

# CEOs, Clerks, Computers, and the Rise of Competition in the Late 20th Century

BY LEONARD NAKAMURA

**A** new era of heightened creative destruction that began in the late 1970s also ushered in a new era of heightened competition. Such intensified competition has made leaders of large industrial enterprises vulnerable to a level of uncertainty previously reserved for managers of small and new firms. Consequently, managerial careers now less often have benign endings. In addition, CEOs have become less reliable servants of the corporation. The story was much different during the previous 100 years. From the 1870s to the 1970s, the large industrial corporation was highly stable. Its stability was derived, in part, from investments in a corporate structure that centered on a sales and administrative staff. In this article, Leonard Nakamura argues that the electronics revolution of the 1970s sharply reduced the value of this corporate asset and made corporations more susceptible to competition.

the opportunity created by the decline of the Ford Motor Company in the mid-twenties, but also because Sloan clearly saw that with Ford rapidly going downhill, GM, in its own interest, needed a strong competitor.” This passage forcefully calls to mind a different era, a time when corporate managers were so secure in their corporations’ solidity that they could deliberately encourage the growth of a formidable competitor. This is a far cry from GM’s aggressive and successful legal pursuit of European purchasing manager Jose Ignacio Lopez when he left General Motors to work for Volkswagen in 1993. (GM forced Volkswagen to fire Lopez and recompense GM for the secrets Lopez took with him.)

There have been sweeping changes in the corporate environment since the late 1970s, when the new era of heightened creative destruction emerged.<sup>1</sup> In this new era, heightened competition has made leaders of large industrial enterprises vulnerable to a level of uncertainty previously reserved for managers of small and new firms. Chief executives of Fortune 500 corporations were once seen as professional, farsighted, and deeply interested in the longevity of their firms; now they find their ability to control their destinies substantially diminished.

The relationship between the modern corporation and its leadership has undergone a sea change over the past 30 years. The large industrial corporation appeared to be a serene republic, protected like 14th century

Venice by a beneficent nature and as likely to exist for centuries. The leader of this corporation — the chief executive — was a sort of philosopher king, dealing with long-term strategic issues and delegating most of the direct oversight of the corporation’s daily operations to the chief operating officer.

In his introduction to A.P. Sloan’s memoir, *My Years with General Motors*, Peter Drucker described the General Motors’ president’s relationship to the founding of Chrysler Motors: “Chrysler started the automobile company that bears his name in large part because Sloan pointed out to him

<sup>1</sup>Economist Joseph Schumpeter coined the phrase creative destruction. Schumpeter theorized that creativity was the prime engine in a modern economy and profits were the fuel. Allowing creative workers to temporarily capture monopoly profits — for example, by granting patents — promotes “creative destruction”: new goods and livelihoods replace old ones. See my *Business Review* article from 2000.



**Leonard Nakamura** is an economic advisor and economist in the Research Department of the Philadelphia Fed.

This heightened competition — firms' ability to enter and conquer markets via new products and processes — need not imply small firms or profits. It may well involve a series of firms that rapidly prosper and attain substantial profits and size, such as Microsoft or Merck. But attaining and maintaining profits has become more hazardous work. Managers and shareholders find their firms increasingly at risk, both from outside competitors and from insiders who threaten to take their talents and become competitors.

The upshot has been that managerial careers now less often have benign endings. Forced resignations of corporate CEOs have become more common, and more CEOs are hired from outside the firm, rather than being promoted from among the ranks of its senior executives (see the study by Huson, Parrino, and Starks). Corporate leaders have found themselves in a harsher economic environment, their jobs riskier, their boards more demanding.

In their turn, CEOs may have become less reliable agents for their shareholders and boards of directors. It should not be surprising if CEOs demand higher wages to compensate for their greater risk. Nor is it a great stretch to imagine that boards must deepen their oversight over CEOs in order to maximize shareholder value in this new environment. Indeed, although this is a conjecture that has not been researched, the recent spectacular examples of corporate fraud may partly be a byproduct of the decline in solidarity between shareholders and their corporate employees.

The story was much different in the previous century. The large industrial corporation was highly stable from the 1870s to the 1970s. According to Alfred Chandler, Harvard Business School's august historian of business, this stability was based both on tangible investments in plant and

equipment and on investments in a corporate structure whose core purpose was information processing: the sales and administrative staff. I argue that the electronics revolution in the 1970s sharply reduced the value of this corporate asset and made corporations far more vulnerable to competition.

### CREATORS AND CLERKS: OCCUPATIONAL CHANGE FROM 1900 to 1980

Chandler wrote two influential tomes on the rise and stability of the great industrial corporation: *The Visible Hand* and *Scale and Scope*. Chandler showed that many of the corporations that were the first modern large producers in their industries in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries were still leading their industries in the

in information, or rather in corporate employees whose collective task was to process information.

*Investment 2: Sales.* One task was collecting information about the corporation's customers. A large and efficient production facility, after all, is valuable only if its immense output can be sold. This required a disciplined, intelligent, and well-trained sales force. The sales force was the eyes, ears, and voice of the corporation for its customers, in a period when orders, invoices, and payments were processed by hand or typed.

*Investment 3. Coordination.* The corporation also needed to create a management and clerical team that coordinated sales and production decisions and accounted for every order, invoice, and item in inventory. Within

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1970s. He attributed this longevity to three complementary investments:

*Investment 1: Production.* The first investment was in a large, scale-economy production facility. Typically, the scale of this plant was substantially larger than its competitors', enabling substantially cheaper production and larger profits. In several cases, a few plants accounted for a substantial fraction of the industry's total capacity. Of course, this physical investment was not easily expropriated by employees of the firm. One cannot easily imagine a disgruntled group of managers resigning en masse and taking with them an oil-refining complex or a section of railroad, complete with trains!

This physical investment was buttressed by additional investments

the extended bureaucratic hierarchy of the great corporation, accurate financial and operational data were crucial to permitting individual units to act autonomously while remaining accountable to the firm as a whole. It also enabled management to identify problems promptly, allocate resources overall, and plan for future ventures. This coordinating mechanism was the nervous system of the great industrial corporation.

Chandler showed that these three complementary investments formed a barrier to entry that few potential entrants could surmount. One way of articulating Chandler's argument is that the sales force and coordinating management protected the production facility investment

against technological innovation. For example, suppose a new technological innovation made a market leader's production facility obsolete. Before an entrant could take full advantage of the innovation, it would have to build up a sales force and management bureaucracy, an expensive and time-consuming affair. In the intervening time, the incumbent could usually duplicate the innovation and keep most of the business for itself.<sup>2</sup>

One example Chandler gives is the Standard Oil Company, whose Cleveland refineries in 1870 were the largest in the world. Standard Oil's large volume enabled it to garner special deals from railroads and to develop an alliance of oil refiners that controlled much of the kerosene output of the U.S. To break the power of the Standard Oil alliance, crude-oil producers set up the rival Tidewater Oil Company with new technology: Tidewater built a huge pipeline from northwest Pennsylvania to Bayonne, New Jersey, where the company eventually built a massive refinery. But the Standard Oil alliance was able to maintain overall dominance of the kerosene market because of its greater organizational capabilities. It constructed its own pipeline, even though doing so required an investment 10 times its previous capitalization, and built new, even larger refineries because it maintained its domination over kerosene sales. Indeed, Tidewater was dependent on Standard Oil to market Tidewater's kerosene in Europe.

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<sup>2</sup> The existence of entry barriers did not imply, of course, complete freedom from failure for the incumbent. A large corporation could fail to take advantage of its market position and ignore rather than adopt and improve upon rivals' innovations. Indeed, Ford Motor Company failed to follow General Motors' market segmentation strategy for over two decades and might well have disappeared. But the very fact that Ford could turn itself around after World War II is testimony to the great stability of large corporations during most of this period.

As Chandler laconically puts it, "Not surprisingly, Tidewater soon came under the financial control of Standard Oil."<sup>3</sup>

Although challengers to the market leaders did appear, the number of players in many industries where these barriers to entry existed remained small, and there was little turnover among the leaders. The corporations that led industries in 1890 or 1915 often still led them in 1975. As these corporations grew — as Standard Oil grew from kerosene to gasoline, as Ford grew from Model Ts to Tauruses, and as DuPont grew from gunpowder to synthetics — so did their corporate and sales staffs.<sup>4</sup>

In addition, corporate managers developed a new professional attitude. In discussing the development of the railroads, Chandler noted that "because of the special skills and training required and the existence of a managerial hierarchy, the railroad managers came to look on their work as much more of a lifetime career than did the plantation overseer or the textile mill agent."<sup>5</sup>

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<sup>3</sup> See Chandler, *Scale and Scope*, p. 95.

<sup>4</sup> Alfred Chandler's vision of the rise of the American corporation remains the central academic interpretation. While Chandler's work has been criticized, it has largely stood the test of time, and most of the critiques to date have modified rather than overthrown its basic themes. See, for example, Louis Galambos's review article on "The U.S. Corporate Economy in the Twentieth Century," and its bibliographic note, in the *Cambridge Economic History of the United States*.

Some economic historians have emphasized the role of government in helping maintain and develop the market power of the great industrial corporations. In this view, government regulation of public utilities and transportation, as exemplified by the regulated monopoly of the Bell System, provided crucial support for the large industrial corporation. But government regulation itself is likely to stifle productivity rather than enhance it. We have to turn to Chandler to understand why the large industrial corporations grew and were able to sell aggressively in competitive world markets.

<sup>5</sup> See Chandler, *The Visible Hand*, p. 87.

As corporations became arenas for professional advancement, the career concerns of management bent the interests of the corporation toward corporate stability. Indeed, in the 1960s and 1970s, as Gordon Donaldson has written, "The essence of the corporate mission ... at many ... companies of that day was the concept of the individual corporation

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as an independent and self-sustaining economic and financial entity within which all primary constituent interests, including shareholders, could fulfill their economic objectives. Growth, diversification, and a higher degree of independence from the public capital markets were essential ingredients of long-term economic self-sufficiency."<sup>6</sup> In that era in which diversification of shareholders was still limited, reducing corporate risk was often seen as valuable to the shareholders as well as to employers.

Donaldson also noted another aspect that characterized the corporation then: "Jobholders at all levels have traditionally looked to the individual corporation as the source of their lifetime economic welfare. It was an expectation to be encouraged, since an unconditional commitment from

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<sup>6</sup> See Donaldson, *Corporate Restructuring*, p. 23.

the workforce served the best interest of corporate leadership.”<sup>7</sup>

### THE RISE OF THE CHANDLERIAN WORKERS: CLERKS, MANAGERS, AND CREATORS

Until about 1980, the continuing rise of the industrial state required an increasing proportion of information processing workers because, until then, office information remained expensive to automate. From 1900 to 1980, as mass production spread over the American economy, the sales and clerical workforce rose from being a relatively minor component of American employment to one of the largest: from 7.5 percent of total employment to 27.3 percent, about 2.5 percentage points a decade (Figure 1). By comparison, agricultural workers (including farmers and farm managers) represented 37.5 percent of the workforce in 1900, while blue collar workers (craft workers, operatives, and laborers) represented 35.8 percent of the workforce in that year. By 1980, agricultural workers had nearly disappeared, falling to 2.9 percent of the workforce, and blue collar workers, while remaining comparatively unchanged, still fell to 31.2 percent of the workforce.

Corporate managers also increased substantially as a proportion of the workforce, rising from 5.8 percent of total employment to 10.3 percent over the same period (Figure 1). Management during this period was self-confident, foresighted, and autonomous to an extent almost unheard of today. Managing a firm was by no means easy: Leaders such as A.P. Sloan of General Motors and Thomas Watson of IBM ran their firms during the uncertainties and difficulties of the Great Depression and World War II. But despite these difficulties, the

large industrial corporation assumed a magisterial, almost immortal stature. Managers climbed the corporate bureaucracy secure in the knowledge that whether they as individuals won or lost in the corporate game, the positions at the top would remain to be handed down by the incumbents.

#### Creativity on a Tight Leash.

Of course, corporations had to develop new products, with all the risks that doing so entailed. But their competition tended to come from their peers — other incumbent large corporations — rather than from smaller firms. Competition among incumbents meant that each firm had to be solicitous of its existing stable of products. New product introduction was generally orderly, so as not to excessively cannibalize currently profitable products.

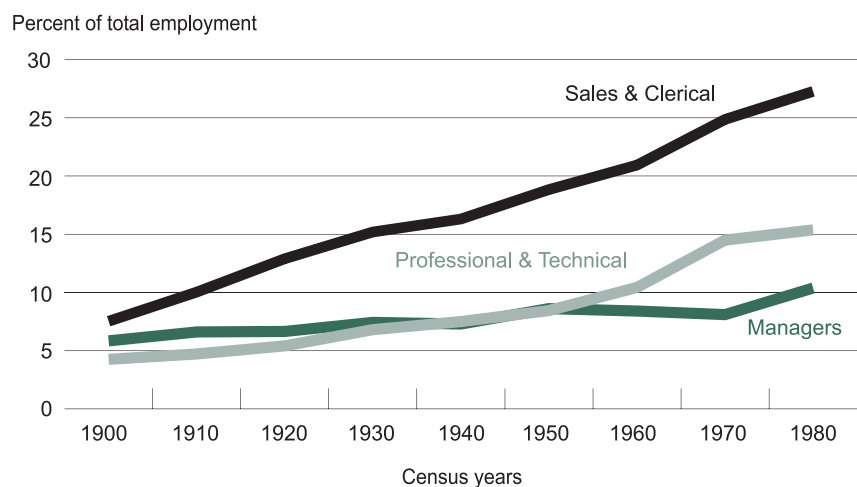
Who created these new products? The occupations most directly concerned with creativity include engineers, scientists (including

computer systems analysts and scientists), and writers, artists, entertainers, and athletes. These workers, whom I call creative workers, are most closely associated with research and development (R&D), software, design, the arts, and the media. Between 1900 and 1980, creative workers as a proportion of the workforce base rose faster than either the sales force or management segments, quintupling from 0.7 percent to 3.8 percent.

But creative workers were not the masters of this world; managers were. If new products came into conflict with existing products, the new products gave way, and the existing products remained. During most of this period, creative employees generally found it difficult to strike out on their own because the manufacturing plants, distribution systems, and their corporate bureaucracies were crucial to bringing new products rapidly to market.

FIGURE 1

**From 1900 to 1980, sales and clerical workers rose from 7.5% to 27.3% of all workers (2.5 percentage points per decade)**



Source: U.S. Census, Employment by Occupation, 1900-1980.

<sup>7</sup>Donaldson, p. 25.

A clear example of the corporation's control over creativity is the annual model changeover instituted by General Motors as a means of maximizing profitability. General Motors orchestrated the rate of change of models in terms of styling and technological progress, introducing technological innovations in its top-of-the-line cars and bringing them, over time, to its entire product line. The phrase "planned obsolescence," which was widely used in the 1950s, described a sales effort to encourage drivers to trade in their cars for the latest model and bespoke the corporation's control over the rate of technological change.

In this ancien régime of the stable corporation, creators were neither as important to corporate profits nor as much of a threat as they would soon be. The great industrial corporations performed most of the private research and development in the U.S. Creativity was leashed, and the managers were in control.

In the 1970s, however, distribution channels began changing more rapidly, as information processing became increasingly automated. Advances in electronics began to out-mode many of the roles of information workers. An indication of the changing usefulness of electronics is that from 1977 to 1985, business investment in computers rose abruptly in economic importance. This was associated with the deployment of PCs, minicomputers, and video terminals, which increasingly permitted the processing, transfer, and storage of information with little or no human intervention. Computer purchases rose from 0.3 percent of GDP to 0.8 percent (Figure 2). This was the starting point of the computer's becoming — through its remarkable technological progress — ubiquitous. The proportion of the U.S. economy's resources used to produce computers has remained roughly at this level ever since 1985.

## THE RISE OF COMPUTERS AND THE DECLINE OF THE TYPING POOL: 1977 TO 2002

In the wake of this eruption of expenditure on computer hardware, the growth of sales and clerical employment slowed dramatically. Some occupations, such as typists, began to decline absolutely. If the trend in the growth of the number of clerks established from 1900 to 1980 had continued to the end of the century, these workers would have been 32.5 percent of the workforce. Instead, sales and clerical workers were 25 percent of the workforce, less than the 27.3 percent in 1980 (Figure 3).<sup>8</sup>

In short, the electronics revolution of the 1970s made large chunks of the existing corporate bureaucracy

<sup>8</sup> These data are based on the U.S. Bureau of Labor Statistics' 1990 system for categorizing occupations. In the 2000 census, a new system was used, which raised the proportion of sales and clerical workers by about 1 percentage point.

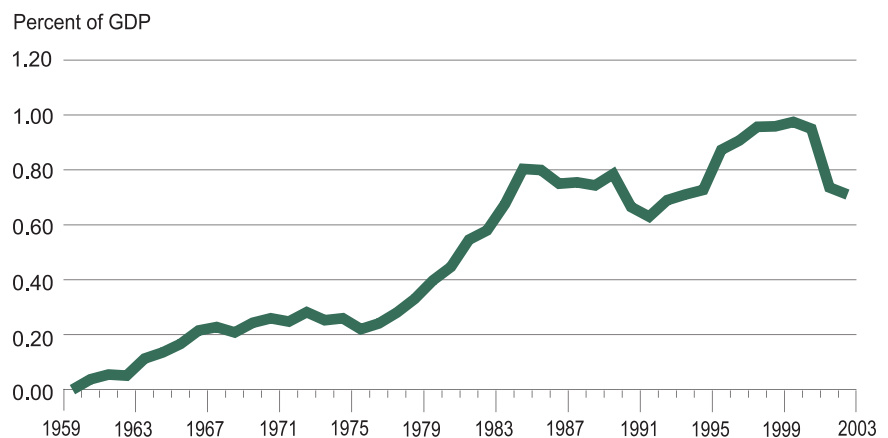
obsolete. The investment that corporations had made in these information systems was sharply devalued. The automation of information meant that new entrants could far more easily enter markets, particularly if they had technology that could surpass that of the existing market leader.

For example, the size of stores and the number of different items on their shelves increased substantially because it became easier for store managers to track sales and inventory, to change prices, and to order new stock.<sup>9</sup> Indeed, tracking sales and ordering

<sup>9</sup> To give one example, variety at the average supermarket accelerated in 1980s and 1990s (see my 1999 article). Items per store in grocery supermarkets surveyed in *Progressive Grocer* magazine rose 2.7 percent annually from 1960 to 1970 and 1.8 percent annually from 1970 to 1980. By contrast, from 1980 to 1990, items per store rose 5.8 percent annually, and from 1990 to 1994, 4.4 percent annually. With the stores providing more space, the rate of innovation accelerated. Annual new product introductions in grocery categories rose from 1,365 in 1970 to 2,689 in 1980 to 13,244 in 1990.

### FIGURE 2

## Investment in Computers Surged from 1977 to 1985\*



\*Gross private investment in computers, nominal

Source: U.S. Bureau of Economic Analysis

fresh stock could increasingly be done at the national level. That, in turn, implied less need for a manufacturer to send sales workers to individual stores: A sales pitch at the retailer's corporate headquarters could stand in for a hundred visits to store managers. And that might give a new manufacturer access to consumers in numbers near those of an established industrial giant.

Microsoft routed IBM from the market for personal computer software despite the fact that IBM had as many as 400,000 employees in the mid-1980s, while Microsoft had fewer than 2,000 as late as the end of 1987. Microsoft did not suffer the fate of the Tidewater Oil Company: Its lack of an extensive corporate bureaucracy and sales force did not prevent it from selling to millions of consumers. Of course, the Internet has further expanded small firms' ability to rapidly seize markets with new products.

Consequently, many large industrial corporations whose sales and clerical workforce had become outmoded by the electronics revolution have found themselves besieged by sharply increased competition. The workforce that had been a barrier to entry could actually impair the corporation's ability to resist entry by a superior product, since laying off or retiring the now-redundant workers is typically an expensive and disruptive process. Naomi Lamoreaux, Daniel Raff, and Peter Temin have also written about the decline of the Chandlerian corporation in this period, emphasizing the inability of these corporations to change rapidly in response to these new conditions.

As these natural barriers to entry were falling, artificial barriers such as tariffs and government regulation were also being reduced. Globalization has increased foreign competitors' ability to enter our markets and, at the same time, has increased the value of new products by widen-

ing the potential market for them. Deregulation has reduced or removed government protection of monopoly power. Telecommunications, trucking, airlines, banking, electric utilities, and pharmaceutical companies have been subject to changes in regulation that have increased competition.

In principle, globalization could have increased the power and stability of large industrial corporations, as the global reach of their marketing expanded. In practice, the great industrial corporations did not fare well. GM, Ford, and Chrysler found their market successfully invaded by Japanese and German competitors. Xerox, IBM, Kodak, Caterpillar, U.S. Steel, AT&T — icons of American industry — all lost their once-solid grips on their core markets.

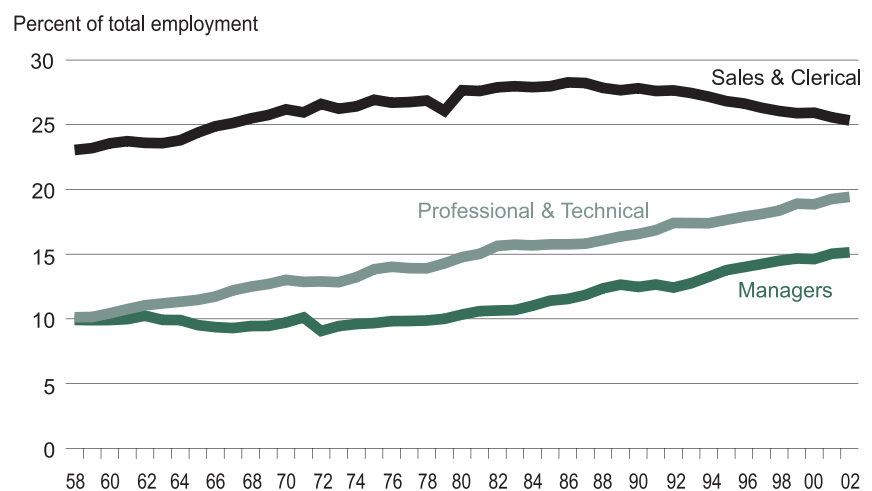
McKinsey management consultant Tom Peters had been a follower of Chandler in 1982, arguing in his bestseller *In Search of Excellence* (written with Bob Waterman) that the large industrial corporation could

be successful as long as its sales force enabled it to pay close attention to its customers. But the very corporations that Peters held up as models of excellence in 1982 stumbled badly as the decade progressed. As the great industrial corporations revealed feet of clay, Peters turned apostate in 1987, proclaiming in the introduction to his new bestseller *Thriving on Chaos* (p.3), "There are no excellent corporations."

**Increasing Competition Means Increased Risk.** As the large industrial corporation lost its ability to defend its markets, creativity became the new key to profitability. But innovations are very risky. A very few have extraordinarily large returns, while most others have little or no value. F.M. Scherer and Dietmar Harhoff have shown this for a variety of groups of patented and licensed products in Germany and the U.S. One new data set they constructed is based on corporate estimates of the value of patents originating in Germany and the United States. They studied a sample

**FIGURE 3**

**Sales and clerical worker growth slowed in the late 1970s and began to decline in the late 1980s**



Source: U.S. Bureau of Economic Analysis

of patents filed in Germany in 1977, all of which had sufficient value to warrant paying 16,000 deutsche marks (roughly \$13,000 in today's dollars) in annual renewal fees until the patents' expiration at full term in 1995. Scherer and Harhoff asked the corporations that had owned the patents what the total value of the patents had been during their lifetimes. Of the more than 600 patents originating in Germany, they found that the most valuable five patents made up 54 percent of the total value of the entire group of patents. And the top 60 patents made up 80 percent. With innovations so risky, the corporate pursuit of innovation as the main source of profit implies more risk for the corporation.

Further evidence of the riskiness of creativity comes from research on its impact on future earnings arising from R&D expenditures. S.P. Kothari, Ted Laguerre, and Andrew Leone showed that from 1972 to 1997, R&D investments generated future earnings that were three times as uncertain as investments in plant and equipment; investments in advertising were about as risky as investments in plant and equipment.<sup>10</sup>

As competition to produce innovations has accelerated, corporations have faced increased individual risk, as reflected in the stock market volatility of corporate share prices. Financial analysts distinguish the risks that are faced by individual firms separately from general economic or market conditions ("idiosyncratic" risks), such as the failure of individual products or brands, and risks, such as interest-rate changes, that are common to the entire stock market ("aggregate" risk) and to all firms within a

given industry ("industry" risk). John Campbell and co-authors documented that idiosyncratic corporate risk rose substantially relative to market and industry risk. During the period they examined (1962 to 1997), overall market risk increased very little. But when the risk of individual shares is broken out into aggregate risk, industry risk, and idiosyncratic firm risk, it is evident that idiosyncratic risk rose substantially after 1980. Thus, it appears that the heightened competition between corporations translated directly into heightened risk for the individual corporation. This heightened risk has a direct consequence: Hedging idiosyncratic risk requires more diversification. Through the 1970s a portfolio of

article. This tendency, in turn, may be due to improved financial markets that can provide firms with good access to capital despite heightened risk. Shareholders, being more diversified, could afford to ignore the heightened risk of individual corporations.

#### **CORPORATE AMERICA ADJUSTS TO GREATER RISK**

How did this heightened risk affect corporate management? Recent research suggests one consequence: In recent years, boards of directors and block shareholders more frequently either forced out the existing chief executive or replaced the chief executive with a new leader drawn from outside the corporation.

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20 stocks was considered big enough to diversify away most idiosyncratic risk. By the early 1990s, that was no longer true; instead, Campbell and co-authors found that it took 50 stocks to achieve the same benefits of diversification. On the other hand, this greater risk to the individual corporation appears to have gone hand in hand with investors' increasing familiarity with mutual funds that enabled stock market investors to inexpensively diversify their holdings.

Some of this increased risk may well be due to the riskiness of creativity. The authors also suggest that some of this risk may be due to changes in corporate governance. There has been a strong tendency over the past two decades to break up conglomerates and replace them with firms that specialize in a given industry, as described in Mitchell Berlin's

**Heightened Risk for Managers.** Mark Huson, Robert Parrino, and Laura Starks documented the rise of forced turnover and outsider succession from 1971 to 1994. In their data on leaders of major corporations, the proportion of involuntary turnovers among corporate chief executive officers rose from 10 percent (1971-76) to 23 percent (1989-94). Similarly, successions in which outsiders were appointed chief executive officer rose from 15 percent (1971-76) to 30 percent (1989-94). When an outsider becomes CEO, the corporate board is failing to use this ultimate promotion as a reward for current managers, thus expressing a lack of faith in existing management.

Did this change occur because shareholders have become more demanding of corporations?

<sup>10</sup> They measure uncertainty of future earnings by using the standard deviation of after-tax corporate profits in the five years after the investment.

There is no doubt that the rise of institutional management of pensions and mutual funds and other large pools of investment funds, including those of corporate raiders, has made the typical shareholder more mobile, less concerned with the stability of individual shares, and more concerned with market risk-adjusted rates of return. However, Huson and co-authors showed that this rise does not appear to have been driven by changes in corporate governance or the intensity of the takeover market. Instead, it appears that corporate risk — profit slowdowns and stock declines — was the driving factor.

Thus, it appears that corporate leaders more often were viewed as failing to maximize the corporation's value in the intense competition that developed over the course of the 1980s and 1990s. The intense competition apparently made corporate boards believe that the right CEO was a rare individual and not necessarily one who could be found within the ranks of the corporation itself.

In addition, directors and shareholders may believe that only an outsider can carry out the successful restructuring of a corporation. If, for example, a corporation needs to dispose of core parts of the business, an insider may be too loyal to the past vision of the corporation to take the necessary steps quickly enough for corporate survival.

**Structural Change in the Corporation.** Another reaction to heightened risk was that top managers became busier. The corporate hierarchy has tended to flatten out, with more managers reporting directly to the chief executive officer. Raghuram Rajan and Julie Wulf documented that corporations became flatter between 1986 and 1999. By 1999, the average chief executive officer had more positions reporting directly: on average, 7.2 positions, up from 4.4 in 1986. Thus,

it appears that the CEO now has more day-to-day responsibilities. In keeping with this, fewer layers intervene between the CEO and division heads (the lowest managers with profit center responsibility), and the average firm has shed more than one layer. This circumstance does not reflect larger divi-

less to gain by defection because their post-defection working life is short. If creative workers need their managers to cooperate with them in a startup to rival the original firm, flattening may help prevent departures by making the CEO and senior managers too important a part of each team to make

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sions (divisions shrank in size) or more employees in the corporation (the average remained roughly constant). Rajan and Wulf argue that this represents firms with more human capital than physical capital. One interpretation is that it reflects a switch from the Chandlerian corporation to a more creative and competitive environment. A free and rapid flow of ideas into action has become more important. A world of intense competition in new products is a world in which the pressure to bring a new product to market before one's rivals may require a leaner corporation.

**More Expropriability?** Another reason that corporations may have become flatter is that creativity is more expropriable than hardware. In the ancien régime of the Chandlerian corporation, which was centered on physical investment in a production facility, this type of expropriation was difficult to achieve.

Rajan and Luigi Zingales argue that pieces of the corporation may break off and compete against the original corporation: A middle manager can leave the firm and take subordinates along. But age is a counterweight to defections: Senior managers have

departures tempting. While Rajan and Zingales have emphasized the organizational changes that accompany a shift away from physical capital to human capital, George Mailath and Andrew Postlewaite highlight a counteracting force that limits employees' ability to defect or to threaten defection in a firm where a large share of assets are intangible. They argue that it may be difficult for employees to coordinate their defection when the number of employees needed for a successful defection is large.

The reduction in the number of layers in the corporation and the rise in the number of individuals reporting to the chief executive officer imply more work day-to-day for the CEO than formerly. The corporate CEO has less time to focus on very long-term corporate issues. But this may not be such a great loss in a world that, because it is rapidly changing, may be less predictable.

### A FRESH WIND FOR CAPITALISM?


I have argued that the rise of computers in the 1970s made life riskier for the large industrial corporation. The result has been more entry



by smaller firms, more new product competition, and compelling vitality for the U.S. economy. The cost has been that life at the top within the large corporation has become tougher: riskier, faster, busier. Corporate hierarchies have flattened, and CEOs spend more time with their division heads and perhaps less time contemplating the long view.

Corporate executives are being treated as if their decisions mattered much more to corporate profitability and are being held accountable accordingly. The talent and effort required to successfully run a corporation may well have risen substantially. In such circumstances, it would be surprising if corporate salaries were not rising to compensate for the height-

ened demands and shortened careers.

All this implies greater conflict in the relationships among shareholders, boards of directors, and top corporate officers. Recent episodes of corporate wrongdoing may be a symptom of uneven progress toward new institutional structures. 

## REFERENCES

Berlin, Mitchell. "Jack of All Trades? Product Diversification in Nonfinancial Firms," Federal Reserve Bank of Philadelphia *Business Review*, May/June 1999.

Bils, Mark, and Peter Klenow. "The Acceleration in Variety Growth," *American Economic Review* 91, May 2001, pp. 274-80.

Campbell, John Y., Martin Lettau, Burton G. Malkiel, and Yexiao Xu. "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk," *Journal of Finance* 56, 2001, pp. 1-43.

Chandler, Alfred. *The Visible Hand: The Managerial Revolution in American Business*. Cambridge, Mass.: Harvard University Press, 1977.

Chandler, Alfred. *Scale and Scope: The Dynamics of American Capitalism*. Cambridge, Mass.: Harvard University Press, 1990.

Donaldson, Gordon. *Corporate Restructuring: Managing the Change Process from Within*. Boston: Harvard Business School Press, 1994.

Galambos, Louis. "The U.S. Corporate Economy in the Twentieth Century," in Stanley L. Engerman and Robert E. Gallman, (eds.), *The Cambridge Economic History of the United States, Vol. III: The Twentieth Century*. Cambridge, UK: Cambridge University Press, 2000, pp. 927-67.

Huson, Mark R., Robert Parrino, and Laura T. Starks. "Internal Monitoring Mechanisms and CEO Turnover: A Long-Term Perspective," *Journal of Finance* 56, December 2001, pp. 2265-97.

Jackson, Tim. *Inside Intel*. New York: Dutton, 1997.

Kothari, S.P., Ted E. Laguerre, and Andrew J. Leone. "Capitalization Versus Expensing: Evidence on the Uncertainty of Future Earnings from Capital Expenditures Versus R&D Outlays," *Review of Accounting Studies*, 7, 2002, pp. 355-82.

Lamoureaux, Naomi R. *The Great Merger Movement in American Business, 1895-1904*. Cambridge, UK: Cambridge University Press, 1988.

Lamoreaux, Naomi R., Daniel M. G. Raff, and Peter Temin, "Beyond Markets and Hierarchies: Towards a New Synthesis of American Business History," *American Historical Review*, 108 (April 2003), pp. 404-33.

Mailath, George J., and Andrew Postlewaite, "Workers Versus Firms: Bargaining Over a Firm's Value," *Review of Economic Studies*, 57, July 1990, pp. 369-80.

Nakamura, Leonard. "The Measurement of Retail Output and the Retail Revolution," *Canadian Journal of Economics* 32, April 1999, pp. 408-25.

Nakamura, Leonard. "Economics and the New Economy: The Invisible Hand Meets Creative Destruction," Federal Reserve Bank of Philadelphia *Business Review*, July/August 2000.

Peters, Tom. *Thriving on Chaos*. New York: Knopf, 1987.

Peters, Tom. *Liberation Management*. New York: Knopf, 1992.

Rajan, Raghuram G., and Julie Wulf. "The Flattening Firm: Evidence from Panel Data on the Changing Nature of Corporate Hierarchies," mimeo, March 2003.

Rajan, Raghuram G., and Luigi Zingales. "The Firm as a Dedicated Hierarchy: A Theory of the Origins and Growth of Firms," *Quarterly Journal of Economics*, 116, August 2001, pp. 805-951.

Scherer, F.M., and Dietmar Harhoff. "Technology Policy for a World of Skew-Distributed Outcomes," *Research Policy*, 29, 2000, pp. 559-66.

Sloan, Alfred P., Jr. *My Years with General Motors*. New York: Doubleday, 1990.