Knowledge-based Approaches to the Theory of the Firm: Some Critical Comments

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Abstract
It is argued that Kogut and Zander (1992) and Conner (1991) erred in the specific way in which they claimed that a distinct theory of the multi-person firm can be constructed on the basis of a theory of organizational knowledge or from resource-based insights. It is not possible to tell very much of a story about why there should be firms in lieu of notions such as "opportunism" or "moral hazard." However, properly interpreted, knowledge-based theories may help shed light on issues relating to the boundaries and internal organization of the firm.
(*Organizational Knowledge*; *Existence and Boundaries of the Firm*)

Approaches to the Theory of the Firm
A number of recent contributions to the economic theory of the firm have made use of insights that essentially stem from—or are closely related to—organizational theory, and have tried to theorize aspects of economic organization on that basis. Although I treat such contributions under one label, namely as "knowledge-based approaches to the theory of the firm", this should not disguise existing differences.[1] Some of these contributions have emerged from the resource-based literature on the firm (such as Conner 1991), while other contributions are more explicitly evolutionary in focus (Langlois 1992, Dosi et al. 1992, Kogut and Zander 1992, Foss 1993b). Some of them self-consciously make a break with existing theories of economic organization (Conner 1991, Kogut and Zander 1992), while others emphasize complementarities to existing theories (Dosi et al. 1992). However, they are all agreed on the need for a knowledge-perspective on the firm, that is for conceptualizing firms as heterogenous, knowledge-bearing entities.

What is meant by "a theory of the firm" in turn is a theory that addresses the issues of the existence, the boundaries, and the internal organization of the multi-person firm (I neglect the unitary firm.) This conception of the primary requisites of a theory of the firm dates back, of course, to Ronald Coase's 1937 classic, "The Nature of the Firm." It has since then been given impetus by the likes of Oliver Williamson (1985), Harold Demsetz and Armen A. Alchian (1972), Steven N. S. Cheung et al. (1986), and a host of other theorists. In fact, the modern theory of the firm—or broader, of economic organization—is perhaps the most rapidly expanding field of economics. And as is not unusual with a relatively new and rapidly expanding field, it has already branched into several distinct subfields and diverging approaches (Foss 1993c). What however unites the above mentioned heirs to Coase's approach is the view that the firm should be seen as an efficient contractual entity and that this is—for understanding the issues of the existence, boundaries, and internal organization—the essential and necessary conceptualization of the firm. Property rights, incentives, and contracts occupy center stage.

What is common to all knowledge-based contributions to the theory of the firm that are explicitly influenced by organizational theory is that they reject the *pure* contractual interpretation of the nature of the firm. Some of these contributions argue that the essential thing about the firm is not *only* its "contractualness," but just as much its function as a repository of distinct productive (technological and organizational) knowledge, and as an entity that can learn—and grow—on the basis of this knowledge (Dosi et al. 1992). Such knowledge stocks are associated with differential efficiencies, and are accumulated in a path-dependent way. Thus, they not only help explain why some firms realize competitive advantage while other firms do not, they also help in addressing issues related to diversification and innovation. In this view of the firm, it is Edith Penrose's 1959 classic, "The Theory of the Growth of the Firm," just as much as Coase's, "The Nature of the Firm" that defines the proper lenses through which firm activity should be perceived. Key words are here "capabilities," "competencies," "learning," "social knowledge," and "tacit knowledge," indicating the huge epistemic content in these theories.[2]

But one can quite meaningfully argue that the conceptualization of the firm one chooses should depend

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on the purpose (cf. Machlup 1967): if that purpose is to investigate successful growth strategies, technological development, imitative strategies, and perhaps the sources of competitive advantage we should apply a Penrosian or some other knowledge-based conceptualization, and perhaps not pay much attention to matters of economic organization. But if the purpose, on the other hand, is to investigate the issues of the existence, boundaries, and internal organization of the firm, we may do with a pure contractual/Coasian conceptualization. As already indicated, there is, however, also a small but growing literature that explicitly emphasize complementarities between the above conceptualizations, placing them on an equal footing. The implicit argument is that some phenomena—such as the organization of innovation activities—can be fully addressed only by such a combined theory. This literature denies, however, that perspectives on the firm that emphasize its knowledge-bearing nature unassisted by Coasian/contractual insights can say anything substantial about the existence, boundaries, and internal organization of the firm.

That something substantial about the existence, boundaries, and internal organization may be said without assistance from the contractual approach is argued by some recent advocates of the view of the firm as *essentially* a knowledge-bearing entity (rather than essentially a contractual one). They argue this on the ground that it is possible to deduct from this conceptualization a theory of economic organization that at least in some respects differs significantly from the contractual approaches. Specifically, it is possible to avoid any reference to concepts such as property rights, incentives, and opportunism for understanding at least the existence of the firm (but probably also the boundaries and internal organization of the firm).

It is this version of knowledge-based approaches—here represented by Kathleen Conner (1991) and Bruce Kogut and Udo Zander (1992)—that I want to take issue with in the following. I start with Kogut and Zander's analysis, and then move on to a brief discussion of Conner's closely related discussion. Briefly, I argue that the implicit assertion of these authors—that they have given *sufficient* reasons for the existence of the firm—is erroneous, since they have indicated only *necessary* reasons. I finally indicate how a knowledge-perspective may *complement*—but not substitute for—the contractual approach.

Kogut and Zander's Analysis

In this section I discuss only a few aspects of Kogut and Zander's (1992) very rich discussion, focusing on those aspects that have a *direct* bearing on the theory of the firm. Almost in the beginning of their article, Kogut and Zander put forward what appears to be their central conclusion:

> Our view differs radically from that of the firm as a bundle of contracts that serves to allocate efficiently property rights. In contrast to the contract approach to understanding organizations, the assumptions of the selfish motives of individuals resulting in shirking or dishonesty is not a necessary premise in our argument. Rather, we suggest that organizations are social communities in which individual and social expertise is transformed into economically useful products and services by the application of a set of higher-order organizing principles. *Firms exist because they provide a social community of voluntaristic action structured by organizing principles that are not reducible to individuals* (p. 384; my emphasis).

And this is given the following nutshell conceptualization, paraphrasing Michael Polanyi's well-known dictum: "... organizations know more than what their contracts can say" (p. 383). Much of Kogut and Zander's contribution is occupied with clarifying the *meaning* of such statements and with making a number of *implications*, once the meaning has been established.

Concerning the *meaning* of saying that, for example, "organizations know more than their contracts can say," what is meant is that a large part of that stock of knowledge that may be an important co-determinant of firms' competitive advantages and positions is *tacit*[3] and *social*. This, in turn, means that the knowledge is produced and reproduced in a social setting, is inseparable from this setting, and is not fully reducible to individuals. Because of the character of this kind of knowledge and the way it is accumulated through experiences of particularity, particularly in social settings, it is largely *path-dependent*. The firm is very much a distinct social and historical entity. Much of this is familiar from knowledge-based writings on the firm (such as Penrose 1959, Nelson and Winter 1982), although Kogut and Zander's discussion is a great deal more comprehensive and thorough than is usual, supplementing the discussion with subtle insights from group psychology, computer science, and interpretive sociology. The *new* aspect of their discussion seems to me to be primarily the various *implications* they distill from their discussion of the firm as a knowledge-bearing entity.

One such implication (among many) of this conceptualization of the firm as a bearer of tacit, social, and path-dependent organizational knowledge is to throw the issues of the existence, boundaries, and internal organization of the firm into a wholly different light relative to the conceptualizations of the contractual approaches. The firm, we have seen, is a repository of specialized and tacit knowledge that is fully efficient in use only within that firm, since it is difficult to take a piece—whatever that would mean—of the stock of firm-specific tacit and social knowledge out of the firm and successfully apply it in a different firm.[1]

From this it follows, according to Kogut and Zander, that firms exist, *because* they provide "a social community of voluntaristic action" in which such knowledge can be learned, produced, and commercially applied. The advantage that firms have over market relationships in carrying out (some) complex productive tasks is —according to Kogut and Zander—one that is distinct from the incentive alignment advantages emphasized by contractual theories (for example, in situations characterized by high levels of asset specificity). Specifically, it does not have anything to do with mitigating opportunism/moral hazard. Firms' advantages over markets derive from their being able to supply some, as Kogut and Zander say, "*higher order organizing principles*" that the market supposedly cannot supply, and in which the members of the organizations are embedded. It is not entirely clear what these higher-order organizing principles are, but they would seem to include "shared coding schemes," "values," "a shared language," as well as "...mechanisms by which to codify technologies into a language accessible to a wider circle of individuals" (Kogut and Zander 1992, p. 389).

Conner's Argument

Kathleen Conner's article, "A Historical Comparison of Resource-Based Theory and Five Schools of Thought Within Industrial Organization Economics: Do We Have a New Theory of the Firm" (1991), is a long, scholarly analysis of the two partly separable issues defined by the title of the article. Thus, the emerging resource-based approach is compared to neoclassical price-theory, Bain-type industrial organization economics, Schumpeterian approaches, Chicago-type industrial organization economics, and "Coase/Williamson transaction cost economics." It is this last comparison that interest me here, since Conner's discussion is somewhat different from Kogut and Zander's discussion, although her conclusion—that it is possible to explain the existence of the firm in a resource-based way that is conceptually different from the contractual view—is essentially the same.

On the existence issue, Conner submits that

> ...existence needs to be explained in terms of a firm's superiority to *two* alternative forms of organization: a collection of market contracts *and* other firms. By the latter, the intention is to raise the issue of why a particular firm exists, as opposed to its assets being distributed among other firms (1991, p. 139).

Her overall view seems to be that co-specialization of assets holds the theoretical key to *both* the above two existence issues, quite independent of considerations of transaction costs, incentives, and opportunism. On the latter existence issue—why does a particular firm exist in terms of its relation to other firms?—this is because some (co-specialized) assets make "a better fit" (ibid.) with some firms than with other firms. But co-specialization also seems to hold the key to the first existence issue.

To illustrate, consider an example given by Conner (1991) of a research project undertaken to create a product using advances in technology to be developed during the course of the project. The project involves two related activities, S and T. We use the notation ST if S and T are owned in common, and $S + T$ if they are owned separately. Under ST the project is done in-house, whereas under $S + T$ the project involves a contract over the market interface between the owners of S and T. Now, on Conner's view, $S + T$, as compared to ST, should find it more difficult to orient the research so that knowledge and skills can be redeployed, simply because "$S + T$ must try to orient in *two* different directions" (Conner 1991, p. 142). Cooperation in terms of ST is in contrast facilitated by the fact that only cooperation in *one* direction is needed. Essentially, this is because of the presence of what Kogut and Zander call higher order organizing principles, viz. shared codes, language etc. The implication is that the cooperation and coordination gain associated with ST relative to $S + T$ is *sufficient* to explain the *existence* of ST. The general issue can be formulated as follows:

> ...under certain circumstances, firms have advantage over market relationships in the *joint activity* of creating and redeploying specific capital [*and this explains why they exist, NJF*]. Further, the advantage of firms in the creation-redeployment combination need not stem from an opportunism-control advantage (Conner 1991, p. 140).

Thus, rather than being an "avoider of a negative" (viz. avoider of opportunism), the firm is seen in as a "creator of a positive" (ibid., p. 139). In the following, I argue that these two conceptualizations do not exclude each other, that the advantage Conner identifies is not sufficient to explain the existence of the firm, and that her separation of the existence issue in two parts is a nonissue.

Discussion

Conner's and Kogut and Zander's views are both non sequiturs and versions—albeit very sophisticated ones—of what Williamson (1985) calls "technological determinism." By this expression he refers to the idea that technology *directly* determines economic organization, so that for example the size of a business organization is directly determined by its minimum efficient scale, that diversified firms exist because of technological economies of scope alone, or that vertical integration takes place because of the need for, say, physical proximity between various pieces of capital equipment. One problem with this idea is that

> [t]echnology is fully determinative of economic organization only if (1) there is a single technology that is decisively superior to all others, and (2) that technology implies a unique organization form. Rarely is there only a single feasible technology, and even more rarely is the choice among alternative organization form determined by technology (Williamson 1985, p. 87).

The kernel of truth in technological determinism is that different technologies yield different constellations of transaction and information costs, and therefore loosely influence economic organization (perhaps define some boundaries for efficient economic organization). But the influence is indirect and the linkage is not tight.

Conner and Kogut and Zander commit the fallacy of technological determinism when they argue that the need for shared codes, languages etc.—easing efficient deployment and utilization of assets—*necessitates* firm organization in a way that can be seen in isolation from considerations of opportunism/moral hazard. It is probably true that the gains identified by Conner and Kogut and Zander are *necessary* to explain firm organization. In fact, this is exactly why value-increasing asset-specificity (Williamson 1985) and/or team-organization (Alchian and Demsetz 1972) are highlighted in the contractual approach, viz. why the conceptualization of the firm as a "creator of a positive" (Conner 1991, p. 139) is *also* important in the contractual approach. But these gains are not sufficient to explain the existence of firm organization.

To fully realize the values of assets/resources, they have—according to Conner and Kogut and Zander—to be embedded within the higher order organizing principles of shared cultures, languages, codes, etc. This may be true for a number of productive tasks. But such embeddedness does not conceptually presuppose common ownership/firm organization; to claim that is to engage in a sophisticated version of technological determinism, viz. to claim that the need for communication channels, shared culture, and other forms of social knowledge *in itself* makes firm organization necessary. In fact, separately owned activities may *conceptually* be much more "embedded" in the above sense than, for example, divisions of the same firm. It is erroneous to think that higher order organizing principles are a *qualitative* differential of the firm relative to the market, although they are probably in reality a *quantitative* one. That is, the qualitative presence of higher order oganizing principles does not necessarily distinguish the market relative to the firm; rather, there may be "more of it" in the firm than in the market, as Arrow (1974) forcefully argued. The argument that firms better cultivate higher order organizing principles demands, however, precisely an argument from opportunism. To see why, consider the following reasoning.

In a moral utopia, characterized by the absence of opportunistic proclivities (the setting that implicitly underlies Conner, and Kogut and Zander's analyses), the gains from resources/assets being embedded in higher order organizing principles could be realized over *the market*. Agents (human resources) could simply meet under the same factory roof, own their own pieces of physical capital equipment or rent it to each other, and develop value-enhancing higher order organizing principles among themselves (as a team). In the absence of opportunism/moral hazard, the degree of co-specialization among the various resources would carry *no* implications for ownership. Or in terms of Conner's example above, $S + T$ could do just exactly as well as could ST. The conclusion on all this is that co-specialization and the presence of higher order organizing principles are not sufficient to explain the existence of the specific constellation of property rights that characterizes the firm.

The argument from the contractual approach would be that because hierarchy can more successfully control opportunism/moral hazard, higher order organizing principles would emerge.[5] This is because the absence of opportunism that the hierarchy may help to create—through internal labor markets, incentive alignment, hierarchical oversight, etc.—stimulates the emergence of trust, cooperation, information exchange, and various sets of commitments, which is precisely what seem to be packed into the concept of higher order organizing principles. In other words, the web of contractual agreements and expectations give employees such incentives that they will invest in accumulating useful social knowledge, and thereby create a "social community of voluntaristic action" (Kogut and Zander 1992, p. 384). This also explains why there normally are more of these higher order organizing principles in firms than in markets. There really is a good reason why we normally speak of corporate culture rather than of industry culture.[6] Conner's and Kogut and Zander's reasoning would not be able to explain this, however, since by dispensing with the notion of opportunism they are fundamentally unable to explain why there should be "more of it" in firms than in markets.

In the contractual approach, the fundamental reason why various resources/assets are brought under common ownership is precisely because of the incentive problems that may arise in situations of (1) high asset-specificity or nonverifiable marginal products under team-production and (2) proclivities to opportunism/moral hazard. This provides a further perspective on Conner's and Kogut and Zander's reasoning, since in this scheme of thought, co-specialized resources/assets are organized more often in the firm than in the market precisely, because co-specialization produces rents that can be appropriated by opportunistic input-owners. This is a general explanation in the sense that it explains both the existence of the firm relative to the market and why a particular firm owns a particular combination of assets/resources. On this reading, Conner's (1991, p. 139) separation of the two is a nonissue. Furthermore, higher order organizing principles may be analyzed as rent-yielding *specific assets*,[7] so the reason why there is "more of it" in the firm than in the market is that firm-organization is the transaction cost-minimizing mode of organizing for this type of asset.

Knowledge-based Approaches and Economic Organization

I have responded to Conner's and Kogut and Zander's analyses by upholding the essential correctness of the contractual approach. We cannot do without concepts such as opportunism if we wish to explain the existence of the firm. That does not preclude, however, that one recognizes the relations of complementarity that exist between a contractual and a knowledge perspective on the firm. These complementarities are particularly fruitful for analyzing the issues of the boundaries and internal organization of the firm. David Teece (1982) in particular has detailed how considerations of appropriability of rent-yielding knowledge resources may influence the firm's boundary choice. But there are other, less developed, points of contact.

For example, one may see knowledge perspectives on the firm as complementing analysis of various agency-problems of internal organization, so that—for example—the organizational knowledge residing in business culture is also seen as influencing the organization's agency costs. They may also bear some promises for broadening the concept of asset-specificity, as argued by Klein (1988). Furthermore, some aspects of a knowledge perspectives nicely complement the incomplete contract-logic of Grossman and Hart (1986): if long contracts are incomplete, the culture and other higher order organizing principles of the firm may provide clues as to how managers will react to those contingencies that are not stipulated in the contract (Kreps 1990). That is to say, incomplete contracts are made less incomplete because of the presence of higher order organizing principles. Finally, some sort of incorporation of knowledge-perspectives in the contractual approach would allow a more fine-grained analysis of the boundaries of the firm. For example, as the diversifying firm moves increasingly away from its core competencies/core business, it may confront increasing agency costs, as increasingly unfamiliar activities produce more severe moral hazard and adverse selection problems. What is common to all these stories is that the boundaries and internal organization of the firm are all fundamentally understood to involve considerations of opportunism/moral hazard. That is accordance with the tenor of my argument so far. But I am willing to admit that *some* limited aspects of the boundaries of the firm may be explained in terms that avoid reference to opportunism/moral hazard. I identify these aspects in the following.

One problem in the contractual approach is that it is often implicitly assumed that what one firm can do on the level of production, another firm can do equally well, so that differences in economic organization are not allowed to turn on differences in production costs (Demsetz 1988).[8] Kogut and Zander (1992) rightly take issue with this. The fact that firms simply aren't equally good at producing goods and services—they have "differential capabilities"—may, as Kogut and Zander argue, explain some aspects of the boundaries of the firm. This is the kernel of truth in the claim that not *all* aspects of economic organization demands an explanation in terms of opportunism/moral hazard. But notice that this does not imply a break with an essentially contractual approach. For we can ask why it is that boundary choices are allowed to turn on differential capabilities.

And the answer has not really to do with production costs per se, but rather with *information* (or communication) costs. If a firm internalizes some economic activity because it believes it can carry out the activity in a more efficient way, it has—at least conceptually—already had the possibility of communicating to (say) supplier firms. For the basis for the firm's belief that it can carry out the activity in a more efficient way must the in-house possession of some superior knowledge. But conceptually the firm has the option of communicating that superior knowledge to the supplier firm (viz. of educating it), so that the reason the activity is internalized must be either inability to communicate or very high information costs.

In fact, Morris Silver (1984) suggests an "entrepreneurial" theory of the boundaries of the firm on such reasoning, and Richard Langlois (1992) places Silver's reasoning within the context of a Marshallian perspective on the evolution of industries and technologies. As Silver (1984) notes:

> In my scenario the entrepreneur does not "do it himself" in order to the profitability of good X a secret. Just the opposite is the case! The innovator would prefer to concentrate his managerial resources narrowly on X. His problem is that he cannot, at reasonable cost, convey his implausible "secret" to those with the technical capabilities needed to produce the required operations at the lowest cost (p. 17).

Silver's and Langlois' contributions are interesting, and may usefully complement more standard contractual reasoning, particularly when analyzing economic organization in regimes of rapid technological change. But it is important in the present context to note that these authors do not say that their reasoning can explain *the existence* of the firm, "merely" its boundaries. Furthermore, Silver's story may be argued to be relatively limited. For example, observe how much it has to do with essential disparity in capabilities among firms, and the consequent nonability to communicate about, for example, technical matters. But much productive knowledge is surely shared in communities of firms, so that this forms a basis for communicating about technical matters. Or in Kogut and Zander's terminology, some higher order organizing principles *may* in fact be industry-specific, rather than firm-specific. This is more or less what Marshall (1925, p. 271) meant when he talked about "the industrial district," in which "the mysteries of the trade become no mysteries; but are as it were in the air." The paradigmatic modern example of co-specialized knowledge streams emerging across market interfaces would be firm-networks in Silicon Valley. In such cases, the boundaries of firms are difficult to rationalize except on a standard contractual basis, since the effects of differential capabilities would be negligible.

Conclusion

Summing up, we may conclude that some limited aspects of economic organization may be given to explanation in terms that avoid reference to incentives, property rights, and opportunism/moral hazard. But these aspects probably relate only to the issue of the boundaries of the firm in regimes where firms' capabilities are strongly diverging, and communication is therefore impossible or very costly. At any rate, I conclude that Conner and Kogut and Zander have not given convincing rationales—in the form of sufficient reasons—for the *existence* of the firm that avoid reference to the above terms.

Furthermore, much of what they say—for example, that firms rather than the market supply higher order organizing principles—is perfectly consistent with contractual reasoning. So, although the insight that organizations know more than their contracts can tell is a fundamental one, economists are not well-advised to make a break with an essentially contractual logic, and should not abstain from using concepts such as opportunism or moral hazard. At our current level of knowledge, they are necessary for obtaining significant explanatory power.

That does not mean that we should not try to incorporate some of the insights from knowledge-perspectives in the contractual approach. Understanding some important phenomena, such as the organization of innovation activities, the economic function of corporate culture, or diversification, would seem to necessitate precisely this, as clearly recognized by writers such as Teece (1982), Klein (1988), Kreps (1990), and Dosi, et al. (1992).

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Endnotes

[1]Note the distinction between a "knowledge-based approach to the theory of the firm" and a "knowledge-perspective," I use the last concept in order to distinguish theories of organizational knowledge ("knowledge-perspectives") from theories that *make use* of theories of organizational knowledge in order to address economic organization ("knowledge-based approaches").

[2]Actually, there are many distinct knowledge-based approaches, such as "the evolutionary theory of the firm" (Nelson and Winter 1982), Penrose's (1959) distinctive contribution, the recent "resource-based view of the firm," taking its lead from Penrose (Lippman and Rumelt 1982, Barney 1986, Conner 1991), "the capabilities view of the firm" (Langlois 1991, Chandler 1992), and recent writings in strategic

management on firms' core competencies (Prahalad and Hamel 1990). Perhaps Harvey Leibenstein's recent work on "effort conventions" (work norms that emerge from the latent prisoners' dilemma games postulated to be played between employees and managers, (Leibenstein 1987) and David Kreps' work on corporate culture (also conceptualized as norms emerging from iterated PD-games, Kreps 1990) should be included here.

[3]That is, not given to direct verbal articulation (non-discursiveness). Such knowledge goes under a number of names, such as "practical knowledge," "know-how," or "knowledge how" [one minor doctrinal quibble: that last concept is really due to British philosopher Gilbert Ryle (1949), not to Bertrand Russell, cf. Kogut and Zander (1992, p. 386)].

[4]This may be a bit of an overstatement, since some competencies may be copied by other firms, and since license markets and franchising exist for the purpose of transferring competencies. So one should distinguish between those competencies that may successfully be transferred and those that may not, on the basis, for example, of Lippman and Rumelt's (1982) concept of "causal ambiguity" (viz. the ability to ascertain the links between competitive advantage and a given resource/competence).

[5]We should not be led to believe that hierarchy does away with all opportunism/moral hazard, however (cf. Grossman and Hart 1986). The hierarchy has its own forms of opportunistic behavior (cf. Miller 1992).

[6]I will certainly not deny that this last concept may be a quite meaningful one. But to the extent that something like industry culture exists, it is probably supported by sets of incentives and commitments in much the same way as corporate culture is.

[7]Klein (1988) explicitly recommends that the concept of asset-specificity be broadened to include what he calls "organizational capital," which is the same as Kogut and Zander's "organizing principles." See Barney (1986) for an analysis of corporate culture as a rent-yielding resource.

[8]See Williamson (1985, p. 88) for some discussion of this. We should not neglect, however, that Williamson has consistently emphasized that efficient economic organization minimizes the sum of transaction *and* production costs.

References

Alchian, A. A. and H. Demsetz (1972), "Production, Information Costs, and Economic Organization," in *Economic Forces at Work: Selected Works by Armen Alchian*, Indianapolis, IN: Liberty Press.

Arrow, K. J. (1974), *The Limits of Organization*, New York: Norton.

Barney, J. B. (1986), "Organizational Culture: Can It Be a Source of Sustained Competitive Advantage?", *Academy of Management Review*, 11, 656–665.

Chandler, A. D. (1992), "Organizational Capabilities and the Economic History of the Industrial Enterprise," *Journal of Economic Perspectives*, 6, 79–100.

Coase, R. H. (1937), "The Nature of the Firm," *Economica*, 4, 386–405.

Conner, K. R. (1991), "A Historical Comparison of Resource-Based Theory and Five Schools of Thought Within Industrial Organization Economics: Do We Have a New Theory of the Firm?" *Journal of Management*, 17, 121–154.

Demsetz, H. (1988), "The Nature of the Firm Revisited," *Journal of Law, Economics and Organization*, 4, 141–162.

Dosi, G., S. G. Winter, and D. J. Teece (1992), "Towards a Theory of Corporate Coherence," in G. Dosi, R. Giannetti, and P. A. Toninelli, (Eds.), Oxford, UK: Clarendon Press.

Foss, N. J. (1993a), "More on Knight and the Theory of the Firm," *Managerial and Decision Economics*, 14, 269–276.

____ (1993b), "Theories of the Firm: Competence and Contractual Perspectives," *Journal of Evolutionary Economics*, 3, 127–144.

____ (1993c), "The Two Coasian Traditions," *Review of Political Economy*, 5, 508–532.

Grossman, S. J. and O. D. Hart (1986), "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *Journal of Political Economy*, 94, 691–719.

Klein, B. (1988), "Vertical Integration as Organizational Ownership," *Journal of Law, Economics and Organization*, 4, 201–213.

Kogut, B. and U. Zander (1992), "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology," *Organization Science*, 3, 383–397.

Kreps, D. M. (1990), "Corporate Culture and Economic Theory," in J. Alt and K. Shepsle (Eds.), *Perspectives on Political Economy*, Cambridge, UK: Cambridge University Press.

Langlois, R. N. (1992), "Transaction Cost Economics in Real Time," *Industrial and Corporate Change*, 1, 99–127.

Leibenstein, H. (1987), *Inside the Firm: The Inefficiencies of Hierarchy*, Cambridge, MA: Harvard University Press.

Lippman, S. A. and R. P. Rumelt (1982), Uncertain Imitability: An Analysis of Interfirm Differences in Efficiency under Competition, *Bell Journal of Economics*, 13, 418–438.

Machlup, F. (1967), "Theories of the Firm: Marginalist, Behavioral, Managerial," in *Methodology of Economics and Other Social Sciences*, New York: Academic Press.

Marshall, A. (1925), *Principles of Economics*, London, UK: MacMillan.

Miller, G. (1992), *Managerial Dilemmas*, Cambridge, UK: Cambridge University Press.

Nelson, R. R. and S. G. Winter (1982), *An Evolutionary Theory of Economic Change*, Cambridge, MA: Belknap Press.

Penrose, E. T. (1959), *The Theory of the Growth of the Firm*, Oxford, UK: Oxford University Press.

Prahalad, C. K. and G. Hamel (1990), "The Core Competence of the Corporation," *Harvard Business Review*, 66, 79–91.

Ryle, G. R. (1949), *The Concept of Mind*, London, UK: Hutchinson.

Silver, M. (1984), *Enterprise and the Scope of the Firm*, Oxford, UK: Martin Robertson.

Teece, D. J. (1982), "Towards an Economic Theory of the Multiproduct Firm," *Journal of Economic Behavior and Organization*, 3, 39–63.

Williamson, O. E. (1985), *The Economic Institutions of Capitalism*, New York: Free Press.

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