholars offer clear and stark interpretations of authority and that this paper is based on organizational economics. This is *not* to deny that much insight may be gained from the more encompassing classic discussions of Weber (1946, 1947), Barnard (1938), etc., and that economists of organization should pay more attention to these (cf. Aghion and Tirole 1997). However, at the present stage a more narrow and focused approach is appropriate, particular as the above propositions primarily relate to the relatively narrow notions of authority typically found in the works of organizational economist.

#### Coase, Simon and Wernerfelt

It is conventional to date the birth of organizational economics to Ronald Coase's 1937 paper, "The Nature of the Firm." This is justified by Coase's stress on market failure caused by transaction costs as the starting point for any explanation of firms, and by his contractual approach, comparative institutionalism, and clear identification of the main explanatory requirements of a theory of the firm (i.e., explaining the existence, boundaries, and internal organization of firms).<sup>11</sup> Coase also founded the widespread practice of identifying the firm with the employment contract; indeed, he puts much emphasis on the flexibility afforded by incomplete employment contracts and the authority relation as the ultimate reason for the existence of firms.<sup>12</sup> Thus, as Langlois and Foss (1999) have argued Coase's

---

<sup>11</sup> In other respects, however, Coase is not so obvious a precursor. For example, the emphasis in the modern economics of organization on incentive conflicts, including the hold-up problem (Williamson 1985; Hart 1995), as a main explanatory principle cannot be found in Coase's paper, as he has stressed himself (Coase 1988).

<sup>12</sup> "It may be desired to make a long-term contract for the supply of some article or service," Coase writes. "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. It may well be a matter of indifference to the person supplying the service or commodity which of several

explanation for the emergence of the firm is ultimately a coordination one: The firm is an institution that lowers the costs of qualitative coordination in a world of uncertainty.<sup>13</sup> The employment contract is explained in related terms, as "... one whereby the factor, for a certain remuneration (which may be fixed or fluctuating) agrees to obey the directions of an entrepreneur *within certain limits*. The essence of the power is that it should only state the limits to the powers of the entrepreneur. Within these limits, he can therefore direct the other factors of production" (idem.: 242).<sup>14</sup>

A later paper by Herbert Simon (1951) provided a formalization of Coase's notion of the employment relationship and a clarification of the notion of authority. The latter is defined as obtaining when a "boss" is permitted by a "worker" to select actions,  $A^0 \subset A$ , where  $A$  is the set of the worker's possible behaviors. More or less authority is then simply defined as making the set  $A^0$  larger or smaller. The model is basically a multi-stages game in the context of an incomplete contract with *ex post* governance: In the first period, the prospective worker decides whether to accept employment or not. Then nature intervenes, uncertainty is resolved, and the costs and benefits associated with the various possible tasks are revealed. Finally, the boss directs the worker to a task (see *Figure 2*).

XXXXXXXXX Insert *Figure 2* here XXXXXXXXX

To the extent that the boss cares about his reputation, he will not direct the worker to undertake tasks that lie outside the latter's "zone of acceptance," and there may thus be an equilibrium in the three-stages game.

A problem with Simon's paper is that he does not really address the issues in the manner of comparative contracting. Thus, the worker only has the choice of accepting or not accepting to work for the boss; the parties are not seen as choosing between an employment relation and *alternative* contractual arrangements for regulating a relation. In a recent contribution, Wernerfelt (1997) begins from Coasian and Simonian premises. By portraying governance mechanisms as gameforms (spot contracting, price lists, hierarchy) chosen to regulate trade Wernerfelt makes precise Coase's idea that the choice of a governance mechanism is

---

courses of action is taken, but not to the purchaser of that commodity or service. But the purchaser will not know which of these several courses he will want the supplier to take. Therefore, the service which is being provided is expressed in general terms, the exact details being left until a later date. ... The details of what the supplier is expected to do is not stated in the contract but is decided later by the purchaser. When the direction of resources (within the limits of the contract) becomes dependent on the buyer in this way, that relationship which I term a "firm" may be obtained (Coase 1937: 242-243).

<sup>13</sup> Apparently, some organization scholars disagree with this. Thus, Grandori (1997: 37) notes that it has been "well-documented" in organization studies that "... authority is not very effective in managing uncertainty." It will later be argued that this depends much on the context; for example, if strong interdependencies ("complementarities") between activities are involved, authority may be extremely effective for "managing uncertainty."

<sup>14</sup> See Hodgson (1998b) for an interesting critical discussion of Coase's notions of authority and the employment contract.

partly determined by the flexibility afforded by that mechanism and he extends Simon's analysis by explicitly comparing alternative mechanisms. Specifically, gameforms determine how players adapt to changes in the environment and communicate about these changes. Wernerfelt's conjecture is that these different gameforms will be systematically characterized by different levels of costs of making adaptations. For example, in the case of the hierarchy, the employer and the employee avoid the costs of negotiating either a very complex agreement or a series of short-term contracts. Instead, the parties negotiate a once-and-for-all wage contract. In this context, authority is simply an implicit contract which states that one of the parties should have the authority to tell the other what to do (as in Coase 1937). This game-form requires less bargaining over prices than the market game-form, and is selected to save on communication (adaptation) costs. The agreement to play by the least costly adaptation-mechanism is upheld by the parties' concern for reputation in a repeated game.<sup>15</sup>

To sum up, in the Coase-Simon-Wernerfelt (henceforth, "CSW") view of authority, the action space is well-defined and known both to the "boss" and the "worker," the boss observes those states of nature to which it is necessary to react (e.g., a realization of demand on the firm's product markets), he possesses the right to direct the worker, and the worker obeys the boss' instructions "within limits."

### **The Puzzling Notion of Authority**

The CSW view of authority raises several puzzles. In the present context, four such puzzles are particularly relevant:

1. What is ultimately the source of the employer's authority? In other words, why exactly is it that the employee accepts to be directed? These are pertinent questions given that slavery is prohibited (i.e., human assets are inalienable).
2. What happens to CSW view if the employer does not possess full knowledge of the employee's action set (i.e., the actions that he can take when uncertainty is resolved), so that the employee can take actions about which the employer has no knowledge? (In other words, the employer suffers from "sheer ignorance" in the sense of Kirzner 1997).
3. What happens to the CSW view of authority if the employee is better informed than the employer with respect to how certain tasks should (optimally) be carried out? In the CSW view there is an implicit assumption that the employer is at least as well informed, and presumably better, about the efficiency implications of alternative actions.<sup>16</sup>

---

<sup>15</sup> Williamson's (1975, 1985, 1996) work adds to these notions of authority by stressing that different bodies of law apply to different kinds of transactions, the implicit contract law of internal governance being that of forbearance. See Masten (1991) and Vandenberghe and Siegers (2000) for illuminating discussions of these issues. Wang and Zhu (2000) formalize Williamson's idea.

<sup>16</sup> This is explicitly argued in Demsetz (1988) and Conner and Prahalad (1996).

4. What happens to the CSW view if employees control knowledge assets that they cannot, or will not, alienate (sell, transfer), and which may give them substantial bargaining power so that they cannot automatically be assumed to obey instructions?

The last three questions relate to the issue of the limits of authority in Hayekian settings, while the first question asks about the sources of the employer's bargaining power over the employee.<sup>17</sup> Only the first question has been given extensive treatment in the economics of organization. In fact, it has been one of the classic points of contention in a long-standing debate in economics, one that was initiated by Alchian and Demsetz (1972). They argue that it is not meaningful to assume that an employer can force an employee to do what the employer wants in the absence of coercion.<sup>18</sup> An implication of this view is that the distinction between the authority-based and the price-based modes of allocation emphasized by Coase (1937) is superficial. One may perhaps talk about a nexus of contracts being more "firm-like" when continuity of association among input owners increases and/or residual claimancy becomes more concentrated, but it is not in general useful to talk about "firms" as distinctive entities. In reality, they argue, there is no economic difference between "firing" one's grocer and firing one's secretary.<sup>19</sup>

### Authority and Ownership

One response to the nexus of contracts view is that there are in fact fundamental economic differences between firms and markets, because the law makes an explicit distinction between market transactions and employment transactions — a distinction that makes the incentives faced by the parties to the relevant transactions differ (Masten 1991), and provides an economic role for authority (Vandenberghe and Siegers 2000). However, the work of Oliver Hart and others (Grossman and Hart 1986; Hart 1995, 1996; Hart and Moore 1990) — called the incomplete-contracts literature — provides an approach to the understanding of authority that is not dependent on legal considerations of this kind. In one important respect this approach differs from all earlier treatments of authority: Whereas Weber, Coase, Barnard, Simon, etc. focus on direct authority over (non-alienable) human assets, the incomplete contracts literature rather explain authority over human assets as something that is *indirectly* acquired through authority (ownership) over alienable assets. Since use will be made of this kind of reasoning later, it is worth briefly examining it.

Contributors to the incomplete contract literature distinguish two basic types of decision rights ("property rights"): specific rights and residual rights. The latter are generic rights to make decisions in circumstances not spelled out in the contract, and imply the ability to exclude other agents from deciding on the use of certain

---

<sup>17</sup> However, as will become apparent later, the four questions are closely related.

<sup>18</sup> Relatedly, Barnard (1938) argued that for authority to be effective, it has to be accepted.

<sup>19</sup> Note that this "nexus of contracts" position is remarkably close to the position that in a knowledge-based economy, the firm/market boundary is unclear and the notion of authority elusive at best, although its conceptual basis is rather different.

assets. Residual control rights are conferred by legal ownership.<sup>20</sup> In contrast, specific rights are allocated through contract terms. If contracts were complete, all rights would be specific, and there would be no residual rights. Two kinds of assets are distinguished, namely alienable (i.e., non-human) and non-alienable (i.e., human) assets. Given this, the distinction between an independent contractor and an employee (i.e., between an inter-firm and an intra-firm transaction) now turns on who owns the non-alienable assets that an agent (whether independent or employee) utilizes in his work. An independent contractor owns his tools etc., while an employee does not. The importance of asset ownership derives from the fact that the willingness of an agent to undertake a *non-contractible* investment (say, exertion of effort or investment in human capital), which is specific to the asset, depends on who owns the asset.

As in Alchian and Demsetz, the parties to a relation — whether customer and grocer, or employer and employee — are seen as being in a bargaining situation, each having an outside option. Although the parties in the specific models that are analyzed always reach an efficient agreement, the division of the surplus from the relation will nevertheless depend on who owns the alienable assets in the relation, since the pattern of ownership will influence the parties' outside options. For example, if the employer owns all the alienable assets, the employee can still quit if he dislikes the employer's orders (as in Alchian and Demsetz), but he cannot take the assets with him, and the employer can ensure that if the employee leaves, somebody else can take over the job. Thus, as Hart (1996: 379) explains, "... an employer's authority is represented not by the ability to force an employee to do what s/he wants, but rather by the ability to obtain a substantial share of the *ex post* surplus from the relationship through the control of non-human assets." Efficiency considerations then suggest that authority (i.e., ownership to the alienable assets) should be allocated to the agent who makes the most important (non-contractible) relation-specific investment. Thus, in an elegant manner, Hart (and his colleagues) link together the issues of the boundaries of the firm (which are defined in terms of ownership of alienable assets) and authority.<sup>21</sup> However, this only provides an answer to the first of the four puzzles above. The remaining three are discussed in the next section.

---

<sup>20</sup> For a critique of these aspects of the incomplete contract literature, see Foss and Foss (2001).

<sup>21</sup> Although the property rights approach of Hart and Moore succeeds in adding an important component to the understanding of authority, and provides a strong answer to the Alchian and Demsetz denial of authority being a useful concept, arguably it doesn't succeed in giving a full explanation of the employment contract, or the firm. For example, the bargaining power possessed by a principal who owns the complementary physical assets in a relation may be exercised over an employee *or* it may be exercised over a legally independent party who just happens to have given up ownership of alienable assets to strengthen incentives (i.e., vertical quasi-integration) (Foss and Foss 2001). In other words, there is no one-to-one correspondence between the firm and the Hart understanding of the exercise of authority. In fact, as Bengt Holmström (1999: 87) has recently argued, the incomplete contracts literature "... is a theory about asset ownership by individuals rather than by firms."

## IV. Authority: The Challenge of the Knowledge Economy

So far, the debate in organizational economics has almost exclusively centered on the problem of providing explanations of what it is that makes the employer able to direct the employee and whether this differs fundamentally from market exchange. In contrast, the knowledge-related puzzles, made increasingly relevant by the emergence of the knowledge economy, have not been given much attention. The problem of what happens to the CSW notion of authority when agents are better informed than principals about how certain tasks should be carried out, the principal is ignorant about certain actions that the agent may take, or agents have considerable bargaining power because of their control over knowledge assets, is not necessarily one of “asymmetric information,” as this is understood in information economics. In a typical asymmetric information problem, an uninformed agent knows what he is uninformed about (e.g., the precise quality of a car). However, this excludes ignorance and how ignorance may be overcome through processes of discovery (Kirzner 1997; Foss 1999; Sautet 2000). A possible interpretation of the claim that authority relations will be transformed, and perhaps vanish, in the emerging knowledge economy is that these relations will break down under the impact of principals becoming increasingly uninformed about the actions open to agents and *at the same time* becoming increasingly reliant on the knowledge controlled by agents. These are the characteristics of Hayekian settings.

### Hayek on Distributed Knowledge

Arguably, Hayek was the first to frame the issue of how to make best use of distributed knowledge (1945: 77-78; see also Hayek 1937, 1946, 1968). As he explained:

The economic problem of society is ... 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.

The dating of the Hayek paper reveals that the problem of making optimal use of distributed knowledge is not a novel one, only brought about by the emergence of the knowledge economy; in fact, *any* complex social system confronts it (Hayek 1964). Arguably, however, the problems posed by Hayekian distributed knowledge have become increasingly pressing for firms (cf. Cowen and Parker 1997; Sautet 2000). Thus, because of the increased importance of specialist workers and the increased knowledge-intensity of production, coping with the problem posed by Hayekian distributed knowledge has moved from being a problem for socialist managers and *dirigiste* bureaucrats to also being a problem confronted by managers of (at least large) firms in capitalist economies. In fact, many of those who argue that organization in the knowledge economy will differ significantly from previous mode of organizing explain this by something like the Hayekian perspective on

distributed knowledge, either explicitly or implicitly (e.g., Hodgson 1998a).<sup>22</sup> Thus, like Hayek they are implicitly making the claim that dispersed knowledge poses an organizational problem because it is prohibitively costly to centralize all relevant knowledge.<sup>23</sup>

Hayek's well-known point is that a market system (but not a socialist one) promotes a tendency towards allocating property rights to those who can make best use of them. More precisely, a system with alienable property rights solves simultaneously both the assignment and the moral hazard problem. However, firms are different in that they don't solve these problems spontaneously. This is not only a matter of the moral hazard problem of making optimal use of decision rights being more severe in firms than in markets (Jensen and Meckling 1992). It is also a matter of firms not being able to rely (to the same extent) on the market's ability to spontaneously allocate resources towards highest-valued ends. Thus, within firms resources are directed (to a larger extent than in markets), and motivation of employees is engineered (to larger extent than in markets). From a Hayekian perspective, firms would seem to be inherently disadvantaged relative to markets, for firms encounter a fundamental problem that markets do not, namely

... the problem which any attempt to bring order into complex human activities meets: the organizer must wish the individuals who are to cooperate to make use of knowledge that he himself does not possess" (Hayek 1973: 49)

The fact that firms do exist is *prima facie* evidence that they can somehow cope with the problem and/or that there are offsetting benefits of firm organization.<sup>24</sup>

### **Distributed Knowledge, Delegated Rights, and Authority**

How may the Hayekian knowledge-problem be handled in firms? One obvious way is to *suppress* distributed knowledge as far as possible by discouraging local initiative, indoctrinating employees harshly, and operating with rigid routines and operating procedures.<sup>25</sup> The archetypal "machine bureaucracy" fits this overall

---

<sup>22</sup> Clearly, there are other reasons why economic organization may differ in the emerging knowledge economy. For example, to the extent that innovative activity strongly increase in the knowledge economy (Brown and Eisenhardt 1998; Coombs and Metcalfe 2000) and to the extent that the production of new knowledge requires intrinsic motivation rather than extrinsic motivation (Osterloh and Frey 2000; Osterloh and Frost 2000), this may require changes in the distribution of decision rights and reward schemes in organizations. Such changes don't turn on the Hayekian problem of distributed knowledge *per se*.

<sup>23</sup> Hayek (1945) is reprinted in Myers' (1996) collection of classics in knowledge management.

<sup>24</sup> Such as the superior ability of firms to organize transactions characterized by high-levels of relation-specific investments (Williamson 1985, 1996; Grossman and Hart 1986; Hart and Moore 1990).

<sup>25</sup> Marglin (1974) tells such a story of the emergence of capitalist authority (although one whose Marxian pedigree makes it strongly differ from the Hayekian emphasis on dispersed knowledge): A thoroughgoing de-skilling of labor was required before capitalist relations could triumph.

characterization.<sup>26</sup> However, to the extent that competition is increasingly knowledge-based, this is a self-defeating strategy. According to a hugely influential perspective, successful organizational learning (which fosters new products, processes and organization) is a matter of balancing processes of exploiting existing resources with processes of exploring new ways of combining, acquiring, building, etc. resources (March 1991). Suppressing distributed knowledge is tantamount to suppressing exploration; thus, firms must devise ways to cope with Hayekian distributed knowledge. However, coping with distributed knowledge inevitably seems to lead in the direction of decentralization, as Hayek (1945: 83-84) forcefully argued:

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 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.

Coping with distributed knowledge would thus seem to require extensive delegation of rights. In fact, there is an argument that under Hayekian distributed knowledge, *de facto* delegation of rights *already* obtains. Thus, the formal right to decide need not confer effective control over decisions, as Aghion and Tirole (1997) point out with a bow to Max Weber. Thus, real authority is already largely determined by the structure of information in the organization, including the distribution of Hayekian dispersed knowledge. Of course, agents who possess local knowledge may be subject to the exercise of authority by uninformed hierarchical superiors, but this is likely to harm incentives.<sup>27</sup> Thus, in Aghion and Tirole (1997), an increase in the agent's real authority is assumed to lead to control losses from the point of view of the principal but also to promote initiative; efficient organization strikes value-maximizing trade-off. It is apparent that Hayekian distributed knowledge has important for understanding internal organization, such as the adoption of internal hybrids in the form of project- or team-based organization, "molecular forms," "cellular organizations," etc.<sup>28</sup>

---

<sup>26</sup> By emphasizing knowledge transfer in firms, knowledge management techniques may also be said to reduce the distributed character of knowledge in firms.

<sup>27</sup> Here is a further limitation to the use of authority. As Frey (1997) argues, both the use of incentive instruments and authoritative direction may harm intrinsic motivation. Osterloh and Frey (2000) and Osterloh and Frost (2000) explore some of the organizational implications of this. For an earlier treatment from a sociological position, see Baron (1988).

<sup>28</sup> The basic conclusion in such a perspective is that decision rights should be delegated in such a way that the benefits of delegation in terms of better utilizing local knowledge are balanced against the costs of delegation in terms of agency losses (Jensen and Meckling 1992; Jensen and Wruck 1994; Aghion and Tirole 1997; Foss and Foss 2000). An interpretation of much of the contemporary emphasis on internal hybrids, such as team-organization, "molecular forms", and other manifestations of organizational delegation and decentralization, is that these are

However, while a Hayekian perspective is informative for understanding internal hybrids, it does not answer the puzzle why such hybrids are at all organized *inside* firms. Because they are organized inside firms, they are subject to the exercise of, at least formal, authority. Being overruled by formal hierarchical superiors may harm motivation. Thus, moving teams out of firms would seem to yield net benefits, since incentives would be strengthened.<sup>29</sup> In fact, spin-offs, carve-outs, and the like may be explained in these terms, so we should ask why not all internal hybrids are spun-off. Adding to the puzzle is that authority in the sense of Coase, Simon and Wernerfelt appears to play at best a very limited role under Hayekian dispersed knowledge. This is because the Coase/Simon notion of authority assumes that a directing principal is at least as knowledgeable about the relevant tasks as the agent being directed.

The ownership-based notion of authority developed by Hart also seems to play only a limited role under Hayekian distributed knowledge. There are several reasons for this. First, in Hart's framework all residual decision-making power is concentrated in the hands of the owner/manager, whereas in actuality delegation often amounts to delegating at least some residual decision rights to hierarchical subordinates (e.g., division managers). Implicitly, the notion that, on the one hand, there are rights that may be clearly specified in a contract and allocated to another party, and that, on the other hand, there are rights that cannot at all be specified in a contract but can only be allocated to a single party through asset ownership, means that the only room left for delegation is that agents receive well-specified rights to carry out well-specified actions. However, this implies that if agents can take actions about which principals have no knowledge or are better informed about how certain actions should be carried out, the superior knowledge of agents cannot be utilized.

A second reason why Hartian ownership-based authority may be increasingly irrelevant under Hayekian distributed knowledge is that the assets that in Hart's scheme confer authority are physical assets (Hart 1995). However, as many writers have emphasized an important aspect of the knowledge economy is exactly that physical assets are of strongly waning importance (Myers 1996; Boisot 1998; Neef 1998). Of course, the implication is that ownership over such assets is an increasingly ineffective source of bargaining power and that, therefore, authority must wane as bargaining power increasingly becomes more symmetrically distributed over the owners of knowledge assets.

### **Authority — and Authority**

The reasoning so far seems to lead to an acceptance of Proposition 3 (i.e., "In the emerging knowledge economy, authority relations will become increasingly

---

prompted by a pressure to delegate decision rights and structure reward schemes in such a way that optimal trade-offs are reached (Zenger 1997; Zenger and Hesterly 1997).

<sup>29</sup> In fact, some writers draw what appears to be the logical consequence of a Hayekian starting point, and flatly argue that only firms that explicitly emulate market organization to the largest possible extent can survive and prosper in the knowledge economy (Cowen and Parker 1997).

inefficient and insignificant means of allocating resources”). Authority — in the sense of economists of organization such as Coase, Simon, Wernerfelt and Hart — is stretched beyond its limits by the increasing importance of Hayekian settings. Grandori (1997: 35) points out the limits of the CSW view of authority:

... whatever its basis, authority is a feasible governance mechanism only if information and competence relevant to solving economic action problems can be transferred to and handled by a single actor, a positive “zone of acceptance” exists, the actions of other supervised actors are observable, and if the system is not as large as to incur an overwhelming communication channel overload and control losses.

Of course, whether all these conditions obtain is an empirical question. What many proponents of the argument that the knowledge economy will radically transform economic organization implicitly assert is that these conditions are increasingly less likely to hold.

However, a main problem with the argument that authority will become increasingly inefficient and therefore increasingly less prevalent as a coordination mechanism (i.e., Proposition 3) is that it implicitly accepts a narrow interpretation of what authority is, namely the CSW view. The same is true of the Grandori quotation above. The CSW view is narrow, because, for example, it explicitly implies that the boss performs a detailed direction of the worker’s actions, based on a complete knowledge of the worker’s action set, and because it implicitly asserts that the boss is always at least as, or more, knowledgeable about what actions should optimally be carried out. However, these conditions are not strictly necessary for authority in the broader sense of directing somebody to do something, for example, backed on some superior bargaining power.

For example, in many firms decision rights are allocated by the top-management team and the board of directors to lower levels, presumably in order to better cope with the distributed knowledge (Jensen and Meckling 1992). However, typically these rights are circumscribed. For example, the right to use an asset in certain ways may be delegated; however, it is understood that that right does not entail the right to use the asset in the service of a competitor firm. Thus, decision rights are delegated in firms, but they are delegated as means to an end (Hayek 1973); their use is monitored (Jensen and Meckling 1992), and top-management reserves ultimate decision rights for itself (Baker, Gibbons, and Murphy 2000). This suggests that authority in the sense of direction and centralized decision-making — which does not necessarily require detailed knowledge about a subordinate’s knowledge or available actions — may persist in Hayekian settings. The following section discusses this in greater detail.

## V. Authority in Hayekian Settings

## **Authority in the Presence of Hidden Knowledge**

This section examines the role of authority, understood in the broad sense of direction, in a Hayekian setting of distributed knowledge. Distributed knowledge is here approximated by “hidden knowledge” (Minkler 1993) in principal-agent relations. That is, it will be assumed that the problem facing an principal is not just that she is uninformed about what state of nature has been revealed or of the realization of the agent’s effort (i.e., hidden information), as in the standard agency paradigm. Rather, the agent’s knowledge is superior to that of the principal with respect to certain production possibilities (i.e., hidden knowledge). The principal may be ignorant about some members of the set of possible actions open to the agent, or the agent may be better informed than the employer with respect to how certain tasks should (optimally) be carried out, or both. The setting is one of incomplete contracts, so authority refers to the giving of direction in situations about which contracts are silent. Given this, the issue is whether it is possible, under hidden knowledge, to make sense of authority in the sense of direction on grounds of efficiency. It turns out that it is indeed possible to explain the presence of authority in such a setting. The key variables are 1) the urgency of decisions and, what is often the other side of the coin, the wish to avoid duplicative effort (Bolton and Farrell 1990), 2) decisive information (Casson 1994), 3) economies of scale in decision-making (Demsetz 1988; Hermalin 1998), and 4) the setting of incentives and the curbing of externalities (Holmström 1999). These are discussed in the following.

### **Urgency and Duplication Avoidance**

While Hayek (1945) did much to identify the benefits of the price with respect to coping with the problems introduced by distributed knowledge and unexpected disturbances, he arguably neglected those situations where efficiency requires that adaptation be “coordinated” rather than “autonomous” (Williamson 1996). Coordinated adaptation or action may be required when actions or activities are complementary (Milgrom and Roberts 1990; Kirsten Foss 2000). Coordination problems are examples of this. In game-theoretic parlance, these problems obtain when there are more than one equilibrium in pure strategies. Examples are Schelling’s famous where-to-meet problems (Schelling 1960) or the choice of standards, such as which side of the road to drive in. Game theory demonstrates that even in extremely stylized and simple, but still decentralized, settings with players possessing perfect reasoning capabilities and common knowledge, they may still be unable to coordinate their independently taken actions or only coordinate these after costly trials and errors. Authority may be a least-cost response to such problems (Foss 2001).

In order to isolate the costs and benefits of centralized and decentralized decision-making in a specific context, Bolton and Farrell (1990) study a coordination problem with private information in the setting of a natural monopoly market. The coordination problem concerns who should enter the market when costs are sunk and are private information. Under decentralization, which is represented as a two-period incomplete information game of timing (sink costs/enter or wait another period), each firm is uncertain about whether the other firm will enter. However,

the incentive to enter depends on the height of a given firm's cost, low-cost firms being less worried that their rival will enter (and *vice versa*). If costs are sufficiently dispersed, the optimal outcome prevails, that is, the lowest-cost producer enters and preempts the rival(s). However, if costs are equal or are high for both, inefficiencies may obtain, since firms will then enter simultaneously (inefficient duplication) or will wait (inefficient delay).

Enter a central authority whose job is to nominate a firm for entry. In the spirit of Hayek, Bolton and Farrell assume that this central authority cannot possess knowledge about costs. In their model, s/he nominates the high cost producer half of the times, which is clearly inefficient. However, this cost of centralization should be compared against the costs of decentralization (delay and duplication). Bolton and Farrell show that "... the less important the private information that the planner lacks and the more essential coordination is, the more attractive the central planning solution is" (1990: 805). Moreover, the decentralized solution performs poorly if urgency is important. Centralization is assumed to not involve delay and therefore is a good mechanism for dealing with emergencies, a conclusion they argue is consistent with the observed tendencies of firms to rely on centralized authority in cases of emergencies.<sup>30</sup>

The inefficiencies under decentralization (duplication, delay) that Bolton and Farrell point to may arguably be particularly relevant for much "knowledge-intensive" production. This is because much of this production is "pooled" rather than "sequential" or "reciprocal" in the terminology of Thompson (1967), that is, involve relatively decentralized efforts aiming at a common end. For example, research-based organizations where much production takes place in decentralized project-groups may be an example. A centralized authority may be necessary to give to priority to certain projects rather than other, even though that authority is basically very ill informed about the projects.<sup>31</sup>

### **Decisive Information**

Even under distributed knowledge, where the centralized decision-maker per definition does not possess (at least some) local information, s/he may in many cases still hold the information that is *decisive*. Intuitively, information is decisive when actions taken on the basis of such knowledge impacts strongly on the firm's payoffs. According to Casson (1994), the extent to which a productive task involving the knowledge of several individuals has decisiveness features and the cost at which knowledge can be communicated helps to explain the allocation of decision rights. For example, if supply conditions (changing technologies and/or input prices) are more volatile than demand conditions (changing sales and/or tastes), it may pay to investigate supply before investigating demand. In fact, if

---

<sup>30</sup> Although Bolton and Farrell don't note this, the example is vulnerable to the critique that the two firms may enter a court-enforceable contract that let entry depend on the flipping of a coin. However, in many realistic situations, particularly when urgency is involved, contracts may not be court-enforceable or the potential delay introduced by using the court system may be intolerable.

<sup>31</sup> For a concrete example, namely the Danish hearing aids producer, Oticon, see Foss (2000).

supply volatility is considerably much higher, it may be evident what the firm should do in terms of its output and pricing decisions without checking demand conditions. In both cases, information about supply is decisive (and more so in the latter case). Note that decisiveness in the examples suggests that decision rights should be allocated towards to the production side of the firm. The more general principle is that decision rights will tend to be concentrated in the hands of the individual who has access to the decisive information, and particularly so the more costly it is to communicate this information.

This means that there may be a role for authority under hidden knowledge, namely when the latter is not decisive, it is costly to communicate the knowledge that is decisive, and if the consequences of an incorrect decision are expected to be small relative to the costs of communicating the knowledge. In contrast, extensive information-sharing is only necessary if each party holds information which is highly likely to be decisive or if the costs of not making the correct decision if lacking some of the tacit information are high. In that case, knowledge transfer and delegation of decision rights are likely to characterize the organization.

### **Economies of Scale**

Demsetz (1988) argues that economies of scale in managing are a neglected factor in the explanation of the existence of firms and the understanding of authority, but doesn't spell out the underlying reasoning. However, the relevant economies may relate both to managing the internal relations between agents inside the firm and managing relations to outside agents (customers, suppliers, government agencies) (Hermalin 1998). Not only may there be scale economies in such activities; there may also be substantial learning economies. Other agents may be happy to let a central agent incur the effort costs of negotiating, learning about potential suppliers, etc., and compensate him accordingly. At first glance, this only explains why a team may hire a "consultant"; it does not explain why this consultant should have any authority (Foss 1996). However, as will be argued later, it may pay to give the consultant authority to the extent that he risks being held up by the other agents to whom he specializes his human capital. Giving the "consultant" authority is tantamount to giving him ownership to the firm's alienable assets.

### **Setting Incentives and Curbing Externalities**

As pointed out earlier, Hayekian distributed knowledge poses special problems for the use of monitoring mechanisms and incentive pay, as these as discussed in the mainstream agency literature (e.g., Holmström 1979) (Minkler 1993; Aghion and Tirole 1997; Foss 1999; Foss and Foss 2000). Minkler (1993: 23) argues that "... if the worker knows more than the entrepreneur, it is pointless for the entrepreneur to monitor the worker," which implies that to the extent that monitoring is a precondition for the exercise of direction, using the authority mechanism also seems to become "pointless." In the extreme case, both the agent's type and actions may be fully observable by the principal but the latter may still not understand the full set of production possibilities open to the agent (all in contrast

to the standard agency paradigm). Clearly, in that extreme case, the problem is to design a contract that 1) allows the agent to use his superior knowledge *ex post*, and 2) gives him the incentive to do so efficiently. This will typically amount to allocating decision rights as well as rights to residual income streams to the agent, which indeed are key features of many new organizational forms.<sup>32</sup>

However, even under hidden knowledge, there may still be a role for authority. For example, Foss and Foss (2000) construct a hidden knowledge model in which the principal can, however, form conjectures of the payoffs that result from the agent's activities (even though the principal cannot observe and fully understand these activities). The payoffs are assumed to be related in a simple manner to the amount of discretion that is left to the agent. It can then be shown that the surplus from the relation may be maximized by choosing degrees of discretion that differ from those the agent would have preferred if he were completely on his own. The power to choose these levels of discretion (i.e., the exact delegation of decision rights) stems from the principal's ownership of the assets in the relation.

More broadly, the ability of a principal to form conjectures with respect to an agent's output even under hidden knowledge — what Knight (1921) called “judgment” — and enter into formal or informal contracts over this, imply that limited notions of monitoring and incentive pay may still have a role to play. For example, so-called “forcing contracts,” in which, for example, a bonus is paid only if a certain threshold of output is reached may work under hidden knowledge. Subjective forms of performance assessment may be workable to the extent that the principal can form estimates of the level of output that can “reasonably” be expected of the agent.<sup>33</sup> Even softer forms of incentive instruments — such as norms and the provision of intrinsic motivation — are arguably particularly important under hidden knowledge (see Jensen and Wruck 1994; Osterloh and Frey 2000; Frost and Osterloh 2000).

In a somewhat speculative vein, it may be argued that the greater the departure from very simple settings where employees, undertaken routinized tasks, are very easily monitored and the harder we make it to find out what the employee can deliver and actually delivers, the more likely is it that an employer will choose to rely on multiple incentive instruments to influence employee behavior (Henderson 2000). Under these circumstances, a key managerial task is to “balance” incentive instruments (Holmström 1999), that is, design and maintain coherence between the various ways in which an employee may be motivated so that negative

---

<sup>32</sup> The problem and its solution are of course subtler than what this suggests. The precise arrangements may also involve the payment of a lump sum from the agent to principal (as in franchising relationships), and it will be shaped by the risk-preferences of the parties and whether liquidity constraints are present or not.

<sup>33</sup> See Prendergast (1999) for an argument that higher environmental uncertainty may lead to more performance pay (contrary to mainstream agency theory), because it complicates input monitoring.

spill-over effects between these ways are minimized.<sup>34</sup> In a dynamic economy, maintaining coherence between such instruments may be a recurrent task. Economies of scale in this task may dictate that this activity is centralized. Moreover, centralization is required to the extent that externalities arise when the instruments are controlled by separate firms and transaction costs hinder the internalization of these externalities. Both arguments point towards the centralization of decision rights.

### Summing Up

It has been argued that it is possible to give efficiency explanations of authority in the sense of direction and centralized decision-making in the context of Hayekian settings.<sup>35</sup> Thus, a response has been provided to Proposition 3 (“In the emerging knowledge economy, authority relations will become increasingly inefficient and insignificant means of allocating resources”). This is *not* to say that authority relations, and the allocation of decision rights in firms in general, will be unaffected by the increased reliance on specialist knowledge (i.e., by Propositions 1 and 2 becoming increasingly descriptively correct). The increasing prevalence of internal hybrids that go beyond traditional hierarchies (Zenger and Hesterly 1997) is very likely caused by the increased importance of Hayekian distributed knowledge.

Still, internal hybrids are organized inside the firm and are thus being subject to the exercise of authority. Thus, even if the hierarchy becomes flatter because of the existence of cellular organizations, authority persists.<sup>36</sup> A reason for this is that even in knowledge-based firms, there may be a need for centralized coordination, as we have seen. When there is such a need, it is often efficient to centralize ownership to alienable assets, as the following section demonstrates. In turn, this suggests that centralized coordination is a feature of firms rather than markets. In other words, it will be argued that the presence of Hayekian settings does not invalidate the notion of the boundaries of the firm, even when these are conceptualized in legal and ownership-based terms.

## VI. Ownership and Firm Boundaries in Hayekian Settings

### Ownership and Assets in the Knowledge Economy

In the previous section, not say much about what backs up authority. However, we know from Hart (1995) and other economist of organization that ownership may play a key role in this respect; the purpose of the present section is

---

<sup>34</sup> For example, if motivation is mainly secured by pecuniary means, this may harm other instruments, such as trying to motivate by fostering a culture that emphasizes trust and sharing.

<sup>35</sup> These reasons also seem broadly consistent with organization theory work on authority in the context of flat hierarchies (where Hayekian distributed knowledge is particularly to exist). In a study of authority in newspaper publishing companies, Brass (1984) identified the determinants of authority as “criticality” (i.e., decisive knowledge), “centrality” (i.e., centralized decision rights because of economies of scale in certain tasks), and “the friendship network.”

<sup>36</sup> For a discussion of the differences between authority and hierarchy, see Ménard (1994).

to go more into ownership issues — particularly the ownership of knowledge assets — and therefore the issue of the boundaries of the firm. One of the key characteristics of the knowledge economy is usually taken to be the increased importance in production of knowledge assets and the decreasing importance of physical assets (Boisot 1998). A further argument is that this transformation will also transform economic organization, because knowledge assets have different implications for the boundaries of firms than physical assets (e.g., Powell 1990; Zucker 1991; Kogut and Zander 1992; Boisot 1998; Mahnke 2001).<sup>37</sup>

The category of “knowledge assets” is a broad one — encompassing individually held tacit knowledge, firm-level capabilities (“organizational knowledge”), patents, client lists, etc. — and difficult to analytically frame.<sup>38</sup> Perhaps for this reason, there are different — albeit all somewhat underdeveloped — modeling strategies available. One such strategy is to stress problems of appropriability as a key determinant of the boundaries of the firm (Teece 1987; Liebeskind 1997). In this scheme, the boundaries of the firm reflect attempts to maximize the rent streams from the firm’s valuable knowledge assets (rather than the hold-up problem). A second one is to stress that many knowledge assets are collective or public goods (e.g., capabilities or reputational assets) and that this creates free-rider problems, causing a need to delimit access to such goods (Holmström and Roberts 1998; Frost and Osterloh 2000). A third strategy is to argue that knowledge assets in the form of differential capabilities give rise to communication costs and attempts to economize with such costs help determining the boundaries of the firm (Langlois 1992; Monteverde 1995). A fourth possibility is to rely on more standard transaction cost economics and incomplete contracts theory arguments about the need to protect specialized assets and investments specific to such assets from rent-capture attempts (Rabin 1993; Brynjolfsson 1994; Putterman 1995). Since the latter strategy is the one that most obviously connects to the theme of authority that has been pursued in so much of this paper, I briefly discuss this approach.

### **An Incomplete Contracts Approach to Knowledge Assets and the Boundaries of the Firm**

Following Brynjolfsson (1994), use will be made of the incomplete contracts modeling methodology of Hart and Moore (1990) to get an understanding of the implications of knowledge assets for the boundaries of the firm. This is a key issue, because asset ownership may provide the bargaining lever that backs up authority, and the concentration of decision rights that we call authority may have important efficiency implications, as already argued. Thus, this section connects the

---

<sup>37</sup> In fact, two of the flagbearers of modern formal contract economics, Bengt Holmström and John Roberts (1998: 90), recently observed that “Information and knowledge are at the heart of organizational design, because they result in contractual and incentive problems that challenge both markets and firms ... In light of this, it is surprising that leading economic theories ... have paid almost no attention to the role of organizational knowledge.”

<sup>38</sup> For example, it is not clear whether it makes sense to speak of ownership to firm-level capabilities. For a discussion of this and related issues, see Zingales (2000).

discussion of authority in a knowledge economy with the issue of the boundaries of the firm in such an economy. This emphasis is on supporting the claim made earlier that when there is a need for centralized coordination, efficiency considerations often suggest a need for also concentrating asset ownership (Holmström 1999; Hermalin 1999).

The primary required change in the basic Hart and Moore framework is a more explicit introduction of knowledge assets (which may be alienable or non-alienable). In fact, we can dispense entirely with physical assets, and discuss a purely knowledge-based firm.<sup>39</sup> It is assumed that agents enter into productive relations with other agents but that synergies between agents occur only through the assets that they control (and not through the actions they take). Furthermore, although assets may influence the value of actions, the reverse is not true (Brynjolfsson 1994: 433). This means that we can write the cost of agent  $i$ 's action as  $c(x_i)$  and the marginal value of  $i$ 's actions when he is in a productive relation with other agents simply as  $v_i(A)$ , where  $A$  is the set of all assets owned by agents (and their actions can be suppressed).<sup>40</sup>

For simplicity, assume that two agents interact and that one of these, "the entrepreneur," owns a knowledge asset,  $K$ , that is "inside his head" (e.g., an entrepreneurial idea) and the other agent, "the scientist," owns the only other asset in the relation,  $P$ , which we may assume to be a "patent." Both assets are necessary to the create value in the relation, and  $K$  and  $P$  are (strictly) complementary, so that the one is of value 0 without the other. It is prohibitively costly to communicate the knowledge embodied in  $K$  from the entrepreneur to the scientist, so  $K$  is effectively non-alienable, although the services of  $K$  may of course be traded. Moreover, it is not possible to write a comprehensive contract, governing the use of the assets in all contingencies. Given this, we may ask who should own the alienable asset,  $P$ , which — in terms of the Hart and Moore (1990) analysis — is tantamount to asking who should own the firm.

In this setting, if the entrepreneur makes an effort investment,  $x_e$ , that is, elaborates on his idea and creates extra value, the scientist can effect a hold-up on the entrepreneur, since the latter needs access to the patent to create value (and the contract is incomplete). Of course, the reverse also holds, so that if the scientist makes an effort investment,  $x_s$ , (e.g., makes a spin-off patent), the entrepreneur can hold-up the scientist by threatening to withdraw from the relation. Under the standard assumption of Nash bargaining, the entrepreneur and the scientist each realizes  $\frac{1}{2}$  of the extra value created as a result of their efforts. Because of the externality problem, each underinvests; specifically, each party invests to the point

---

<sup>39</sup> This is because the key issue is not whether assets are material or immaterial, but whether they are alienable or non-alienable.

<sup>40</sup> One may wonder what has happened to the notion of Hayekian distributed knowledge in this setting. Although it is a necessary assumption that the agents can observe each others' marginal product values, they don't need to observe each others' specific actions or know the underlying knowledge. Thus, Hayekian distributed knowledge is consistent with the assumptions being made here.

where the marginal cost of effort investment equals  $\frac{1}{2}$  of the marginal value.<sup>41</sup> Suppose instead that the entrepreneur owns *both* the patent and the entrepreneurial idea. This will strengthen the entrepreneur's incentives (the scientist cannot hold him up anymore) and it will leave the scientist's incentives unaffected.<sup>42</sup> Obviously, this ownership arrangement should be chosen.<sup>43</sup>

A conclusion at this stage is that it *is* possible to speak of the boundaries of the firm in terms of ownership (and therefore also in legal terms) — even in a situation where all assets are knowledge assets.<sup>44</sup> However, this does not yet demonstrate the point made earlier, namely that concentration of coordination tasks produces a need for concentration of ownership. We can address this issue, however, by assuming that one of the agents have decisive information (in the sense of Casson 1994). While efficiency may require that this agent should have decision rights amounting to authority, should he also be an owner?

Consider a “knowledge-based” group of scientists where each scientist owns a patent,  $P_i$ . One of the scientists possesses decisive knowledge,  $C$ , and the other scientists communicate directly with him rather than with each other.<sup>45</sup> For example, this agent aggregates information from the messages of the other agents and issue directives. His knowledge is decisive in the sense that without it, all actions of the other agents produce zero value. The coordinator may improve on this decisive knowledge. Each agent needs access to his own patent and to  $C$  in order to be productive. Given this assumption (which means that we need only consider relations between any agent and the coordinator), we have the by now familiar under-investment problem for both the coordinator and the scientists.<sup>46</sup> If the coordinator is given ownership to all patents, things change: While the incentives of the scientists are not affected,<sup>47</sup> the incentives of the coordinator to invest in augmenting his decisive coordination knowledge are strengthened. Thus, this ownership arrangement should be chosen.

---

<sup>41</sup> The first-order conditions are given by 1)  $\frac{1}{2}v^e(K, P) + \frac{1}{2}v^e(K) = c'(x_e)$  and 2)  $\frac{1}{2}v^s(K, P) + \frac{1}{2}v^s(P) = c'(x_s)$ . Since it has been assumed that the value of the assets outside the relation is zero, the second term in 1) and 2) equals zero.

<sup>42</sup> This may be seen from inspecting the first order conditions when the entrepreneur owns both  $K$  and  $P$ : 3)  $\frac{1}{2}v^e(K, P) + \frac{1}{2}v^e(K, P) = c'(x_e)$  and 4)  $\frac{1}{2}v^s(K, P) = c'(x_s)$ .

<sup>43</sup> This shows somewhat more formally the argument made earlier that incentives are likely to be strengthened by spinning off employees who come up with idiosyncratic entrepreneurial ideas that are costly to communicate to the rest of the firm.

<sup>44</sup> For applications of the basic model, for example, with respect to what happens if knowledge ( $K$ ) is made alienable, see Brynjolfsson (1994).

<sup>45</sup> Clearly, this is a strong assumption, but one that is made for analytical convenience. The main point simply is that there is a central agent whose centrality in the information network is crucial to the value-creating efforts of other agents.

<sup>46</sup> For example, the first-order condition for any individual scientist is: 5)  $\frac{1}{2}v^i(P, C) + \frac{1}{2}v^i(P) = c'(x_i)$ , where the second term is zero.

<sup>47</sup> The first-order condition for any individual scientist is now: 6)  $\frac{1}{2}v^i(P, C) = c'(x_i)$ , which is the same as 5).

## Summing Up

Although the framework that has been applied in this section is extremely stylized and in many ways quite limited (Holmström 1999; Foss and Foss 2001), it does succeed in providing an answer to Proposition 4 in Section II that “[t]he boundaries of firms blur because of the increasing importance of knowledge networks that transcend those boundaries. Thus, while legal and ownership-based definitions of the boundaries of the firm may formally be made, they will be increasingly irrelevant from an economic (and strategic) perspective.” The analysis shows, first, that it makes perfect sense to address ownership issues in terms of knowledge assets, and, second, that ownership to such assets may be important in situations where agents need to be provided with incentives (and where contracts are incomplete). Therefore, ownership-based (and therefore also legal) definitions of the boundaries of the firm will continue to be crucially important. The discussion ties together the notions of authority and ownership in the context of knowledge-based production. As will be argued in the following section, this has implications for the malleability of coordination mechanisms, for example, the extent to which market mechanisms can be introduced in firms.

## VII. Coordination Mechanisms in Hayekian Settings

### The Malleability and Combinability of Coordination Mechanisms

The dominant perspective in much of organization theory and organizational economics has been that there are stable, discrete governance structures that combine various coordination mechanisms in predictable ways. The specific combinations are typically seen as being dependent upon the underlying technology, characteristics of the environment, such as exchange conditions, and the strategy of the firm (Thompson 1967; Williamson 1985, 1996; Holmström and Milgrom 1994; Nickerson and Zenger 2000).

In contrast to this, it has been argued that there are *no* compelling reasons why specific coordination mechanisms should necessarily cluster in a few ideal typical governance structures of the “firm-hybrid-market” variety (particularly Grandori 1997, 2000). In particular, advances in networked computing, management information systems, and methods of measuring performance have made possible a richer set of combinations of coordination mechanisms. “Cellular” or “molecular” forms are examples. The fact that these forms — which much operate on market-like principles — are still organized inside firms serve to illustrate the flexibility with which coordination mechanisms may be combined. This raises the issue of whether there are constraints on the ways in which coordination mechanisms may be combined.

There is a substantial literature on these points. For example, in economics, much emphasis has been placed on the need to design organizational structures so that their constituent elements are complementary (Holmström and Milgrom 1994; Zenger 1997; Zenger and Hesterly 1997). Organization theory has long highlighted

“consistency” among constituent elements (Burns and Stalker 1961; Thompson 1967). The following section argues that authority is an element of the consistency of elements of an organizational firm, using internal hybrids as an example.

### **Incentive Limits to the Use of Market Mechanisms**

The problem of combining market and hierarchy has been much discussed in economics. Notably, the Austrian economics Ludwig von Mises (1949: 709) argued that there are inherent contradictions involved in “playing market,” that is, trying to simulate a market in the context of hierarchy. With reference to various socialist schemes of his day that tried to preserve some market relations while eliminating capital and financial markets, Mises argued that these schemes would be unworkable. The concentration of ultimate decision-making rights and responsibilities, and therefore ownership, in the hands of a central planning board would dilute the incentives of managers. Thus, while planning authorities could delegate rights to make production and investment decisions to managers, these rights were likely to be used inefficiently. First, since managers couldn’t be sure that they would not be overruled by the planning authorities, they were not likely to take a long view, notably in their investment decisions. Moreover, since managers were not the ultimate owners, they were not the full residual claimants of their decisions and, hence, would not make efficient decisions. Therefore, Mises declared, the attempt to “play market” under socialism would lead to inefficiencies. In a related vein, the attempt to simulate markets in a firm hierarchy may lead to inefficiencies.

As later research has clarified, the problem may be handled if the planning authorities can credibly commit to a non-interference policy. However, doing so may be very hard, since renegeing on a promise to delegate will in many cases be extremely tempting and those to whom rights are delegated anticipate this.<sup>48</sup>

The logic may be stated in the following way (cf. Baker, Gibbons and Murphy 1999). Assume that a subordinate initiates a project.<sup>49</sup> Assume further that the manager has information that is necessary to perform an assessment of the project, but that he decides upfront to ratify *any* project that the subordinate proposes. Effectively, this amounts to full informal delegation of the rights to initiate and ratify projects — “informal,” because the formal right to ratify is still in the hands of the manager and because that right cannot be allocated to the subordinate through a court-enforceable contract (cf. Williamson 1996). Because the subordinate values being given freedom, this will induce more effort in searching for new projects (Aghion and Tirole 1997; Foss and Foss 2000). The expected benefits of these

---

<sup>48</sup> Transaction cost economist, Oliver Williamson (1996) has referred to these kinds of problems with his concept of the “impossibility of (efficient) selective intervention.” The main problem is that incentives are diluted. This is because the option to intervene “... can be exercised both for good cause (to support expected net gains) and for bad (to support the subgoals of the intervenor)” (Williamson 1996: 150-151). Promises to only intervene for good cause can never be credible, Williamson argues, because they are unenforceable.

<sup>49</sup> This should be understood in a broad sense: A “project” may refer to many different types of decisions or clusters of decisions.

increased efforts may overwhelm the expected costs from bad projects that the manager has to ratify. However, the problem is that because the manager has information about the state of a project ("bad" or "good"), he may be tempted to renege on a promise to delegate decision authority, that is, intervene in a "selective" manner. But if he overrules the subordinate, the latter will lose trust in him, holding back on effort. Clearly, in this game a number of equilibria are feasible. The particular equilibrium that emerges will be determined by the discount rate of the manager, the specific trigger strategy followed by the sub-ordinate (e.g., will he lose trust in the manager for all future periods if he is overruled?), and how much the manager values his reputation for not renegeing relative to the benefits of renegeing on a bad project (for details and extensions, see Baker, Gibbons, and Murphy 1999).

Arguably, organizations that try to infuse their structures with organizational elements characteristic of the market are more prone to suffer from these commitment problems than firms with more traditional hierarchical structures. The reasons are that decision rights are more solidly established in a traditional hierarchy than in, say, a flat, project-based organization, and that a CEO who selectively intervenes in a hierarchical organization risk overruling the whole managerial hierarchy, whereas this is not a concern in a flat organization.

### **Implications**

An implication is that mixing very different coordination mechanisms may lead to efficiency losses, and may not be sustainable for this reason.<sup>50</sup> The basic problem is that emulating market organization inside firms amounts to "playing market." Unlike independent agents in markets, corporate employees never possess ultimate decision rights. They are not full owners. This means that those who possess ultimate decision rights can always overrule employees. Thus, there are fundamental incentive limits to the extent to which market principles can be applied inside firms.

These insights imply that coordination mechanisms are not combinable in an arbitrary fashion. In other words, using the case of internal hybrids, an argument has been made that Proposition 5 (i.e., "[c]oordination mechanisms will be combined in new, innovative ways, suggesting that these mechanisms are inherently combinable and not limited to being necessarily clustered in certain discrete governance structures") needs substantial qualification. There are inherent (incentive) limits to the extent to which such mechanisms can be combined. It is the inherent tension between authority (backed up by ownership) and delegated rights that creates limits to the combinability of coordination mechanisms. To the extent that authority persists in the knowledge economy, so will these limits.

## **VIII. Conclusion**

---

<sup>50</sup> Foss (2000) for a specific empirical application, namely the application of market principles in the internal organization of the Danish hearing aid producer, Oticon.

Addressing economic organization in the context of the emerging knowledge economy is a task of almost forbidding complexity. It is also inherently speculative, suggesting that the use of scenario techniques may be appropriate (Hodgson 1998a) and that a multi-disciplinary approach may be justified (Daft and Lewin 1993). However, the present paper has taken a more narrow approach, being founded on the conviction that organizational economics is helpful for clarifying the central issues and providing tentative answers, and has tried to demonstrate this. Admittedly, the richness of the recent literature on organization in the knowledge economy may have been sacrificed by the relative narrowness of the present approach. On the other hand, the approach of this paper has been to try to distill some key assumptions and propositions that characterize much of this literature, and examine these in the light of organizational economics. This has the advantage of making explicit what may be the issues of contention and the terms of the debate. Needless to say, although a strong attempt has of course been made to be fair to the literature, the danger of having constructed a strawman is present; but at least the possibility of ascertaining whether this is the case exists.

Thus, it has been argued that for the purposes of examining crucial phenomena of economic organization — relating to authority, the boundaries of firms and organizational design — the recent literature on economic organization in the knowledge economy may be summarized in a handy way by means of six basic assumptions. Of these, the two first were statements about the use of knowledge in production. These were flatly accepted, and used as “inputs” (i.e., assumptions) for subsequent analysis of the remaining four propositions. Thus, it was essentially asked: Accepting that knowledge has become increasingly distributed and that knowledge assets are increasingly important in production, is it then true that authority relations will wither, that legal and ownership-based definitions of the boundaries will become unimportant, and that coordination mechanisms can be combined virtually at will?

The answers to all these questions were negative. This is where the strawman issue enters the discussion. Although it may be possible to find authors who present propositions 1) to 6) in an extreme form, it may also be argued that one can always dig up unimportant extremists, smash their arguments, and obtain an easy victory. Two responses are pertinent here. First, the proponents of Propositions 3 to 6 that have been cited are not unimportant extremists, but established and respected academics. Second, even if the statements contained in Propositions 3 to 6 were the brainchildren of intellectual extremists, investigating them would still have been a worthwhile task. This is because such an activity helps establishing the boundaries of the discussion. For example, although it may be argued that nobody truly believes that all authority relations will disappear completely in the knowledge economy, we still need to know why authority relations will persist and how they will change. Answering this question makes us better understand the limits and potentials of authority in Hayekian settings. For example, as I have argued, it furthers understanding of the extent to which coordination mechanisms that are characteristic of market allocation can be introduced in firms’ internal organization. Although the discussion in this paper moves on an abstract level,

managerial implications may thus be derived from it.

## References

- Aghion, Philippe and Jean Tirole. 1997. "Formal and Real Authority in Organization," *Journal of Political Economy* 105: 1-29.
- Alchian, Armen A. and Harold Demsetz. 1972. "Production, Information Costs, and Economic Organization," in
- Baker, George, Robert Gibbons, and Kevin J. Murphy. 1999. "Informal Authority in Organizations," *Journal of Law, Economics and Organization* 15: 56-73.
- Baker, George, Robert Gibbons, and Kevin J. Murphy. 2000. "Relational Contracts and the Theory of the Firm," *unpublished manuscript*.
- Barnard, Chester. 1938. *The Functions of the Executive*. Cambridge: Harvard University Press.
- Baron, James N. 1988. "The Employment Relation as a Social Relation," *Journal of the Japanese and International Economies* 2: 492-525.
- Boisot, Max. 1998. *Knowledge Assets: Securing Competitive Advantage in the Information Economy*. Oxford: Oxford University Press.
- Bolton, Patrick and Joseph Farrell. 1990. "Decentralization, Duplication, and Delay," *Journal of Political Economy* 98: 803-826.
- Brass, D.J. 1984. "Being in the Right Place: A Structural Analysis of Individual Influence in an Organization," *Administrative Science Quarterly* 29: 518-539.
- Brown, Shona L. and Kathleen M. Eisenhardt. 1998. *Competing on the Edge: Strategy as Structured Chaos*. Boston: Harvard Business School Press.
- Brynjolfsson, Erik. 1994. "Information Assets, Technology, and Organization," *Management Science* 40: 1645-1662.
- Burns, Tom and G.M. Stalker. 1961. *The Management of Innovation*. London: Tavistock.
- Casson, Mark. 1994. "Why are Firms Hierarchical?," *International Journal of the Economics of Business* 1: 47-76.
- Cheung, Stephen N.S. 1983. "The Contractual Nature of the Firm," *Journal of Law and Economics* 26: 1-22.
- Coase, Ronald H. 1937. "The Nature of the Firm," in Nicolai J. Foss, ed. 1999. *The Theory of the Firm: Critical Perspectives in Business and Management, Vol II*. London: Routledge.
- Coff, Russell W. 1999. "When Competitive Advantage Doesn't Lead to Performance: The Resource-Based View and Shareholder Bargaining Power," *Organization Science* 10: 119-134.
- Conner, Kathleen R. and C.K. Prahalad. 1996. "A Resource-Based Theory of the Firm," *Organization Science* 7: 477-501.
- Coombs, Rod and Stan Metcalfe. 2000. "Organizing for Innovation: Co-ordinating Distributed Innovation Capabilities," in Nicolai J Foss and Volker Mahnke, eds. *Competence, Governance, and Entrepreneurship*. Oxford: Oxford University Press.

- Cowen, Tyler and David Parker. 1997. *Markets in the Firm: A Market Process Approach to Management*. London: The Institute of Economic Affairs.
- Daft, Richard and Arie Lewin. 1993. "Where Are the Theories of the 'New' Organizational Forms?," *Organization Science* 4: i-iv.
- D'Aveni, Richard. 1994. *Hypercompetition: The Dynamics of Strategic Maneuvering*. New York: Basic Books.
- Day, Jonathan and Jim Wendler. 1998. "The New Economics of Organization," *McKinsey Quarterly* : 4-18.
- Demsetz, Harold. 1988. "The Theory of the Firm Revisited," *Journal of Law, Economics, and Organization* 4: 141-161.
- Fama, Eugene and Michael C. Jensen 1983. "Separation of Ownership and Control," *Journal of Law and Economics* 26: 301-325.
- Foss, Kirsten. 2000. "Organizing Technological Interdependencies: A Coordination Perspective on the Firm", forthcoming in *Industrial and Corporate Change* (downloadable from <http://www.cbs.dk/link/papers>).
- Foss, Kirsten and Nicolai J. Foss. 2000. "Economic Organization and the Trade-Offs Between Productive and Destructive Entrepreneurship," *LINK Working Paper 2000-14*. (downloadable from <http://www.cbs.dk/link/papers>).
- Foss, Kirsten and Nicolai J. Foss. 2001. "Assets, Attributes and Ownership," *International Journal of the Economics of Business* 8: 19-37.
- Foss, Nicolai J. 1996. "More Critical Comments on Knowledge-Based Theories of the World," *Organization Science* 7: 519-523.
- Foss, Nicolai J. 1999. "The Use of Knowledge in Firms", *Journal of Institutional and Theoretical Economics* 155: 458-486.
- Foss, Nicolai J. 2000. "The Costs of Internal Hybrids: The Rise and Decline of the Oticon Spaghetti Organization," *LINK Working Paper 2000-18* (downloadable from <http://www.cbs.dk/link/papers>).
- Foss, Nicolai J. 2001. "Leadership, Coordination, and Beliefs," (*Industrial and Corporate Change* 10: 357-388).
- Frey, Bruno. 1997. *Not Just for the Money: An Economic Theory of Personal Motivation*. Cheltenham: Edward Elgar.
- 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.
- Grandori, Anna. 1997. "Governance Structures, Coordination Mechanisms and Cognitive Models," *Journal of Management and Governance* 1: 29-42.
- Grandori, Anna. 2001. *Organizations and Economic Behavior*. London: Routledge.
- Grant, Robert M. 1996. "Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration," *Organization Science* 7: 375-387.
- Grossman, Sanford, and Oliver Hart. 1986. "The Costs and Benefits of Ownership: A Theory of Vertical Integration," *Journal of Political Economy* 94: 691-719.

- Halal, William E. and Kenneth B. Taylor. 1998. *Twenty-First Century Economics: Perspectives of Socioeconomics for a Changing World*. New York: St. Martin's Press.
- Harrison, Richard T. and Claire M. Leitch. 2000. "Learning and Organization in the Knowledge-Based Information Economy: Initial Findings from a Participatory Action Research Case Study," *British Journal of Management* 11: 193-119.
- Harryson, Sigvald J. 2000. *Managing Know-Who Based Companies*. Cheltenham: Edward Elgar.
- Hart, Oliver. 1995. *Firms, Contracts, and Financial Structure*. Oxford: Oxford University Press.
- Hart, Oliver. 1996. "An Economist's View of Authority," *Rationality and Society* 8: 371-386.
- Hart, Oliver and John Moore. 1990. "Property Rights and the Nature of the Firm," *Journal of Political Economy* 98: 1119-1158.
- 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. 1964. "The Theory of Complex Phenomena," in idem. 1978, *Studies in Philosophy, Economics, and Politics*. London: Routledge and Kegan Paul.
- Hayek, Friedrich A. von. 1968. "Competition as a Discovery Procedure," in idem. 1978, *New Studies in Philosophy, Economics, Politics, and the History of Ideas*, London: Routledge and Kegan Paul.
- Hayek, Friedrich A. von 1973. *Law, Legislation, and Liberty, Vol.1: Rules and Order*, Chicago: University of Chicago Press.
- Helper, Susan, John Paul MacDuffie, and Charles Sabel. 2000. "Pragmatic Collaborations: Advancing Knowledge While Controlling Opportunism," *Industrial and Corporate Change* 9: 443-487.
- Henderson, Richard I. 2000. *Compensation Management in a Knowledge-Based World*. London: Prentice-Hall.
- Hennart, Jean-Francois. 1993. "Explaining the Swollen Middle: Why Most Transactions are a Mix of "Market" and "Hierarchy," *Organization Science* 4: 529-544.
- Hermalin, Benjamin. 1998. "The Firm as a Non-Economy: Some Comments on Holmstrom," *Journal of Law, Economics and Organization* 15: 103-105.
- Hodgson, Geoff. 1998a. *Economics and Utopia*. London: Routledge.
- Hodgson, Geoff. 1998b. "The Coasean Tangle: The Nature of the Firm and the Problem of Historical Specificity," in Steven G. Medema, ed. 1998. *Coasean Economics: Law and Economics and the New Institutional Economics*. Boston: Kluwer Academic Publishers.

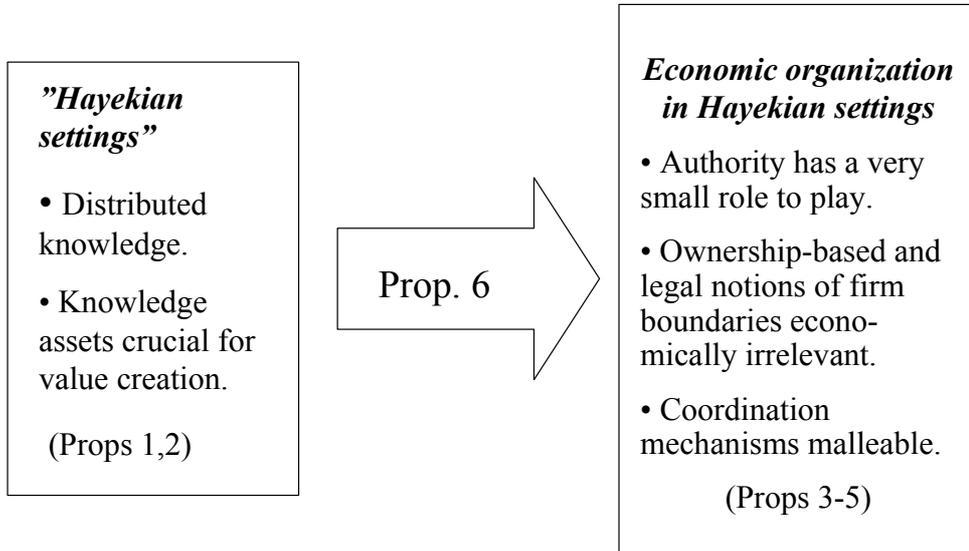
- Holmström, Bengt. 1979. "Moral Hazard and Observability," *Bell Journal of Economics* 10: 74-91.
- Holmström, Bengt. 1999. "The Firm as a Subeconomy," *Journal of Law, Economics, and Organization* 15: 74-102.
- Holmström, Bengt and Paul Milgrom. 1994. "The Firm as an Incentive System," *American Economic Review* 84: 972-991.
- Holmström, Bengt and John Roberts. 1998. "The Boundaries of the Firm Revisited," *Journal of Economic Perspectives* 12: 73-94.
- 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.
- Jensen, Michael C. and Karen Wruck. 1994. "Science, Specific Knowledge and Total Quality Management," in Michael C. Jensen. 1998. *Foundations of Organizational Strategy*. Cambridge: Harvard University Press.
- Kirzner, Israel M. 1997. "Entrepreneurial Discovery and the Competitive Market Process: An Austrian Approach," *Journal of Economic Literature* 35: 60-85.
- Knight, Frank H. 1921. *Risk, Uncertainty, and Profit*. 1965 reprint. New York: Augustus M. Kelley.
- Langlois, Richard N. 1992. "Transaction-Cost Economics in Real Time," *Industrial and Corporate Change* 1: 99-127.
- Langlois, Richard N. and Nicolai J. Foss. 1999. "Capabilities and Governance: the Rebirth of Production in the Theory of Economic Organization," *KYKLOS* 52: 201-218.
- Leadbetter, C. 1999. *Living on Thin Air: the New Economy*. London: Viking.
- Liebesskind, Julia Porter. 1997. "Keeping Organizational Secrets: Protective Institutional Mechanisms and their Costs," *Industrial and Corporate Change* 6: 623-663.
- Liebesskind, Julia Porter, Amalya Lumerman Oliver, Lynne G. Zucker, Marilyn B. Brewer. 1995. *Social Networks, Learning, and Flexibility: Sourcing Scientific Knowledge in New Biotechnology Firms*. Cambridge: NBER Working Paper No. W5320.
- Mahnke, Volker. 2001. *The Economic Organization of Intellectual Production*. Oxford: Oxford University Press.
- March, James G. 1991. "Exploration and Exploitation in Organizational Learning," *Organization Science* 2: 71-87.
- Marglin, Stephen A. 1974. "What Do Bosses Do?," The Origins and Functions of Hierarchy in Capitalist Production," *Review of Radical Political Economy* 6: 33-60.
- Masten, Scott. 1991. "A Legal Basis for the Firm," in Oliver E. Williamson and Sidney G. Winter, eds. 1991. *The Nature of the Firm: Origins, Evolution, and Development*. Oxford: Oxford University Press.
- Matusik, Sharon F. and Charles W. L. Hill. 1998. "The Utilization of Contingent Work, Knowledge Creation, and Competitive Advantage," *Academy of Management Review* 23: 680-697.

- Ménard, Claude. 1994. "Organizations as Coordinating Devices," *Metroeconomica* 45: 224-247.
- Mendelson, Haim and Ravindran R. Pillai. 1999. "Information Age Organizations, Dynamics, and Performance," *Journal of Economic Behavior and Organization* 38: 253-281.
- Meyer, Christopher. 1994. "How the Right Measures Help Teams Excel," *Harvard Business Review* (May-June): 95-103.
- Miles, Raymond E. and Charles C. Snow. 1992. "Causes of Failure in Network Organizations," *California Management Review*: 53-72.
- Miles, Raymond E., Charles C. Snow, John A. Mathews, Grant Miles and Henry J. Coleman, Jr. 1997. "Organizing in the Knowledge Age: Anticipating the Cellular Form," *Academy of Management Executive* 11: 7-20.
- Miles, Raymond E., Grant Miles, and Charles C. Snow. 1998. "Good for Practice: An Integrated Theory of the Value of Alternative Organizational Forms," in Gary Hamel, C.K. Prahalad, Howard Thomas and D. O'Neal, eds. *Strategic Flexibility: Managing in a Turbulent Environment*. New York: John Wiley.
- Milgrom, Paul. 1988. "Employment Contracts, Influence Activities and Efficient Organization Design," *Journal of Political Economy* 96:42-60.
- Milgrom, Paul and John Roberts. 1990. "The Economics of Modern Manufacturing: Technology, Strategy and Organization," *American Economic Review* 80: 511-528.
- Miller, Gary. 1992. *Managerial Dilemmas*. Cambridge: Cambridge University Press.
- Minkler, Alanson P. 1993. "Knowledge and Internal Organization," *Journal of Economic Behavior and Organization* 21: 17-30.
- Mises, Ludwig von. 1949. *Human Action*. San Francisco: Fox and Wilkes.
- Monteverde, Kirk. 1995. "Technical Dialog as an Incentive for Vertical Integration in the Semiconductor Industry," *Management Science* 41: 1624-1638.
- Myers, Paul S., ed. 1996. *Knowledge Management and Organizational Design*. Boston: Butterworth-Heinemann.
- Neef, Dale, ed. 1998. *The Knowledge Economy*. Boston: Butterworth-Heinemann.
- Nickerson, Jackson and Todd Zenger. 2000. "Being Efficiently Fickle: A Dynamic Theory of Organizational Choice," *unpublished paper*.
- Nonaka, Ikujiro and Takeuchi. 1995. *The Knowledge-Creating Company*. Oxford: Oxford University Press.
- Osterloh, Margit and Bruno Frey. 2000. "Motivation, Knowledge Transfer and Organizational Form," forthcoming in *Organization Science*.
- Osterloh, Margit and Jetta Frost. 2000. "Motivation in a Knowledge-Based Theory of the Firm," paper prepared for the LINK Workshop on "Learning, Incentives, and Corporate Disaggregation," Copenhagen 26-7 October 2000.
- Powell, Walter. 1990. "Neither Market, Nor Hierarchy: Network Forms of Organization," *Research in Organizational Behavior* 12: 295-336.

- Prendergast, Canice. 1999. "The Tenuous Tradeoff of Risk and Incentives," *working paper*.
- Prusac, Laurence. 1998. "Introduction to Series - Why Knowledge, Why Now?," in Dale Neef, ed. 1998. *The Knowledge Economy*. Boston: Butterworth-Heinemann.
- Putterman, Louis. 1995. "Markets, Hierarchies and Information: On a Paradox in the Economics of Organization," *Journal of Economic Behavior and Organization* 26: 373-390.
- Radner, Roy. 1993. "The Organization of Decentralized Information Processing," *Econometrica* 61: 1109-1146.
- Sautet, Frederic. 2000. *An Entrepreneurial Theory of the Firm*. London: Routledge.
- Schelling, Thomas. 1960. *The Strategy of Conflict*. Cambridge: Harvard University Press.
- Semler, Ricardo. 1989. "Managing Without Managers," *Harvard Business Review* (Sept.-Oct.): 76-84.
- Simon, Herbert A. 1951. "A Formal Theory of the Employment Relationship," in idem. 1982. *Models of Bounded Rationality*. Cambridge: MIT Press.
- Simon, Herbert A. 1991. "Organizations and Markets," *Journal of Economic Perspectives* 5: 25-44.
- Rabin, Matthew. 1993. "Information and the Control of Productive Assets," *Journal of Law, Economics and Organization* 9: 51-76.
- Teece, David J. 1987. "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy," in idem. 1987. *The Competitive Challenge*. Cambridge: Ballinger Publ. Comp.
- Thompson, James D. 1967. *Organizations in Action*. McGraw-Hill.
- Tomlinson, Mark. 1999. "The Learning Economy and Embodied Knowledge Flows in Great Britain," *Journal of Evolutionary Economics* 9: 431-451.
- Vandenberghe, Ann-Sophie and Jacques Siegers. 2000. "Employees versus Independent Contractors for the Exchange of Labor Services: Authority as Distinguishing Characteristic?," *paper for 17<sup>th</sup> Annual Conference on the European Association of Law and Economics, Gent, 14-16 September*.
- Wang, Susheng and Tian Zhu. 2000. "Contract Law and the Boundaries of the Firm," *Manuscript*.
- Weber, Max. 1946. *Essays in Sociology*. New York: Oxford University Press.
- Weber, Max. 1947. *The Theory of Economic and Social Organization*. New York: Oxford University Press.
- Wernerfelt, Birger. 1997. "On the Nature and Scope of the Firm: An Adjustment Cost Theory," *Journal of Business* 70: 489-514.
- Williamson, Oliver E. 1975. *Markets and Hierarchies*. New York: Free Press.
- 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.

- Zenger, Todd. 1997. "Crafting Internal Hybrids," *working paper*, Olin School of Business, Washington University.
- Zenger, Todd and William S. Hesterly. 1997. "The Disaggregation of Corporations: Selective Intervention, High-Powered Incentives, and Molecular Units," *Organization Science* 8: 209-222.
- Zingales, Luigi. 2000. "In Search of New Foundations," forthcoming in *Journal of Finance*.
- Zucker, Lynne. 1991. "Markets for Bureaucratic Authority and Control: Information Quality in Professions and Services," *Research in the Sociology of Organizations* 8: 157-190.

**Figure 1**  
*Economic Organization in Hayekian settings*



**Figure 2**  
*Authority in economics*

