Beyond Markets and Hierarchies: Toward a New Synthesis of American Business History

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IN THIS ESSAY, we offer a new synthesis of American business history that aims to replace, but also subsume, the dominant Chandlerian framework.[1] Writing in the mid-1970s, Alfred D. Chandler, Jr., attributed the success of the U.S. economy in the twentieth century to the rise of large, vertically integrated, managerially directed enterprises in the nation's most important industries. These enterprises, Chandler argued, were dramatically more efficient than the small, family-owned and managed firms that previously had characterized the economy. Where small firms were dependent on the market to coordinate their purchases of raw materials and the sale of their output, large firms took on these supply and marketing functions themselves, using hierarchies of salaried managers to coordinate them administratively. This visible hand of management, Chandler claimed, represented such a vast improvement over the invisible hand of the market that firms that developed these capabilities were able not only to dominate their own industries but to diversify into other sectors of the economy and attain positions of power there as well.[2]

From the perspective of the early twenty-first century, these kinds of large-scale

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[1] This effort at synthesis grows out of a series of conferences we organized at the National Bureau of Economic Research. For the revised proceedings, see Peter Temin, ed., *Inside the Business Enterprise: Historical Perspectives on the Transformation and Use of Information* (Chicago, 1992); Naomi R. Lamoreaux and Daniel M. G. Raff, eds., *Coordination and Information: Historical Perspectives on the Organization of Enterprise* (Chicago, 1995); and Lamoreaux, Raff, and Temin, eds., *Learning by Doing in Organizations, Markets, and Nations* (Chicago, 1999).

[2] See especially Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, 1977); but also *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, 1990). For a review of Chandler's approach and the criticism that has mounted against it, see Richard R. John, "Elaborations, Revisions, Dissents: Alfred D. Chander, Jr.'s, *The Visible Hand*

enterprises no longer seem so imposing. Indeed, by the 1980s, classic Chandlerian firms frequently were being outperformed, even in their core businesses, by more specialized, vertically disintegrated rivals. At the very least, then, our synthesis must modify Chandler's framework in order to take these recent developments into account. But we aim to do more than that—to provide an alternative methodology for writing business history that avoids the tendency (exemplified by Chandler but also generally characteristic of the field) to view the present as the final stage in an evolutionary process and thus, effectively, the end point of business history. With this goal in mind, we move beyond the simple markets versus hierarchies dichotomy that undergirds Chandler's analysis to focus attention on the broad range of techniques that businesspeople have developed over time to coordinate their activities. Drawing on recent economic theory, we array these mechanisms along a one-dimensional analytical scale and offer some generalizations about their relative advantages and disadvantages under different sets of circumstances. We then describe the uses to which these devices have been put over the course of American history, emphasizing both the diversity of the mechanisms in operation at any given time and the heterogeneous ways in which they have been adapted to changing economic circumstances.

Although in hindsight there appears to have been a clear economic logic to the pattern of successful and unsuccessful adaptations, we argue that there was nothing predetermined about these outcomes. The advantage of our focus on heterogeneity—on the multiplicity of ways in which businesses have responded to change—is that it enables us to maintain a dual perspective through which we can both elucidate the economic logic of the choices that were made and, at the same time, retain a sense of their contingency.[3] In the end, this dual perspective allows us not only to explain why Chandlerian enterprises suffered declining fortunes in the late twentieth century but also to situate the "New Economy" firms of that period in the broader sweep of history—a history whose patterns can be understood retrospectively but which is still unfolding in ways that are by no means clear.

CHANDLER'S STARTING POINT was the observation that technological change had made it possible by the late nineteenth century for firms in some sectors of the economy to reap substantial economies of scale. He reasoned that firms had to do more than simply build large factories to achieve these lower unit costs. They also had to keep their plants operating consistently at high levels of capacity utilization and, therefore, had to ensure both that shortfalls in supply did not disrupt their

after Twenty Years," *Business History Review* 71 (Summer 1997): 151–200. In the same issue of that journal, see also Louis Galambos, "Four Paths into the Third Industrial Revolution," 287–90.

[3] It is this dual perspective that most strikingly differentiates our approach from two recent attempts at synthesis with which we otherwise have a great deal of sympathy: Richard N. Langlois, "The Vanishing Hand: The Changing Dynamics of Industrial Capitalism," *Industrial and Corporate Change* 12 (April 2003): 351–85, which takes recent experience as the culmination of a process of economic evolution; and Charles F. Sabel and Jonathan Zeitlin, "Stories, Strategies, Structures: Rethinking Historical Alternatives to Mass Production," in *World of Possibilities: Flexibility and Mass Production in Western Industrialization*, Sabel and Zeitlin, eds. (Cambridge, 1997), which obscures the regularities in past experience.

production processes and that output did not pile up in their warehouses unsold. The solution, as Chandler saw it, was for firms to bring these supply and distribution activities under their direct control by integrating backward into raw-material production and forward into marketing and by building a managerial hierarchy capable of coordinating the flow of inputs and outputs from raw material to final sale.[4]

Chandler claimed that firms that took these steps improved on the workings of the market, captured the resulting gains in efficiency, and reaped enormous competitive advantages. The only firms capable of competing against them, he argued, were those that successfully duplicated their vertically integrated structures and managerial hierarchies. Because relatively few firms could raise the enormous amounts of capital required, these industries quickly took on oligopolistic structures. Moreover, because large firms could exploit economies of scope as well as of scale by diversifying their operations into other industries, as time went on they wielded their managerial authority over an increasing share of the economy.[5]

When *The Visible Hand* was first published in 1977, Chandler's synthesis represented an extraordinary achievement. It provided a compelling alternative to the robber-baron view of big business that still figured prominently in the literature. It also offered business historians for the first time a framework that made sense of the many (often antiquarian) histories of individual firms and industries that up to that point largely constituted the field. Most significantly, it focused attention on a central economic problem—understanding the dramatic change that had occurred in the organization of manufacturing and distribution—and drew out the implications of this change for the structure of the American economy and for the place of the United States in the larger world.

Chandler's synthesis was largely descriptive, however; and the lack of an underlying theory of organizational change made it difficult for him to explain the erosion that occurred in the position of these giant firms by the late twentieth century.[6] Fortunately, other scholars, most notably Oliver Williamson, had already recognized the need to fit Chandler's narrative into a broader theory of the firm. Williamson's starting point was a seminal 1937 essay by Ronald Coase positing that some kinds of economic activity occur within firms rather than in the market because in that way businesspeople can lower their transaction costs. Building on Coase's basic insight, Williamson argued that transaction costs arise for two related reasons.[7] First, economic actors have only imperfect information to guide their behavior. Second, what information they do possess is typically asymmetric—that is,

[4] See Chandler, *Visible Hand*.

[5] Chandler, *Visible Hand*; and *Scale and Scope*.

[6] In his one sustained (but again essentially descriptive) attempt to confront this problem, Chandler argued that some large firms made the mistake of overdiversifying during the 1960s and 1970s and that their subsequent problems were a necessary correction. See Alfred D. Chandler, Jr., "The Competitive Performance of U.S. Industrial Enterprises since the Second World War," *Business History Review* 68 (Spring 1994): 1–72.

[7] Ronald Coase, "The Nature of the Firm," *Economica* 4 (November 1937): 386–405. For the original version of Oliver Williamson's transaction-cost theory, see *Markets and Hierarchies: Analysis and Antitrust Implications: A Study of the Economics of Internal Organization* (New York, 1975). Williamson applied this theory to Chandler's narrative in "The Modern Corporation: Origins, Evolution, Attributes," *Journal of Economic Literature* 19 (December 1981): 1537–68. He later refined and extended his transaction-cost theory in *The Economic Institutions of Capitalism* (New York, 1995).

people know more about their own capabilities and circumstances than they know about those of the parties they transact with. As Williamson pointed out, the existence of such asymmetries makes it possible for economic actors to take advantage of one another, to extract more benefit from an exchange than they would otherwise receive if each had the same information. In the absence of any organization or institution to temper this advantage, he argued, the fear that one party to a transaction might exploit the other was likely to restrict severely the scope of exchange, or even jeopardize it altogether. In his view, the large, vertically integrated firm rose to such a dominant position because it was able, by expanding its boundaries and substituting managerial coordination for market exchange, to resolve the serious information problems that plagued manufacturers and their suppliers, as well as manufacturers and their distributors. But Williamson's theory left open the possibility that change in the economic environment could affect the level of these transaction costs, and thus the relative advantages and disadvantages of managerial coordination.

In the analysis that follows, we retain Williamson's core assumption that imperfect information creates the potential for exploitation whenever goods or services are exchanged, but argue that economic actors have attempted to resolve these problems in a wide variety of ways.[8] For expository convenience, we array these methods (which we call coordination mechanisms) along a one-dimensional scale according to the permanence of the resulting relationships between the transacting parties. At the left-hand extreme of the scale is pure market exchange—one-shot transactions based on price in which there is no ongoing connection between the parties. At the right-hand extreme is pure hierarchy—a permanent, or at least very long-lived, command relationship in which superiors issue orders to subordinates (obvious examples include rank-and-file soldiers and slaves), who face draconian punishment for non-compliance. As one moves rightward on the scale from pure market exchange, parties may deal with each other more than once and so have an incentive to behave in ways that encourage repeat business. As one moves leftward on the scale from pure hierarchy, parties increasingly have the ability to exit from arrangements they deem disadvantageous. In the middle of these two extremes are long-term relationships—that is, transactions among otherwise independent economic actors in which the parties voluntarily choose to continue dealing with each other for significant periods of time. It is a central claim of this article that this intermediate form is distinctive and common enough to be identified as a third major type of coordination mechanism.[9]

Each of these three types of coordination mechanisms does certain things well but not others. Moreover, their relative advantages and disadvantages may shift as

[8] Although Williamson, like Chandler, focused in his work on the dichotomy between markets and hierarchies, he recognized the possibility of intermediate, "hybrid" forms of organization. See Oliver Williamson, "Comparative Economic Organization: The Analysis of Discrete Structural Alternatives," *Administrative Science Quarterly* 36 (June 1991): 269–96.

[9] On this point, see Walter W. Powell, "Neither Market nor Hierarchy: Network Forms of Organization," *Research in Organizational Behavior* 12 (1990): 295–336. Our one-dimensional model arrays these coordination mechanisms in the simplest possible way. A more complicated, two-dimensional schema might distinguish frequency of interaction from ownership structure and thus treat long-run relationships, as Powell does, as a distinct organizational category rather than as an intermediate form.

a result of changes in the economic environment that affect the parties' access to information. The benefits of arm's-length (market) transactions as a form of coordination, for example, lie chiefly in their usefulness in minimizing costs. These benefits may be easy to reap when both sellers and buyers are located in close proximity and buyers can examine wares in advance of purchase. But sellers may be tempted to foist goods of substandard quality on buyers who are located far away. Because in a pure market setting there is no expectation of a repeat interaction, buyers are unable to punish such behavior by refusing to deal with the seller a second time.[10] For similar reasons, a buyer cannot punish a supplier who fails to deliver goods in a timely fashion, or even determine reliably whether the supplier has misbehaved or simply experienced unavoidable delays.[11]

The advantage of hierarchical coordination lies in its potential to eliminate these kinds of problems by internalizing and thus more firmly controlling both the quality of goods and the timing of their delivery. For hierarchies to work well as coordination mechanisms, however, the directives issued by superiors must be obeyed. Subordinates may not want to follow orders that they do not perceive to be in their interests. Or they may have their own ideas about what to do. If the organization is large or if the contributions of individual workers are difficult to distinguish from those of their fellow employees, superiors may have only an imperfect knowledge of what their subordinates are doing and may not be able to detect and punish deviations. Subordinates, therefore, may be able to exploit this "principal-agent" problem to engage in behaviors that are contrary to the wishes of their superiors.[12]

Long-term relationships are sometimes superior to both markets and hierarchies.[13] In the former case, buyers seeking to ensure that goods are of desired quality may prefer to give their business to suppliers with whom they have dealt satisfactorily in the past, even when it is possible to obtain superficially similar goods more cheaply on the spot market. For analogous reasons, suppliers may find it advantageous to incur the extra expense needed to build a reputation for quality. At the opposite end of our spectrum, superiors in hierarchies may prefer to conduct certain kinds of economic activities through long-term relationships that they could

[10] Similar problems arise when all potential buyers find it difficult to ascertain quality. See George Akerlof, "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics* 85 (August 1970): 488–500. The 2001 Nobel Prize in Economics was awarded for this and other pioneering work along similar lines.

[11] For a related example, see Thomas N. Hubbard, "Contractual Form and Market Thickness in Trucking," *Rand Journal of Economics* 32 (Summer 2001): 369–86.

[12] See Herbert Simon, "A Formal Theory of the Employment Relationship," *Econometrica* 19 (July 1951): 293–305; and J. W. Pratt and R. Zeckhauser, eds., *Principals and Agents* (Boston, 1985). See also Mark Granovetter, "Economic Action and Social Structure: The Problem of Imbeddedness," *American Journal of Sociology* 19 (November 1985): 481–510. Even organizations as highly disciplined as the military can be affected by such problems, as suggested by Wellington's lament that "nobody in the British Army ever reads a regulation or an order as if it were to be a guide for his conduct, or in any manner other than as an amusing novel." Quoted in Elie Halévy, *England in 1815* (New York, 1961), 85.

[13] See Robert Gibbons, "Firms (and Other Relationships)," in Paul DiMaggio, ed., *The Twenty-First Century Firm: Changing Economic Organization in International Perspective* (Princeton, N.J., 2001), 186–99; and, for a more formal model, George Baker, Robert Gibbons, and Kevin J. Murphy, "Relational Contracts and the Theory of the Firm," *Quarterly Journal of Economics* 117 (February 2002): 39–83.

conceivably have carried out internally, the advantage being the constraints on opportunistic behavior that result from the parties' mutual need to build and maintain trust. Such outsourcing may be a particularly valuable strategy where there is a great deal of uncertainty about the direction of technological change and both parties can benefit from the pooling of information and resources that trust makes possible. On the other hand, long-term relationships are by their nature somewhat isolated from pressures to reduce costs and improve efficiency. Moreover, it can be difficult to renegotiate the terms of a relationship in response to evolving economic conditions.

Coordination mechanisms from one part of our scale can sometimes be made more effective by combining them with devices from other parts. Under certain circumstances, problems of asymmetric information in markets can be reduced with a limited infusion of hierarchy (for example, by creating a regulatory authority to oversee exchanges), and problems in hierarchies can be mitigated by adding a component of market competition (as, for example, when plant managers are evaluated according to their relative ability to reduce unit costs). The threat of competition can be used in long-term relationships to keep costs under control. Similarly, the hierarchical ordering that occurs when one party is more powerful than another can make it easier to alter the terms of such a relationship in response to economic needs.

The extent to which particular coordination mechanisms (or combinations of them) effectively solve problems of asymmetric information also depends on the institutional environment, which (following Douglass North) we define broadly to include not only formal rules (such as laws) and the various procedures used to enforce them but also moral and ethical norms.[14] Thus markets, and also long-term relationships, may work better in situations where buyers and sellers are members of the same religious or ethnic group. Similarly, subordinates in hierarchies may be more likely to respond positively to instructions if their superior's authority is legitimated by broader cultural values, whether meritocratic or ascriptive. In addition, the extent to which the legal system efficiently punishes violations of contract can affect the utility of markets relative to long-term relationships and hierarchies, both of which can serve as substitutes for effective contract enforcement.[15]

The upshot of the preceding theoretical discussion is that there is likely to be a diversity of coordination mechanisms at work in the economy at any given time. In the first place, the advantages of one type of mechanism relative to others are likely to differ across industries. (In some cases, for example, price will be a more important attribute of a transaction than quality, while in others quality will matter more.) Second, the kinds of information problems that firms face are likely to vary with the number and types of enterprises in an industry and with their degree of geographic dispersion. Furthermore, within industries, there is likely to be signif-

[14] Douglass C. North, *Structure and Change in Economic History* (New York, 1981), 201–02.

[15] See, for example, Avner Greif, "Self-Enforcing Systems and Economic Growth: Late Medieval Genoa," in *Analytic Narratives*, Robert H. Bates, *et al.*, eds. (Princeton, N.J., 1998), 23–63; and Greif, "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies," in *The New Institutionalism in Sociology*, Mary C. Brinton and Victor Nee, eds. (New York, 1998), 77–104.

icant variation across countries, or even regions, because differences in the institutional and cultural environment will affect the relative effectiveness of the main types of coordination mechanisms.

The preceding discussion also suggests that coordination mechanisms that successfully mitigate problems of asymmetric information in one period may not operate as effectively when economic conditions or institutional environments change. In such circumstances, continuing economic success requires that businesses modify their organizations to fit the new circumstances they face. But they must do so in the context of a great deal of uncertainty about the future direction of change. Because of this uncertainty and the difficulty of completely remaking existing organizations and relationships, the solutions that economic actors adopt will be affected to some extent by what they have done in the past.[16] Some may try to innovate—that is, experiment creatively with entirely new types of solutions. But most are likely to imitate arrangements that seem to be working successfully in other sectors of the economy or in their own industry in other locations. As a result, certain coordination mechanisms may experience surges of popularity—temporary periods of dominance—that can tempt historians to view them as culminations of some kind of relentless economic logic. By emphasizing instead the interplay between historical circumstances and the advantages and disadvantages of the different mechanisms used to coordinate economic activity, we can recapture the sense of contingency that the actors themselves experienced. Moreover, we can achieve this greater verisimilitude not by sacrificing theoretical rigor but by enhancing it.

BECAUSE STARTING POINTS affect the ways in which economic processes unfold, we begin our history of American business with a survey of the main coordination mechanisms in place at the beginning of the nineteenth century—before falling transportation and communication costs dramatically transformed the structure of the economy. The vast majority of the population was spread thinly across the countryside, organized into households that functioned as the main production units, and most exchange as a result was necessarily local. Within households, production was coordinated hierarchically. The father was the head of the household and, as such, responsible for training children, especially sons, for assigning them tasks, and also for disciplining them when they did not fulfill their duties.[17] The father represented the family's interests in the outside world, marketing most of its output and purchasing supplies that it could not produce for

[16] As this passage suggests, our approach owes much to the work of Richard R. Nelson and Sidney G. Winter; see esp. *An Evolutionary Theory of Economic Change* (Cambridge, Mass., 1982). See also Paul David, "Why Are Institutions the 'Carriers of History'? Path Dependence and the Evolution of Conventions, Organizations and Institutions," *Structural Change and Economic Dynamics* 5 (December 1994): 205–20.

[17] A more complete discussion would include a description of the mother's role as the household's second in command. She was supposed to be subservient to the father whenever he was present but had to be able to substitute for him and run the family enterprise in his absence. The mother also managed her own domain, which might include home manufactures and involve supervising girls in various production tasks as well as dealing independently with outside suppliers and purchasers. See Laurel Thatcher Ulrich, *Good Wives: Image and Reality in the Lives of Women in Northern New England,*

itself. He also controlled the distribution of the family's income and wealth and had full property rights to the labor of his minor children. Indeed, he could sell this labor to others if he did not wish to exploit it himself. Because the father spent most of his time in the household, he could easily detect and punish disobedience. Occasionally, a child ran away to escape the father's authority, but generally the rewards to be gained from staying in the household worked to prevent such acts of rebellion. At the same time, the affective bonds that formed between parents and children mitigated (and, of course, also reinforced) the hierarchical nature of patriarchal authority.[18]

Economic activity within shops and stores was an extension of that within families. Apprentices, journeymen, and clerks typically lived in the master's household and were subject to his discipline in the same way as children were. Their incentive to obey was somewhat different, however, as it depended on the future rewards to be earned by accumulating skill or knowledge in the business and the extent to which a good relationship with the master might help the young man get a start in his field. Clerks, for example, often moved into positions as junior partners after a period of training, and thus had a powerful motive to stay on their master's good side. In occupations where these kinds of future rewards were meager, where the amount of training required for technical mastery was modest, or where young men had other opportunities that did not require such a lengthy period of training, apprentices tended to run away. Thus in industries where technological change during the early nineteenth century reduced skill requirements, apprenticeship tended to decline, and a more impersonal labor market developed.[19]

Although activity within households, shops, and stores was coordinated hierarchically, interactions between these various economic units typically were mediated by more equal long-term relationships. When farmers did business with local storekeepers and craftsmen, they transacted with kinsmen or neighbors with whom they had close multidimensional relationships. The need to deal with each other repeatedly in a number of different contexts discouraged one party from taking advantage of another. In addition, a variety of customary practices governed these local transactions. Payment, for example, often took the form of book debt, which did not bear interest charges and was likely to be paid off over a long time through offsetting book credits. These credits might result from goods provided or services performed by the borrower. They might alternatively derive from exchange with third parties (also typically from the same local network) who were indebted on the

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1650–1750 (New York, 1982); and Ulrich, *A Midwife's Tale: The Life of Martha Ballard, Based on Her Diary, 1785–1812* (New York, 1990).

[18] See Robert A. Pollak, "A Transaction Cost Approach to Families and Households," *Journal of Economic Literature* 23 (June 1985): 581–608.

[19] Gillian Hamilton, "Enforcement in Apprenticeship Contracts: Were Runaways a Serious Problem? Evidence from Montreal," *Journal of Economic History* 55 (September 1995): 551–74; Bernard Elbaum, "Why Apprenticeship Persisted in Britain but Not in the United States," *Journal of Economic History* 49 (June 1989): 337–49; W. J. Rorabaugh, *The Craft Apprentice: From Franklin to the Machine Age in America* (New York, 1986); and Tristan Traviolia, "White Male Apprenticeship in the Early Republic," unpublished paper, 2000.

borrower's books. Borrowers were socially obligated to pay off their debts, but lenders similarly were obligated not to pressure those who owed them for goods.[20]

Households bought most goods that they could not make for themselves from local shopkeepers and artisans, but some of these products (mainly manufactures and agricultural commodities that could only be grown in other climates) came from far away. This long-distance exchange generally operated through networks built up by merchants in port cities—networks that incorporated both storekeepers in the countryside and merchants in other ports throughout the trading world. Because trade over long distances posed difficult principal-agent problems when transportation and communication costs were high, the earliest links among merchants in different locations were mainly familial. Agents who were family members were less likely to pursue their own interests at the expense of their principals because they would not want to risk their claim on familial resources. Other kinds of personal connections could also provide a basis for the creation of long-distance trading relationships. For example, members of minority religious groups, such as Quakers, often felt duties toward co-religionists, even those who were otherwise strangers, that they did not feel toward people of other faiths. Moreover, connections could be built up over time through letters of introduction and repeat dealing. A merchant might trust a trader recommended to him for a small amount and, if the outcome was within expectations, continue the relationship, gradually expanding both the amount and type of business transacted. The resulting business "friendship" brought with it social expectations that were in many ways similar to those between kinsmen and neighbors and helped ensure that the relationship would proceed according to terms acceptable to both parties.[21]

Merchants who invested in factories during this early period exploited these trading networks both to sell output and to process intermediate goods using the putting-out system. A good example is Almy & Brown, which in 1790 established the first successful cotton-spinning mill in the United States by combining the technical expertise of British mechanic Samuel Slater with the commercial know-how of Providence merchant Moses Brown. Almy & Brown sold some of their machine-spun thread on the market, making use of trading connections that the Brown family had painstakingly built up over the previous half century. The rest the firm put out to farm households to be woven into cloth, transforming the rural shopkeepers with whom the Browns had long done business into intermediaries who distributed the thread and collected the finished cloth. However, the enormous coordination problems that this system entailed (for example, unsupervised weavers

[20] Christopher Clark, *The Roots of Rural Capitalism: Western Massachusetts, 1780–1860* (Ithaca, N.Y., 1990), 21–38. These social conventions might break down, however, during periods of severe economic strain. For an example, see Thomas Stuart Allen, "Commerce, Credit and Community: The Transformation of Economic Relationships in Rhode Island, 1771–1850" (PhD dissertation, Brown University, 1994), 101–02.

[21] Bernard Bailyn, *The New England Merchants in the Seventeenth Century* (New York, 1955); David Hancock, *Citizens of the World: London Merchants and the Integration of the British Atlantic Community, 1735–1785* (Cambridge, 1995); Thomas M. Doerflinger, *A Vigorous Spirit of Enterprise: Merchants and Economic Development in Revolutionary Philadelphia* (New York, 1986), 47–62; T. H. Breen, *Tobacco Culture: The Mentality of the Great Tidewater Planters on the Eve of Revolution* (Princeton, N.J., 1985), 84–123. For a more general theoretical treatment, see Pollak, "Transaction Cost Approach"; and Yoram Ben-Porath, "The F-Connection: Families, Friends, and Firms and the Organization of Exchange," *Population and Development Review* 6 (March 1980): 1–30.

working in their homes turning out fabrics of vastly varying qualities) spurred manufacturers to reconcentrate production in factories as soon as technological innovation in the form of the power loom enabled them to expand capacity sufficiently.[22]

Within their factories, Almy & Brown and other early textile manufacturers initially attempted to coordinate their workers using traditional patriarchal means of control.[23] As factories grew larger, however, manufacturers experimented with other techniques, for example, investing in religious institutions that they hoped would inculcate in their workers the values of hard work and responsibility.[24] The growth in the size of their labor forces also spurred managers to develop new information systems that would enable them to monitor their workers' activities. Merchants involved in the putting-out system had used traditional commercial accounting systems designed to keep track of debits and credits, and these methods had been employed by early manufacturers as well. The managers of larger enterprises now began to modify their accounts to include production-expense reports that they used to evaluate both the efforts of individual workers and those who supervised them. In addition, they adapted the putting-out custom of paying by the piece to the new factory environment, creating an incentive for operatives to tend their machines diligently by making their income proportional to output.[25]

Even though transportation and communication systems were primitive at the beginning of the nineteenth century, the rural economy was productive and farmers relatively prosperous. Local shopkeepers stocked goods (supplied by merchants in port cities) for which there was a predictably steady demand—for example, the machine-made textiles that British and later New England factories were turning out increasingly cheaply. But shopkeepers could not afford to maintain inventories of goods, particularly expensive durable goods, for which there was only sporadic local demand, and this inability created an incentive for merchants to find new ways of tapping farmers' buying potential. One important innovation was to hire young men eager to escape the drudgery of farming as peddlers and send them wandering through the countryside with carts of merchandise.

[22] Barbara M. Tucker, *Samuel Slater and the Origins of the American Textile Industry, 1790–1860* (Ithaca, N.Y., 1984), 57–58, 104–05; Alison Wheeler, "The Forces of Industrialization and the Blackstone Manufacturing Company, 1808–1864" (Senior Honors Thesis, Brown University, 1991); Thomas Dublin, *Transforming Women's Work: New England Lives in the Industrial Revolution* (Ithaca, 1994), 37–48. For a theoretical treatment of the shift from putting-out to factory production, see Joel Mokyr, *The Gifts of Athena: Historical Origins of the Knowledge Economy* (Princeton, N.J., 2002), chap. 4.

[23] Tucker, *Samuel Slater*, 147–62; Teresa Anne Murphy, *Ten Hours' Labor: Religion, Reform, and Gender in Early New England* (Ithaca, N.Y., 1992), 9–31.

[24] Indeed, some scholars have argued that manufacturers encouraged the spread of evangelical Protestantism during this period in order to increase the discipline of their work forces. See, for example, Anthony F. C. Wallace, *Rockdale: The Growth of an American Village in the Early Industrial Revolution* (New York, 1971), 296–471; Tucker, *Samuel Slater*, 163–85; and Judith A. McGaw, *Most Wonderful Machine: Mechanization and Social Change in Berkshire Paper Making, 1801–1885* (Princeton, N.J., 1987), 81–88. Other scholars, however, have argued that religion could also play a subversive role. See Murphy, *Ten Hours' Labor*, 73–100.

[25] Steven Lubar, "Managerial Structure and Technological Style: The Lowell Mills, 1821–1880," *Business and Economic History* 13 (1984): 20–30; H. Thomas Johnson, "Early Cost Accounting for Internal Management Control: Lyman Mills in the 1850's," *Business History Review* 46 (Winter 1972): 466–74; Thomas Dublin, *Women at Work: The Transformation of Work and Community in Lowell, Massachusetts, 1826–1860* (New York, 1979), 66; see Tucker, *Samuel Slater*, 153, 204–06, 228–29.

Two lessons quickly became apparent from this innovation. The first was that there was indeed a broad rural market for consumer durables, if such items could be produced at a cost that brought them within range of the "middling sort" of farmer. Connecticut merchants Levi and Edward Porter attempted to capitalize on this lesson by contracting in 1807 with Eli Terry for the production of 4,000 inexpensive, wooden-movement clocks—more than a clockmaker using traditional techniques could make in an entire lifetime. Terry fulfilled the contract in the stipulated three years by figuring out how to simplify the clock's mechanisms and by developing special-purpose machinery that allowed him to produce the component parts in quantity. Thus the ability to distribute goods to a broad market of farmers stimulated technological change in the direction of "American-system" mass production.[26]

The second lesson was that there were serious agency problems associated with this means of distribution. Merchants had no way of ensuring that the peddlers they hired would treat expensive and delicate merchandise such as clocks with suitable care or that they would report accurately the prices at which they sold products to farmers. Similarly, farmers whose experience with manufactured goods was relatively limited had good reason to suspect that peddlers, whom they were likely never to see again, would misrepresent the quality of their wares or overcharge them for items they wished to purchase.[27] The experience of peddlers thus illustrates the difficulties associated with marketing goods over long distances in an economy where transportation and communications costs were high. In the absence of networks based on family, religion, or long-term association, exchange was difficult to conduct.

THE DRAMATIC FALL IN TRANSPORTATION AND COMMUNICATION COSTS achieved first by the innovations of the steamboat and canal and then by the railroad and telegraph was not sufficient to effect a market revolution in and of itself, however. Problems of asymmetric information still had to be solved, as the case of a basic commodity such as wheat vividly illustrates.[28] Farmers in the expanding agricultural regions of the Middle West initially shipped their wheat to market in essentially the same way as their forebears had—by packing it into sacks that then made the complete journey from farm gate to final market. As Chicago's hinterlands expanded with the construction of the railroad network, however, the costs associated with handling an ever-larger volume of shipments in this manner mounted, and by the 1850s merchants had begun to take the wheat out of sacks and pour it into grain elevators and railroad cars. As wheat from one farm became intermixed with, and therefore indistinguishable from, wheat from other farms, consumers could no longer use the reputation of a farmer as an assurance of quality. The Chicago Board of Trade attempted to grapple with this problem by dividing wheat on the market into three

[26] Donald R. Hoke, *Ingenious Yankees: The Rise of the American System of Manufactures in the Private Sector* (New York, 1990).

[27] See Joseph T. Rainer, "The 'Sharper' Image: Yankee Peddlers, Southern Consumers, and the Market Revolution," *Business and Economic History* 26 (Fall 1997): 27–44.

[28] This example is drawn from William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York, 1991), 104–19.

categories—white winter wheat, red winter wheat, and spring wheat—and measuring the grain by weight rather than volume. This remedy proved inadequate, however, because farmers no longer had any economic motive to bother to clean their wheat. To the contrary, the incentive structure encouraged farmers to adulterate their product with cheaper grains, or even with inedible materials that increased its weight and hence the payment they would receive at market. The result was a general fall in the price earned by the region's farmers. When the situation worsened during the hard times that followed the Panic of 1857, the Board of Trade finally worked out a solution by dividing the three categories of wheat into finer gradations based on quality (including "rejected" for wheat deemed highly inferior) and hiring inspectors with authority to enter storage elevators and ensure that merchants were adhering to the new standards.

As the case of wheat suggests, broad geographic markets did not emerge automatically as a result of falling transportation and communication costs. In order for long-distance trade to work effectively, the information problems associated with exchanging goods in quantity among actors physically remote from one another had to be solved. If the personal identity of the producer could no longer serve as an indicator of quality, new ways of setting and communicating standards had to be designed. The merchants of the Chicago Board of Trade quickly learned that it was not sufficient simply to articulate a grading system. Consumers would only accept the new standards as informative if some person or group with something at stake ensured that the grades accurately represented quality. What the Board of Trade had to do, in essence, was add an element of hierarchical enforcement to what was otherwise a relatively pure market exchange.

This was not the end of the story, however, because the addition of hierarchy had the further consequence of giving the Board of Trade, and the merchants associated with it, considerable market power over farmers. Because the higher the grade a farmer received for wheat, the higher the profits, the grading process was a lightening rod for agrarian discontent. As complaints mounted that operators of grain elevators were increasing their returns at farmers' expense by unfairly manipulating the grading process, the Illinois legislature stepped in and shifted responsibility for inspection to a new government body, the Railroad and Warehouse Commission. Hierarchical enforcement was still needed to make the market work, but it was now the domain of a more neutral authority.[29]

The particular combination of market and hierarchical coordination developed by the Chicago Board of Trade to facilitate trade in wheat worked well for commodities that could be sorted into standard grades with relative ease. But the marketing of more complex goods to remote consumers required different methods. One solution was the large wholesaling firm. These enterprises bypassed the networks of personal connections that earlier merchants had so painstakingly built up and instead opened offices throughout the country, constructing their own internal systems of purchasing and sales agents. Large wholesalers coordinated their employees hierarchically, creating a command structure in which lines of authority radiated from a national office to regional and local offices whose

[29] Cronon, *Nature's Metropolis*, 132–42.

managers were responsible for monitoring agents in their respective areas. Unlike textile distributors, who had typically operated on a commission basis, wholesalers took formal title to the goods they handled, often branding them with their own trademarks. By putting their own reputations on the line, they assumed responsibility for the quality of the goods they marketed.[30]

Consumers rarely purchased goods directly from wholesalers but instead from retailers, who in turn bought from wholesalers. The growth of cities during the late nineteenth century made it possible for new kinds of urban retailers, such as five-and-dimes and department stores (the largest of which were able to bypass wholesalers and create their own purchasing networks), to provide urban residents with a cornucopia of goods at both cheaper prices and guaranteed quality. Buyers for these large retailers began to take on the role, in Regina Blaszczyk's apt phrase, of "fashion intermediary" for the economy.[31] In the course of their jobs, they collected information about customers' tastes and communicated this knowledge to the wholesalers and manufacturers who supplied their stores. In this way, they helped ensure that manufacturers would make, and wholesalers would stock, the goods that consumers really wanted to buy. Moreover, because maintaining their relationship with these stores was so profitable, suppliers had good reason to meet the buyers' expectations about quality.

Tapping the consumption potential of America's large number of prosperous farmers depended on another innovation of the period—the catalog mail-order firm. First Montgomery Ward, and then Sears, Roebuck & Company, took advantage of the new national railroad network to create a distribution system that supplanted the itinerant peddlers of the previous period. They mailed rural Americans catalogs detailing a wide variety of merchandise, took orders by return post, and then shipped the goods to purchasers with a money-back guarantee. As in the case of urban retailers, their buyers served the dual function of communicating information about consumers' tastes to suppliers and enforcing standards of quality.

Although large wholesalers and retailers solved the problem of trading goods over long distances in volume by substituting hierarchical coordination for the networks and itinerant peddlers that earlier merchants had employed, their hierarchies were no more likely to work automatically than were markets. In order to live up to the promises they made to consumers and still earn a profit sufficient to attract and retain investors, they too had to overcome serious information problems. Sears, for example, had arranged initially for goods to be shipped directly to consumers from the factories in which they were made, but the firm found that it had to take charge of distribution itself in order to ensure that items arrived speedily and in good condition. To this end, it integrated backward and opened a massive new mail-order warehouse in Chicago in 1906. To confront the internal principal-agent problems that inevitably arose, Sears divided its warehouse into departments whose supervisors were linked to top company officials in a chain of command. At the same time, it created an incentive structure to keep these supervisors on their toes. Dispatchers assigned orders to particular shipping rooms

[30] Chandler, *Visible Hand*, 215–24.

[31] Regina Lee Blaszczyk, *Imagining Consumers: Design and Innovation from Wedgwood to Corning* (Baltimore, 2000).

as soon as they were received, and each department had fifteen minutes to deliver its items before the goods were packaged together and shipped out. Items that did not arrive in time had to be shipped separately at the expense of the supplying department. This cost of late delivery motivated supplying departments to maintain adequate inventories and to organize them so that products could be found quickly. It also provided top executives with a useful measure of the success with which subordinates were fulfilling their responsibilities.[32]

THE LARGE WHOLESALERS and retailers that emerged during the second half of the nineteenth century solved many of the information problems associated with long-distance commerce, but they also exercised considerable market power over the many small producers who depended on them for access to national markets. Small-scale manufacturers responded by attempting to improve their bargaining position vis-à-vis wholesalers. They were most likely to succeed where producers of similar goods clustered near each other in what are now known as "industrial districts."

Regardless of the reason firms initially located in such close proximity (access to markets or the availability of low-cost raw materials or other inputs), these concentrations often persisted because they attracted businesses that supplied complementary products or services and because the networks manufacturers formed among themselves and with related businesses became an important source of competitive advantage. Firms in such industrial districts tended to be smaller and more specialized than those in isolated locations. In the 1870s, for example, Philadelphia's textile sector included over 600 firms, most of which focused on a single step of the manufacturing process (such as spinning or weaving or dyeing) and contracted with other firms in order to fill orders for finished goods. This ability to join forces with a wide variety of other highly specialized producers enabled them to customize their products to meet the needs of specific buyers and also to respond flexibly to changes in style. Moreover, because participation in such multi-firm deals was vital to success, producers had an ongoing incentive to deal fairly with each other.[33]

Much like tradesmen in the early nineteenth century, businesspeople in these industrial communities interacted socially as well as economically, and the resulting multidimensional relationships facilitated cooperation for purposes besides production. Thus manufacturers were able to join together to develop new ways of marketing their goods that helped them both discipline wholesalers and sell directly to retailers. In Philadelphia, for example, textile manufacturers collectively built the

[32] Daniel M. G. Raff and Peter Temin, "Sears, Roebuck in the Twentieth Century: Competition, Complementarities, and the Problem of Wasting Assets," in Lamoreaux, Raff, and Temin, *Learning by Doing*, 221–25.

[33] See Philip Scranton, *Endless Novelty: Specialty Production and American Industrialization, 1865–1925* (Princeton, N.J., 1997); *Proprietary Capitalism: The Textile Manufacture at Philadelphia, 1800–1885* (New York, 1983); and *Figured Tapestry: Production, Markets, and Power in Philadelphia Textiles, 1885–1941* (New York, 1989). For a more theoretical treatment, see Michael J. Enright, "Organization and Coordination in Geographically Concentrated Industries," in Lamoreaux and Raff, *Coordination and Information*, 103–42.

"Bourse," a nine-story building that showcased the wares of hundreds of local firms in a central location convenient for buyers to visit. Similarly, furniture producers in Grand Rapids, Michigan, exploited market forces by organizing huge biannual expositions to sell their wares to the trade.[34]

The use of wholesalers to reach national markets could pose problems for large manufacturers as well as small. The solution in this case, as Chandler has argued, was for the firms to integrate forward into distribution and take responsibility for marketing their own goods. Such problems were particularly likely to arise in industries where firms produced complex machinery for a broad market (sewing machines, harvesters and other types of farm equipment, and later automobiles), where goods required special handling (dressed beef and other perishable foods), and where demand had to be built from scratch (as in the case of cigarettes, a new product in the late nineteenth century).[35] For instance, the Singer Sewing Machine Company found that consumers were reluctant to buy expensive items like sewing machines unless they had instruction in how to use them and also assurance that broken devices would be speedily and inexpensively repaired. Wholesalers generally handled goods from a variety of manufacturers and, as Williamson's transaction-cost analysis would predict, were unwilling to invest in these costly but (for Singer's profitability) necessary teaching and repair services. Hence Singer had to integrate vertically into distribution and take on these tasks itself. Beginning in the late 1850s, the company built a national system of sales offices, each staffed at minimum by a manager, a female demonstrator, a mechanic, and a salesman. These investments in distribution paid off in a growing stream of orders, forcing Singer to streamline its manufacturing process in order to deliver the machines in a timely fashion. In much the same way as Eli Terry had previously transformed the manufacture of clocks in order to fulfill his contract, Singer redesigned both its product and its production process along American-system lines, using special-purpose machine tools to turn out standardized parts that could be assembled with predominantly unskilled labor.[36]

As manufacturing firms expanded their boundaries and increased the scale of their production processes, they faced new difficulties coordinating their labor forces. It had been a relatively simple proposition to pay an employee in a small artisanal workshop, or even a laborer in a small factory, according to the value of his or her marginal revenue product (piece rates, for example, could be an effective way of gauging effort), but in large firms the value of an individual worker's marginal product might not be well defined or easy to measure, improvements in accounting practice notwithstanding. Moreover, such knowledge of employee performance as was obtainable by direct observation was effectively the property of foremen, whose interests might or might not be served by passing it on to superiors. Taylorism was in part an attempt to bypass foremen, secure direct information about the productivity levels that might reasonably be expected from workers, and create incentives for workers to perform up to their capabilities. Such individual

[34] See Scranton, *Endless Novelty*, for these and other examples. See also Blaszczyk, *Imagining Consumers*, 24–26.

[35] Chandler, *Visible Hand*, 287–314.

[36] David A. Hounshell, *From the American System to Mass Production, 1800–1932: The Development of Manufacturing Technology in the United States* (Baltimore, 1984), 67–123.

incentives could be counterproductive, however, in complex production situations that required team effort if employees did not all work at the same pace. Consequently, firms in such industries tended to shift away from individual toward group incentives.[37] In mass-production enterprises where machines controlled the pace of work—the Ford Motor Company's assembly lines, for example—it was much easier to identify workers who were slacking off or unable to keep up. Hence Ford was able to secure a high level of effort from its work force by paying generous wages and dismissing workers who could not make the grade.[38]

Cultural formations could also be used to control labor and, indeed, became especially important when workers attempted to counter the monopsony power of large-scale employers in the labor market by joining together in unions. At the most obvious level, firms might amass work forces whose ethnic or gender heterogeneity operated as a barrier to labor organization.[39] But racial or gender divisions could also be exploited to inculcate a sense of loyalty to the enterprise or encourage employees to work hard. Southern textile mills' refusal to hire African Americans aimed to give white workers a sense that they were privileged to work in unhealthy conditions at low wages.[40] For similar reasons, Henry Ford coded assembly-line work as masculine, deliberately refusing to hire women so that he could denigrate the manhood of employees who could not keep up with the line.[41] Moreover, by replicating in their organizations the ethnic, gender, and class structure of society, firms were able to make their hierarchies seem natural—as if those on top were destined to be there. These efforts were particularly effective when coupled with internal job ladders that gave workers evidence that hard work and loyalty would be rewarded, even if there were severe limits on the positions to which they could aspire.[42] Combined, as was often the case, with harassment of pro-union workers, such methods were generally successful in staving off organized labor. Only in the second quarter of the twentieth century, when the federal government began to force businesses to recognize unions and bargain with them in good faith, were

[37] The type of group compensation varied with the type of production. For example, firms like the Baldwin Locomotive Works that made custom-designed products tended to rely on inside contracting schemes, but firms that mass produced consumer goods like automobiles experimented with group piece rates. See John K. Brown, *The Baldwin Locomotive Works, 1831–1915: A Study in American Industrial Practice* (Baltimore, 1995), 115–19; Ernest J. Englander, "The Inside Contract System of Production and Organization: A Neglected Aspect of the History of the Firm," *Labor History* 28 (Fall 1987): 429–46; Daniel Nelson, *Managers and Workers: Origins of the New Factory System in the United States, 1880–1920* (Madison, Wis., 1975), 34–78; Nelson, "Industrial Engineering and the Industrial Enterprise, 1890–1940," in Lamoreaux and Raff, *Coordination and Information*, 35–50; Daniel M. G. Raff, "The Puzzling Profusion of Compensation Systems in the Interwar Automobile Industry," in Lamoreaux and Raff, *Coordination and Information*, 13–29.

[38] On Ford, see Daniel M. G. Raff, "Wage Determination Theory and the Five-Dollar Day at Ford," *Journal of Economic History* 48 (June 1988): 387–99. For a more general discussion of the use of "technical control," see Richard Edwards, *Contested Terrain: The Transformation of the Workplace in the Twentieth Century* (New York, 1979), 111–29.

[39] See, for an example, David Brody, *Steelworkers in America: The Nonunion Era* (Cambridge, Mass., 1960).

[40] David L. Carlton, *Mill and Town in South Carolina, 1880–1920* (Baton Rouge, La., 1982).

[41] Wayne A. Lewchuk, "Men and Monotony: Fraternalism as a Managerial Strategy at the Ford Motor Company," *Journal of Economic History* 53 (December 1993): 824–56.

[42] For examples, see Angel Kwolek-Folland, *Engendering Business: Men and Women in the Corporate Office, 1870–1930* (Baltimore, 1994); Walter Licht, *Working for the Railroad: The Organization of Work in the Nineteenth Century* (Princeton, N.J., 1983). See also Edwards, *Contested Terrain*, 130–62.

workers able to counter in any significant way the market power of large-scale manufacturers.

As the Philadelphia textile industry showed, one advantage of industrial districts was the flexibility with which producers could respond to customers' needs and changing tastes. The integration of mass distribution with mass production in large Chandlerian firms enabled producers to lower the cost of goods dramatically, but the tradeoff was a significant loss of flexibility. In the early twentieth century, for example, engineers at the Ford Motor Company designed an automobile with simple components that could be cheaply machined and then figured out how to manufacture the car on a mass scale by combining American-system technology with the assembly line. At that time, most automobile firms bought parts from independent suppliers, but Ford early on pursued a strategy of vertical integration in order to reduce costs and ensure a ready supply of parts that precisely fit its specifications. When the company moved from its Highland Park factory to the colossal River Rouge complex in Detroit, it pushed this strategy even further, producing not only parts but also most of the materials that went into them. Ford also invested in building a system capable of selling the cars that "the Rouge" could turn out in such large quantities. By single-mindedly pursuing this strategy of mass production and distribution, Ford successfully lowered the cost of automobiles to a point where their purchase price was within range of the majority of American consumers. The range of choices that the company offered its customers was extremely limited, however. Whether or not Henry Ford actually spoke the famous words that buyers "can have any color they want so long as it's black," the quote accurately captured the company's philosophy—to lower production costs through relentless standardization.[43]

Ford, of course, was an extreme case. In the 1920s, General Motors (GM) developed a platform system of production that gave its customers considerably more choice, but here too the company's drive to keep costs low by achieving long production runs severely constrained its ability to respond to the desires of different consumers and even to changes in taste over time. Forecasting the demand for various models and colors was a serious problem, and GM assiduously tracked dealer sales and also experimented with new techniques of market research. Inevitably, however, the need to make production decisions far in advance of actual sales meant that firms like GM increasingly resorted to advertising to shape buyers' tastes—that is, to make into objects of desire the highly standardized products required to capture economies of scale.[44]

[43] Hounshell, *From the American System to Mass Production*, 217–301; and David A. Hounshell, "Why Corporations Don't Learn Continuously: Waves of Innovation and Desperation at Ford Motor Company, 1903–1996," unpublished paper, 1996. See also Richard S. Tedlow, *New and Improved: The Story of Mass Marketing in America* (New York, 1990), 112–81.

[44] Daniel M. G. Raff, "Making Cars and Making Money in the Interwar Automobile Industry: Economies of Scale, Economies of Scope, and the Manufacturing That Stood Behind the Marketing," *Business History Review* 65 (Winter 1991): 721–53. For GM's efforts to learn about consumer tastes, see Sally Clarke, "Consumers, Information, and Marketing Efficiency at GM, 1921–1940," *Business and Economic History* 25 (Fall 1996): 186–95. That large automakers' production decisions were sometimes a good fit with consumer tastes is suggested by Aver Offer's analysis of fins as an expression of joy at the end of depression and war. Offer, "The American Automobile Frenzy of the 1950s," in *From Family Firms to Corporate Capitalism: Essays in Business and Industrial History in Honour of Peter Mathias*, Kristine Bruland and Patrick K. O'Brien, eds. (Oxford, 1998), 315–53.

THE LARGE, VERTICALLY INTEGRATED FIRM was confined in the late nineteenth century to a relatively small number of mass-production industries (particularly those, like sewing machines, where wholesalers could not provide adequate distribution services). Over the course of the next hundred years, however, a series of merger waves greatly expanded the number of industries dominated by such Chandlerian enterprises. The earliest of these waves—the most important being the Great Merger Movement of 1895–1904—consisted for the most part of horizontal, single-industry combinations whose primary motive was to reduce price competition by increasing market power.[45] The number and scale of these mergers, as well as the suddenness with which they transformed the structure of many of the nation's largest industries, provoked an enormous public outcry, and the federal government stepped in to make such horizontal combinations more difficult to effect. As a result, subsequent merger waves consisted for the most part of acquisitions for the purpose of diversification across industries.

Because the highly centralized managerial organizations that large firms initially created tended to suffer from rigidity and information overload when they expanded into other businesses, an organizational innovation was necessary before such efforts at diversification could succeed. The Du Pont Company was among the first enterprises seriously to confront this problem.[46] Du Pont had flourished during World War I, supplying gunpowder and related war materiel to the belligerents. Expecting the firm to suffer from excess capacity after the armistice, its officers decided to diversify into new markets, such as paint, that exploited the firm's expertise in chemicals but also promised substantial potential for growth during peacetime. It quickly became apparent, however, that the firm's centralized management could not effectively coordinate its diversified operations. After several halting efforts to address the problem by incremental means, Du Pont's owners developed and implemented a multi-divisional form of organization in which each distinct product line was organized as a separate business (albeit one wholly owned by Du Pont). Under the new organization, the head of a division was like the chief executive of a company, accountable to the owners for divisional profit-and-loss performance. Each division controlled all the functions required to support its operations, from product development and procurement to marketing and sales, while the Du Pont board controlled the amount of capital allocated to each division and the appointments and tenure of divisional heads. Although this change inevitably involved some loss of scale economies (functions such as procurement and marketing moved, for example, from the central office to the several divisions), it freed top executives in the central office to focus on resource allocation and long-run strategic concerns, at the same time giving divisional

[45] Chandler argued that the actual reason these mergers occurred was inconsequential, because in order to succeed the consolidations had to integrate vertically and develop a managerial apparatus capable of smoothly coordinating the flow of inputs and outputs (see *Visible Hand*, 334–44). He did not seriously entertain the possibility that consolidations may have owed their success to barriers they were able to erect to new competition. For evidence on this point, see Naomi R. Lamoreaux, *The Great Merger Movement in American Business, 1895–1904* (New York, 1985), chaps. 5–6. For a theoretical rationale for this possibility, see Oliver Hart and Jean Tirole, "Vertical Integration and Market Foreclosure," *Brookings Papers on Economic Activity: Microeconomics* (1990): 205–76.

[46] The following account is from Alfred D. Chandler, Jr., *Strategy and Structure: Chapters in the History of Industrial Enterprise* (Cambridge, Mass., 1962), 52–113.

managers the ability to respond to changing conditions and opportunities in their areas. By forcing divisional managers to compete for capital, moreover, it introduced elements of the market into the business's hierarchical organization.

Similar problems managing multiple product lines inspired a handful of other firms to decentralize their managerial hierarchies at around the same time, but this organizational innovation did not spread much further until the second half of the century. As the economy recovered from the twin disruptions of the Great Depression and World War II, the first impulse of many of the nation's largest enterprises was to follow the trail that Du Pont had blazed after World War I to protect its long-run profitability: diversify into new areas of business and adopt the decentralized multidivisional (M-form) organizational structure to manage them. Like Du Pont, these firms initially diversified into businesses that were closely related to their main product lines. In that way, they could deploy more fully capabilities they had already developed and exploit potential economies of scope. An important ancillary aim of firms that pursued this strategy was to smooth profits over the business cycle by producing goods that had complementary time patterns of demand.[47]

Firms could move into new product lines by building their own plants, but it was often more efficient to acquire producers that had already developed a presence in these markets. Once firms began to use their surplus capital for the purposes of acquisition, however, it seems to have been hard to stop. If an important goal of diversification was to enable managers to stabilize earnings by producing goods that had different time patterns of demand, it was tempting to conclude that they could better accomplish this end by amassing a broad portfolio of companies in much the same way as investors might choose a portfolio of securities. Firms began to acquire companies in industries completely unrelated to their core businesses, and the result was a merger mania that grew to enormous proportions during the 1960s and early 1970s.[48]

Thus, by the time Chandler sat down to write *The Visible Hand* during the mid-1970s, the large, vertically integrated, horizontally diversified, managerially coordinated enterprise had come to account for a broad swath of the nation's economic activity. Not only had large firms apparently translated success in their core businesses into other economic activities, they had managed to maintain their positions of dominance for an unprecedented length of time. Richard Edwards, also writing during the mid-1970s, found that there had been remarkably little change in the ranks of the nation's largest corporations between 1919 and 1969: virtually all the firms that led their industries in 1919 were still at the top of the list in 1969.[49] Moreover, these same American corporations (or foreign companies that appeared to be structured along similar lines) had triumphed by the 1970s in the international

[47] Chandler, *Visible Hand*, 479. For the following paragraph, see pp. 481–82. See also *Scale and Scope*, chaps. 5–6.

[48] According to Bruce Kogut and David Parkinson, "Adoption of the Multidivisional Structure: Analyzing History from the Start," *Industrial and Corporate Change* 7 (June 1998): 249–73, use of the M-form was relatively limited in 1950, higher in 1960, and much higher after that. For a case study of one of the most active conglomerates of this period, see George P. Baker, "Beatrice: A Study in the Creation and Destruction of Value," *Journal of Finance* 47 (July 1992): 1081–1119.

[49] Richard C. Edwards, "Stages in Corporate Stability and the Risks of Corporate Failure," *Journal of Economic History* 35 (June 1975): 428–57.

arena as well. Given this record, it is perhaps not surprising that Chandler's view that the vertically integrated, managerially coordinated firm was *the* modern industrial enterprise found easy acceptance.[50]

CIRCUMSTANCES WOULD SOON CHANGE, HOWEVER. When Leslie Hannah revisited the subject during the late 1990s, he found that the relative position of once-dominant Chandlerian-style enterprises had deteriorated dramatically. For example, of the fifty-four U.S. firms that ranked among the top one hundred in the world in 1912, only seventeen retained that status in 1995. Moreover, despite large numbers of mergers, only twenty-six actually had capitalizations that were greater (adjusting for price changes) than they had been in 1912. In other words, over half the firms had lost ground in absolute as well as relative terms during the intervening years.[51]

At the root of this deteriorating performance were changes in the economic environment that affected the value of the coordination mechanisms employed by large vertically integrated, horizontally diversified firms. The sudden onslaught of international competition during the 1970s highlighted the seriousness of the problem that American firms faced, but the underlying sources of their difficulties were largely domestic. Rising per-capita income had shifted consumers' preferences toward higher quality, more individuated goods, but the large firms' hierarchical organizations generally proved rigid and unresponsive. At the same time, as transportation and communications costs continued to fall, markets became thicker and the transaction-cost problems that had initially motivated firms to integrate vertically were greatly reduced. In many cases, it was now more cost-effective for businesses to buy inputs than to make them. Large firms had by no means disappeared from the U.S. economy (average firm size actually increased in the 1990s, although the cause was the growth of moderately large firms rather than giants), but they began to contract their boundaries by retreating both from diversification and vertical integration.[52]

The disadvantages of the hierarchical coordination techniques employed by Chandlerian-style firms appeared earliest and most obviously in the case of conglomerates. Top executives in the mergers' central offices rarely had much detailed knowledge of the businesses they acquired and, as a result, increasingly restricted themselves to evaluating divisional managers' performance in terms of easily interpreted financial measures such as revenue, profit, and return on invested capital. In effect, what top executives attempted to do was expand the element of market coordination built into the M-form by using rate-of-return accounting to mimic competitive processes. Not only did this kind of monitoring add less and less

[50] See, for example, the essays in the book that Chandler co-edited with Herman Daems, *Managerial Hierarchies: Comparative Perspectives on the Rise of the Modern Industrial Enterprise* (Cambridge, Mass., 1980).

[51] Leslie Hannah, "Marshall's 'Trees' and the Global 'Forest': Were 'Giant Redwoods' Different?" in Lamoreaux, Raff, and Temin, *Learning by Doing*, 253–86.

[52] Lawrence J. White, "Trends in Aggregate Concentration in the United States," *Journal of Economic Perspectives* 16 (Fall 2002): 137–60. White also calculated that aggregate concentration in the U.S. economy (roughly, the share of economic activity of the largest firms) declined during the 1980s and early 1990s but had risen again, albeit not to previous levels, by the late 1990s.

value over time, it could be downright harmful. In the first place, the organizational routine of target setting and frequent evaluation tended to focus executives' attention on specific short-term goals rather than on the sort of longer-term strategic planning needed to ensure the firm's continued success. Second, as the underlying businesses grew more complex, accounting systems that were well suited to monolines became grossly inappropriate, giving useless or even positively misleading information about the structure of costs and ultimately about the sources of profits. Finally, this "management by the numbers" approach tended to create incentive structures that rewarded subsidiaries for achieving long production runs that spread fixed costs over a large output, compounding the measurement problem by encouraging managers to sacrifice quality in the interests of quantity production.[53]

Not surprisingly, by the 1980s, the capital markets had begun to discount the value of central-office control as a coordination mechanism and to impose a penalty (in the form of relatively lower share prices) on diversified firms.[54] When entrenched managerial hierarchies seemed unable or unwilling to reform themselves in response to changed economic conditions, shareholders responded by supporting hostile takeovers and leveraged buyouts. By the 1990s, however, large firms showed greater willingness to internalize the lessons of the preceding decade, and the use of hostile methods declined. The main reform instead was to tie executives' compensation to the performance of their corporation's stock—an attempt to bring market forces into the heart of the Chandlerian-style firm by forcing top managers to take cognizance of the financial sector's evaluation of their decisions.[55] Regardless of method, however, the result was a striking retreat from diversification. According to one calculation, firms had divested themselves by 1989 of as many as 60 percent of the acquisitions they had made outside their core businesses between 1970 and 1982.[56]

[53] See Robert H. Hayes and William J. Abernathy, "Managing Our Way to Economic Decline," *Harvard Business Review* 58 (July–August 1980): 67–77; Andrei Shleifer and Robert W. Vishny, "The Takeover Wave of the 1980s," *Science* 249 (August 17, 1990): 745–49; and H. Thomas Johnson, "Managing by Remote Control: Recent Management Accounting Practice in Historical Perspective," in Temin, *Inside the Business Enterprise*, 41–66.

[54] See Larry H. P. Lang and Rene M. Stulz, "Tobin's Q, Corporate Diversification, and Firm Performance," *Journal of Political Economy* 102 (December 1994): 1248–80; and Philip G. Berger and Eli Ofek, "Diversification's Effect on Firm Value," *Journal of Financial Economics* 37 (January 1995): 39–65.

[55] The financial scandals of the early twenty-first century have, of course, cast doubt on the wisdom of this latter change. On the changes of the 1980s and 1990s, see Bengt Holmstrom and Steven N. Kaplan, "Corporate Governance and Merger Activity in the United States: Making Sense of the 1980s and 1990s," *Journal of Economic Perspectives* 15 (Spring 2001): 121–44; Michael C. Jensen, "Takeovers: Their Causes and Consequences," *Journal of Economic Perspectives* 2 (Winter 1988): 21–48; Jensen, "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems," *Journal of Finance* 48 (July 1993): 831–80; and George P. Baker and George David Smith, *The New Financial Capitalists: Kohlberg Kravis Roberts and the Creation of Corporate Value* (New York, 1998).

[56] Sanjai Bhagat, Andrei Schleifer, and Robert W. Vishny, "Hostile Takeovers in the 1980s: The Return to Corporate Specialization," *Brookings Papers on Economic Activity: Microeconomics* (1990): 1–72. As Cynthia A. Montgomery has shown, however, large firms in the 1990s were still on average relatively diversified by historical standards. Montgomery calculated that, in 1992, only about 12 percent of the 500 largest U.S. companies operated in a single (four-digit Standard Industrial Classification code) industry, whereas nearly 70 percent operated in more than five and more than 40 percent in excess of ten. See Montgomery, "Corporate Diversification," *Journal of Economic Perspectives* 8 (Summer 1994): 164.

During this period, there was also a significant retreat from vertical integration.[57] In the case of steel, for example, the large firms that dominated the industry from early in the century had managed to forestall new domestic competition by integrating backward into ore reserves and other raw materials, effectively preventing potential entrants from gaining access to the requisite inputs. Protected as well from foreign rivals by high transportation costs, U.S. firms felt little incentive to stay abreast of technological developments around the world. By the 1970s, however, the development of new bulk-capacity ships caused transportation costs to fall dramatically. Imports surged, and in the face of competition from more technologically sophisticated rivals, U.S. firms collapsed. When the domestic industry began to recover during the next decade, the giant integrated firms of the previous era were in retreat. In their place, a relatively large number of smaller, more specialized firms had emerged, each of which tended to focus on a particular stage of the production process and on one or two types of outputs.[58]

In the automobile industry, the limitations of the large, vertically integrated firm had also become apparent by the last quarter of the twentieth century. Seduced by the vastness of the (seemingly secure) domestic American market, top executives had focused on extended production runs and relatively superficial product differentiation as the path to profits; under pressure to exploit economies of scale, quality suffered.[59] When the price of gasoline climbed as a result of the oil shocks of the 1970s, the share of U.S. firms in their home market dropped as consumers found small, fuel-efficient imported cars increasingly more attractive than the powerful, but heavy and inefficient, American models. Japanese firms such as Toyota were able to take advantage of this shift in preferences to make permanent inroads on the U.S. market because they were able to provide consumers not only with greater fuel economy but also, it emerged, higher quality and a wider choice of models.[60]

Originally a textile firm with a history of innovation, Toyota had begun manufacturing automobiles during the difficult interwar years. The small size of the Japanese market, combined with the presence of local Ford and GM assembly plants, had obliged the company (government assistance notwithstanding) to

[57] In the discussion that follows, we rely on anecdotal evidence because existing data make it difficult to quantify the extent of vertical integration in the economy. Our contention is, however, supported by studies that use the best available measure (value added within firms) as a proxy for vertical integration. See Erik B. Brynjolfson, *et al.*, "Does Information Technology Lead to Smaller Firms?" *Management Science* 40 (December 1994): 1628–44.

[58] Christopher G. L. Hall, *Steel Phoenix: The Fall and Rise of the U.S. Steel Industry* (New York, 1997).

[59] In this general context, manufacturers recognized that turning out low quality cars raised the cost of honoring warranties to customers, but they simply shifted this problem to their dealers. Blaming the company's large numbers of defective automobiles on the low quality of its work force, Ford's president Lee Iacocca asserted that there was nothing manufacturers could do to solve the problem: "We can't change a man," he claimed, "so what we're going to do at Ford is create a dealer organization that will fix up the cars and guarantee that they'll function right. We'll give you a dealer who will repair what we produce." David Halberstam, *The Reckoning* (New York, 1986), 467. See also Hounshell, "Why Corporations Don't Learn Continuously." On the supply chain aspect of this problem, see Susan Helper, "Strategy and Irreversibility in Supplier Relations: The Case of the U.S. Auto Industry," *Business History Review* 65 (Winter 1991): 781–824.

[60] For data showing the greater range of choices that Japanese firms introduced, see James P. Womack, Daniel T. Jones, and Daniel Roos, *The Machine That Changed the World* (New York, 1990), 125.

address differentiated demand in a flexible way from the very start. It also led the firm to invest in its suppliers, both financially and operationally. These investments included support for component design, assistance in training suppliers' work forces, help with the organization of production and the continuous improvement of quality, and the development of "just-in-time" routines for coordination and delivery of components—all in the context of a committed and ongoing relationship in which problems were resolved via voice rather than exit. Toyota functioned, and conceived of itself, as the hub of a network of distinct companies. For many years, it could not have afforded anything else; in a dynamic world, however, it profited greatly from the capacity for change and improvement that resulted from this network arrangement.[61]

U.S. automakers, with their established, hierarchically structured managerial organizations and their longstanding focus on reducing the cost of parts, found it difficult, despite major efforts, to reorganize their supply systems along lines similar to Toyota. But firms in other U.S. manufacturing industries, particularly new ones such as computers, have extensively exploited the possibilities for flexible production inherent in just-in-time inventories and network relations with suppliers.[62] The Dell Computer Company, for example, uses these techniques to enable it to custom-build computers quickly and cheaply for individual purchasers. Through a process it calls "virtual integration," Dell buys parts from a network of suppliers who are willing to make the investments necessary to keep technologically up to date and also meet the company's rigorous quality standards and just-in-time delivery needs. Suppliers that fail to meet Dell's requirements risk penalties much more drastic than those faced earlier in the century by Sears' internal departments, which only had to shoulder extra shipping costs in their budgets: they risk losing these lucrative contracts entirely. But Dell assists its suppliers by giving them direct, "real-time" access to its order books so they can plan their production and delivery schedules effectively.[63]

In other parts of the computer industry, networks of long-term connections among firms have become so dense and so geographically concentrated that they have taken on all the characteristics of an industrial district. Silicon Valley, of course, is the preeminent example. Firms in the Valley are generally small and highly specialized. Although they compete vigorously with each other, they also share technological information and cooperate in joint ventures to meet specialized consumer needs. According to Annalee Saxenian, large managerial enterprises are at a competitive disadvantage in technologically dynamic industries such as

[61] William Mass and Andrew Robertson, "From Textiles to Automobiles: Mechanical and Organizational Innovation in the Toyoda Enterprises, 1895–1933," *Business and Economic History* 25 (Winter 1996): 1–37; Takahiro Fujimoto, *The Evolution of a Manufacturing System at Toyota* (New York, 2000); Stephen Spear and H. Kent Bowen, "Decoding the DNA of the Toyota Production System," *Harvard Business Review* 77 (September–October 1999): 96–106; Michael Cusumano, *The Japanese Automobile Industry: Technology and Management at Nissan and Toyota* (Cambridge, 1984); Toshihiro Nishiguchi, *Strategic Industrial Sourcing: The Japanese Advantage* (New York, 1994); Helper, "Strategy and Irreversibility in Supplier Relations."

[62] Womack, Jones, and Roos, *Machine That Changed the World*; and James P. Womack and Daniel T. Jones, *Lean Thinking: Banish Waste and Create Wealth in Your Corporation* (New York, 1996).

[63] Joan Magretta, "The Power of Virtual Integration: An Interview with Michael Dell," *Harvard Business Review* 76 (March–April 1998): 72–84.

computers. Contrasting the experience of Boston's "Route 128" technology corridor during the 1980s with that of Silicon Valley, she found that the larger, more hierarchical firms in the Boston area were less able both to weather swings in demand and stay abreast of technological developments.[64]

Large, hierarchical firms in regulated industries such as telecommunications experienced similar difficulties at about the same time. Until the early 1980s, for example, AT&T owned and operated a telephone system that was integrated both horizontally and vertically. Its subsidiary Bell Operating Companies (BOCs) offered local service and interconnection to AT&T's long distance network, and Western Electric provided the equipment from which the network was built (with the aid of research conducted at Bell Labs). Earlier in the century, AT&T had worked out an accommodation with the federal government that allowed it to maintain its monopoly position in telephony in exchange for submitting to regulation on prices and other aspects of its business. By the late 1970s, however, technological change and the appearance of new potential competitors in long-distance communication made this arrangement increasingly seem a barrier to progress. Under pressure from the federal government to reduce its monopoly position, AT&T was forced to divest itself either of its horizontal or vertical operations.[65] Following a chain of reasoning similar to Chandler's, AT&T's management chose to keep its vertical structure intact. The firm retained Western Electric and Bell Labs and gave up the BOCs, launching them as seven independent regional companies. This new industry structure endured for only about a decade. AT&T found that it could more easily buy than make the new electronic hardware it needed, given that Western Electric's capabilities were electro-mechanical. Like other large firms at about the same time, it shifted toward dis-integration, spinning off Western Electric and Bell Labs into a new firm, Lucent Technologies (which itself fell on hard times by the end of the 1990s).[66] In the meantime, AT&T expanded (mainly by acquisition) into the wireless and broadband sectors of the telecommunications market. When the synergies it expected between its new and old activities failed to materialize or provide any competitive advantage, AT&T again split itself into separate firms.

National retailers such as mail-order firms and department-store chains were also seriously affected by the changed economic environment of the late twentieth century. These enterprises employed professional buyers to track changing fashions, but the long lead time that manufacturers wanted to produce the desired goods meant that orders had to be placed substantially in advance, increasing the possibility that buyers would misjudge the direction of consumer tastes. Stores

[64] Annalee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, Mass., 1994). For a slightly different account, see Christophe Lécuyer, "Making Silicon Valley: Engineering Culture, Innovation, and Industrial Growth," *Enterprise and Society* 2 (December 2001): 666–72. On the history of Silicon Valley's industrial-district structure, see the essays in Chong-Moon Lee, *et al.*, eds., *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship* (Stanford, Calif., 2000).

[65] Similar changes encouraged a movement to deregulate other industries around the same time. See Thomas K. McCraw, *Prophets of Regulation: Charles Francis Adams, Louis D. Brandeis, James M. Landis, Alfred E. Kahn* (Cambridge, 1984), 210–309.

[66] Peter Temin with Louis Galambos, *The Fall of the Bell System* (New York, 1987); Stephen B. Adams and Orville R. Butler, *Manufacturing the Future: A History of Western Electric* (New York, 1999).

traditionally dealt with errors of judgment by selling unsold merchandise at clearance prices at the end of each season. Beginning around the mid-1960s, however, the problem worsened as rising per-capita income made Americans less tolerant of standardized commodities and more interested in purchasing goods that expressed their individual tastes. In bedding, for example, the market share of white sheets dropped from about 75 percent in 1960 to about 20 percent by the mid-1970s, while the share of fancy patterned sheets showed precisely the opposite trend. Men similarly shifted away from white shirts, women from tailored clothing, and there was a general trend toward more casual clothing in a greater variety of styles, fabrics, and colors. As tastes became more diverse and merchants strove to satisfy them, the chance that company buyers would make errors in stocking specific merchandise increased. Department stores coped with this problem in two ways: by increasing the general markup they charged on merchandise and by putting items that did not sell at first on sale more rapidly. But they made no fundamental changes in their organizations or their abilities to capture and process information and act on it.[67]

This situation offered new national chains of specialty boutiques an opportunity to take substantial chunks of business away from more traditional stores. Riding the wave of new information technology, innovative retailers such as The Limited and The Gap learned how to manage their assortments flexibly so as to reduce these kinds of errors. Their checkout scanners, reading barcodes that contained detailed information on each item sold, generated immense amounts of data (style, color, and size) on precisely what was selling in every time period in every store location. Senior managers analyzed the local, regional, and national patterns in the data and continually adjusted orders (and sometimes prices), rerouted shipments, and revised assortments offered by particular stores.[68] Moreover, by relying on just-in-time supply-chain relationships similar to those of Toyota and Dell, they were able to manage all this variety far more efficiently than was possible even with the narrower set of offerings under the old department-store system of ordering. Similar techniques led to the success of stores like Toys "R" Us, Circuit City, and Borders—known collectively as "category killers" because of their effect on the range of goods department stores could profitably stock and sell.[69]

The result of all these innovations was to provide consumers with a vastly greater selection of choices within any particular product category. Advances in communications technology pushed this development even further by ushering in the age of Internet marketing, where—in a fashion reminiscent of the early years of Sears and other mail-order firms but without the ensuing communication disad-

[67] In addition to demand-side shifts favoring variety, there were also supply-side changes (for example, the spread of the shuttleless loom) that made it possible to produce patterned fabrics more cheaply. B. Peter Pashigian, "Demand Uncertainty and Sales: A Study of Fashion and Markdown Pricing," *American Economic Review* 78 (December 1988): 936–53; and Pashigian and Brian Bowen, "Why Are Products Sold on Sale? Explanations of Pricing Regularities," *Quarterly Journal of Economics* 106 (November 1991): 1015–38.

[68] See Raff and Temin, "Sears, Roebuck in the Twentieth Century," 241–42, summarizing unpublished research by Raff and Walter Salmon.

[69] Supply-chain management has also been a key factor in the success of a new generation of mass retailers. Wal-Mart, for example, provides direct computer feeds from its individual checkout scanners to its leading suppliers, leaving it to them to manage efficiently the shelf space they are allocated.

vantages—retailers consisted of little more than customer interfaces. The Internet, of course, is not itself a coordination mechanism but rather a coordination infrastructure, the most recent development in a long history of infrastructural improvements that have brought down the costs of communication. Yet the speed and ease with which the World Wide Web makes search and information transfer possible suggests that its effect on the incidence of specific coordination mechanisms may be profound. As vendors accumulate information on the interests and preferences of individual consumers, it may be possible for them to present both individualized offerings (economizing on the customers' search time) and individualized pricing (economizing on the amount of the resultant surplus with which the consumer walks away) in much the same way as craftsmen in the early nineteenth century understood local buyers' wants and priced accordingly.[70]

BY EXPANDING ON THE FAMILIAR OPPOSITION between markets and hierarchies, we have been able to provide a more complex narrative of American business history than is currently available in the literature. The heterogeneity that we have observed, both cross-sectionally and over time, in the techniques used by businesspeople to solve their information problems has offered important insights into the relative advantages and disadvantages of our three main types of coordination mechanisms. Moreover, it has also provided us with the raw material we need to pursue simultaneously both a backward and a forwarding-looking perspective on the history of organizational change.

Looking backward, for example, our survey has revealed an intriguing juxtaposition of trends. On the one hand, there has been, since the early nineteenth century, a more-or-less steady decline in transportation and communication costs and also a more-or-less steady rise in per-capita income. Yet, despite these cumulative, unidirectional trends, the use of hierarchical coordination in the economy has followed a pronounced hump-shaped pattern over time, at least to date. That is, as transportation and communication costs fell with the spread of the railroad and telegraph during the second half of the nineteenth century, firms in industries characterized by economies of scale responded by substituting hierarchical for other forms of economic coordination, integrating forward into distribution and backward into supply and developing managerial organizations to coordinate these activities (organizations that were later used to expand into additional industries). But as transportation and especially communication costs continued to fall during the computer era, firms in these same industries responded by shifting away from both conglomeration and vertical integration, increasingly substituting coordination by long-term relationships for their extended managerial hierarchies.

The perspective of hindsight enables us to see that this puzzling combination of trends can be attributed in part to the effects of communication and transportation costs on the location and organization of economic activity. When these costs are high, economic activity tends to be local and consequently small in scale. When

[70] Eric J. Johnson, *et al.*, "On the Depth and Dynamics of Online Search Behavior," Wharton School Marketing Department Working Paper 00–019 (2000).

communication is virtually instantaneous, as on the Internet, and transportation is very cheap, then, all else equal, economic activity can be located virtually anywhere and even tailored to individual needs. When communication and transportation costs are neither prohibitive nor trivial, however, there are advantages to be obtained from concentrating productive activity in specific locations and in large firms.[71]

Trends in per-capita income had a similar effect on the organization of economic activity. During the nineteenth century, most households had relatively small surpluses to spend on products not required for basic subsistence, and their ability to expand the range of goods they consumed was largely a function of cost. In a situation where the price of most manufactured items put them beyond consumers' reach, there were big rewards to be earned by lowering the cost of production. By the late twentieth century, however, rising per-capita income had shifted the reward structure toward firms that were able to respond more flexibly to consumer wants. As we have seen, large, vertically integrated mass-production firms were able to produce goods at low cost, but the tradeoff was an increase in standardization. This was an exchange that consumers were happy to make in the late nineteenth century but were less willing to accept a hundred years later. When new firms emerged in the late twentieth century that substituted long-term relationships for vertical integration and better accommodated preferences for greater quality and choice, consumers voted with their feet.

This explanation for the origins of the "New Economy" is itself a valuable contribution to the literature. Not only does it significantly modify the Chandlerian framework, it enables us to reassess other unidirectional theories of change that have influenced historical writing. For example, members of the so-called market-revolution school have argued that the economy underwent a transition to capitalism during the late eighteenth and early nineteenth centuries, as a result of which the personal connections that hitherto had governed exchange (and kept greed under control) were disrupted by the growth of broad, impersonal markets in which there was little to restrain rapacious behavior.[72] Our analysis suggests, by contrast, that long-term connections (and the informal restraints on self-interested behavior with which they are linked) have continued to play an important role in exchange—that they constituted in fact a third major type of coordination mechanism whose significance has waxed as well as waned over time. In a similar vein, our analysis allows us to contextualize the claim made by some historians (and contested by others) that large, vertically integrated corporations were able, by the early twentieth century, to exert a kind of Gramscian hegemony over Americans' consumption choices.[73] By emphasizing the links between different kinds of

[71] See Paul Krugman, *Geography and Trade* (Cambridge, Mass., 1991).

[72] See Michael Merrill, "Cash Is Good to Eat: Self-Sufficiency and Exchange in the Rural Economy of the United States," *Radical History Review* 4 (1977): 42–71; Christopher Clark, *The Roots of Rural Capitalism: Western Massachusetts, 1780–1860* (Ithaca, N.Y., 1990); James Henretta, *The Origins of American Capitalism: Collected Essays* (Boston, 1991); and Charles Sellers, *The Market Revolution: Jacksonian America, 1815–1846* (New York, 1991).

[73] See Stuart Ewen, *Captains of Consciousness: Advertising and the Social Roots of the Consumer Culture* (New York, 1976); Richard Wightman Fox and T. J. Jackson Lears, eds., *The Culture of Consumption: Critical Essays in American History, 1880–1980* (New York, 1983); William Leach, *Land of Desire: Merchants, Power, and the Rise of a New American Culture* (New York, 1993).

coordination mechanisms and particular marketing arrangements, we have provided historians with a means of understanding the shifts that have occurred (and are still occurring) in the relative power of producers and consumers.

Although our analysis helps delineate the forces at work in the current economy, we believe it would be a serious mistake to consider the types of business organizations that appear to be most successful in the present day as a new end point toward which history has been inexorably evolving. Although the long-term relationships at the heart of the New Economy offer advantages of flexibility, there may be offsetting disadvantages under some circumstances. For example, in order for a relationship to hold up over time, all the parties involved must benefit from its continuance. Such mutual profitability can be difficult to sustain in a dynamic environment where fluctuations or downward trends in demand result in sustained excess capacity. In a market situation, manufacturers can simply reduce the amount they buy from suppliers; in a hierarchy, they can adjust production in accordance with demand. In the case of long-run relationships, however, manufacturers must try to reduce the burden on their contractees in order to keep their network intact.[74] If they cannot steer new work to their suppliers or help them find other customers, they must shoulder some or all of the costs themselves by accumulating inventory. Whether or not they can carry enough of the burden to keep these relationships functioning depends on the severity of the downturn.

Competition in final goods markets can also affect these kinds of network relationships by putting pressure on manufacturers to obtain their components more cheaply. In a market environment, manufacturers can simply demand lower prices; in a hierarchy, they can strive to reduce their own production costs. In a long-term relationship, however, manufacturers must help their suppliers make cost-reducing process improvements to production, even though they are likely to reap only part of the gains.[75] Similarly, in industries where manufacturers must engage in extensive product innovation in order to retain their customer base, they must work with suppliers in order to maintain their network advantages. Here again, the manufacturer may be able only partially to recapture the costs of retooling production throughout an entire supply chain, but there are also potential advantages from being able to access the human capital and financial resources of multiple firms.[76]

Whether or not networks of long-term relationships, or any other type of coordination mechanism, can survive such environmental stresses is likely to vary from industry to industry and even from firm to firm. It is also likely to vary internationally because different cultural and institutional settings affect the efficacy with which the three main forms of coordination mechanisms can be

[74] For a study of such a response in the case of the automobile industry, see Nishiguchi, *Strategic Industrial Sourcing*.

[75] For a detailed example, see John Paul MacDuffie and Susan Helper, "Creating Lean Suppliers: Diffusing Lean Production through the Supply Chain," in *Remade in America: Transplanting and Transforming Japanese Management Systems*, Jeffrey K. Liker, W. Mark Fruin, and Paul S. Adler, eds. (New York, 1999), 154–200.

[76] For the automobile case, see Kim B. Clark and Takahiro Fujimoto, *Product Development Performance: Strategy, Organization, and Management in the World Automobile Industry* (Boston, 1991). See also Jeffrey H. Dyer, *Collaborative Advantage: Winning through Extended Enterprise Supplier Networks* (New York, 2000).

deployed. Particular national environments can nurture specific types of business organizations, which then may diffuse internationally when circumstances enhance their attractiveness. Chandler and his disciples took the spread of M-form of organization throughout Europe in the third quarter of the twentieth century as evidence of the superiority of the American managerial enterprise. By the next period, however, the model of choice was the vertically dis-integrated Japanese firm at the hub of a network of long-term relationships.

Maintaining a forward-looking perspective on the process of economic change requires that we acknowledge not only the variety of choices available to firms at any given point in time but also the enormous uncertainty that businesspeople face in deciding which coordination mechanisms would be best to employ. Hence we conclude by noting that nothing better underscores the difficulty of predicting the future trend in business organizations than the yearly international survey of CEOs conducted by the *Financial Times*. The ten most respected business leaders of 2001 included people from highly focused companies such as Intel (Andy Grove) and Microsoft (Bill Gates), as well as gurus of vertical dis-integration such as Hiroshi Okuda of Toyota and computer assembler Michael Dell. But it also included heads of more traditional Chandlerian firms such as Lou Gerstner of IBM and John Browne of BP Amoco. More intriguing still, nearly a third of the spots on the list were occupied by CEOs of conglomerates: Jack Welch of General Electric, Warren Buffett of Berkshire Hathaway, and Richard Branson of Virgin.[77] That businesspeople from around the world would choose such a diverse group of executives as role models is an important indication of the ongoing uncertainty they face about the direction of change and how to solve the coordination problems that confront them. Their uncertainty in turn should be a powerful signal to us that the shift toward long-term relationships that characterized the "New Economy" of the late twentieth century should not be taken as a new ending point for business history.

[77] Michael Skapinker, "Business Leaders: Admiration for Those Doing It Their Own Way," *Financial Times* (December 17, 2001), II.

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