

NEITHER MARKET NOR HIERARCHY: NETWORK FORMS OF ORGANIZATION

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Network forms of organization—typified by reciprocal patterns of communication and exchange—represent a viable pattern of economic organization. Networks are contrasted with market and hierarchical governance structures, and the distinctive features of networks are highlighted. Illustrative examples of network arrangements—in craft and high-technology industries, in regional economies, and in formerly vertically integrated fields—are presented. The paper concludes with a discussion of the conditions that give rise to network forms.

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In recent years, there has been a considerable amount of research on organizational practices and arrangements that are network-like in form. This diverse literature shares a common focus on lateral or horizontal patterns of exchange, interdependent flows of resources, and reciprocal lines of communication. Yet this rich vein of work has had much impact on students of organizational behavior. This is not particularly surprising, given the many divergent strands of this work. One would need to have followed the fields of international business, technology strategy, industrial relations, organizational sociology, and the new institutional economics, as well as interdisciplinary work on such themes as cooperation, the embeddedness of economic life in social structure, and the proliferation of small business units to have kept abreast. The purpose of this chapter is to render this literature more accessible to scholars in the organizational behavior field. I do so by arguing that relational or network forms of organization are a clearly identifiable and viable form of economic exchange under certain specifiable circumstances.

I begin by discussing why the familiar market-hierarchy continuum does not do justice to the notion of network forms of organization. I then contrast three modes of organization—market, hierarchy, and network—and stress the salient features of each. The logic of network forms is explored systematically in order to demonstrate how networks differ from other forms. I cull the literature in a number of social science and management fields and provide examples of a wide range of organizational arrangements that can be characterized as networks. This review affords considerable insight into the etiology of network forms, and allows me to develop a number of empirically disconfirmable arguments about the circumstances that give rise to networks and allow them to proliferate. I close with some thoughts on the research agenda that follows from these arguments.

MARKETS AND FIRMS

In his classical article on the nature of the firm, the economist Ronald Coase (1937) conceived of the firm as a governance structure, breaking with orthodox accounts of the firm as a "black box" production function. Coase's key insight was that firms and markets were alternative means for organizing similar kinds of transactions. This provocative paper, however, lay fallow, so to speak, for nearly four decades, until it was picked up by Williamson and other proponents of transaction costs economics in the 1970s. This work took seriously the notion that organizational form matters a great deal, and in so doing moved the economics of organization much closer to the fields of law, organization theory, and business history.

The core of Williamson's (1975; 1985) argument is that transactions that involve uncertainty about their outcome, that recur frequently and require substantial "transaction-specific investments"—of money, time or energy that cannot

be easily transferred—are more likely to take place within hierarchically organized firms. Exchanges that are straightforward, non-repetitive and require no transaction-specific investments will take place across a market interface. Hence, transactions are moved out of markets into hierarchies as knowledge specific to the transaction (asset specificity) builds up. When this occurs, the inefficiencies of bureaucratic organization will be preferred to the relatively greater costs of market transactions. There are two reasons for this: (1) bounded rationality—the inability of economic actors to write contracts that cover all possible contingencies; when transactions are internalized, there is little need to anticipate such contingencies since they can be handled within the firm's "governance structure"; and (2) "opportunism"—the rational pursuit by economic actors of their own advantage, with every means at their disposal, including guile and deceit; opportunism is mitigated by authority relations and by the stronger identification that parties presumably have when they are joined under a common roof.

This dichotomous view of markets and hierarchies (Williamson, 1975) sees firms as separate from markets or more broadly, the larger societal context. Outside boundaries of firms are competitors, while inside managers exercise authority and curb opportunistic behavior. This notion of sharp firm boundaries was not just an academic view. A good deal of management practice as well as antitrust law shared the belief that, in Richardson's (1972) colorful language, firms are "islands of planned co-ordination in a sea of market relations."

But just as many economists have come to view firms as governance structures, and are providing new insights into the organization of the employment relationship and the multidivisional firm (to cite only two examples), firms appear to be changing in significant ways and forms of relational contracting appear to have assumed much greater importance. Firms are blurring their established boundaries and engaging in forms of collaboration that resemble neither the familiar alternative of arms' length market contracting nor the former ideal of vertical integration.

Some scholars respond to these changes by arguing that economic changes can be arrayed in a continuum-like fashion with discrete market transactions located at one end and the highly centralized firm at the other. In between these poles, we find various intermediate or hybrid forms of organization.¹ Moving from the market pole, where prices capture all the relevant information necessary for exchange, we find putting-out systems, various kinds of repeated trading, quasi-firms, and subcontracting arrangements; toward the hierarchy pole, franchising, joint ventures, decentralized profit centers, and matrix management are located.

Is this continuum view satisfactory? Can transaction costs logic meet the task of explaining this rich array of alternative forms? Williamson clearly thinks that it can. Shifting gears somewhat, he remarks that he is "now persuaded that transactions in the middle range are much more common" than he previously recog-

nized (Williamson, 1985, p. 83).² But, he avers, the distribution of transactions are such that the tails of this continuum from market to hierarchy are "thick."

I do not share the belief that the bulk of economic exchange fits comfortably at either of the poles of the market—hierarchy continuum. The legal theorist Ian Macneil (1985, p. 485) also disputes this view, arguing that, "discrete exchange can play only a very limited and specialized function in any economy."³ Moreover, although I was earlier of the view that nonmarket, nonhierarchical forms represented hybrid modes (Powell, 1987), I now find that this mixed mode or intermediate notion is not particularly helpful. It is historically inaccurate, overly static, and it detracts from our ability to explain many forms of collaboration that are viable means of exchange.⁴

The view that transactions are distributed at points along a continuum implies that markets are the starting point, the elemental form of exchange out of which other methods evolve. Such a view is, obviously, a distortion of historical and anthropological evidence. As Moses Finley (1973) tells us so well, there was no market in the modern sense of the term in the classical world, only money in the nature of free booty and treasure trove. Nor did markets spring full blown with the Industrial Revolution. Economic units emerged from the dense webs of political, religious and social affiliations that had enveloped economic activity for centuries. Agnew (1986) documents that the word market first enters the English language during the twelfth century to refer to specific locations where provisions and livestock were sold. The markets of medieval England had a highly personal, symbolic, and hierarchical flavor. E.P. Thompson (1971) used the term "the moral economy" to characterize the intricate pattern of symbolic and statutory expectations that surrounded the eighteenth century marketplace. It was not until the latter part of the eighteenth century that among the British educated classes the term market became separated from a physical and social space and came to imply a boundless and timeless phenomenon of buying and selling (Agnew, 1986).⁵

By the same token, hierarchies do not represent an evolutionary end-point of economic development. A long view of business history would suggest that firms with strictly defined boundaries and highly centralized operations are quite atypical.⁶ The history of modern commerce, whether told by Braudel, Polanyi, Pollard, or Wallerstein, is a story of family businesses, guilds, cartels, and extended trading companies—all enterprises with loose and highly permeable boundaries.

Recent work on the growth of small firms also casts doubt on the utility of a continuum view of economic exchange. Larson (1988) and Lorenzoni and Ornat (1988) draw similar portraits from very different settings—high tech start-ups in the United States and craft-based firms in Northern Italy—which do not follow the standard model of small firms developing internally through an incremental and linear process. Instead, they suggest an entirely different model of external-

ly-driven growth in which preexisting networks of relationships enable small firms to gain an established foothold almost overnight. These networks serve as conduits to provide small firms with the capacity to meet resource and functional needs.⁷

The idea that economic exchanges can be usefully arrayed along a continuum is thus too quiescent and mechanical. It fails to capture the complex realities of exchange.⁸ The continuum view also misconstrues patterns of economic development and blinds us to the role played by reciprocity and collaboration as alternative governance mechanisms. By sticking to the twin pillars of markets and hierarchies, our attention is deflected from a diversity of organizational designs that are neither fish nor fowl, nor some mongrel hybrid, but a distinctly different form.

To be sure, there are a number of social scientists who question whether the distinction between market and hierarchy is particularly useful in the first place.⁹ They contend that no sharp demarcation exists and that the argument is more a matter of academic pigeon-holing than of substantive operational differences. These analysts are united, however, more by their dislike of stylized models of economic exchange than by any shared alternative perspective.

One group of critics emphasizes the embeddedness of economics in social and cultural forces. Markets, in this view, are structured by a complex of local, ethnic, and trading cultures, and by varying regimes of state regulation (Gordon, 1985). Historians and sociologists contend that the market is not an amoral self-subsistent institution, but a cultural and social construction (Agnew, 1986; Reddy, 1984; Zelizer, 1988).¹⁰ Others maintain that markets cannot be insulated from social structure because differential social access results in information asymmetries, as well as bottlenecks, thus providing some parties with considerable benefits and leaving others disadvantaged (Granovetter, 1985; White, 1981).

Another chorus of skeptics point to the intermingling of various forms of exchange. (See Bradach & Eccles, 1989, for a good review of this literature.) Stinchcombe (1985) shows that there are strong elements of hierarchy and domination in written contracts. Goldberg (1980, p. 338) notes that many market exchanges have been replaced by interorganizational collaborations. He contends that much economic activity "takes place within long-term, complex, multiparty contractual (or contract-like) relationships; behavior is in various degrees sheltered from market forces." Similarly, much of the observed behavior in hierarchical firms seems unrelated to either top management directives or the logic of vertical integration. For example, a firm's relationships with its law, consulting, accounting, and banking firms may be much more enduring and personal than its employment relationship with even its most senior employees.¹¹ The introduction of market processes into the firm also appears to be widespread. Eccles (1985) observes that large firms commonly rely on such market-like methods as transfer pricing and performance-based compensation schemes, while Eccles and Crane

(1987) report that dual reporting relationships, internal competition, and compensation based on services provided to clients are the current norm in investment banking.

MARKETS, HIERARCHIES, AND NETWORKS

I have a good deal of sympathy regarding the view that economic exchange is embedded in a particular social structural context. Yet it is also the case that certain forms of exchange are more social—that is, more dependent on relationships, mutual interests, and reputation—as well as less guided by a formal structure of authority. My aim is to identify a coherent set of factors that make it

Table 1. Stylized Comparison of Forms of Economic Organization.

Key Features	Forms		
	Market	Hierarchy	Network
Normative Basis	Contract—Property Rights	Employment Relationship	Complementary Strengths
Means of Communication	Prices	Routines	Relational
Methods of Conflict Resolution	Haggling—resort to courts for enforcement	Administrative fiat—Supervision	Norm of reciprocity—Reputational concerns
Degree of Flexibility	High	Low	Medium
Amount of Commitment Among the Parties	Low	Medium to High	Medium to High
Tone or Climate	Precision and/or Suspicion	Formal, bureaucratic	Open-ended, mutual benefits
Actor Preferences or Choices	Independent	Dependent	Interdependent
Mixing of Forms	Repeat transactions (Geertz, 1978)	Informal organization (Dalton, 1957)	Status Hierarchies
	Contracts as hierarchical documents (Stinchcombe, 1985)	Market-like features: profit centers, transfer pricing (Eccles, 1985)	Multiple Partners Formal rules

meaningful to talk about networks as a distinctive form of coordinating economic activity. We can then employ these ideas to generate arguments about the frequency, durability, and limitations of networks.

When the items exchanged between buyers and sellers possess qualities that are not easily measured, and the relations are so long-term and recurrent that it is difficult to speak of the parties as separate entities, can we still regard this as a market exchange? When the entangling of obligation and reputation reaches a point that the actions of the parties are interdependent, but there is no common ownership or legal framework, do we not need a new conceptual tool kit to describe and analyze this relationship? Surely this patterned exchange looks more like a marriage than a one-night stand, but there is no marriage license, no common household, no pooling of assets. In the language I employ below, such an arrangement is neither a market transaction nor a hierarchical governance structure, but a separate, different mode of exchange, one with its own logic, a network.

Many firms are no longer structured like medieval kingdoms, walled off and protected from hostile outside forces. Instead, we find companies involved in an intricate latticework of collaborative ventures with other firms, most of whom are ostensibly competitors. The dense ties that bind the auto and biotechnology industries, discussed below, cannot be easily explained by saying that these firms are engaged in market transactions for some factors of production, or by suggesting that the biotechnology business is embedded in the international community of science. At what point is it more accurate to characterize these alliances as networks rather than as joint ventures among hierarchical firms?

We need fresh insights into these kinds of arrangements. Whether they are new forms of exchange that have recently emerged of age-old practices that have gained new prominence (more on the etiology of networks below), they are not satisfactorily explained by existing approaches. Markets, hierarchies, and networks are pieces of a larger puzzle that is the economy. The properties of the parts of this system are defined by the kinds of interaction that takes place among them. The behaviors and interests of individual actors are shaped by these patterns of interaction. Stylized models of markets, hierarchies, and networks are not perfectly descriptive of economic reality, but they enable us to make progress in understanding the extraordinary diversity of economic arrangements found in the industrial world today.

Table 1 represents a first cut at summarizing some of the key differences among markets, hierarchies, and networks. In market transactions the benefits to be exchanged are clearly specified, no trust is required, and agreements are bolstered by the power of legal sanction. Network forms of exchange, however, entail indefinite, sequential transactions within the context of a general pattern of interaction. Sanctions are typically normative rather than legal. The value of the goods to be exchanged in markets are much more important than the relationship

itself; when relations do matter, they are frequently defined as if they were commodities. In hierarchies, communication occurs in the context of the employment contract. Relationships matter and previous interactions shape current ones, but the patterns and context of intraorganizational exchange are most strongly shaped by one's position within the formal hierarchical structure of authority.

The philosophy that undergirds exchange also contrasts sharply across forms. In markets the standard strategy is to drive the hardest possible bargain in the immediate exchange. In networks, the preferred option is often one of creating indebtedness and reliance over the long haul. Each approach thus devalues the other: prosperous market traders would be viewed as petty and untrustworthy shysters in networks, while successful participants in networks who carried those practices into competitive markets would be viewed as naive and foolish. Within hierarchies, communication and exchange is shaped by concerns with career mobility—in this sense, exchange is bound up with considerations of personal advancement. At the same time, intraorganizational communication takes place among parties who generally know one another, have a history of previous interactions, and possess a good deal of firm-specific knowledge, thus there is considerable interdependence among the parties. In a market context, it is clear to everyone concerned when a debt has been discharged, but such matters are not nearly as obvious in networks or hierarchies.

Markets, as described by economic theory, are a spontaneous coordination mechanism that imparts rationality and consistency to the self-interested actions of individuals and firms. One need not go as far as Polanyi (1957) did, when he argued that market transactions are characterized by an "attitude involving a distinctive antagonistic relationship between the partners," but it is clear that market exchanges typically entail limited personal involvement. "A contract connects two people only at the edges of their personalities" (Walzer, 1983, p. 83). The market is open to all comers, but while it brings people together, it does not establish strong bonds of altruistic attachments. The participants in a market transaction are free of any future commitments. The stereotypical competitive market is the paradigm of individually self-interested, noncooperative, unconstrained social interaction. As such, markets have powerful incentive effects for they are the arena which each party can fulfill its own internally defined needs and goals.

Markets offer choice, flexibility, and opportunity. They are a remarkable device for fast, simple communication. No one need rely on someone else for direction, prices alone determine production and exchange. Because individual behavior is not dictated by a supervising agent, no organ of systemwide governance or control is necessary. Markets are a form of noncoercive organization, they have coordinating but not integrative effects. As Hayek (1945) suggested, market coordination is the result of human actions but not of human design.

Prices are a simplifying mechanism, consequently they are unsuccessful at capturing the intricacies of idiosyncratic, complex, and dynamic exchange. As a

result, markets are a poor device for learning and the transfer of technological know-how. In a stylized perfect market, information is freely available, alternative buyers or sellers are easy to come by, and there are no carry-over effects from one transaction to another. But as exchanges become more frequent and complex, the costs of conducting and monitoring them increase, giving rise to the need for other methods of structuring exchange.

Organization, or hierarchy, arises when the boundaries of a firm expand to internalize transactions and resource flows that were previously conducted in the marketplace. The visible hand of management supplants the invisible hand of the market in coordinating supply and demand. Within a hierarchy, individual employees operate under a regime of administrative procedures and work roles defined by higher level supervisors. Management divides up tasks and positions and establishes an authoritative system of order. Because tasks are often quite specialized, work activities are highly interdependent. The large vertically-integrated firm is thus an eminently social institution, with its own routines, expectations, and detailed knowledge.

A hierarchical structure—clear departmental boundaries, clean lines of authority, detailed reporting mechanisms, and formal decision making procedures—is particularly well-suited for mass production and distribution. The requirements of high volume, high speed operations demand the constant attention of a managerial team. The strength of hierarchical organization, then, is its reliability—its capacity for producing large numbers of goods or services of a given quality repeatedly—and its accountability—its ability to document how resources have been used (DiMaggio & Powell, 1983; Hannan & Freeman, 1984). But when hierarchical forms are confronted by sharp fluctuations in demand and unanticipated changes, their liabilities are exposed.

Networks are "lighter on their feet" than hierarchies. In network modes of resource allocation, transactions occur neither through discrete exchanges nor by administrative fiat, but through networks of individuals engaged in reciprocal, preferential, mutually supportive actions. Networks can be complex: they involve neither the explicit criteria of the market, nor the familiar paternalism of the hierarchy. basic assumption of network relationships is that one party is dependent on resources controlled by another, and that there are gains to be had by the pooling of resources.¹² In essence, the parties to a network agree to forego the right to pursue their own interests at the expense of others.

In network forms of resource allocation, individual units exist not by themselves, but in relation to other units. These relationships take considerable effort to establish and sustain, thus they constrain both partners ability to adapt to changing circumstances. As networks evolve, it becomes more economically sensible to exercise voice rather than exit. Benefits and burdens come to be shared. Expectations are not frozen, but change as circumstance dictate. A mutual orientation—knowledge which the parties assume each has about the other and upon which they draw in communication and problem solving—is es-

tablished. In short, complementarity and accommodation are the cornerstones of successful production networks. As Macneil (1985) has suggested, the "entangling strings" of reputation, friendship, interdependence, and altruism become integral parts of the relationship.

Networks are particularly apt for circumstances in which there is a need for efficient, reliable information. The most useful information is rarely that which flows down the formal chain of command in an organization, or that which can be inferred from shifting price signals. Rather, it is that which is obtained from someone whom you have dealt with in the past and found to be reliable. You trust best information that comes from someone you know well. Kaneko and Imai (1987) suggest that information passed through networks is "thicker" than information obtained in the market, and "freer" than communicated in a hierarchy. Networks, then, are especially useful for the exchange of commodities whose value is not easily measured. Such qualitative matters as know-how, technological capability, a particular approach or style of production, a spirit of innovation or experimentation, or a philosophy of zero defects are very hard to place a price tag on. They are not easily traded in markets nor communicated through a corporate hierarchy. The open-ended, relational features of networks, with their relative absence of explicit quid pro quo behavior, greatly enhance the ability to transmit and learn new knowledge and skills.

Reciprocity is central to discussions of network forms of organization. Unfortunately it is a rather ambiguous concept, used in different ways by various social science disciplines. One key point of contention concerns whether reciprocity entails exchanges of roughly equivalent value in a strictly delimited sequence of whether it involves a much less precise definition of equivalence, one that emphasizes indebtedness and obligation. Game theoretic treatments of reciprocity by scholars in political science and economics tend to emphasize equivalence. Axelrod (1984) stresses that reciprocal action implies returning ill for ill as well as good for good. As Keohane (1986) notes, the literature in international relations "emphatically" associates reciprocity with equivalence of benefits.¹³ As a result, these scholars take a view of reciprocity that is entirely consistent with the pursuit of self-interest.

Sociological and anthropological analyses of reciprocity are commonly couched in the language of indebtedness. In this view, a measure of imbalance sustains the partnership, compelling another meeting (Sahlins, 1972). Obligation is a means through which parties remain connected to one another. Calling attention to the need for equivalence might well undermine and devalue the relationship.¹⁴ To be sure, sociologists have long emphasized that reciprocity implies conditional action (Gouldner, 1960). The question is whether there is a relatively immediate assessment or whether "the books are kept open," in the interests of continuing satisfactory results. This perspective also takes a different tack on the issue of self-interest. In his classic work *The Gift*, Marcel Mauss (1967 [1925]), attempted to show that the obligations to give, to receive, and to return were not

to be understood simply with respect to rational calculations, but fundamentally in terms of underlying cultural tenets that provide objects with their meaning and significance, and provide a basis for understanding the implications of their passage from one person to another. Anthropological and sociological approaches, then, tend to focus more on the normative standards that sustain exchange; game theoretic treatments emphasize how individual interests are enhanced through cooperation.

Social scientists do agree, however, that reciprocity is enhanced by taking a long-term perspective. Security and stability encourage the search for new ways of accomplishing tasks, promote learning and the exchange of information, and engender trust. Axelrod's (1984) notion of "the shadow of the future"—the more the immediate payoff facing players is shaped by future expectations—points to a broadened conception of self-interest. Cooperation thus emerges out of mutual interests and behavior is based on standards that no one individual can determine alone. Trust is thereby generated. Trust is, as Arrow (1974) has noted, a remarkably efficient lubricant to economic exchange. In trusting another party, one treats as certain those aspects of life which modernity rendered uncertain (Luhmann, 1979). Trust reduces complex realities far more quickly and economically than prediction, authority, or bargaining.

It is inaccurate, however, to characterize networks solely in terms of collaboration and concord. Each point of contact in a network can be a source of conflict as well as harmony. Recall that the term alliance comes from the literature of international relations where it describes relations among nation states in an anarchic world. Keohane (1986) has stressed that processes of reciprocity or cooperation in no way "insulate practitioners from considerations of power." Networks also commonly involve aspects of dependency and particularism.¹⁵ By establishing enduring patterns of repeat trading, networks restrict access. Opportunities are thus foreclosed to newcomers, either intentionally or more subtly through such barriers as unwritten rules or informal codes of conduct. In practice, subcontracting networks and research partnerships influence who competes with whom, thereby dictating the adoption of a particular technology and making it much harder for unaffiliated parties to join the fray. As a result of these inherent complications, most potential partners approach the idea of participating in a network with trepidation. In the various examples presented below, all of the parties to network forms of exchange have lost some of their ability to dictate their own future and are increasingly dependent on the activities of others.

ILLUSTRATIVE CASES OF NETWORK FORMS

It is time to add some flesh to these stylized models. Substantive details enable us to see how these abstractions operate in economic life. I provide examples of

networks from a diversity of industries, ranging from highly traditional sectors to the most technologically advanced ones. These disparate examples share some important commonalities. They all involve intricate, multifaceted, durable relationships in which horizontal forms of exchange are paramount. My argument is based on the Simmelian notion that similar patterns of exchange are likely to entail similar behavioral consequences, no matter what the substantive context.

I begin this section with craft industries, a setting where network forms have long been dominant. I turn next to a discussion of industrial districts, where network forms have made a resurgence. I then move to high technology fields; here, networks are a much more novel phenomenon. They are being established for strategic purposes because neither market nor hierarchical forms have delivered the goods. Networks, in this case, are very much associated with the early stages of product life cycles. I conclude with the case of vertical disaggregation, where networks represent an effort to introduce collaboration into well-established contexts in which trust and cooperation have long been absent. The logic is to move from arenas in which networks are common and easy to form to settings where they are developed almost as a last resort.

Networks in Craft Industries

The distinction between craft-based work and formal organization revolves around not only the dissimilar way in which work is organized in the two settings, but also on a different set of expectations about where authority is located. Craft work tends to be project-based, while in bureaucratic organizations a product moves through a series of functional departments where different activities are performed. In craft work each product is relatively unique, search procedures are non-routine, and the work process depends to a considerable degree on intuition and experimentation (Perrow, 1967). The examples presented below represent well-researched cases that highlight the many network features associated with craft production.

Construction. Robert Eccles (1981), in his research on the construction industry, found that in many countries the relations between a general contractor and his subcontractors are stable and continuous over long time periods, and only rarely established through competitive bidding. This type of quasi-integration results in what Eccles calls the "quasi-firm." Although most contracts are set under fixed price terms, no hierarchical organization arises, even though there are clear "incentive for shirking performance requirements." Instead, long-term and fairly exclusive association obviates the need for costly organizational monitoring. In an empirical study of residential construction in Massachusetts, Eccles found that it was unusual for a general contractor to employ more than two or three subcontractors in a given trade. This relationship obtained even

when a large number of projects were done in the same year, and despite the fact that a number of alternative subcontractors were available.

Publishing. The book industry is, to a considerable extent, based on network relationships (Coser, Kadushin & Powell, 1982). One effort to recognize and profit from these linkages is the establishment of personal imprint lines within large trade publishing houses. Under these arrangements, successful editors enjoy freedom from corporate constraints, and authors enjoy the intimacy and closeness associated with a small company. These extended networks allow an editor to rely on his or her own judgment and not have to appeal for higher level approval. The large firm is able to keep top-flight editors content and, at the same time, give them a greater financial stake in the books they bring in. Personal imprint editors are on their own as far as acquiring and nurturing authors, yet retain corporate clout for financing, sales, and distribution. Other publishers, in a related effort to hold on to key personnel, have "spun off" subsidiaries that operate in an autonomous fashion within the loose boundaries of the larger company. These "boutique" operations permit, in the words of the head of one such company, "the intimacy of a small operation with no committee meetings and no bureaucracy" (Coser et al, 1982, p. 53).

But these developments are merely reflections of a general phenomenon that is characteristic of certain sectors of the book trade. In trade and scholarly publishing, much of the time editors behave as if they are optimizing not their organization's welfare, but the welfare of the social networks to which they belong. In scholarly publishing, editorial research and evaluation relies extensively on personal networks, which are based on loyalty and friendship, cemented over time. Bonds of allegiance shape the processes of access and discovery. These personal relationships are also vital to economic success. While competition among firms does, to some extent, influence the success or failure of particular publishing houses, these selection pressures are dampened by the dense associational ties and personal relations that support all publishing transactions. The fortunes of a scholarly publishing house often depend more on the rise and fall of various academic paradigms than on the efficiency of a firm's internal operations. In a sense, companies do not so much compete with one another as hitch their fate to the success or failure of different academic networks and intellectual fashions.

Both the spinoff arrangements and the quasi-organizations based on personal networks reflect the fact that editors are located in structurally ambivalent positions: loyalty to their authors and their craft often outweighs allegiance to the firm that employs them. From the employer's perspective, the only means of responding to circumstances in which the most valued assets of the organization—the editor and his or her contacts—are highly mobile is to either allow the editor to set up shop on their own within the corporate boundaries or to try to in-

fluence editorial behavior in an unobtrusive manner (Powell, 1985, pp. 144-157).

Film and Recording Industries. Sociologists who study popular culture have long known that the music and movie businesses were external economy industries in which there was heavy reliance on subcontracting and freelance talent. But recent research has shed new light on this particular method of matching investment capital and human capital. These industries thrive on short-term contracts, minimization of fixed overhead, mutual monitoring of buyers and sellers, and a constant weaving and interweaving of credits, relationships, and successes or failures. But the ostensibly open competition that one might expect to pervade these markets is minimal (Peterson & White, 1981). Instead, recurrent small-numbers contracting appears to be the norm.

Cultural industries are characterized by high variance and great unpredictability; conditions which breed high rates of social reconstruction or reproduction (Faulkner & Anderson, 1987). These "project markets" are complex, dynamic, and uncertain. The participants in the firm industry—producers, directors, cinematographers, actors, and musicians—appear at first glance to be highly mobile. They move from studio to studio, from one project to another, with few stable ties to any formal organization. But as Faulkner and Anderson (1987) show, in their analysis of participation in 2,430 films over a fifteen year period (1965-1980), considerable stability and recurrent contracting among the participants is the norm. It is the networks of participants, however, that are stable and enduring, not the film studios, where employees come and go and ownership changes frequently.

Not surprisingly, the key players in the film industry trust others with whom they have worked in the past and found to be reliable. What is striking about Faulkner's and Anderson's analysis is how dramatic the patterns of inclusion and exclusion are. Reproduction persists within film genres and between big money and small money films. They observe (p. 907) that "distinct networks crystallize out of a persistent pattern of contracting when particular buyers of expertise and talent (film producers), with given schedules of resources and alternatives, settle into self-reproducing business transactions with distinct (and small) sets of sellers (directors, cinematographers, and fashionable actors and actresses)." Commercial results feedback and then historically shape the next round of contracting.

These network patterns are interesting in their own right; but Peterson and White (1981) point out that even though they are powerful and long-lasting, they tend to be invisible to most observers. Instead of long-term rates of reproduction most participants observe individual acts of ranking, favors, and contacts.

These craft-based examples are not particularly unique. Network forms of social organization are found in many cultural industries, in research and knowledge production, and in various industrial districts—such as the diamond

trade (Ben-Porath, 1980), the garment and fashion business in Milan and New York, the Lyonese silk industry (Piore & Sabel, 1984), or the "Third Italy," discussed below. And many of the professions exhibit some network-like features. Architecture is a prime example; but so apparently is engineering where, to judge from one recent study (Von Hippel, 1987), the informal trading of proprietary know-how among technical professionals in competing firms is extensive.¹⁶ What these different activities share in common is a particular kind of skilled labor force, one with hands-on experience with production and the strategic ability to generate new products to keep pace with changing market demands. The people who perform the work have a kind of knowledge that is fungible, that is, not limited to an individual task but applicable to a wide range of activities. The organizations that complement these human capital inputs are highly porous—with boundaries that are ill-defined, where work roles are vague and responsibilities overlapping, and where work ties both across teams and to members of other organizations are strong.

Regional Economies and Industrial Districts

Recent economic changes have created, or perhaps recreated is a more apt description, new forms of collaboration among for-profit firms. In the previous century, a number of regions and industries were closely identified because both the social life and the economic health of such areas as Lyon and Sheffield were closely linked to the fate of the silk and cutlery trades, respectively (see Piore & Sabel, 1984; Sabel, 1989). This rediscovery or reinvigoration of the 19th century industrial districts points to the advantages of agglomeration, in which firms choose to locate in an area not because of the presence of an untapped market, but because of the existence of a dense, overlapping cluster of firms, skilled laborers, and an institutional infrastructure (for a good discussion of the economies of agglomeration, see Arthur, 1987).

German textiles. Charles Sabel and his colleagues (1987) describe the German textile industry, centered in the prosperous state of Baden-Wurttemberg in southwestern Germany, as an "association of specialists, each with unmatched expertise and flexibility in a particular phase or type of production." This flourishing traditional craft industry employs a highly refined system of production that links small and medium-size firms with a wide range of institutional arrangements that further the well-being of the industry as a whole. These support services include industry research institutes, vocational training centers, consulting firms, and marketing agencies. Most textile producers are highly specialized; and, as Sabel et al. (1987) argue, the more distinctive each firm is, the more it depends on the success of the other firms' products that complement its own. This production system depends on an extensive subcontracting system in which key technologies are developed in a collaborative manner. The subcontractors

are also connected to overlapping inter-industry supplier networks. These linkages allow textile makers to benefit from the subcontractors' experiences with customers in other industries, and the suppliers are, in turn, buffered from downturns in any one industry. All of these arrangements serve to strengthen the social structure in which textile firms are embedded and to encourage cooperative relations that attenuate the destructive aspects of competition.

The Emilian Model. Perhaps nowhere have socially integrated, decentralized production units had more of an impact than in Italy, where the economy has outgrown Britain's and is catching up to France's.¹⁷ Modena, the microcosm of Latin Europe's renaissance, is the center of Emilia-Romagna, in north central Italy, and it is here that Italy's economic performance has been most exceptional. Behind this success is both a set of unusual, to an American eye, political and social institutions, and a size distribution of firms that seem more suited to the nineteenth century than the late twentieth.¹⁸

Firms employing fewer than 50 employees engaged 49 percent of the Italian labor force, and the average manufacturing firm has only 9.19 employees (Lazerson, 1988, p. 330). The proportion of the labor force grouped in smaller units of employment is greater in Emilia than in Italy as a whole (Brusco, 1982). The success of these small enterprises rests on a different logic of production than found in a typical vertically-integrated firm.

These small firms are frequently grouped in specific zones according to their product, and give rise to industrial districts in which all firms have a very low degree of vertical integration (Brusco, 1982). Production is conducted through extensive, collaborative subcontracting agreements. Only a portion of the firms market final products, the others execute operations commissioned by the group of firms that initiate production. The owners of small firms typically prefer subcontracting to expansion or integration (Lazerson, 1988). The use of satellite firms allows them to remain small and preserve their legal and organizational structure as a small company. Often satellite firms outgrow the spawning firms. Though closely related and highly cooperative, the firms remain strictly independent entities.

These industrial districts embrace a wide range of consumer goods and engineering components and machines: knitwear in Modena, clothes and ceramic tiles in Modena and Reggio, cycles, motorcycles and shoes in Bologna, food processing machinery in Parma, and woodworking machine tools in Capri, to name but a few (see Brusco, 1982, pp. 169–170).

Why is production so widely decentralized and so spatially concentrated? The answer appears to be rather idiosyncratic to the Italian case. It is partly a response to labor union power in large firms, where union influence has proved to be a disincentive to job expansion. The small firms exhibit high wage dispersion, with highly skilled workers who have registered as artisans in order to make more than is standard in large-firm industrial relations agreements, and un-

skilled, temporary employees—students, the elderly, immigrants, who work off the books for much less than they would receive in a large factory, if they could find employment. The districts are also a response to changing tastes and technology, in particular the emerging popularity of custom rather than the standardized goods and the availability of high quality, flexible technologies that are compatible with the needs and budgets of small firms.

These decentralized organizational arrangements depend on a unique set of political and social institutions, most notably the fact that almost all local political authorities are controlled by the Communist party (Brusco, 1982; Lazerson, 1988). A combination of familiar, legislative, ideological, and historical factors buttress Emilia-Romagna's economic progress. The continued existence of the extended family provides for economic relations based on cooperation and trust, and facilitates the search for new employees through family and friendship networks (Lazerson, 1988). The CNA, a national organization with close ties to the Italian Communist party, represents some 300,000 artisanal firms and provides them with a rich array of administrative services. These artisanal associations prepare pay slips, keep the books, and pay the taxes, as well as establish consulting, marketing, and financial services (Brusco, 1982). By coordinating these various administrative activities, the associations establish on a cooperative basis the conditions for achieving economies of scale.

Brusco (1982) and Sabel (1989) make a persuasive case that the Emilian models fosters the skills and initiative of artisanal entrepreneurs. The number of entrepreneurs previously employed by large firms, particularly as foremen, is very high. By tapping both initiative and detailed production knowledge, the small firms are able to offer a vast array of new products. And these small firms, through their multitude of collaborative networks, are able to give shape to new ideas with a speed unimaginable in larger enterprises.

Extended Trading Groups. The kind of collaboration that obtains in the industrial districts of southwestern Germany or north central Italy is based in part on a set of local circumstances, but the principles of mutual organization on which the districts are based are more widely applicable. Interfirm cooperation is often found in economic activities based in a particular region, such as in Japan or Scandinavia, or in locales where firms from similar industries are spatially concentrated, such as Silicon Valley or Route 128 in the United States. The extended trading relationships that develop under these circumstances of physical proximity may vary considerably in their details, but their underlying logic is constant.

Ronald Dore (1983) argues that networks of preferential, stable trading relationships are a viable alternative to vertical integration. His work on the regionally concentrated Japanese textile industry, particularly its weaving segment, aptly illustrates this point. The industry was dominated in the 1950s by large mills, most of which were vertically integrated enterprises with cotton-importing, spin-

ning and finishing operations. By 1980 the larger mills had closed and the integrated firms had divested and returned to their original base in spinning. This "devolution" has led to a series of stable relationships among firms of different sizes. The key to this system is mutual assistance. Dore (1983) gives the example of a finisher who re-equipment with a more efficient process, which gives him a cost advantage. This finisher, however, does not win much new business by offering a lower price. The more common consequence is that merchants go to their own finishers and say: "Look how X has got his price down. We hope you can do the same because we really would have to reconsider our position if the price difference goes on for months. If you need bank financing to get the new type of vat we can probably help by guaranteeing the loan." This type of relationship is, of course, not limited to the Japanese textile industry; similar patterns of reciprocal ties are found in many other sectors of the Japanese economy.¹⁹

What are the performance consequences of these kinds of trading relationships? Dore suggests that the security of the relationship encourages investment by suppliers, as the spread of robotics among Japan's engineering subcontractors amply attests. Trust and mutual dependency result in a more rapid flow of information. In textiles, changes in consumer markets are passed quickly upstream to weavers, and technical changes in production also flow downstream rapidly. There is, Dore asserts, a general emphasis on quality. One would not terminate a relationship when a party cannot deliver the lowest price, but it is perfectly proper to terminate a relationship when someone is not maintaining quality standards.

More recently, Dore (1987) has maintained that Japanese economic relations in general do not have the properties (i.e., opportunism, short-term profit-maximization, and distrust) that we commonly associate with capitalist enterprise and on which we build our theories of economic organization (in particular, transaction cost economics). He contends that the costs of doing business in Japan are lower than in Britain or the United States because of concerns for reputation and goodwill and considerations of trust and obligation. Moreover, he argues, this embedding of business relations in moral and social concerns does not reduce economic vitality, it sustains it and provides Japan with a considerable edge (for further discussion on this point, see the chapter by Lincoln).

But is Japan all that unique? Perhaps it is true, as Dore (1987) suggests, that as a nation, Japanese industry is organized more along the principles of an extended network (see also, Imai & Itami, 1984), but it does not appear to have a monopoly on these practices. Hägg and Johanson (1983), in an analysis of the industrial markets which comprise the core of the Swedish economy, describe a series of long term, stable relationships among industrial producers who share R&D resources and personnel. They suggest that the companies are actually investing in their connections with other companies, and in the process, losing their own identity to some extent. Instead of a competitive environment, there is a sharing

of risks and resources and a pooling of information. Hägg and Johanson argue that these arrangements eliminate costly safeguards and defensive measures and are better adapted to uncertainty. Competition in intermediate producer markets is not eliminated, rather coalitions of firms compete with other coalitions, not on the basis of price, but in terms of product development and knowledge accumulation.

Swedish researchers have chronicled numerous such collaborative projects, principally among large manufacturing companies (Hakansson, 1987; Johanson & Mattson, 1987). Most of the ventures involve at least one firm with a home base in Sweden, but the researchers do not speculate whether Swedish industry has a particular proclivity for coordinating product development activities with suppliers, consumers, and producers of complementary products. These "network forms of interorganizational relations" tend to be long-term, costly, project-based efforts at product development or technological innovation (Hakansson, 1987). They differ, however, in a number of respects from some of the examples discussed above. They usually involve very large firms, such as Volvo, Saab-Scandia, Ericsson, and Fairchild, and are typically heavy manufacturing projects in fields such as aerospace, metallurgy, mining, and marine engines. Unlike many of the subcontracting relationships, in which one firm serves as a principal and various satellite firms as agents, these production ventures bring companies together as co-contractors. In the language of agency theory, they are both principals and agents: risk-takers who allocate tasks and share in the gains or losses and contributors to the final product.

It was not all that long ago that notions of industrial districts and spatially concentrated production were largely ignored—both intellectually and geographically.²⁰ Now, every municipality seems busy at work trying to create their own Route 128 or Modena.²¹ The success of these forms of extended trading networks has several key ramifications:

1. One of the main consequences has been to blur the boundaries of the firm—boundaries are being expanded to encompass a larger community of actors and interests that would previously have either been fully separate entities or absorbed through merger;
2. A new constellation of forces is being recognized as crucial to economic success: whether in the Third Italy of Silicon Valley, spatially concentrated production involves the cooperation of local government, proximity to centers of higher education, a highly skilled labor pool, extensive ties to research institutes and trade associations, and cooperation among firms with specialized skills and overlapping interests;
3. The spread of technologically advanced, smaller units of enterprise—a growth that comes at the expense of larger companies and is not explained solely by the shift from manufacturing to services (Loveman,

Piore & Sengenberger, 1987), and occurs without notable direct investment or significant employment increase, but rather as a result of expansion through various cooperative interorganizational relationships (Lorenzoni & Ornati, 1988).

Strategic Alliances and Partnerships

In many respects, partnerships and joint ventures are not new developments. They have been common among firms involved in oil extraction and petroleum refining as a means of spreading risks. Chemical and pharmaceutical firms have long conducted basic research jointly with university scientists. And some of the most complex partnerships have taken place in the commercial aircraft industry. Three major global players—Boeing, McDonnell Douglas, and Airbus Industrie—construct their planes via complex joint ventures among firms from many nations (Mowery, 1987). Boeing and Rolls Royce teamed up to produce the Boeing 757, and much of the construction of the Boeing 767 is done, through joint ventures, in Japan and Italy. Airbus Industrie is a four nation European aircraft consortium, supported in part through loans (or subsidies, if you take the competition's view) from European governments.²²

There is widespread evidence, however, that experimentation with various new kinds of interfirm agreements, collaborations, and partnerships have mushroomed in an unprecedented fashion (Friar & Hoewitch, 1985; Teece, 1986; Zagnoli, 1987; Hergert & Morris, 1988; Mowery, 1988). Firms are seeking to combine their strengths and overcome weaknesses in a collaboration that is much broader and deeper than the typical marketing joint ventures and technology licensing that were used previously. These new ventures may take the form of novel cooperative relationships with suppliers, or collaboration among several small firms to facilitate research and new product development. More generally, internally-generated-and-financed research is giving way to new forms of external R&D collaboration among previously unaffiliated enterprises. Indeed, in some industries, there appears to be a wholesale stampede into various alliance-type combinations that link large generalist firms and specialized entrepreneurial start-ups. Nor are these simply new means to pursue research and development; the new arrangements also extend to production, marketing, and distribution. And, in some circumstances, large firms are joining together to create "global strategic partnerships" (Perlmutter & Heenan, 1986) that shift the very basis of competition to a new level—from firm vs. firm to rival transnational groupings of collaborators.²³

In the past, the most common way in which large companies gained expertise or products that they were unable to develop on their own was to acquire another company with the needed capability. Mergers and acquisitions in high technology fields have not disappeared, but their track record is generally poor (Doz, 1988). Partnerships are more frequent now because of growing awareness that

other options have serious drawbacks. Recent efforts at various kinds of more limited involvement represent an important alternative to outright takeover. Equity arrangements—deals that combine direct project financing and varying degrees of ownership—are an example. A larger firm invests, rather than purchases, primarily for reasons of speed and creativity. The movement in large companies away from in-house development to partial ownership reflects an awareness that small firms are much faster at, and more capable of, innovation and product development. General Motors explained its 11 percent investment in Teknowledge, a maker of diagnostic systems that use a type of artificial intelligence, by noting that "if we purchased the company outright, we would kill the goose that laid the golden egg." Equity arrangements can be quite complex. Some small companies have several equity partners, and large companies find themselves in the novel position of negotiating product development contracts and licensing arrangements with companies that they partly own. Equity investments are typically "complemented by various agreements, such as research contracts from the larger firm to the smaller one, exclusive licensing agreements to the larger firm, and often loan and other financial agreements provided by the larger firm to the smaller one" (Doz, 1988, p. 32).

These developments, not surprisingly, are particularly common in technology-intensive industries (Mariti & Smiley, 1983; Zagnoli, 1987; Contractor & Lorange, 1988). Both the motivations for collaboration and the organizational forms that result are quite varied. Firms pursue cooperative agreements in order to gain fast access to new technologies or new markets, to benefit from economies of scale in joint research and/or production, to tap into sources of know-how located outside the boundaries of the firm, and to share the risks for activities that are beyond the scope or capability of a single organization. The ensuing organizational arrangements include joint ventures, strategic alliances, equity partnerships, collaborative research pacts of large scale research consortia, reciprocity deals, and satellite organizations. There is no clear cut relationship between the legal form of cooperative relationships and the purposes they are intended to achieve. The form of the agreement appears to be individually tailored to the needs of the respective parties, and to tax and regulatory considerations. The basic thrust, however, is quite obvious: to pursue new strategies of innovation through collaboration without abrogating the separate identity and personality of the cooperating partners.

In these process-oriented fields, knowing how to make a product and how to make it work is absolutely critical to success. In recent years, as product life cycles shorten and competition intensifies, timing considerations and access to know-how have become paramount concerns. Teece and Pisano (1987) suggest that, increasingly, the most qualified centers of excellence in the relevant know-how are located outside the boundaries of the large corporation. Fusfeld and Haklisch (1985) argue that corporations are becoming less self-sufficient in their ability to generate the science and technology necessary to fuel growth. The

larger and more technology-intensive the firm, the greater the amount of technical expertise it requires to maintain its position. Whether it is the case that one firm's technological competence has outdistanced the others, or that innovations would be hard to replicate internally, as suggested by the growing reliance on external sources of research and development (see Friar & Horwitch, 1985; Graham, 1985; & Hamilton, 1985), network forms of organization represent a fast means of gaining access to know-how that cannot be produced internally. The network-like configurations that have evolved in high technology can process information in multiple directions. They create complex webs of communication and mutual obligation. By enhancing the spread of information, they sustain the conditions for further innovation by bringing together different logics and novel combinations of information.

Collaborative agreements involve a wide variety of organizations. While the joining together of small firms that possess entrepreneurial commitment and expertise in technology innovation with large scale corporate organizations that have marketing and distribution power represents the prototypical example, these arrangements are certainly not the only option. Many large firms are linking up with other large companies, particularly in international joint ventures.²⁴ These partnerships are unusual in that they involve the creation of dependencies and linkages among very large firms, such as Toyota and General Motors.

Porter and Fuller (1986) suggest that such coalitions seem well suited to the process of industry and firm globalization, as evidenced by AT&T's alliances with Olivetti, Phillips, NTT, Toshiba and Ricoh. Large telecommunications companies have been very active participants in collaborative international research efforts. Siemens and ICL both have links with Fujitsu, while ICL, Siemens, and Machines Bull have formed a joint research institute in Munich to pool their basic research. Machines Bull is also a partner in a joint venture with Honeywell and N.E.C. Indeed, firms often have stakes in several projects with different partners (and potential competitors) and are engaged in ventures involving several technologies of different stages of development, creating a "loose network of sometimes interlocking companies" (Contractor & Lorange, 1988, p. 24).

Traditionally, international joint ventures were not regarded favorably by multinational firms, especially those based in the United States. International manufacture and marketing occurred through either direct foreign investment or export, and occasionally international licensing was utilized when a firm wished to exploit a process technology. Joint ventures were sometimes resorted to when political exigencies or protectionist policies prevented operating fully owned subsidiaries. This was the standard reason for joint ventures in Japan, certain third world nations, and socialist countries.

Recent collaborations differ substantially from previous strategies. In these new global partnerships, all of the participants contribute technological and managerial expertise, as well as capital. The relationships are multidimensional

and long-term, rather than one-shot transfers of technologies. What has happened to cause firms to prefer cooperation to full ownership, or a "go-it-along" approach?

There are numerous factors both pushing and pulling U.S. multinationals into global alliances. On the push side are technological constraints. Much sophisticated technological knowledge is tacit in character (Nelson & Winter, 1982) and cannot easily be transferred by licensing. Indeed, it is the unwritten, intangible character of much firm-specific knowledge that has led U.S. firms, particularly the automakers, to form joint ventures with Japanese manufacturers in an effort to better understand their production processes. Similarly, Japanese companies have been attracted to joint projects with U.S. high tech firms because technological innovation cannot be simply purchased, it requires cumulative knowledge of the linkages among design, production, and sales.

On the pull side are financial concerns and the advantages of risk reduction. In joining a coalition with another firm, both partners may enjoy options that otherwise would not be available to them, ranging from better access to markets, pooling or exchanging technologies, and enjoying economies of scale and scope. Risk-sharing is very attractive in industries where each successive generation of products is expensive to develop, and product life cycles are short.

In some instances, international joint ventures do appear to represent an intermediate position between contracting among independent firms and vertical integration of the entire production chain. This is most common when the venture involves securing complementary inputs representing successive stages of production, or contracting for specific services or distribution arrangements. But this intermediate stage does not appear to be a temporary or unstable arrangement. Indeed, firms in such situations are ceding a good deal of their autonomy and facing considerable interorganizational dependence. Moreover, alliances that involve the pooling of know-how, the ceding of proprietary information, and the sharing of common assets are not intermediate in either an analytical or a developmental sense. They represent a very different form of interorganizational exchange, one in which ongoing vitality rests on continuing mutual dependence.

While U.S. firms have been recently active in international business alliances, collective industrial research is considerably less advanced here than in Japan or Western Europe,²⁵ where research consortia have proven to be valuable in eliminating costly, duplicative R&D, in achieving economies of scale in research, and in diversifying the search for solutions to technical problems. But it was not until 1984 that Congress passed the National Cooperative Research Act, easing antitrust laws and permitting collaborative research among competing firms. Since then, more than 100 R&D consortiums have been founded, involving more than 500 companies in such fields as biotechnology, telecommunications, automobiles, energy, and steel. Collective industrial research is, nevertheless, still viewed by many in the U.S. industry and government as a form of collusion and as a seedbed for anticompetitive practices.²⁶

Despite a growing consensus that the changing nature of technology development encourages collective R&D, firms have been reluctant to share their best scientists and most attractive projects.²⁷ It may well be the perceived threat of Japan, with its extensive government-sponsored networks of collective research, that is the greatest spur to collaboration among large U.S. firms. Cries of economic nationalism were motivating forces in the establishment of research consortia such as Sematech. This consortium of semiconductor firms may signal a new awareness of the need for collective research. Both IBM and AT&T are, for the first time, surrendering proprietary designs and processes to competitors in hopes of aiding the consortium's efforts at trying to revive the domestic semiconductor industry.

Cooperative arrangements are not necessarily easy to sustain, nor do they always entail success.²⁸ They can create a host of management problems and they also raise serious questions about effective industrial policy. On the organizational front, Doz (1988) has cautioned that convergence of purpose is often difficult to achieve, consistency of effort can be undermined by parochial subunit goals, and middle managers and technical specialities may not share top management's enthusiasm for cooperation. Similarly, Borys and Jemison (1989) suggest that because partners have not previously worked together, they may misperceive one another's actions. They observe that collaborations often begin with considerable resources, heavy obligations, and lofty expectations. Thus, the pressures to perform successfully may be considerable.

Collaboration can be fraught with other risks. Parties may bring hidden agendas to the venture. There is an ever-present threat that one party will capture the lion's share of the benefits, or defect with the other party's knowledge and expertise.²⁹ Some analysts worry that U.S. partners to global alliances may provide "mundane" services such as assembly, distribution, and marketing, which add little value to the product.³⁰ The key development work and the higher-paying, value-added jobs are taken overseas, and the U.S. firm merely completes the final stages. These issues are far from being resolved, but they point out the complex ways in which collaborative networks may or may not contribute to a country's stock of organizational talents.

Vertical Disaggregation

Evidence is accumulating that many firms are choosing to shrink their operations in response to the liabilities of large-scale organization. For example, Mariotti and Cainarca (1986) describe a "downsizing" pattern in the Italian textile industry, where there has been a decline in the number of vertically-integrated firms and growth in "intermediate governance structures." They attribute this development to three failures that plague vertically-integrated firms: an inability to respond quickly to competitive changes in international markets; resistance to process innovations that alter the relationship between dif-

ferent stages of the production process; and systematic resistance to the introduction of new products.³¹ Interestingly, in an earlier era, firms actively pursued a strategy of vertical integration in an effort to reap the benefits of administrative coordination, economies of scale, and risk reduction (Chandler, 1977). Today, these "strengths" have results in various weaknesses: structural inertia, slow response times, and decreased employee satisfaction.

Large organizations are designed to do certain things well over and over again. The more that behaviors are repeated, the more predictable they become; thus, the greater likelihood that these actions will become formalized. Child (1972) found that large organizations tend to be more rule-bound and to require greater documentation of their efforts. For certain kinds of activities, such practices are useful, but for others it can result in informational logjams and a serious mismatch between organizational outcomes and the demands of clients and customers in a changing environment. Thus, the very factors that make a large organization efficient and reliable at some tasks render it cumbersome and resistant to change when it comes to other actions (Nelson & Winter, 1982; Hannan & Freeman, 1984).

The information costs in large organizations are further compounded by motivational difficulties as well. One point that Alchian and Demsetz (1972) and Williamson (1975) implicitly demonstrate is that much of the internal structure of large organizations is designed to prevent collective action by employees. This basic attitude of suspicion may explain the finding by social psychologists that job satisfaction (as measured by turnover, absenteeism, and morale) declines with increases in organizational size and/or centralization (Porter & Lawler, 1965; Berger & Cummings, 1979). The design of organizations can affect the behavior of their members in a number of powerful ways.³² In large hierarchical organizations, promotions up the career ladder are a key part of the reward structure. You have, then, little incentive to disagree with the operating decisions made by people above you in rank because they are the people who must decide on your promotion. Research suggests that hierarchical design dampens employee motivation because individuals are likely to be more committed when they have participated in a decision, and much less enthusiastic when they have been ordered by superiors to undertake a particular task (Hackman & Oldham, 1980).

When the pace of technological change was relatively slow, production processes were well understood and standardized, and production runs turned out large numbers of similar products, vertical integration was a highly successful strategy. But the disadvantages of large-scale vertical integration can become acute when the pace of technological change quickens, product life cycles shorten, and markets become more specialized. Firms are trying to cope with these new pressures in a variety of ways: by explicitly limiting the size of work units, by contracting work out, or through more collaborative ventures with suppliers and distributors. One route leads firms to a rediscovery of the market, to the hos-

tile world of arms-length relationships. Associated with a greater reliance on external contracts are strong efforts at cost-cutting, and greater managerial freedom in the deployment of resources and personnel. Another route leads firms to try to reorganize production, not so much through eliminating jobs, but by searching for new methods of collaboration among formerly antagonistic and/or competitive parties (Walton, 1985; Weitzman, 1984). Both responses entail some form of vertical disaggregation, or the shrinking of large corporate hierarchies.

The U.S. auto industry provides a good example of the crossroads many firms are at as they encounter the limits of vertical integration. The auto industry has undergone a profound shake-up, but the ultimate consequences of these changes have yet to be determined (see Dyer et al., 1987; Quinn, 1987). Prior to the mid-1970s, the big three automakers operated in a comfortable environment with little competitive pressure and scant customer demands for gas-efficient, high quality cars. The auto companies pursued a strategy of tight integration of production, which provided a means to guarantee supplies during periods of peak demand, as well as to protect the secrecy of annual styling changes. Vertical integration also kept down the prices of the independent parts suppliers with whom the companies traded. There was neither any give and take nor trust between the automakers and the subcontractors. Contracts were lost because a supplier bid .01 cents per item higher than a competitor (Porter, 1983). Automakers rigorously inspected supplier facilities, quality control procedures, stability of raw material sources, cost data, and management quality and depth (Porter, 1983, p. 278). They were reluctant to permit a supplier to manufacture a complete system. Instead, automakers preferred a competitive situation in which several firms supplied various components and the final assembly was done in-house.

Today this old system has crumbled in the face of international competition and fallen prey to the contradictions and short-term logic of the regime of competitive supplier relations. Heightened competition exposed a number of serious defects in this system. Abernathy (1978) has argued that vertical integration in the auto industry led to inflexibility. One consequence of tight technological interdependence is that change in any one part means the entire process must be altered. Pursuit of a cost-minimization strategy also reduced the automakers' ability to innovate. Susan Helper (1987), in an excellent analysis of supplier relations in the auto industry, observes that the old methods prevented suppliers from developing expertise, thereby reducing the skill requirements of their employees. This made it hard for them to develop any nonautomotive contracts and kept them dependent on the auto companies. It also had a chilling effect on innovation. There was neither any incentive nor capability for the suppliers to update equipment, suggest technological changes, or make long-range plans.

Because of their declining market share and lower profits, automakers are experimenting with an enormous variety of new approaches. A complex web of ties has developed among U.S. automakers, their Japanese rivals, American labor, and auto parts suppliers. These changes are transforming the way the U.S.

auto industry operates, changing the nature of competition worldwide, and sharply blurring the distinction between domestic and imported cars. Joint venture activity is extensive: between Ford and Mazda, General Motors and Toyota, GM and Volvo, and Chrysler and Mitsubishi. Ownership is also held in tandem: Ford owns 25 percent of Mazda, GM 42 percent of Isuzu and 5 percent of Suzuki, Chrysler 12 percent of Mitsubishi Motors. These relationships involve close collaboration and joint production on some projects, and secrecy and exclusiveness on other models.

Equally extensive tinkering is underway with respect to subcontracting arrangements (Helper, 1987). The length of contracts have been expanded, from one year to three to five. More joint design work is being undertaken and sole-sourcing agreements are becoming more common. These new, more collaborative arrangements involve less monitoring and costly inspections, yet defect rates are much reduced. The automakers are becoming more dependent on the technological expertise of the suppliers, whose long-run health is now a factor in the automakers' profits.

At the same time, however, the automakers are pursuing a second strategy: outsourcing to low wage areas. They are simultaneously deciding which suppliers are worth investing in a long-term relationship with and determining which components can be obtained on the basis of price rather than quality. In these cases, there is little concern for collaboration or supplier design work; instead, the effort is aimed at finding third-world suppliers that can provide parts at the lowest possible price.

These disparate options graphically illustrate how practices such as subcontracting have a double edge to them: they may represent a move toward relational contracting (Macneil, 1978), with greater emphasis on security and quality; or they could be a return to earlier times, a part of a campaign to slash labor costs, reduce employment levels, and limit the power of unions even further. Hence, many of the current downsizing efforts seem, at the first glance, to be illogical. Some firms are seeking new collaborative alliances with parts suppliers while at the same time they are trying to stimulate competition among various corporate divisions and between corporate units and outside suppliers. Firms are proposing new cooperative relationships with labor unions and in the same motion reducing jobs and outsourcing them to foreign producers.

Are companies really as confused as it seems? Are these various actions merely the faulty experimentation of poor and indecisive managements? Not necessarily. Though many of the efforts at vertical disaggregation appear to work at cross purposes, there does appear to be an underlying theme. Strong competitive pressures within an industry reduce the number of levels of hierarchy within firms and push companies to redefine the boundaries of their organizations. Firms are externalizing the production of highly standardized components, and searching for new collaborative methods to produce components that require highly skilled, innovative efforts. These collaborations may entail new rela-

tionships with labor, close relationships with "outsiders" who are no longer viewed merely as providers of a component but rather as sources of technological creativity that large firms cannot duplicate internally, and new cooperative ventures with competitors to pool risks and to provide access to markets.

THE ETIOLOGY OF NETWORK FORMS

Examples, as the old adage goes, are never proof. Qualitative data are always vulnerable to charges of being selectively presented. But qualitative materials are very useful for theory generation. The cases presented above are, in my view, much more than anecdotes, because taken together they represent a number of highly competitive and/or resurgent industries, and more importantly, they tell a consistent story that enables us to understand the circumstances under which network forms arise. These examples suggest that non-market, non-hierarchical modes of exchange represent a particular form of collective action, one in which:

- cooperation can be sustained over the long run as an effective arrangement;
- networks create incentives for learning and the dissemination of information, thus allowing ideas to be translated into action quickly;
- the open-ended quality of networks is most useful when resources are variable and the environment uncertain;
- networks offer a highly feasible means of utilizing and enhancing such intangible assets as tacit knowledge and technological innovation.

The examples presented above suggest that the conditions that give rise to network forms are quite diverse. The immediate causes, to the extent that they can be discerned, reveal a wide variety of reasons for the proliferation of network-like arrangements. In only a minority of instances is it sensible to maintain that the genesis of network forms is driven by a concern for minimizing transaction costs. Strategic considerations—such as efforts to guarantee access to critical resources, to obtain crucial skills that cannot be produced internally, to pacify the concerns of professional communities or national governments, or even, as in the case of global partnerships, to remake the very nature of international competition—certainly seem to outweigh a simple concern with cost minimization.

The origins and development of network forms seldom reveal a simple chain of events. The loose informal ties that sustain the Japanese *keiretsu*—the powerful trading companies such as Mitsui, Mitsubishi, and Sumitomo—developed because in the years immediately following the Second World War the U.S. Occupation Authority dissolved the tightly centralized prewar *zaibatsu* (Gerlach, 1990). In Italy, the extended trading groups of small firms in the north central region emerged as a consequence of restricted job opportunities available to edu-

cated young people, due in part to labor union power and large firm rigidities (Sabel, 1989). Thus in some cases, the formation of networks anticipates the need for this particular form of exchange; in other situations, there is a slow pattern of development which ultimately justifies the form; and in still other circumstances, networks are a response to the demand for a mode of exchange that resolves exigencies that other forms are ill-equipped to handle. The network story, then, is a complex one of contingent development, tempered by an adjustment to the social and economic conditions of the time.

The absence of a clear developmental pattern and the recognition that network forms have multiple causes and varied historical trajectories suggest that no simple explanation ties all the cases together. Economizing is obviously a relevant concern in many instances, especially in infant industries where competitive pressures are strong. But it alone is not a particularly robust story, it is but one among a number of theoretically possible motives for action—all of which are consonant with a broad view of self-interest. Clearly many of the arrangements discussed above actually increase transaction costs, but in return they provide concrete benefits or intangible assets that are far more valuable. The reduction of uncertainty, fast access to information, reliability, and responsiveness are among the paramount concerns that motivate the participants in exchange networks.

My claims about network forms of organization obviously have broader ramifications. To the extent that these arguments are persuasive, they suggest that some of the basic tenets of other approaches to economic organization are problematic. For example, an exclusive focus on the transaction—rather than the relationship—as the primary unit of analysis is misplaced. Similarly, approaches that neglect the role of the state in shaping the context in which exchange is conducted are too narrow. The degree to which economic actors rely on the marketplace, private enterprise, or network forms of relational contracting is determined, to a considerable extent, by state policies. From a sociologist's perspective, it makes little sense to separate organizational behavior from its social, political, and historical context. To make serious progress in understanding the diversity of organizational forms, we need arguments that are much more historically contingent and context dependent.

RATIONALE FOR NETWORK FORMS

Does the diversity of network arrangements imply that their pattern of development is largely idiosyncratic? Or do the cases have sufficient generality that we can point to specific enabling conditions that foster the formation and proliferation of networks? If we are able to identify these conditions, then it would be possible to make refutable arguments about the circumstances that promote and

sustain network forms. My own modest contribution to the theory of network forms highlights three factors—know-how, the demand for speed, and trust—which are critical components of networks.

Know-how. There are a number of jobs that are based, in large measure, on either intellectual capital or craft-based skills, both of which have been honed through years of education, training, and experience. Many of these kinds of knowledge-intensive activities, such as cultural production, scientific research, design work, mathematical analysis, computer programming or software development, and some professional services, require little in the way of costly physical resources. They are based on know-how and detailed knowledge of the abilities of others who possess similar or complementary skills. Know-how typically involves a kind of tacit knowledge that is difficult to codify (Nelson & Winter, 1982; Teece & Pisano, 1987). These assets are both largely intangible and highly mobile. They exist in the minds of talented people whose expertise cannot be easily purchased or appropriated and who commonly prefer to ply their trade in a work setting that is not imposed on them “from above” or dictated to them by an outside authority. Indeed, markets or hierarchical governance structures may hinder the development of these capabilities because the most critical assets—the individuals themselves—may choose to walk away.

Network forms of organization, with their emphasis on lateral forms of communication and mutual obligation, are particularly well-suited for such a highly skilled labor force, where participants possess fungible knowledge that is not limited to a specific task but applicable to a wide range of activities. Thus, networks are most likely to arise and proliferate in fields in which knowledge and/or skills do not lend themselves to either monopoly control or expropriation by the wealthiest bidder.

Exchange relations vary both in terms of how they are organized, as well with respect to the object of exchange. Transactions can take place in a variety of contexts; but, as Williamson and others have alerted us, certain kinds of goods and services lend themselves more readily to particular forms of exchange. The more general, and more substitutable are resources, the more likely they will be secured through short-term market transactions. Similarly, some kinds of exchanges fit more comfortably under the rubric of networks. Take the case of joint ventures, either domestic or international, which are organized for the purposes of exchanging skills or services between two or more firms. What kind of ventures are more likely to promote long-term collaboration and shared responsibility? Agreements that are based on contracting for the performance of particular services, such as sales or distribution, are not likely to promote cooperation. Indeed, joint ventures of this kind are often discontinued when one party’s capabilities “catch up” with those of the other. In contrast, when partners are involved in ongoing, complementary activities—such as pooling of

research staffs or joint production arrangements—the relationship is more likely to lead to the sharing of critical information and the development of some measure of trust in one another. The sharing of information, as Buckley and Casson (1988) suggest, often leads to the emergence of common values. This cooperation is particularly likely to develop either in circumstances that require operational integration or under conditions of uncertainty about how to obtain desired outcomes. In both cases, there is a strong motive for parties to share information with one another (Buckley & Casson, 1988).

Thus, the exchange of distinctive competencies—be they knowledge or skills—is more likely to occur in networks. The transfer of resources—tangible items, such as equipment, services, patents, and the like—more commonly occurs through a market transaction or among organizational units, depending on the frequency and the distinctiveness of the items that are exchanged.

The *demand for speed* is based on a compelling economic logic. A regime of intense technological competition robs incumbents of their clout and brings upstarts to the fore. Firms join forces with other companies and/or with university scientists to reduce the risks and to share the expense of developing costly products that have very short life spans. Porter and Fuller (1986) argue that partnerships and coalitions are a more rapid means of repositioning than internal development and are less costly, less irreversible, and more successful than mergers. This view suggests that the business environment has changed in such a manner that it now rewards many of the key strengths of network forms of organization: fast access to information, flexibility, and responsiveness to changing tastes. Networks, then, possess some degree of comparative advantage in coping with an environment that places a premium on innovation and customized products.

What is it about networks that makes them more adaptive and well-suited to coping with change? One of the key advantages of network arrangements is their ability to disseminate and interpret new information. Networks are based on complex communication channels. Kaneko and Imai (1987) emphasize this dynamic property of networks, noting that they are particularly adept at generating new interpretations; as a result of these new accounts, novel linkages are often formed. This advantage is seen most clearly when networks are contrasted with markets and hierarchies. Passing information up or down a corporate hierarchy or purchasing information in the marketplace is merely a way of processing information or acquiring a commodity. In either case the flow of information is controlled. No new meanings or interpretations are generated. In contrast, networks provide a context for learning by doing. As information passes through a network, it is both freer and richer; new connections and new meanings are generated, debated, and evaluated.

Thus, to the extent that competition is based on such factors as the ability to

innovate and translate ideas into products quickly, network forms of organization are more likely to proliferate. When competition occurs on the basis of price or manufacturing intensity, networks are likely to be less in evidence.

Trust. Several of the examples, particularly the cases of craft-based networks and industrial districts, suggest that certain social contexts encourage cooperation and solidarity, or a sense of generalized reciprocity. In these situations, exchange relations have been long-term and continuous, hence there is scant need to formalize them. What are the specific attributes that create circumstances in which collaboration is so easily accomplished? Axelrod (1984) has demonstrated the powerful consequences of repeated interaction among individuals. When there is a high probability of future association, persons are not only more likely to cooperate with others, they are also increasingly willing to punish those who do not cooperate. When repeat trading occurs, quality becomes more important than quantity. The reputation of a participant is the most visible signal of their reliability. Reputation bulks large in importance in many network-like work settings because there is little separation of formal business statuses and personal social roles. One's standing in one arena often determines one's place in the other. As a result, there is limited need for hierarchical oversight because the desire for continued participation successfully discourages opportunism. Monitoring is generally easier and more effective when done by peers than when done by superiors. Consensual ideologies substitute for formal rules and compliance procedures.

Networks should be most common in work settings in which participants have some kind of common background—be it ethnic, geographic, ideological, or professional. The more homogeneous the group, the greater the trust, hence the easier it is to sustain network-like arrangements. When the diversity of participants increases, trust recedes, and so does the willingness to enter into long-term collaborations. Calculative attitudes replace cooperative ones, and formal agreements—either contractual or bureaucratic—supplant informal understandings.

It also stands to reason that certain kinds of institutional contexts, that is, particular combinations of legal, political, and economic factors, are especially conducive to network arrangements as well as interorganizational collaborations. Yet we know very little about what kinds of political and economic conditions support network forms. As a result, I hold this discussion for the next section on unresolved issues. It is, however, worth noting that networks appear to involve a distinctive combination of factors—skilled labor, some degree of employment security, salaries rather than piece rates, some externally-provided mechanisms for job training, relative equity among the participants, a legal system with relaxed antitrust standards, and national policies that promote research and development and encourage linkages between centers of higher learning and in-

dustry—which seldom exist in sufficient measure without a political and legal infrastructure to sustain them.

A RESEARCH AGENDA

The discussion thus far points to a number of key issues that require more sustained attention, as well as suggests several new topics for the research agenda. We need to know a good deal more about the factors that explain the ecology of network forms. Why is there such considerable cross-national variation in the frequency of network forms? Why are network arrangements so common in some nations and some sectors and not others? The evidence that I have presented suggests that state policies make a difference in the ease with which collaborative arrangements are formed and are sustained, but we have only begun to investigate the relationship between governance structures and state policies. Similarly, network forms are found in a diverse set of industries—craft-based occupations and professions, high technology sectors, and even mature ones such as auto. Can we make sense of this diversity? Do rates of formation vary across industries? Some early research (Friar & Horwitch, 1985; Hamilton, 1985; Hergert & Morris, 1988; Mariti & Smiley, 1983; Zagnoli, 1987) suggests that alliances are much more common in high technology fields, but we do not yet know whether this is a function of a youthful stage in an industry's life cycle or of basic structural features of activities that are highly dependent on the creation of new forms of knowledge.

A good deal more research is needed on the durability of networks. I have suggested above that the distinction between very specific resources and intangible assets might account for divergent patterns. The need to acquire resources may lead to network arrangements that are an interim step, either a half way point between market procurement and outright merger or a transitional move until internal capability is built up. Tacit knowledge, however, is inherently difficult to exchange; it may well lead to repeated, reciprocal interactions, transforming what was initially a relationship approached with some caution and fear into one that is institutionalized and enduring. In these circumstances, collaboration would be expected to shift from a means to an end in itself. Careful comparative research along these lines would be highly useful.

We know very little about the phenomenology of work under different governance structures. Do participants "experience" networks as qualitatively different from market transactions or careers in hierarchical firms? If the argument that markets, hierarchies, and networks are distinctive forms, with their own logic and procedures, is correct, then we should find important behavioral differences among them. Do members of networks exhibit greater loyalty or commitment? Do participants in network arrangements face novel problems of control?

How do people cope with relationships that are both collaborative and competitive, with circumstances in which control is not direct and immediate, and conformity to well-established administrative routines not guaranteed?

What are the performance liabilities of networks? There are, in all likelihood, certain tasks for which networks are poorly suited. When do networks create new levels of complexity that are incommensurate with their intended benefits? Are the gains from network relationships appropriated asymmetrically due to differences in the learning capacity of the participants? Some researchers (Cole, 1985; Pucik, 1988) suggest that much of the imbalance between Western and Japanese partners to joint ventures can be attributed to disparities in learning. Many Japanese firms have in place systematic methods that encourage the transfer of information and know-how from a joint venture throughout their organization (Imai, Nonaka, & Takeuchi, 1985). More work is needed to understand how information is processed through networks and how learning is sustained.

Does participation in a network arrangement alter one's orientation toward future collaboration? Do the partners to a successful network relationship change their calculus and decide to act in different ways because of this experience? Does a reputation for being a fair-minded and successful exchange partner translate into clear economic benefits? These are fundamental questions and they suggest that much work remains to be done. This is not a daunting prospect, however. Indeed, one of my goals in this paper has been to suggest that students of organizational behavior are particularly well-equipped to study and explain the circumstances under which cooperation and collaboration proceed with only limited reliance on contracts and the legal system on the one hand, and on administrative fiat and bureaucratic routines on the other.

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sociology departments at Arizona, Chicago, and Santa Barbara. Of course, I remain responsible for any errors or omissions.

NOTES

1. See Koenig and Thietart (1988) on intermediate forms in the aerospace industry, Thorelli (1986) on industrial marketing networks, Eccles and White (1986) on transfer pricing, and Powell (1987) on hybrid forms in craft and high technology industries.

2. This recognition of intermediate forms has not, however, been accompanied by much in the way of concerted analysis. *The Economic Institutions of Capitalism* may include relational contracting in its subtitle, but the index lists a scant four pages of references to the topic. Similarly, Riordan and Williamson (1985) emphasize polar firm and market choices throughout their analysis, and then acknowledge in their last paragraph that "hybrid modes of organization are much more important than had hitherto been realized."

3. Transaction costs reasoning borrows freely from legal scholars, such as Macaulay and Macneil, who are noted for the development of ideas regarding relational contracting. Gordon (1985), however, questions whether this assimilation is satisfactory, noting that the price of success by economists is the "exclusion of the very elements of contract relations to which Macneil and Macaulay have given most prominence: culture, politics, and power" (p. 575).

4. Transaction cost logic involves the comparison of discrete structural alternatives, typically the comparison that is made is that between market and hierarchy. The problem I have with this analysis is that in many cases where transaction cost reasoning predicts internalization, we find other kinds of governance structures, particularly networks. But one can read Williamson (1985) in a different manner, ignoring the argument about the predominance of markets and hierarchies, and focus instead on the highly important role of credible commitments. The book discusses a marvelous array of mechanisms for creating mutually reliant and self-enforcing agreements. If one conceives of production as a chain of activities in which value is added (Porter, 1985), the question is thus posed: which activities does a firm chose to perform internally and which activities are either downplayed or "farmed out" to members of a network who presumably can carry them out more effectively, due to benefits of specialization, focus, or size (see Jarillo, 1988 for an extended discussion of this network value chain). When production is viewed in this manner, Williamson's arguments about credible commitments are quite useful in assessing what kinds of network agreements are likely to prove durable.

5. This does not mean that market forces were of little consequences before the eighteenth century. Braudel (1982) argues that economic history is the story of slowly-evolving mixtures of institutional forms. He suggests that we can speak of a market economy when the prices in a given area appear to fluctuate in unison, a phenomenon that has occurred since ancient times. But this does not imply that transactions between individuals were of a discrete, impersonal nature.

6. I owe this observation to comments made by Jim Robins.

7. What is remarkable about the firms in these two studies is how explicitly the entrepreneurs follow a "network" strategy, intentionally eschewing internalization for such crucial and recurrent activities as manufacturing, sales, and research and development.

8. On this point, Macneil (1985, p. 496) suggests that "the transaction costs approach is far too unrelational a starting point in analyzing" relational forms of exchange. Richardson (1972, p. 884) provides an apt example of these densely connected forms of exchange: "Firm A, . . . is a joint subsidiary of firms B and C, has technical agreements with D and E, subcontracts work to F, is in marketing association with G—and so on. So complex and ramified are these arrangements, indeed, that the skills of a genealogist rather than an economist might often seem appropriate for their disentanglement."

9. Bob Eccles and Mark Granovetter have repeatedly made this point to me in personal communications, insisting that all forms of exchange contain elements of networks, markets, and hierarchies. Since they are smarter than me, I should listen to them. Nevertheless, I hope to show that there is merit in thinking of networks as an empirically identifiable governance structure.

10. This line of work is both novel and promising, but it has yet to demonstrate how social ties and cultural patterns transform economic exchange in a systematic fashion; nor do we as yet have any clear cut notions about how cultural or historical factors create or introduce comparative variations in economic life. The focus, thus far, has been more on the intriguing question of how are economic motives culturally constructed.

11. Some economists (Alchian and Demsetz, 1972; Klein, 1983) go so far as to regard the firm as merely a set of explicit and implicit contracts among owners of different factors of production.

12. Many other scholars have their own definitions. Jarillo (1988, p. 32) defines strategic networks as "long-term, purposeful arrangements among distinct but related for-profit organizations that allow those firms in them to gain or sustain competitive advantage vis-à-vis their competitors outside the network." Kaneko and Imai (1987) conceive of networks as a particular form of multifaceted, inter-organizational relationships through which new information is generated. Johanson and Mattsson (1987) regard networks as a method of dividing labor such that firms are highly dependent upon one another. Coordination is not achieved through hierarchy or markets, but through the interaction and mutual obligation of the firms in the network. Gerlach (1990) suggests that alliances among Japanese firms are an important institutional alternative that links Japanese firms to one another in ways that are fundamentally different from U.S. business practices. Alliances, in his view, are coherent networks of rule-ordered exchange, based on the mutual return of obligations among parties bound in durable relationships.

I find these various definitions very helpful, but also limited. They all describe networks as a form of dense interorganizational relationships. But networks can also evolve out of personal ties, or market relationships among various parties. Many of the arrangements discussed below, commonly found in the publishing, fashion, computer software, construction, and entertainment businesses are among individuals, independent production teams, or very small business units. Thus, my conception of networks is closer to Macneil's (1978; 1985) ideas about relational contracts than to the above views.

13. In an illuminating essay, Keohane (1986, p. 8) defines reciprocity as exchanges of roughly equivalent values in which the actions of each party are contingent on the prior actions of the others in such a way that good is returned for good, and bad for bad.

14. For example, successful reciprocal ties in scholarly book publishing—between authors and editors or between editors in competing houses—were highly implicit, of long-standing duration, and not strictly balanced (Powell, 1985). It was widely believed that the open-ended quality of the relationship meant that the goods being exchanged—advice, recommendations, or manuscripts—were more valuable and reliable.

15. Parties are, of course, free to exit from a network. But the difficulty of abandoning a relationship around which a unit or a company has structured its operations and expectations can keep a party locked into a relationship that it experiences as unsatisfactory. This problem of domination in networks obviously lends itself to transaction costs discussions of credible commitments.

16. In his study of the U.S. steel minimill industry, Von Hippel (1987) found the sharing of know-how to be based on professional networks, which develop among engineers with common research interests. When a request for technical assistance is made, the person being asked typically makes two calculations: (1) is the information being requested vital to the health of the firm or just useful, but not crucial? and (2) how likely is the requester to reciprocate at a later date? Even though no explicit accounting is made, assistance is commonly offered. Von Hippel argues that this "economically feasible and novel form of cooperative R&D" is probably found in many other industries as well.

17. For useful reports on Italy's economy, see "Europe's sun belt also rises," *U.S. News & World Report*, 7/18/88, pp. 27-29; and "The Italian Economy: A Special Survey," *The Economist* 2/27/88, pp. 3-34. Both surveys point to the remarkable transformation of Italian industry, led by v battalions of small firms, but caution that huge government budget deficits, inefficient public s vices, and an antiquated financial system could hold back further progress.

18. While the organizational structure of Italian firms may not seem modern, they are decide successful and high-tech in their operations. Benetton, the fashionable clothing company, is an c cited example. With some 2,000 employees, the company orchestrates relations backward with m than 350 subcontractors throughout western Europe and forward with some 100 selling agents: over 4,000 retail stores worldwide. The company's spectacular growth from small family busines: far-flung empire has not been built on internalization or economies of scale, but on external relati: for manufacturing, design, distribution and sales. These extended networks have both advantage: terms of speed and flexibility and liabilities with regard to maintaining quality standards. See Jar: and Martinez (1987) and Belussi (1986) for detailed case studies of the company.

19. For more discussion of the interfirm networks that pervade the Japanese economy, Okumura (1982), Shimokawa (1985), and Gerlach (1990).

20. For a thoughtful analysis of regional economies and changes in the scale of production, Sabel (1989).

21. Such efforts, alas, will be hard pressed to succeed. See Dorfman (1983) on the larg: idiosyncratic, hard-to-duplicate origins of Route 128 technology corridor.

22. The commercial aircraft industry is unusual with respect to the very active role playec governments in insuring that their countries maintain a major presence in the industry. In this c coalitions and joint ventures are driven as much by political factors and pressures for econc nationalism as by organizational and economic logic. See several of the chapters in Porter (1986): a discussion of the political aspects of international alliances.

23. Competition over the marketing of tissue plasminogen activator (TPA), an enzyme may pect to be a major drug in treating heart attacks, is the most severe and complicated in biotechno today. This competitive struggle illustrates how rival transnational alliances race for global ma share. The U.S. firm Genentech is allied with Mitsubishi Chemical and Kyowa Hakko in Japan, w another American firm, Biogen, is collaborating with Fujisawa. Numerous other Japanese European pharmaceutical alliances, ignoring Genentech's claims for patent priority for TPA, are l with their own TPA research. This contest shows the intensity of transnational alliance competiti but at the same time that Genentech and Fujisawa are at odds over TPA, they are collaborating i marketing of another biotech drug, tumor necrosis factor (TNF). Yoshikawa (1988) offers a road map to the complex, crosscutting terrain of biotechnology strategic alliances.

24. The label "joint venture" implies the creation of a separate organization, but this need n the case. Rather than form a new entity, partners can agree to a co-production arrangement. T common in manufacturing, particularly aerospace, where each partner produces a section of the product. Or firms may agree to a research partnership in which scientists and laboratories are sh Similarly, exploration consortia in extractive industries need not create a new firm, but rather the costs and risks of existing activities.

25. The founding chairman of Sematech (a research consortium of 14 semiconductor fi Charles Sporck, bemoaned that, "We are trailing a pack of nations that are far ahead of us in for consortiums. We're especially trailing the Japanese." Quoted in Peter Lewis, "Are U.S. Comp Learning to Share?" *New York Times*, 2/7/88, Week in Review, p. 5.

26. Ouchi and Bolton (1988) provide a good summary of the factors that account for the pi stage of mixed support in the U.S. for collective industrial research.

27. For a detailed discussion of the origins, development, and initial problems of one cooperative R&D venture, the Microelectronics and Computer Technology Corporation (MC Austin, Texas, see Peck (1986).

28. Ed Zajac has emphasized to me that the termination of a relationship does not necessarily imply failure. Collaboration is often intended as a means for the transfer of knowledge. Once this process is realized, termination may well be a sign of success.

29. Analysts have cautioned against alliances that involve a relative power imbalance, in which either one partner receives undue benefits or where one partner becomes so dependent on another that they may have no option other than to continue a relationship in which their share is increasingly inferior (see Teece, 1986). This fear, along with the worry that the partner will not perform according to expectations, explains why most potential partners approach an agreement with trepidation. These are typical and well-founded misgivings about any asymmetric exchange relationship.

30. Many commentators have voiced particular concerns about global partnerships, issues that are contested in the current "manufacturing matters" debate (see Cohen & Zysman, 1987). Reich and Mankin (1986) warn that friendly colleagues often revert to hostile competitors. In the Pentax-Honeywell and Canon-Bell & Howell alliances, Japanese partners took advantage of valuable U.S. technology and know-how only to later discard their American partners. *Business Week*, in its well-known March 3, 1986 issue, cautioned against the growth of "hollow corporations," that is, firms that have disaggregated so radically that they are left without any core expertise.

31. Wilkinson (1983) details related developments in Britain, where retailing, clothing, shoemaking, printing, and foodstuffs have undergone vertical disintegration, with the subsequent rise of small firms and numerous subcontracting relationships.

32. Top-down controls create distance between supervisors and subordinates, between powerful executives and less powerful employees. A vertical chain of command, and its accompanying layers of administration, undercuts management's ability to see its directives implemented and creates an environment in which employees see their work as but a tiny cog in a large impersonal machine. The diffuse control structure in large firms both dampens management's ability to move quickly and labor's sense of commitment to the enterprise.

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