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THE LOGIC OF COORDINATING AMERICAN MANUFACTURING SECTORS

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The previous chapter assumes that in order to comprehend how a particular industrial sector is governed or coordinated at any moment in time, we must first understand the historical process from which the sector evolved. Each governance arrangement is both historically conditioned and contingent. Although this project has as its goal to illuminate variation in the governance of industrial sectors – both across industries and over time within a single industry – we must recognize that there are broad parameters within which this variation takes place in a nation’s history. In other words, there are broad styles of governance that are distinct within specific historical epochs in each nation’s history. Chapters 3 through 10 focus on transformations of governance structures of particular industries in American history, but this chapter defines the broad parameters within which the governance of various sectors has taken place over time in American society.

Because institutional arrangements emerge over long periods of time, this chapter focuses attention only on the coordination of manufacturing sectors in the American economy during the period since 1870. Due to space limitations, the chapter devotes very little attention to sectors in agriculture, service, or transportation except insofar as they impinge on manufacturing. In many respects, the coordination and governance of American manufacturing during this time frame falls within two distinct periods: 1870 to 1950, and 1950 to the present. Both periods experienced basic transformations in the coordination and governance of the nation’s economy.

1 In writing this chapter, I very much appreciate the assistance of Leon Lindberg. He and John Campbell provided very useful comments on an earlier draft. In addition, I have very much profited from stimulating conversations with the following: Masahiko Aoki, Ken Bickers, Alfred D. Chandler, Jurgen Feick, Philip Genscheil, Wyn Grant, Jerald Hage, Robert Hanneman, Hal Hansen, Rob Kennedy, Diane Lindstrom, Tom McCraw, Renate Mayntz, Richard Nelson, Yoshi Okada, Charles Sabel, Fritz Scharpf, Christoph Scherer, Philippe C. Schmitter, Volker Schneider, Marc Schneier, Wolfgang Streeck, David Teese, Raymund Werle, Oliver Williamson, and Eric Wright. But the person who did more than anyone else to sharpen my views about the issues developed here is Ellen Jane Hollingsworth.
A complex explanation is required in order to understand the emergence of various governance arrangements during these two periods, for there are a host of contextual and interacting variables that shaped transformations in the governance of American manufacturing sectors. There are organizational- or firm-level variables. There are country-specific characteristics: the size of the country (both in terms of space and population); the degree of complexity of the national economy; the degree to which firms are embedded either in a rich or impoverished network of institutional arrangements (e.g., highly developed trade associations, capital markets, training institutions for the development of broad skills for the workforce); and the society's belief system, which gives rise to rules and normative constraints for the governance of particular sectors. There are variables that are sector-specific: the degree of competitiveness of specific industries; their level of capital intensity; the size of the sector measured by the numbers of firms and employees; and the degree to which consumer tastes are diversified or homogeneous. Transformations are also influenced by variables about the sector's product, especially its level of technological complexity and the rate of technological change, as well as by variables that influence the costs of transactions, e.g., the degree of uncertainty among actors engaged in transactions, the degree of asset specificity involved in transactions, and the degree of trust among transacting partners. Of course, the age of a sector influences its flexibility for change. New industries generally have greater capacities to undergo structural change than older industries that have highly institutionalized arrangements. Very importantly, there is the industrial relations system of a sector. It not only reflects the way that relations between capital and labor are constrained within an industry, but it may influence the way that relations among other actors are coordinated. And finally – but perhaps most importantly of all – there is the role of the state. The state defines property rights and the conditions under which each of the six types of governance arrangements may exist. Without the state, there can be no capitalist economy.

The goal of this chapter is to discover the logic by which broad parameters of governance existed during these two periods of American history. It was the interaction of all of these contextual variables that established a logic for the governance of American manufacturing sectors. However, there was nothing deterministic in the way these variables interacted. Rather, governance arrangements in each period were shaped as a result of an historical configuration of interdependent, very complex, loosely structured relationships. Because the models to be discussed involve dialectical, complex feedback relationships and mutual interaction among elements, it would be impossible to test the arguments with econometric tools or simulation strategies. There are other reasons as well for this. First, there is no single dependent variable that this chapter sets out to explain. There are six types of governance arrangements, each having its own logic.
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Second, we are still in the early stages of theory construction about the emergence of governance arrangements in capitalist economies. And in most scientific disciplines, advance in the early stages proceeds through description. Rich theorizing can only occur at a later stage.

There is no universal and immutable logic involved in the governance of capitalist societies. Firms make decisions in response to a large number of variables that are interactive with one another. And although nothing is deterministic, there are in the histories of individual countries decision-making styles and strategic policy choices that emerge again and again. And it is as a result of such a logic of decision making that certain options tend to be chosen in specific time frames in various countries and others are rarely chosen. It is the distinctive interaction of a large number of interdependent elements that forms what Max Weber (1978) labeled as historical individuals (Sorge and Streeck 1988; Scharpf 1989). It is in the tradition of this type of scholarship that this chapter is written. It is an effort to discover the complex pattern by which numerous complex elements interacted during two periods of American history.

THE COORDINATION OF THE AMERICAN ECONOMY,
1870–1950

Prior to the Civil War, the United States was predominantly an agrarian society, in which most firms were small businesses owned by a single individual. Most industrial production took place in small shops, with goods purchased by merchants or commission men who then moved goods into streams of commerce. As a result of the communication and transportation revolution, which led to declining transportation rates, many firms during the post–Civil War era were able to extend the geographical area over which they marketed their products. Because of the large market area in which they operated and the introduction of new machinery, firms in numerous industries were able to increase their output, to utilize economies of scale and scope, and to undersell smaller and less efficient firms. After a couple of decades of expanding markets and impressive profits, firms in numerous industries were faced with a classic problem in the history of capitalism: intense price competition, "saturated" markets, idle plants, accumulating inventories, severe price declines, and the threat of bankruptcy. It was the effort to cope with these problems that resulted in a fundamental transformation in the coordination of the American economy during the late nineteenth and early twentieth centuries — though there was considerable variation in the way that industrial sectors responded to these problems.

Firms in some industries reacted to overcapacity by producing more differentiated products — turning out high-quality products and attempting
to establish a good reputation for their brands. For firms in most manufacturing sectors, the basic strategy for relieving the downward pressure on prices was to search for some means of stabilizing prices and/or restricting the output of mass-produced, standardized products.

Coordination among firms in the same industry

During the late nineteenth century, some of the most severe price competition occurred in industries that were very capital-intensive, that had high fixed costs, that were involved in the output of standardized products and in which no single firm had a clear-cut advantage over the rest, e.g., coal, metal and paper products, railroads (Warren and Pearson 1932, 1933; Lamoreaux 1985). In these sectors, firms increased their output as prices fell, causing prices to fall even more. It was in response to this type of syndrome that firms attempted to limit output and stabilize prices with a variety of collusive arrangements.

Collective action, in the form of pooling agreements or cartels (Cell Six), has been a classic device in capitalist economies for regulating output and prices. Before the Civil War, pooling agreements or cartels had rarely existed in American society and had occurred primarily in local or regional markets, but in the late nineteenth century, they became increasingly common. At first, firms entered into rather simple and informal agreements to stabilize prices and to lower production levels. When these failed to be effective, more formal arrangements such as trade associations emerged. By the end of the century, associative behavior had become quite common in a variety of industrial sectors: mechanical industries, such as lumber, flooring, furniture, shoes, and other leather products; refining and chemically oriented industries, such as petroleum, rubber footwear, paint, explosives, paper, and glass; industries engaged in mining, the fabricating of metals, and in most types of hardware (Schneiberg and Hollingsworth 1989). According to Chandler (1977: 317), “No industry appears to have been immune. Only in textiles, apparel, publishing, and printing were the number of trade associations small” (Dewing 1914; Ripley 1916; Burns 1918).

2 This is the same strategy that some firms employed in response to problems of overcapacity during the 1930s and 1980s. During each of these periods, this kind of strategy did little to contribute to an overall transformation of the sectoral structure. It is mentioned here simply because it is a logical reaction to the problem of overcapacity that capitalist economies periodically face. Such a strategy permits firms to increase earnings with high margins per item rather than with volume production, to maintain output during recessions, and to avoid the cheapening of the firms’ image by engaging in price reduction (Warren and Pearson 1932, 1933; U.S. Bureau of the Census, 1960: 115). A few of the industries in which firms successfully pursued this strategy during the late nineteenth century were producers of high-quality writing paper, aged bourbon and rye, high-quality lubricants, and specialty metals (Dewing 1914: 51-2; Williamson and Daum 1959: 274, 464-5, 684-7; Lamoreaux 1985: 16-27).
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Even though cartel-type trade associations became quite pervasive, they generally failed to stabilize output and prices. Cheating invariably occurred, as members would secretly cut prices, increase output, falsify reports, and/or leave the cartel. In most industries, a number of firms failed to join. Even when cartels met with initial success, this simply provided incentives for other firms to enter the industry, thus destabilizing prices again.

There were two major reasons why cartel-type arrangements of collective behavior were less successful in the United States than in several other capitalist countries at the same time. First, there was the size of the country. In contrast to Europe, most American industries had many more firms, and the larger the number of firms, the more difficult it was to organize and regulate them. Because of the large size of the country, there was more uneven industrial development among regions in the United States than was the case in smaller countries. In general, the larger the country and the more uneven the regional development, the greater the diversity of interests among firms. And the greater the heterogeneity of interests among firms in the same industry, the more difficult it was for collective strategy via cartels to be effective.

Another major reason for the ineffectiveness of cartel-type arrangements was that American courts and legislatures declared them to be illegal. The courts had long refused to enforce private contracts that were in restraint of trade or that were designed to develop monopolies. Then in the 1880s, in response to the development of cartel-type arrangements, a number of states passed antimonopoly laws, and in 1890, Congress passed the Sherman Antitrust Act. Congress has since expanded this legislation, clearly making cartel-type arrangements a violation of federal law. Important reasons why the Americans historically have taken antitrust considerations far more seriously than most European countries are the large size of the country, the uneven regional development, and the low dependence of the country on foreign trade. Had the United States been a small country with relatively few firms in each industry and heavily dependent on foreign trade, no doubt there would have been greater homogeneity of interests and a greater tendency among firms and the state to promote interfirm cooperation at the industry level in order to assist domestic firms in having a competitive advantage in international markets.

Even though state and federal governments have effectively limited the capacity of trade associations to fix prices and to limit production, it is important to emphasize that trade associations have been important institutions for the coordination of the American economy throughout the twentieth century, though never as densely developed as in a number of European countries. Indeed, during the First World War, the American government encouraged the development of trade associations so that it
could more effectively coordinate the war economy. Moreover, Congress passed the National Industrial Recovery Act in 1933, which attempted to organize all manufacturing sectors in order to regulate prices and production — though the Supreme Court later held this legislation to be unconstitutional.

Even if American trade associations have not generally operated to limit production and to fix prices, they have since the turn of the century provided many coordinating functions for their members: gathering information about product markets, advertising products, conducting research, aggregating and articulating member interests, establishing codes of fair competition, developing industry standards, sharing information about production costs and industry output. These functions have been more important in industries in which firms have been too small to carry out most of these activities for themselves — competitive industries (e.g., textiles, apparel, shoes) — than in oligopolistic industries (e.g., automobile, steel, copper). Because of the large size of the country, the large number of firms eligible to join associations, and the heterogeneity of interests among firms in the same industry, business associations in the United States have been somewhat less developed and, therefore, have tended to have less autonomy, fewer resources, and less capacity to govern their members than in those smaller countries in which sectors have had fewer firms and the firms have had more homogeneous interests within the same industry.

The unintended effects of antitrust legislation

There were not only numerous cartels in Europe at the turn of the twentieth century, but the courts tended to enforce them (Cornish 1979). But in America, antitrust law was complex and dense. Ironically, the absence of effective antitrust law in Europe had the effect of perpetuating relatively small family firms, whereas in America, the evolution of antitrust law had the unintended consequence of accelerating the development of large-scale corporations or hierarchical arrangements.

In other words, antitrust law facilitated the transformation of a number of industrial sectors in the American economy. In the United States, the courts firmly ruled that “loose combinations” — e.g., “gentlemen’s” agreements, pools, and other types of cartels — were illegal under the Sherman Antitrust Act. However, firms could not be held to be in violation of the Sherman Act simply because of their size and market share. Thus, “tight combinations” — even if their purpose was to lower output and to raise prices — would not automatically be held in violation of law. Before the courts would rule that consolidations and “tight combinations” were illegal, the government had to build a case based on the evidence of customers and competitors that the firm had engaged in abusive, restrictive, and/or predatory behavior. In order to prosecute firms under the Sherman Act,
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Unfortunately, the government had to demonstrate that a company had acted with the "intent to restrain trade" and that as a result of this "intent," it had already succeeded or would succeed in the future in obtaining monopoly power. By acting reasonably toward one's competitors - by adopting a live-and-let-live posture toward rivals - firms were permitted to do those things within a "tight combination" that were illegal under a "loose combination" or cartel-type arrangement. This over time became known as the "rule of reason." For many years, conviction under the Sherman Act required the testimony of competitors or customers in order to demonstrate "intent." It was in this context that Justice McKenna wrote that there could be no restraint of trade as long as there were no complaints (U.S. v. U.S. Steel et al., 251 US 451). This kind of live-and-let-live policy meant that as long as firms did not engage in such "unfair" business practices as exclusive dealing contracts, railroad rebates, and other cartel-type arrangements, tight consolidations involving horizontal and vertical mergers were acceptable, legal forms of behavior (Lamoreaux 1985). Thus, the implementation of the Sherman Act encouraged firms to abolish their previous practices of restraining their competitors through loose combination and to pursue internal strategies (e.g., hierarchical arrangements) to enhance their market position and to stabilize their industries. Even though many Congressmen voted for the Sherman Act because they wanted to maintain a very decentralized, competitive American economy, a long-term consequence of the Act was to facilitate the development of horizontal and vertical integration in numerous industries and to enhance concentration of the American economy. In short, the American state in its antitrust policies unintentionally transformed the governance of many manufacturing sectors of the American economy to hierarchical-type arrangements (Thorelli 1955; Letwin 1965; Bork 1978; Fox and Halverson 1979; McCurdy 1979; Pratt 1980; Lamoreaux 1985).

The emergence of hierarchies via horizontal integration

Once it was widely understood that contracts establishing loose combinations were illegal, firms resorted to a strategy of merger, and it is in this context that the extensive merger movement of the late nineteenth and early twentieth centuries occurred. Horizontal mergers occurred with great frequency in industries that were capital-intensive, employed strategies of mass production, had undergone rapid expansion prior to the depression of the 1890s, and experienced severe price competition. However, many of the consolidations failed, for they succeeded only when tight integration resulted in economies of scale, led to lower labor costs, or raised barriers to entry in the industry. Thus, horizontal consolidations tended to succeed in industries engaged in high-volume, large-batch, or continuous-process production strategies, in industries that were capital-intensive, were high
energy consuming, and had large mass markets. These included firms in
the following industries: food processing, oil, chemicals, primary metals,
paper, and consumer durables (e.g., sewing machines, office machines,
agricultural machinery, electrical equipment, elevators, and other forms
of standardized machinery). Consolidations that had no cost advantage
over their competitors tended to fail. Indeed, the failure rate was especially
high in the following industries: textiles, apparel, leather, shoes, furniture,
printing, and publishing. Significantly, these were industries in which there
were diversified consumer tastes and in which it was relatively easy for
new firms to enter.

In the long run, cost advantages over competitors tended to lie in be-
coming vertically integrated. Whereas horizontal mergers were a form of
transformation that addressed interdependencies among firms in the same
industry, strategies of vertical integration represented a transformation by
which firms confronted their interdependencies with actors on whom they
had a dependency relationship, e.g., the relations processors had with
producers, distributors, transportation firms, etc. (Galambos 1966; Chan-
der 1977).

The emergence of hierarchies via vertical integration

The strategy of backward integration. There were two basic motives for
American firms to employ strategies of vertical integration. The first was
to reduce the level of uncertainty about the availability of raw materials
and transport facilities by engaging in backward integration, and to attain
an outlet for their products by a strategy of forward integration. The second
was to enhance their market share by erecting barriers to new competition.
From the available historical evidence, it is often difficult to measure the
relative importance of each of these motivations, though there was a clear
logic to whether firms engaged in forward and/or backward forms of in-
tegration, and an understanding of this logic is important to understand
the transformation that occurred in the coordination of manufacturing
sectors in the first part of the twentieth century.

In general, American firms resorted to strategies of vertical integration
because of the inability of markets to coordinate technologically separable
production functions. More specifically, backward forms of integration
tended to occur when processors had relatively few sources of suppliers
for resources on which they were heavily dependent, it was difficult for
firms to write contracts for supply far into the future, the technology in-
volving the production process was relatively stable, and the product was
in a relatively mature stage of the life cycle. Thus, food processing and
tobacco industries tended not to engage in backward forms of integration,
for they had large numbers of suppliers, no one of which was capable of
producing enough to shape prices. In industries where there were large numbers of producers engaged in nonrecurring transactions with processors and there was little uncertainty in the minds of processors about the availability of resources in the future, coordination among actors tended to be coordinated by market transactions rather than within a firm. On the other hand, backward forms of vertical integration were quite common in the oil refining, steel, aluminum, and copper industries—industries in which processing firms believed that they might be vulnerable to having their sources of supply cut off or that they might have to pay monopoly prices. Where firms were engaged in recurring transactions with other firms for the use of highly specific forms of assets, vertical integration was also a preferred strategy as a means of avoiding monopolistic pricing. Hence, the following industries tended either to develop their own railway cars or their own transportation facilities in order to reduce uncertainty and transacting costs with transportation firms: oil, chemical, coal, steel, automobile, meat processing. On the other hand, if transportation did not require unusual types of facilities for shipping, firms did not vertically integrate into the transportation industry (Chandler 1962, 1977; Williamson 1975, 1985; Hennart 1982; Lamoreaux 1985).

However, there was also often an offensive dimension to backward forms of vertical integration. Firms in some industries bought raw materials in order to limit their competitors' access to materials. In the steel, copper, aluminum, and newsprint industries, a small number of firms gradually gained control of vital ore deposits and timber, thus removing the possibility for other domestic producers to compete. Where there was a threat of competition from abroad, firms in these industries often lobbied for tariff barriers (Schroeder 1953; Bain 1956; Smith 1970; Parsons and Ray 1975; Fell 1979).

Research and development also tended increasingly to become vertically integrated in the twentieth century. During the nineteenth century, American manufacturing firms had obtained most of their R&D in standalone research organizations. One such organization was Thomas Edison's laboratory in Menlo Park, New Jersey, and in it he developed the light bulb and many other products (Friedel and Israel 1986). Vertically integrated in-house research became increasingly common, for it was exceedingly difficult for firms to write satisfactory contracts for specifying research on new products that were not yet developed. In short, firms feared that by contracting out research and development, they might lose their proprietary interests to opportunistic contractors. Hence, proprietary considerations were served by tight integration (Teece 1988). However, firms also used in-house research as a means of restricting competition. For example, American Telephone and Telegraph, General Electric, Westinghouse, and numerous other firms used their laboratories to develop patents as a strategy of keeping substitute goods from being developed by their competitors.
and as a means of enhancing and maintaining market share with similar strategies (Passer 1953; Noble 1977; Reich 1977, 1980).

The main consideration here is that the consolidations that took place during the late nineteenth and early twentieth centuries could keep their dominance over time only by developing some edge over their competitors. These were obtained not only with economies of speed and appropriate management of horizontal consolidations, but, where appropriate, firms erected barriers to entry by backward forms of integration, and for a number of years, their superior competitive position could be altered only if other firms duplicated the firm's vertically integrated structure.

*The strategy of forward integration.* In contrast to the relationship between producers and processors, the logic that transformed the relationship between processors (manufacturers) and distributors was much more complex. The critical consideration involved the role that wholesalers and retailers exerted on the purchase decisions of consumers and the ability of the retailer to influence the purchase decision of consumers, which depended very much on the nature of the product.

Most relationships between manufacturers and retailers involving low-priced consumer goods have been coordinated by simple market transactions. Such products (e.g., food, matches, cigarettes) tended to have low unit prices and were bought very frequently. Because consumers did not invest much time and energy in searching for these products, manufacturers attempted to differentiate their product by creating brand images through advertising. If the manufacturer were successful in creating a brand image, the retailer had little leverage in dealing with the manufacturer, who had to exert very little effort to convince distributors to market the product. In such circumstances, the relationship between manufacturers and distributors was coordinated by market-type transactions. On the other hand, the less able the manufacturer was in differentiating the product through advertising, the more the manufacturer was dependent on the distributor. The manufacturer then had an incentive to control the distribution process either by authorizing exclusive dealerships, franchising, or integrating forward into retailing.

American manufacturers have often integrated forward into distribution when they have introduced new complex consumer durable products. In such situations, not only has the public been unaware of the product, but also the normal retail establishments have frequently lacked knowledge about how to operate and to service the product. In general, the more complex the product, and the less sophisticated the buyer, the greater the incentive for forward forms of vertical integration (Hennart 1982: 86). Thus, in the sewing machine, office equipment, and farm implement industries, manufacturers moved from a market form of coordinating distribution to forward integration to provide not only proper demonstration
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of their products, but also such ancillary services as repairs and credit. Companies such as Singer Manufacturing Company, IBM, Honeywell, and Xerox are only a few manufacturers of complex consumer durables that still maintain their own retail outlets (Jack 1957; Wilkins 1970; Hennart 1982).

On the other hand, manufacturers of consumer durables have long resorted to franchising when coordinating manufacturing and retailing has led to high management costs. When sales have required detailed knowledge of local conditions, manufacturers have found that central direction is inefficient. For example, automobile manufacturers have found that automobile trade-ins vary so much in condition that it is necessary for local retailers to have considerable autonomy to make decisions about prices. Thus, auto and truck manufacturers have tended to market their products through franchised dealers (Caves and Murphy 1976; Hennart 1982).

In general, when variations in local conditions are considerable, franchising (Cell Two) has become the preferred strategy over vertical integration. For example, manufacturers of beverage syrups such as Seven-Up and Coca-Cola decided very early to grant franchises to independent local bottlers, for successful wholeselling of soft drinks required in-depth knowledge and close monitoring of the local reselling outlets (Caves and Murphy 1976: 582; Hennart 1982).

Monitoring networks

The strategy of price leadership. Even after corporate hierarchies were established by horizontal and vertical forms of integration, it was still possible for firms to engage in ruinous price competition with one another. Thus, many such firms still wished to engage in some form of industry-wide or collective strategy of stabilizing prices. Though it was illegal to fix prices with cartel-type arrangements, oligopolistic-type hierarchies frequently engaged in an alternative form of collective price setting: price leadership, or what is frequently called the dominant-firm strategy. In our typology, this form of collective behavior is called a monitoring network. Price leadership existed when the price of the goods in an industry was announced by one firm — usually the largest — and the rest of the firms in an oligopolistically structured industry responded by adopting essentially the same prices. When one firm was much larger than others in the industry, it usually had the most interest in preventing price cutting. It generally had the most capacity to prevent price reductions, as it tended to have the greatest amount of financial resources and unused productive capacity. Moreover, in order to achieve price stability, smaller firms were willing for the largest firm to set industry prices.

The sectors in which price leadership occurred most frequently prior to
1950 were steel, copper, petroleum, agricultural implements, anthracite coal, newsprint, fertilizer, industrial alcohol, cement, and the refining of sugar and corn products. Whereas dominant-firm pricing tended to stabilize prices in industries in the short term, in the long run, price leadership was somewhat unstable: the leader's proportion of market share in the industry tended to decline, the differentials among size of firms diminished somewhat, and the leadership tended to decay as a result of competition from other industries or from foreign competitors in the same industry. Because price leadership stabilized the industry in the short term, firms tended not to have high incentives to innovate or to adopt new technologies. Hence, in the long run, firms adopting price leadership as a strategy tended to decline in efficiency. In this respect, it is interesting to note that while these industries used dominant-firm pricing to their advantage prior to and after World War II, Japanese firms in some of these same industries fiercely engaged in price competition within Japan after the War, and this is a consideration of importance in understanding why Japanese firms were so efficient and successful once they eventually entered the American markets. In short, the Japanese strategy suggests that corporate hierarchies without collective forms of price leadership tend to lead to intensive competitiveness among firms over prices, but high levels of innovativeness and efficiency over the long run (Burns 1936: 76–145; Stigler 1968: 108–12; Scherer 1980: 232–6; Lamoreaux 1985: 120–58).

Sources of capital and the emergence of corporate interlocks. To understand how important the source of capital potentially is in the coordination of industrial sectors, one need simply to think comparatively. In Japan and Germany, where industrialization occurred somewhat late and where mass markets have always been much smaller than in the United States, large firms before the Second World War were quite dependent on outside financiers for capital — the large banks in Germany and the major financial groups (e.g., Zaibatsu) in Japan. Historically, it was quite common for Japanese and German firms to rely on one or two major banks for capital. Not only did those banks closely monitor the firms' operations, but banks often held equity in the firms — making the bank-firm relationship quite tight. In Japan, there were extensive cross-company forms of stock ownership. These patterns in both countries are important reasons why Japanese and German firms were able to forsake short-term profit maximization in favor of a strategy of long-term goals. In the United States, where the equity markets have been much more developed, however, American managers of large firms have been much less dependent on commercial banks for financing. Indeed, during part of the twentieth century, the proportion of industrial funds contributed by commercial bank loans to American firms has been among the lowest in the world (Ackroyd et al. 1988; Oliver and Wilkinson 1988).
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The capital markets developed earlier and became more important in the development of capital-intensive industries in the United States because it was an earlier industrializer. Substantial profits generated from textiles and sailing ships were available for investment purposes in the late nineteenth and early twentieth centuries. Specifically, it was the investment banking houses in the United States that served as the intermediary between those in need of capital and those having capital to invest, and without this intermediary to monitor investments and corporate practices, many large-scale hierarchical-type arrangements could not have emerged in the United States during the late nineteenth and early twentieth centuries.

For example, American investment banks not only channeled investment capital into American industry during the late nineteenth and early twentieth centuries, but they also imposed themselves on the boards of directors of numerous firms in order to convince investors that their investments were being carefully monitored and were relatively safe. The role of a few investment banks was so great in transforming the American railroad industry during the late nineteenth century that they could determine which railroads would grow and which would not, which areas of the country would have railroad expansion, and how many railroads would be established between major cities (Moody 1904; Navin and Sears 1955; Chandler 1956; Carosso 1970; Kotz 1978). The most powerful investment bank was J. P. Morgan and Company, which had access to vast amounts of capital because of its close financial ties with various New York commercial banks and insurance companies. With its power to provide capital and promote consolidations, the House of Morgan and its financial associates by 1912 exercised control through a system of interlocking directorships over a dozen major railroad systems, several of the nation’s largest urban transportation systems, United States Steel, International Harvester, General Electric, American Telephone and Telegraph, and Western Union. In addition, Kuhn, Loeb and Company and the Rockefellers, through their control of the National City Bank, also exercised control over a number of companies – among which were Westinghouse Electric, Standard Oil, the Union Pacific Railroad, and Amalgamated Copper – predecessor of Anaconda Copper (U.S. Congress, House Banking and Currency Committee 1913; Kotz 1978).

By channeling investment capital into these various industries, these investment banks played an important role in transforming and stabilizing the railway, steel, copper, telephone, oil, and electric products industries during the late nineteenth and early twentieth centuries. Firms within these industries may have become large-scale hierarchies, but they were embedded in a well-established monitoring network that was extremely important as a governance mechanism. Without the monitoring and discipline exercised by these investment banks, these hierarchies would not have emerged.
when they did and in the same form. Moreover, without the key role played by investment banks in promoting mergers in the late nineteenth and twentieth centuries, these industries would have been much more unstable. But after 1912, the role of investment banks as a monitoring institution for these industries declined. Thus, for several reasons, there was a further transformation in the coordination of these industries.

State policy was the most important reason for the declining role of investment banking in governing these industries. For example, the Clayton Antitrust Act of 1914 made interlocking directorships among large banks and trusts illegal. Moreover, it forbade a corporation to acquire the stock of another if the acquisition reduced competition in the industry. In the longer term, the Clayton Act tended to reduce the ability of investment banks and firms to carry out a long-term strategy of promoting a community of interests among firms either in the same or in complementary industries as was the case with the Zaibatsu and later the Keiretsu in Japan, or with the relationship between banks and large firms in Germany. In addition, the American government in 1933 forced a sharp separation between commercial and investment banking. From that point on, investment banks lost much of their access to capital and had diminished capacity to regulate or govern nonfinancial corporations. The net result was that both types of banks lost much of their control over the modern American corporation.

As a consequence, American nonfinancial corporations became dependent on liquid financial markets for raising capital rather than on the kinds of stable networks that Morgan and other financial banking houses had established at the turn of the century. Increasingly, corporate managers became dependent on the whims and strategies of stockholders and bond owners. When owners of American securities have thought that their investment was not properly managed—as reflected by price earnings ratios, current dividends or interest on the value of the bonds—they have tended to sell their assets. Since American management during the past half century has been evaluated more and more by the current selling price of the stocks and bonds of the company that they manage, the American corporate structure has increasingly been embedded in an institutional arrangement that places strong incentives on management to maximize short-term considerations at the expense of engaging in long-term strategy. In what follows, we observe how this process has placed constraints on the type of transformations that have occurred at subsequent points in time.

*Industrial relations and hierarchical coordination*

The way in which relations between employees and employers are coordinated is of fundamental importance in shaping the performance of a capitalist economy. Moreover, the type of coordination between labor and capital places limits on the type of transformation that can occur in
industry. In the United States, there has been considerable variation in
the way that labor-management relations have been coordinated, not only
over the last century and a half, but among different sectors of the economy.
For example, during the 1870s and 1880s, inside contracting ("subcon-
tracting") was a common form of employee/employer relations in the iron,
steel, and construction industries. Under this system, the owners of a firm
generally provided floor space, machinery, raw materials, and capital, and
the work was carried out by inside contractors who hired their own em-
ployees, supervised the work process, and received a piece rate from the
firm. Under this system, the owners of the dominant firm had little technical
knowledge about the work process and limited their involvement to nego-
tiating contracts with inside contractors, inspecting the flow of products,
and assuming responsibility for final sales. Contractors exercised consid-
erable autonomy in determining when to work, how much to work, and
how the work would be done. However, as Braverman points out, this
type of subcontracting was plagued by problems of irregularity of produc-
tion, loss of materials in transit, embezzlement, slowness of manufacture,
lack of uniformity, and uncertainty about product quality. But most of all,
firms were limited in their inability to change the processes of production
(Braverman 1974: 60–1. See also Buttrick 1952; Stone 1974; Williamson
1975, 1985). In other industries, work was organized very differently. There
were artisans who worked as regular employees in a single firm, e.g.,
shoemakers, wagon, bicycle, and furniture makers. They tended to be
highly skilled and were very much in control of the work process.
During the late nineteenth century, the communication and transpor-
tation revolution permitted firms to expand the size of their markets if they
could only produce more. And it was the expansion of the market that
transformed the system of production in many industrial sectors to one of
mass production. Through the 1950s, the model of mass production became
the undisputed means of enhancing industrial efficiency in numerous sectors
of the American economy. For about a century, industrial economists
assumed that the most efficient means of reducing costs was by employing
economies of scale and a standardized system of production. Mass pro-
duction became the basic strategy for expanding markets, and expanding
markets became the means of minimizing costs.
Firms engaged in mass production followed a distinctive logic. They
employed a particular form of industrial relations, used specific types of
machinery, and related in particular ways to other firms in the manufactur-
ing process. Mass producers took seriously Adam Smith's prescription
that the most efficient way of organizing a factory was to routinize and
differentiate workers' tasks down to the smallest detail. The key to breaking
down manufacturing into even more detailed operations was to employ
specific-purpose machinery for each manufacturing task along an assembly
line. In much neoliberal thinking about mass production, employment was
viewed as an impersonal economic-exchange relationship, and machines
(when profitable) could easily be substituted for workers. Whatever labor
was needed to work on assembly lines could be hired or dismissed on short
notice. As machinery became more and more specialized, the skill and
autonomy of individual workers often declined—though the process of
“de-skilling” varied from industry to industry. As employees became in-
creasingly “de-skilled,” one worker could easily be exchanged for another.
Management had little incentive to engage in long-term contracts with
workers or to invest in the skills of employees.

Prior to 1960, mass-production strategies were dominant among (1) mass
producers of low-priced, semiperishable packaged products, relying on
large-batch and continuous-process technology, e.g., cigarettes, breakfast
cereals, canned foods, and soaps; (2) processors of perishable products
for regional and national markets, e.g., meat packing and processing
firms; (3) manufacturers of mass-produced consumer durables that used
continuous-process technology, e.g., sewing machines, automobiles, office
equipment, and farm implements; (4) makers of high-margin production
goods that were technologically complex but standardized, e.g., elevators
and pumps; and (5) other industries that were capital-intensive, high energy
consuming, and relied on continuous large-batch production technology
for mass markets, e.g., chemicals, oil refining, glass, paper, and rubber
products (Hollingsworth and Lindberg 1985).

Despite the fact that standardized mass production was the dominant
technological paradigm for a number of decades, there were always in-
dustries that were organized differently. In short, there was considerable
diversity in production strategies among firms and industrial sectors. Stan-
dardized mass production always demanded the existence of industries
organized along completely opposite principles. For example, the special-
purpose machines necessary for mass production could not be mass pro-
duced but had to be custom made. Therefore, it was always necessary that
there be a sizeable work force having broad and flexible skills with the
capability of continually redesigning, reorganizing, and reproducing spe-
cial-purpose machines. In other words, industrial dualism was always a
logical necessity even when standardized production was the dominant
technology (Piore 1980).

Mass production and the “de-skilling” associated with it was also in-
appropriate in industries if processes of production were labor-intensive
and low in energy consumption and if the markets for the products were
quite heterogeneous. Examples included firms involved in lumber products,
printing and publishing, and residential construction. In these industries,
craft-based work was dominant, and it was essentially incompatible with
systems of mass production, and thus continued. With craft work, each
product was relatively unique, requiring considerable worker autonomy.
Hence, craft-type activities took place in settings involving long-term stabl...
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Contracts, often resulting in what Eccles (1981) has called the “quasi-firm” and that is analogous to obligational networks in the typology presented in Chapter 1.

By 1950, numerous manufacturing sectors of the American economy were tightly integrated into a system of mass production, in which the whole was greater than the sum of the parts. This form of production was dependent on stable and relatively defined but very large markets for products that were usually low in their technological complexity and relatively slow in their rate of technological change. Hierarchical governance structures (Cell Three) were particularly well suited for mass production and distribution. When the transaction costs of working with external suppliers and distributors became high, firms frequently resorted to vertically integrated structures and performed diverse functions in house. Such a system was complemented and supported by public-sector mass education, which provided a labor force with the basic training in reading, writing, and discipline to work on assembly lines. The capital markets were sufficiently well developed to provide the capital the standardized system of production required. Because the American model of coordinating mass production with hierarchical institutional arrangements was widely thought to be the undisputed means of enhancing industrial efficiency, many observers believed through the 1950s that the hierarchical form of mass production was the direction in which manufacturing sectors were converging both within and across countries.

THE UNITED STATES ECONOMY SINCE 1950: THE TRANSFORMATION FROM HIERARCHIES TO NETWORKS

As suggested earlier, many of America’s industrial firms had succeeded with a hierarchical form of coordination because the barriers to entry were too high for effective competition from other firms – both domestic and foreign – in the same industry. But the day of reckoning was to come. Following the Second World War, various European and Japanese manufacturers adopted the latest technology in industry after industry at a time when transportation costs were declining and markets for high-quality consumer goods – as distinct from standardized products – were expanding. Moreover, manufacturers in Japan, Germany, and several other countries had never become as committed to the hierarchical form of standardized mass production as had manufacturers in many sectors of the American economy. Indeed, those countries had a very different form of coordinating manufacturing sectors – coordination forms geared to flexible forms of production, such as obligational networks based on subcontracting coalitions, strategic alliances rather than hierarchies based on vertical integration, and collective forms of governance.
In Japan, Germany, and other countries where industrialization occurred later and where markets were smaller, forms of coordination that were less hierarchical but more network in nature had long been common. These forms of coordination were more effective in coping with their environment than hierarchical-type arrangements once markets became unstable and consumers increasingly demanded products based on technologies that were highly complex and changing very rapidly. In other words, hierarchical forms of coordinating industrial production are quite effective when markets are quite stable, consumer tastes are relatively homogeneous, and the technology is not highly complex and is slow to change. But when markets are less stable, consumer tastes are more heterogeneous, and the technology of products is complex and fast changing, various types of obligatory networks tend to be more appropriate for coordinating economic transactions among various types of actors.

During the 1950s and 1960s, the managers of most American manufacturing firms were unaware that obligatory networks, as more efficient organizational forms, would eventually challenge firms in many older American industries, e.g., automobiles, steel, and consumer electronics. Nor were they highly conscious that in newer American industries in which the technology was highly complex and changing very rapidly – pharmaceuticals and other biotech industries, aerospace, and computer-related industries – various types of obligatory networks were becoming a dominant form of coordination. But astute observers were noting that as the demand for more flexible forms of production increased, obligatory networks provided flexibility in coordination far more so than hierarchically oriented strategies in vertically integrated firms (which in an earlier era had been engaged in producing standardized products).

Following the first world oil crisis of the 1970s, many American manufacturers who had been engaged in producing standardized products found themselves in the position of having products for which there was little demand, and yet their rigid system of production meant that they had little capacity to produce the products that were in demand. Once again, the teachings of Adam Smith were instructive: standardized production and an increasing division of labor were limited by the size of the market, but now markets were shrinking as they became increasingly saturated, volatile, and/or unstable.

Many American firms engaged in producing standardized products responded to saturated markets and the decline in profits simply by trying to reduce costs. Some froze or rolled back their employees’ wages. Others took advantage of the declining costs of transportation and communication by shifting production to low-wage areas at home (e.g., the meat processing industry) and/or abroad (as in the auto industry). Most reduced their labor force and introduced new forms of automated equipment. Many firms and their trade associations – especially in the shoe, textile, steel, and auto-
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mobile industries – pressured Washington for protection against foreign competitors. However, these were only temporary expedients, for it became increasingly evident that standardized systems of production were incompatible with volatile and unstable markets. Even when the market demand for certain goods remained relatively stable, less developed countries with lower wage rates were able to copy standardized products and sell them in the United States at lower prices. Hence, American mass producers increasingly faced severe price competition and losses.

Eventually, it became increasingly obvious that a different coordinating strategy was needed in many manufacturing sectors of advanced capitalist societies. And the question was whether industries in the United States, historically coordinated predominantly by hierarchical strategies, could shift to a mix of more flexible and less hierarchical coordinating strategies employed by their foreign competitors. The need for different forms of coordination did not, of course, extend to all industries. Standardized production strategies associated with hierarchical forms of coordination continued to be effective in industries where the technology was not very complex and rapidly changing, consumer tastes were relatively homogeneous, and markets were relatively stable.

The coordinating form that was slowly emerging in numerous manufacturing sectors was one involving flexible forms of production, with coordination based on a variety of networks. This was not an entirely new paradigm in the United States, but it had long been subordinate to the mass-production perspective. However, a flexible system of production involves vastly different views of labor-management relations, levels of skills and work tasks, and relations among producers, processors, and distributors. Whereas standardized production was characterized by an increasing hierarchically imposed division of labor, flexible systems of production require work forces with broad levels of skills, employees who have "learned to learn" about new technologies and can easily shift from one work task to another, and who can work closely and cooperatively with other employees and management. Labor relations must be structured so that people of various ranks engage in meaningful consultation with one another, rather than constantly responding to commands. Whereas many firms that earlier had engaged in mass production tended to pursue hierarchical strategies of vertical integration in order to lower transaction costs (Williamson 1975, 1985; Chandler 1977), manufacturing firms producing products with rapidly changing technologies reduce transaction costs by relying on long-term stable networks with their suppliers and distributors. The historic strengths of vertical production in the auto, aircraft, steel, consumer electronics, and many other industries are increasingly perceived to have enormous costs in a world in which markets are volatile and the technology is increasingly complex and changing. The older, more hierarchically vertically integrated firms have increasingly become saddled with
structural inertia, slow response time, inability to develop in-house components with complex technologies and high production costs.

How widespread have flexible systems of production become across manufacturing sectors of the American economy and why have flexible forms of production become more pervasive in some sectors than in others? Unfortunately, it is difficult to determine the extent to which firms and sectors are moving in the direction of a flexible system of production. From the exterior of firms, it is often difficult to code production systems. Public and private statistics are often unreliable sources for understanding the internal labor markets of firms and the kinds of relationships that exist among producers, processors, and distributors. Even so, there is a great deal of qualitative and quantitative data, as well as in-depth studies of firms and industries, that make it possible to assess the pervasiveness of flexible forms of production. To understand why firms in some sectors have adopted flexible methods of production more than others, the analysis must be sensitive to the following variables: the degree of and nature of international competitiveness; the level of technological complexity and rate of technological change of the products; the degree to which other types of production arrangements had already become highly institutionalized within the sector; whether the industry has a long or a short history; and the potential of firms in an industry to engage in collective behavior.

For purposes of this discussion, a flexible system of production is simply the inverse of mass production. It is the production of goods by means of general-purpose resources rather than vice versa, a system of production that can quickly adapt to different market demands. Thus, firms that are embedded in obligatory networks and that have flexible strategies of production have enhanced potential to be competitive in volatile environments, for they can make an ever changing range of goods to appeal to specialized tastes with customized designs (Piore and Sabel 1984; Sabel and Zeitlin 1985; Kristensen 1986; Streeck 1987b).

Markets for many products are changing with great speed, and in such sectors, it is less appropriate for firms to invest in product-specific machines and workers with a capability of doing only one thing. Production systems are closely linked to and conditioned by technology. For example, the emergence of microelectronic circuitry in numerous industries has done much to revolutionize systems of production. In short, the flexibility of microelectronic circuitry now permits firms to produce a variety of products in production runs of variable sizes. Because employees and general-purpose machines can be used for many different purposes in a flexible production system, manufacturing must be coordinated in ways that permit its various parts to be combined and recombined; and the extent of flexibility is measured by the ease with which suppliers, machinery, and workers can be rearranged for different tasks (Kristensen 1986: 38). However,
flexible producers require a work force with high levels of skills, workers who can make changes on their own, with less hierarchical work supervision than under a mass-production system. Because of the need to shift production strategies quickly, management must be able to depend on employees to assume initiative, to integrate conception of tasks with execution, and to make specific deductions from general directives. Moreover, firms engaged in flexible systems of production tend to be less vertically integrated than firms engaged in mass production, and to be in close technical contact with other firms. Thus, firms operating in environments with volatile markets must adopt strategies that rely on highly skilled work forces operating with minimal supervision, general-purpose machinery, and flexible network forms of coordination with other producers.

As a result of microelectronic production technology, mass producers have been able to improve the quality and diversity of their products and to reduce the size of their production runs. At the same time, many craft-oriented firms have been able to increase their production volume without sacrificing their quality standards. And in the process, such large and small firms increasingly compete in terms of quality as well as price (Sorge and Streeck 1988).3

As flexible production systems become more pervasive, there is a tendency for mass markets to be divided into specialized segments, for consumers in more affluent environments to demand more customized and/or diversified products, and for firms to be smaller than would be the case with a mass-production system. Even in capital-intensive industries, product diversification and small-batch production are becoming very common. Flexible minimills are taking over an increasing share of the steel industry from the integrated mills. Large chemical companies have found it necessary to become increasingly flexible in order to produce more specialty products in small volume. Automobile factories increasingly produce thousands of varieties of cars in small batches. Thus, manufacturing firms with flexible production systems must develop a wide range of options for coping with demand shifts, material shortages, foreign competition, and other types of disruptions. Whereas firms engaged in mass production historically had a tendency to respond to market disruptions by lowering prices, re-

3 In writing this chapter, I am very indebted to the stimulating essays by Charles Sable (1982, 1987a, 1987b). However, I do have profound differences with Sable. Whereas he sees the introduction of microelectronic technology as introducing a new industrial divide in which small producers will become increasingly dominant, my perception of capitalist development is less utopian. My chapter assumes that very large firms in many industries will also adopt microelectronic circuitry technology and will over the long term compete very successfully against small firms. In short, there is likely to be great variability across industries, with large firms dominating some industries (e.g., automobiles) and small firms doing very well in others (see the criticisms of Sable's perspectives in the essays in Hyman and Streeck, 1988).
ducing the scale of operations, and discharging employees and reducing wages, firms with flexible systems of production have tended to respond by developing new market niches and new products. And the emphasis on new products tends to contribute to more expert skills among management, workers, and subcontractors (Sabel 1987b; Lazerson 1988), thus increasing the demand for ever more products.

Even if there is an ideal typical form of industrial organization that we may label as a flexible production system, there is no single pattern of flexible production. However, there are several strategies of coordinating flexible systems of production that are becoming quite common. Consistent with the typology in Chapter 1, the coordinating form that is becoming increasingly pervasive in advanced capitalist societies is the obligational network.

**Obligational networks**

Obligational networks assume autonomy of linked firms working in an interdependent fashion. There are several forms of relationships subsumed under the term obligational networks: (1) subcontracting among firms; (2) cooperative contracting among small firms; and (3) strategic alliances and joint ventures among large and small firms, both at the nation-state and global level. Although it is possible analytically to differentiate these various forms of coordination, they often overlap and are integrated in practice. All of these forms of obligational networks involve actors in pursuit of the interests of individual firms. In other words, this form of coordination is not part of an effort to govern collectively an entire industry, though obligational relationships function most effectively when they are embedded in a rich set of promotional networks.

**Subcontracting among firms.** Increasingly, highly capital-intensive manufacturing firms producing products that have technologies that are complex and rapidly changing are engaging in long-term stable relationships with other firms. One type of relationship that is becoming quite common can be labeled as subcontracting. In contrast to vertical integration strategies for mass, standardized production, large firms in many manufacturing sectors are increasingly attempting to base their production process on many smaller-scale suppliers. Examples are found in the automobile, consumer and durable electronic goods, metal products, aircraft, aerospace, and computer industries. Because the American automobile industry has historically been more vertically integrated than many of its foreign competitors (e.g., the Japanese), it has been somewhat slow to "dis-integrate vertically," but even in the American automobile industry, the trend toward long-term stable relationships among subcontractors rather than the construction of components in house. Such subcontracting provides...
opportunity to move away from mass standardized production and to develop more diversified, higher-quality systems of production (see the automobile chapter in this volume, Chapter 7).

In most of these industries, there is usually a hierarchy of firms – the very large corporation at the top and a number of smaller firms under its influence. By relying on subcontracting, larger firms are able to reduce the amount of capital that they must invest, to change quickly the technology upon which their production is based, and to produce a variety of goods in small and medium batches using many kinds of materials and components. In general, the more complex the firm’s technology and the better skilled the firm’s labor force, the more autonomous the subcontracting firm. On the other hand, subcontracting is not very common in certain industries: furniture, food processing, petroleum, coal, ceramics, and stone products industries, where the technology is not very complex and rapidly changing.

The industrial relations system of industries is increasingly the key to a diversified quality system of production, to more obligatory network types of coordination. To attain diversification, and high-quality production, firms must have a labor force with very flexible and broad job skills. But in order to maintain such a labor force, medium- and long-term manpower planning and training are necessary (Hyman and Streeck 1988).

In order to stay at the cutting edge of technology, large and small firms are becoming increasingly interdependent. Just as large firms increasingly have broadly trained workers in order to remain competitive in world markets, so also have subcontractors had to train their workers according to flexible principles. This has become feasible as relationships among firms have become long-term and stable. Arms-length contracting based on short-term market pricing is not conducive to investing in the long-term training of a highly skilled work force.

Increasingly, large firms in the auto, aircraft, aerospace, computer, and other industries must provide capital, marketing, and research services to their suppliers. As products become more complex and change rapidly, many large firms no longer know exactly how to produce their products. To keep up with changes in the market, large and small firms must learn from one another about new markets and new technologies. To facilitate this, middle-level management increasingly moves back and forth between suppliers and final assemblers. Meantime, price considerations have become less important in shaping the relationships among suppliers and customers (Sabel 1987a, 1987b; Hyman and Streeck 1988).

As subcontractors work with complex technology, they increasingly attempt to develop long-term stable relationships with several companies, reducing their dependence on a single large firm. In some sectors, smaller firms not only have increased the number of buyers to which they sell, but also have diversified into several product lines. Through diversification,
firms protect themselves in the event of a downturn in the market for a single product, and they become immune from "strong arm" tactics that could be exerted from a single customer. It is not uncommon for firms that make dies and molds for auto assemblers, as well as parts for aircraft assemblers, to make tractor parts as well as specialty machinery for electronics and computer industries.

The key to high-quality product diversification is technology based on a highly and broadly trained labor force using microelectronic machinery. This strategy has increasingly shifted competition away from a focus on prices to greater concern with product quality and other considerations of work-force capability to meet rapidly changing demands.

Although it is popular today to minimize the role of technology in dictating the strategies of firms and the governance arrangements dominant in particular industries, advances in semiconductor and computer technology since the 1970s have made it possible to develop a generation of machine tools that can easily adapt to new tasks and products. Before these advances in computerized technology, firms generally had to obtain new equipment whenever they produced different products. For firms engaged in mass production, it generally meant replacing the machinery. By relying on microelectronic technology, firms can put their manufacturing equipment to new uses simply by reprogramming the machinery. Because microelectronic technologies have almost limitless uses in a vast array of industrial sectors, firms can more easily shift into different product lines—assuming they have broadly trained workers.

Computerized technology alone cannot assure the emergence of flexible production systems and the existence of a broadly trained labor force. Indeed, firms engaged in standardized production often use computer-based technologies for rather rigid purposes. In many American industries, the paradigm of mass production is declining more rapidly than a new paradigm of flexible, diversified quality production is being institutionalized. Ideally, before a production system based on an obligatory form of networks can be highly effective, firms must be intricately embedded into an institutionalized infrastructure that provides for training of labor, extensive links with research institutes and business associations, cooperation with local governments and various types of credit institutions—in short in a system of promotional networks. Moreover, firms must have a willingness to cooperate and have trusting relationships with their competitors, suppliers, and customers. However, the degree to which firms are embedded into these two types of networks varies greatly across industries (Piore and Sabel 1984; Sorge and Streeck 1988; Herrigel 1989).

Even if this type of industrial coordination becomes increasingly more common, it will not completely replace hierarchical processes of standardized production. Flexible production processes require standardized production processes. For example, Herrigel (1989) has demonstrated that
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industrial sectors employing flexible, diversified, and high-quality forms of production are dependent on the mass production of flexible machines. Moreover, the customization of many products is based on the standardized production of component parts. Thus, it is still uncertain how widespread the diffusion of a flexible system of production will be across sectors of advanced capitalist societies.

The study of firms employing a strategy of diversified quality production and engaging in long-term relations with firms in several industries poses difficult problems for sectoral analysis, for as firms become increasingly flexible in their production capabilities, they tend to engage in more and more product diversification. But as firms move into multiple product lines, the boundaries among sectors become increasingly blurred. Of course, product diversification within firms is not new, as the histories of the chemical and other industries demonstrate (Chandler 1962). But more recently, the pace of diversification is accelerating. Textile firms are producing medical supplies, optical-fiber materials, and print distributing boards; transport machinery makers have shifted to the general machinery sector and are producing motors and industrial machinery; chemical firms are moving into applied areas of biotechnology and are producing medical supplies and enzyme products, print distributing boards, electromagnetic materials, resins related to electronic products, carbon and optical fibers, as well as videotapes. Food manufacturers are moving into the service sector, particularly into the restaurant business; steel manufacturers are making electromagnetic products. On the other hand, there has been much less diversification in petroleum, paper and pulp, and rubber industries.

Cooperative (relational) contracting among small firms. In this institutional form, firms are small and skill-intensive. Each small shop specializes in one phase in the chain of production, but is engaged in long-term stable relations with other firms in the same community or region. These relationships are open-ended and continuous, with relationships being periodically redefined. This form of production is especially common in the industrial areas of Italy, in Smaland in southern Sweden, in the western part of Denmark, and in different regions of Japan. What is remarkable is the similarity in the structure and process of these small firms whether they exist in Japan or in Western Europe. In general, they rely heavily on microelectronic tools and extremely well-trained labor to produce high-quality shoes, silverware and cutlery, ceramics, textiles, apparel, agricultural implements, special machines, electronic musical instruments, and well-designed furniture. As each shop tends to engage in only one task in a complex chain of production, the long-term stable relationship among firms is similar to the following model: $A + B + C + D + E + F$. Thus, in the shoe industry, one firm makes the sole and another the heel, another cuts and sews the leather, etc. Cooperative contracting is based on high
interdependence, with each actor completely dependent on every other for its survival. This type of production is labeled "cooperative contracting" rather than "subcontracting," though the final product of all of these firms may ultimately go to a large distributor as some form of subcontracting.

There is increasing evidence that in these industries this type of cooperative arrangement leads to higher levels of productivity than an hierarchical-type arrangement. At one time, the United States mass produced shoes, cutlery, and many other products in which this coordinating form exists, but because of their impoverished institutional environment, American firms in these industries have lacked the capacity to be transformed from a coordinating system based on hierarchical forms of mass production to one of cooperative contracting. And lacking the capacity to develop this form of coordination, American firms in these industries either are declining or have already died – though firms in these industries perform extremely well in some advanced capitalist societies. Why is this the case?

Cooperative contracting tends to flourish in those regions that historically had strong artisan traditions and where there had also been a tradition of small firms engaging in strong collective action, e.g., where highly institutionalized promotional networks exist. However, the United States either never had a strong artisan tradition in these industries – or if the tradition ever existed – it succumbed long ago to hierarchical forms of mass production. Moreover, the tradition of antitrust legislation, the strong ethnocultural cleavages in American society, the large size of the country, and heterogeneity of interests among firms in the same industry have placed severe constraints on the ability of firms in these industries to develop the kind of institutionalized networks for sustaining effective collective actions. In other words, cooperative contracting among small firms can be effective only if they are embedded in an environment consisting of a highly institutionalized set of promotional networks.

With cooperative contracting, each firm is dependent on a collectivity of firms – cooperative pacts and local associations in order to regulate their relations – to carry out a multiplicity of tasks in separate work settings that in the United States was historically more likely to have been carried out in a large factory. Elsewhere, small firms in these industries even join together to reduce all kinds of overhead costs – rent, insurance, accounting – and it is not uncommon that they borrow machinery from one another. Through negotiations conducted by their business associations, they often receive special subsidies from local, regional, and national governments. Moreover, they are embedded in a set of long-term stable networks with specialized banks, credit associations, and government lending agencies. Efficiencies are achieved by rapid responses to market needs because of the flexible organizational structure of the entire system (Sabel 1987b, Friedman 1988, Lazerson 1988).

Although declines in business cycles or in specific markets can injure
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The firms engaged in this kind of relationship, when these conditions occur, cooperate in the development of new products. Because it is not easy to shift to different product markets, firms share in the costs of continual training and retraining their workers and the acquisition of new machinery. Indeed, cooperative production among potential competitors helps producers to prevent downward price competition and wage squeezing. Familiarity breeds cooperation and a willingness to share risks (Sabel 1987b; Lazerson 1988).

The survival of this kind of relationship depends on the intensity of group solidarity among firms. The stronger their sense of collectivity, the more successful they are in regulating the relations between owners of firms and their employees. Strong group solidarity permits small firms to resist high wage demands and profit pressures from large distributors. Otherwise, firms might lay off workers, reduce wages, move elsewhere, or close down.

Though this type of cooperative contracting is pervasive among small firms in Japan, Italy, and elsewhere, it would be a mistake to assume that this form of production is common across all manufacturing sectors in which small firms exist in large numbers. For example, the cooperative contract model is much less common in the production of printing, pencils, and food products—in short, in industries in which the skill levels have remained quite low and the technology of production has remained standardized and slow to change.

Strategic alliances and joint ventures among firms. Firms in a number of industries that historically conducted transactions with either a corporate strategy of vertical integration or in market-type transactions are presently conducting these transactions through obligational networks, specific forms of which are here called joint ventures. These are also forms of obligational networks and are becoming increasingly common in advanced capitalist societies.

These relationships are of a different order from the cooperative contracting and subcontracting discussed before. In the language of agency theory, firms in this type of relationship are both principals and agents: risk takers who allocate tasks and share in the gains or losses of the final product (Powell 1988). These relationships have the potential to be long-term and durable, much more flexible than the type of hierarchical arrangements that historically characterized firms specializing in standardized production.

In an era when the rate of technological change was relatively slow, production processes in an industry relatively standardized, and production runs quite long, vertical integration was an appropriate strategy for firms that faced high uncertainties and small numbers in their relationships with either suppliers or distributors. However, there have always been costs to
integrating interdependent relationships within one firm. For example, there is high potential for bureaucratic rigidities to develop in vertically integrated firms. Moreover, it becomes increasingly inefficient for firms to produce everything in house when technology is very complex and changes very rapidly.

Historically, some companies developed special long-term relationships with firms in other countries in order to gain market access or to transfer technology through licensing agreements. In more recent years, however, joint ventures among firms have become more varied in goal and scope, e.g., the search for economies of scale, the need for market access, the sharing of risks, the need to have access to technology, and to pool know-how. Moreover, the frequency of these relationships has increased, especially in industries involving high-cost products with complex and rapidly changing technologies. Like mergers, strategic alliances and joint ventures offer benefits quickly, but without the necessity of giving up much of one's independence. Unfortunately, our knowledge about the conditions under which strategic alliances emerge — at both the empirical and theoretical level — is still quite limited.

In general, joint ventures function best when the various actors are embedded in a highly institutionalized set of promotional networks that facilitate trust and cooperation. However, the American political economy has a strong neoliberal tradition with networks designed to promote cooperation among actors in the same industry being poorly developed, especially in more traditional industries. But as the next section argues, cooperative and collective forms of networks have been better developed in newer industries where the technology is more complex and changing more rapidly.

The importance of multilateral and collective action

Hierarchical forms of governance are based on the assumption that in order to reduce uncertainty among actors, relationships must be coordinated within a firm. Markets tend to generate fierce competition among like actors, and through such competition, actors attempt to eliminate their competitors. But in advance capitalist societies, when obligational networks become more pervasive as a governance form, different forms of behavior become manifest.

Due to high research-and-development costs, rapid change in products, and volatile markets, it is no longer possible, in many industries, to coordinate as many things in house as was possible during the age of mass standardization. Markets and hierarchies can work best when firms are embedded in an impoverished institutional environment. But for obligational networks to operate efficiently, they must be embedded in an institutional environment that is highly developed with institutions that promote
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cooperation between processors and suppliers and even among their competitors, an environment that facilitates the exchange of information among competitors as well as among suppliers and producers. Firms must also be embedded in an environment that develops rich, broad, and flexible skills for the work force. In short, advanced capitalist societies require cooperative relations and collective resources far in excess to what is needed for markets and hierarchies to function effectively and in excess of what single firms can develop for themselves (Streeck 1987a, 1988). These collective arrangements are displayed in the right-hand column of the typology, Table 1.1, in Chapter 1.

Highly effective sharing of information and cooperation among various actors requires all of the following: collective action on the part of competitors, rich training centers — whether within vocational schools, universities, or other institutions — and institutions willing to provide financing on a long-term basis. In other words, obligatory networks function best when they are embedded in an institutional environment with rich multilateral or collective dimensions that provide these conditions.

Of course, a number of American industries have long been coordinated by obligatory networks that have also been firmly embedded in an institutional environment of promotional networks. In the American case, some of the most effective promotional networks have involved cooperative relations among university-based firms, commercial firms in the same industry, and the state and federal governments. For example, American agriculture owes much of its twentieth-century success to the way that agricultural producers have been embedded in a rich institutional environment that has provided cooperative activity among producers, the dissemination by the state of university-based knowledge to agricultural scientists, and financial assistance from a number of public and quasipublic institutions. Another sector with a long history of being embedded in promotional networks is the American chemical industry. Since the turn of the century, chemical firms have been extensively involved in promotional networks that have consisted of university-based scientists and, from time to time, the federal government. It is no exaggeration to argue that those countries that have lacked promotional networks involving rich university resources for the training of chemists and for the conduct of nonproprietary research have failed to develop a successful chemical industry.4

The key actor in promoting multilateral activity among producers in American society has generally been the American state. Significantly, the American state has rarely taken the lead in developing promotional networks among manufacturing firms that historically were coordinated primarily by markets and/or hierarchies. Rather, the American state has been most active during the past half century in developing promotional net-

4 I am indebted to Richard Nelson of Columbia University for this observation.
works for manufacturing firms that have addressed the military and health-related needs of the society. For example, the following are some of the products and technologies derived from firms coordinated by obligational networks that were firmly embedded in an environment (e.g., promotional networks) involving cooperative relations with university-based scientists and engineers, the state – especially the military – and other firms – both suppliers and competitors: commercial aircraft, semiconductors, integrated circuits, computers, nuclear power, microwave telecommunications, new materials such as high-strength steel alloys, fiber-reinforced plastics, titanium, and new methods of fabricating metals such as numerical-controlled machine tools. Without obligational networks embedded in promotional networks involving multilateral relations with universities, various agencies and departments of the federal government, and numerous business firms, these technologies and products could not have occurred in the United States at the time they did (Nelson 1982; Landau and Rosenberg 1986).

The importance of obligational networks being embedded in an environment with rich promotional networks is that it links together organizations having different knowledge bases. This kind of coordination is not possible within a single hierarchy, as no firm has had the capacity to incorporate all the knowledge and resources to develop any one of the technologies and products listed before. Nor could a single firm linked with its suppliers in an obligational network have developed these products. They could be developed only because obligational networks were embedded in an environment with highly developed promotional networks. In this context, the Agency for Science and Research reported in 1985 that 20% of the firms it surveyed were linked with other firms, universities, and government laboratories through networks involving joint research projects, commissioned research, or other forms of information exchange – and it predicted that in 1990, there would be 26% (Aoki 1988).

Thus, advances in electronics have required extensive communication networks involving physicists as well as engineers in electronics and material science. Even though American firms are highly sensitive to antitrust issues, the American government has increasingly realized the importance of cooperative research among competing firms and in recent years has relaxed its enforcement practices in certain industries. This has facilitated rich collaboration among firms in the semiconductor industry through the Semiconductor Industry Association and the American Electronics Association, both of which have research programs in conjunction with various American universities. In the pharmaceutical industry, promotional networks have been extensive in linking together experts in industry, government laboratories, and land universities in the fields of pharmacology, biochemistry, immunology, molecular and cell biology.

Because of the flexibility of obligational and promotional networks as well as the flexibility of the external labor market, and because ventur
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capital markets have been quite well developed in the United States, it has been relatively easy - by world standards - for entrepreneurial-oriented American researchers and engineers to develop their own firms in order to commercialize new products. This has been especially common in information-based industries in and around Silicon Valley, California, as well as in the biomedical, biochemical, and artificial-intelligence-related industries throughout the United States.

With a cross-national perspective, it is apparent that this type of institutional arrangement has performed extremely well in American society in advancing knowledge at the frontiers of science and in the development of new products derived from basic science. Americans have been particularly successful in the development of new products that have many kinds of military and health-related applications. However, the American R&D system has been less successful in improving upon older and new products for commercial markets. For example, when one observes the Japanese system of research and development, one quickly becomes aware that the American system of networking facilitates creativity in developing new products, but it has its shortcomings in improving on existing products. Though the Japanese are much weaker in basic science, have not succeeded in developing radically new products, and are somewhat deficient in entrepreneurial leadership, they have concentrated on establishing very close communication among researchers and engineers with production and marketing personnel involved in existing product technologies. Japanese firms are also increasingly embedded in networks involving university-based scientists and engineers - but established networks are closely linked with established production facilities, whereas in the United States, manufacturing networks tend not to involve production personnel - or else the production activity is only at the periphery of the network. In Japan, R&D and production personnel frequently move back and forth among production sites, research laboratories, and engineering departments. Americans are socialized in their educational system to make scientific discoveries and to develop new products. In contrast, the Japanese are socialized to be highly attentive to detail and to improve upon existing products. Whereas the Americans excel in horizontal communication across organizations in the development of new products, the Japanese excel in establishing horizontal feedback types of communication “from marketing to production and production to redesign” (Aoki 1988: 247). In other words, the Japanese emphasis is clearly on the production phases of the industrial process, whereas the Americans have tended to be less creative in this area. And this difference in where networks focus their energies in the two countries does much to explain why the Japanese have over the long run been so successful in commercially producing and marketing products that the Americans first developed.

Similarly in Europe, producers of more traditional products (automob-
biles, ceramics, textiles, furniture, machine tools, shoes) are embedded in a rich infrastructure consisting of training institutes, business associations, and local and regional governments (Schmitter and Streeck 1981; Piore and Sabel 1984). And it is from this cooperative environment that diversified high-quality production has emerged in these European industries. One reason why American firms in these industries have not been highly competitive in recent decades – at least internationally – is because of the weakness of obligational networks embedded in a rich institutional environment of promotional networks.

Finally, there is one other aspect of American obligational networks in high-tech industries that deserves mention. Because of the flexible external labor market in the United States, it is very difficult for American firms to keep knowledge proprietary. The moving of personnel from one organization to another undoubtedly facilitates communication, creativity, and the development of new products. But it also tends to limit the ability of individual firms to focus all of their talents on the long-term development of particular products once they come into existence, whereas the rigid external labor market in Japan and Germany permits firms in these countries to focus enormous energy on the improvement and refinement of products.

This brief comparison of networking in the Japanese, European, and American environments suggests that despite the utility of our concept of obligational networks, there are different types of obligational networks, and they may be concentrated primarily at the research-and-development stage of new products or at the production stages or both, and they may or may not be deeply embedded in a set of promotional networks. All of this variation in national arrangements leads to different performance consequences following from the emphasis of the network.

CONCLUDING OBSERVATIONS

Historically, there has been much greater variability in the coordination of manufacturing sectors in the United States than in Japan, Germany, or the smaller democracies of Europe. The greater variability in the American case results from several factors, chief among them: (1) The United States has a very complex economy, much more complex than any other advanced capitalist society, with many more manufacturing sectors to be coordinated. (2) The United States is much larger – both in space and population – than any other advanced capitalist country, with very heterogeneous sectors. And because there is considerable heterogeneity of interests within sectors, it has historically been more difficult for firms to engage in collective action to develop effective associative structures for the governance of their sectors. If there are large numbers of firms in industries but weak associative structures – as in the United States – there is more variability in the co
ordination of industries than in countries that have extremely well-developed systems of associations. (3) Because the United States became a highly industrialized society much earlier than most other capitalist societies, it has a mixture of earlier forms of coordination and new forms of coordination that have emerged since the Second World War. (4) More than in most countries, there are sectors at many different stages of the product life cycle — and variation in product life cycle leads to differences in coordinating styles. Some sectors are always growing or declining more rapidly than others. Because the United States industrialized relatively early and over a long period of time, because of the American tendency to be inventive in the development of new industries, and because of the complexity of the American economy, there tend to be more industries at different stages of the life cycle than is the case in most countries. In American history, there have been institutional forms for the coordination and governance of multiple economic sectors at different points in time. Thus, batches of sectors — branches of the economy — have similar competitive and cooperative arrangements. But some of the variability in governance of different branches of the economy occurs because industries developed and coordinating arrangements emerged at different times. In other words, part of the variation in the coordination of the same industries across countries results because institutional arrangements for coordinating specific industries developed at different times.

Taking a long-term perspective on the governance mechanisms used in American manufacturing, one sees truly effective forms of coordination of a collective nature for only brief periods. Monitoring as a form of coordination has been relatively uncommon, and promotional networks have been even less conspicuous, but most prominent in manufacturing industries that address the military and health needs of the society and that involve products that are very costly and with complex and rapidly changing technologies.

In contrast to most advanced capitalist countries, the distinctive feature of collective governance in the American case is its weakness of associative institutional arrangements (Galambos 1966; Hawley 1966; Schmitter and Streeck 1981; Hollingsworth and Lindberg 1985; Schneiberg and Hollingsworth 1989). A variable of considerable importance in shaping the associative structure of an industry is the degree to which the country has historically been dependent on foreign trade. Political elites in countries heavily dependent on foreign trade encourage firms to develop strong associational structures in order to cooperate in competing internationally, whereas countries less dependent on foreign trade tend to be less tolerant of associations, seeing them as institutions that retard change and grant monopolistic status to firms. It is in this context that antitrust legislation emerged more strongly in the United States than in most other capitalist societies. And, in recent years, as foreign trade has become more important
in the overall American economy, there is evidence that the rigidity of antitrust enforcement is being moderated.

Countries with strong associative structures tend to have firms that cooperate not only with competitors, but also with suppliers and distributors in long-term stable networks (Schaeiberg and Hollingsworth 1989). On the other hand, where associations are more weakly structured — as in the United States — coordination through markets and hierarchies has historically been more pervasive. In the past forty years, however, there has been very substantial decline in the importance of the hierarchical form of coordination. Obligational networks, in numerous varieties, have become more prominent. Through joint ventures and strategic alliances, they may offer the prospect of economic coordination at a global level, especially when markets are volatile and technology is unstable (Porter 1986).

In assessing the relative roles of corporate hierarchies and networks in the United States, several points should be noted. First, since stable, homogeneous markets remain for many products that have technologies with low levels of complexity, hierarchical forms of coordination remain in many industries. "Dis-integration" may be occurring, but hierarchical forms of coordination are still widespread in American manufacturing. Paper products, breakfast cereals, soft drinks, bug sprays, floor wax, deodorants, soaps, shaving cream, and hundreds of other products remain, symbolic of the familiar hierarchical form of corporate America. The mass markets to which these products are directed seem quite stable and unsaturated, ready for products manufactured by semiskilled workers and distributed by general-purpose firms.

Second, the ability of the United States to move rapidly toward more network forms of coordination is drastically limited by prevailing practices of industrial relations. The type of industrial relations that facilitates diversified and high-quality production strategies is one in which workers have broad levels of skills and some form of assurance that they will not be dismissed from their jobs. Indeed, job security or other arrangements that assure long-term employment tend to be necessary for employers to have sufficient incentives to make long-term investments in developing the skills of their workers. And this type of incentive and skill system has become much more widespread in Japan, West Germany, and Sweden than in the United States (Aoki 1988; Hyman and Streeck 1988). In the United States, manufacturing employment has tended to be much more job-specific, workers have been less broadly trained, internal labor markets have been more rigid, and employers have had much less incentive to invest in their workers' skill development. Because the United States has a very flexible external job market, it is much easier for American workers to leave jobs for other firms than is the case in countries where workers have long-term job security. This also provides disincentives for Ameri
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employers to invest in worker training. Firms with semiskilled work forces have little capacity to be substantially involved in flexible production arrangements coordinated by obligational networks.

Third, the associational system of a country influences both its industrial relations system and its ability to engage in obligational networks. Where there is a well-developed associational system, firms have greater capacity to enter into collective agreements with their competitors so as not to poach one another's workers, in effect creating more rigid external labor markets. But this in turn encourages firms to develop more flexible internal labor markets, to invest in the skills of their employees, to develop more flexible forms of production and more pervasive forms of obligational networks, and to produce higher-quality products. Thus, countries with firms tightly integrated into highly institutionalized systems of business associations (e.g., Japan and Germany) have rather rigid external labor markets but flexible internal labor markets, whereas countries (the United States) with weak associative structures tend to have more flexible external labor markets but more rigid internal labor markets.

Fourth, the capital markets in the United States have placed constraints on the development of broad employee skills. The kinds of capital markets that have emerged in the United States have encouraged firms to engage in short-term maximization of profits. On the other hand, large firms in Japan and Germany have relied more on bank loans and/or cross-firm ownership as a major source of capital because of the lack of a well-developed bond and stock market such as that which developed in the United States (Zysman 1983; Aoki 1988). The short-term profit horizon of many American corporations has been very much due to their high dependency on very liquid equity markets, combined with the fact that American banks have been disinclined to provide long-term, low-interest loans. This kind of emphasis on a short-term horizon has placed constraints on the development of long-term stable relations between employers and their employees – a prerequisite for a highly skilled and broadly trained work force.

Fifth, as technology in sectors of advanced capitalist societies becomes increasingly complex, changes more rapidly, and becomes more expensive, actors in these sectors are increasingly finding that obligational networks are an effective form of coordinating and transacting with each other. But to maximize their effectiveness as governance arrangements, obligational networks need to be embedded in a rich institutional environment involving various forms of collective behavior. However, American firms with obligational networks as a major form of coordination are very weakly embedded in institutional arrangements of a collective nature. On the other hand, their Japanese and German competitors not only rely on obligational networks as a dominant form of coordination, but they are embedded in a
rich institutional environment (Aoki 1988; Hyman and Streeck 1988). And it is for this reason that they are likely to continue outperforming their American competitors.

On the other hand, there is some convergence in the coordinating styles of American firms with those in Japan and West Germany. Indeed, the term "Japanization" has become increasingly common—a term used to describe the attempts by non-Japanese firms to emulate Japanese practices and to describe the process and impact of Japanese direct investment in the United States. In recent years, Japanese manufacturers have gradually increased their presence in the United States for a variety of reasons: the upward valuation of the yen, the threat of protectionism, the competition of new industrializing countries, and a response to their competitive struggle against rivals in Japan. Eight Japanese auto makers have either completed or are in the process of making plans to produce cars in North America. Even the large American automakers now purchase large quantities of their parts from Japanese component manufacturers. Most Japanese manufacturers that have located in the United States originally had considerable skepticism about the capability of American suppliers to provide quality products. However, there is increasing evidence that slowly though often with great pain—American firms are succeeding in meeting Japanese requirements, and are thus entering into long-term, stable relationships—e.g., obliged networks—with Japanese firms. In many instances, this interaction with Japanese firms is having a major effect in changing management and production styles of American firms. Meantime, some Japanese component manufacturers are also locating in the United States. However, the Japanese emphasis on long-term, stable relationships among firms, long-term employment within firms, heavy emphasis on providing workers with broad skills, and a reward system based on seniority has not become dominant within many manufacturing sectors of the American economy. Nevertheless, diversified quality production practices and obligatory network forms of coordination are becoming somewhat infectious in the United States, especially in those industries in which the Japanese are highly successful.

As one would expect, these practices have been far more successful in Japanese owned and managed firms than in American owned and managed firms (Oliver and Wilkinson 1988: 132–4). In response to Japanese competition, American management has often engaged in cost-cutting elements of just-in-time and total quality principles (see Chapter 7 on the automobile industry in this volume). Because American manufacturing firms remain embedded in a culture in which the business horizons are of a short-term nature, however, they have not engaged in extensive investments in the education and training of their employees. And this poses a fundamental problem for American owned firms, for as long as they are situated in an environment with flexible external labor markets, employers are fearful
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that if they make long-term investments in their workers, other firms may hire them away. With the business associative structure and various aspects of promotional networks very weak in older industries, it is very difficult to develop and implement a new set of rules that will facilitate the implementation of the kind of internal and external labor markets that are essential for high-level performance among firms engaged in obligational networks.

On the other hand, there are American firms that are excellently managed, that do have flexible internal labor markets, that invest in the long-term development of their employees, that make serious efforts to engage in systems of diversified quality production, and that are intricately linked into both obligational and promotional networks. For the most part, these are firms in industries that are relatively new, in which the technology is quite complex and changes very rapidly, and in which the product technology is heavily based on principles of basic science. Examples include firms in computer or computer-related, biotechnology, aerospace, and numerous defense-related industries. Most firms in these sectors never had an industrial relations system that was heavily dominated by a system of standardized mass production. These industries have tended to be very research- and growth-oriented, and because of the profitability of their firms, layoffs of employees – by American standards – have been less common. As a result, firms in these sectors have been willing to invest in their employees’ future, and, in turn, employees have tended to develop strong loyalties toward their company.

Despite the revolution in communications and transportation and increased competitiveness in the world’s economy, there remains considerable variation in the way that manufacturing sectors are coordinated in the United States. Much of this variation is due to political, social, and economic institutional arrangements that emerged at earlier moments in time and that have acquired considerable legitimacy. Because the legacy of the past very much influences the way that sectors are coordinated in the contemporary world, and because these traditional institutional arrangements are so intertwined, governance and coordinating mechanisms are likely to diverge among American manufacturing sectors long into the future.

Even so, it should now be quite apparent to the reader that many sectors of the American economy emerged from a market-oriented form of coordination to what has popularly been called Fordist in the late nineteenth and early twentieth century. However, due largely to international competition and changes in technology, a transformation to a post-Fordist system has been slowly emerging. The Fordist system was heavily based on the principles of mass standardized production, whereas the post-Fordist is shaped by the principles of diversified quality production. Empirically, the two types of production do not exist in pure form, but there are a
Table 2.1. A typology of Fordist system of mass production and post-Fordist system of diversified quality production

<table>
<thead>
<tr>
<th>Variables</th>
<th>Fordist system</th>
<th>Post-Fordist system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size and nature of the market</td>
<td>Large homogeneous markets, with competition based very much on price</td>
<td>Smaller markets; more heterogeneous tastes with competition based very much on quality</td>
</tr>
<tr>
<td>Technology of the product</td>
<td>Stable and slow to change; not highly complex. Products produced in large volume</td>
<td>Rapidly changing and highly complex. Products produced in small batches</td>
</tr>
</tbody>
</table>

*Organizational characteristics of firms*

| Chain of production                    | Tendency for production to be vertically integrated | Vertical disintegration, with various types of obligational networks linking various actors together. Subcontracting, cooperative contracting among small firms, joint ventures, and strategic alliances are common |
| Work skills                            | Narrowly defined and very specific in nature        | Well-trained, highly flexible, and broadly skilled work force |
| Labor-management relations             | Low trust between labor and management. Poor communication but hierarchical in nature | High degree of trust |
| Internal labor market                  | Rigid                                               | Flexible |
| Centralization                         | Very hierarchical and semiauthoritarian             | Decentralized, consensual, and participatory-type organization |
| Production equipment                   | Product-specific machines                           | General-purpose machines |
| Work security                          | Relatively poor security except due to considerable class conflict | Long-term employment, relatively high job security |
| Investment in work skills by firm      | Low                                                 | High |
Table 2.1 (continued)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Fordist system</th>
<th>Post-Fordist system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conception of property</td>
<td>High degree of consciousness of property rights</td>
<td>Lower level of consciousness of property rights</td>
</tr>
<tr>
<td>Environmental structures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship with other</td>
<td>Highly conflictual, rather impoverished institutional environment</td>
<td>Highly cooperative relationships with suppliers, customers, and competitors in a very rich institutional environment</td>
</tr>
<tr>
<td>firms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collective action with</td>
<td>Trade associations poorly developed and where existent are lacking in power to discipline members</td>
<td>Trade associations highly developed with capacity to govern industry and to discipline members</td>
</tr>
<tr>
<td>competitors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modes of capital</td>
<td>Capital markets well developed; equities are highly liquid, frequently traded</td>
<td>Capital markets are less well developed, strong bank-firm links, extensive cross-firm ownership, long-term ownership of equities</td>
</tr>
<tr>
<td>formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antitrust legislation</td>
<td>Designed to weaken cartels and various forms of collective action</td>
<td>More tolerant of various forms of collective action</td>
</tr>
<tr>
<td>Institutional training</td>
<td>Public education emphasizing very low levels of skills</td>
<td>Greater likelihood of strong apprenticeship programs linking vocational schools and firms</td>
</tr>
<tr>
<td>facilities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A number of interacting contextual variables that give rise to these types, and Table 2.1 describes the variation of these variables in the two types. And it is these variables on which much of the preceding analysis has been based. As the analysis has demonstrated, however, elements of these two types often exist side by side during the same period in a nation's history — but generally one type is more dominant than the other and there is often strong tension between the two types in the history of any single sector.