
The US stock market and the governance of innovative enterprise*

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During the 1980s and 1990s, the argument that “maximizing shareholder value” results in superior economic performance came to dominate the corporate governance debates. This shareholder-value perspective represents an attempt to construct a theory of corporate governance that is consistent with the neoclassical theory of the market economy. I outline the rationale for the shareholder-value perspective, and show that, rooted in agency theory, it lacks a theory of innovative enterprise. To go beyond agency theory and its shareholder-value perspective, I present a framework for analyzing the functions of the stock market in the business corporation and the influence of these functions on the innovation process. I then apply this framework to the experience of the US ICT industries over the past decade to consider empirically the influences of the five functions of the stock market—summarized as “creation,” “control,” “combination,” “compensation,” and “cash”—on innovative enterprise in US high-technology industries. In the conclusion, I draw out the implications of the changing functions of the stock market for the governance of innovative enterprise.

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1. Innovative enterprise and “shareholder value”

In all of the richest economies, business corporations are repositories of large, and in many cases vast, quantities of resources over which corporate managers, rather than markets, exercise allocative control. Indeed, it can be argued that corporate control, as distinct from market control, of resource allocation represented the defining institutional characteristic of 20th century capitalist economies (Chandler, 1977, 1990). Whereas neoclassical economic theory maintains that markets should allocate resources to achieve superior economic performance, the actual pervasiveness of corporate control over resource allocation demands a theory of the ways in which corporate governance affects economic performance.

During the 1980s and 1990s, the argument that “maximizing shareholder value” results in superior economic performance came to dominate the corporate governance debates. This shareholder-value perspective represents an attempt to construct a theory of corporate governance that is consistent with the neoclassical theory of the market economy. Like the theory of the market economy, however, the shareholder-value perspective lacks a theory of innovative enterprise (O’Sullivan, 2000; Lazonick, 2003b, 2007b). Yet, economic development depends on innovation. The result is that, as I argue in this article, the shareholder-value perspective on corporate governance fails to comprehend how and under what conditions the corporate allocation of resources can contribute to stable and equitable economic growth.

In Section 2 of this article, I outline the rationale for the shareholder-value perspective, and show that it lacks a theory of innovative enterprise. In Section 3, I provide a critique of the shareholder-value perspective based on the ways in which an innovative corporate economy actually operates. In Section 4, I outline an approach to analyzing the functions of the stock market in the business corporation and the influence of these functions on the innovation process as well as on stock-market valuations through a combination of innovation, speculation, and redistribution. In Sections 5 through 9, I draw on the experience of the US information and communications technology (ICT) industries to consider empirically the influences of the five functions of the stock market—summarized as “creation,” “control,” “combination,” “compensation,” and “cash”—on innovative enterprise in US high-technology over the past decade. In the conclusion, I draw out the implications of the changing functions of the stock market for the governance of innovative enterprise to achieve stable and equitable growth in the US economy of the 2000s.

2. Maximizing shareholder value

For adherents of the theory of the market economy, “market imperfections”—for example, “asset specificity” in the work of Oliver Williamson (1985, 1996)—necessitate managerial control over the allocation of resources, thus creating an

“agency problem” for those “principals” who have made investments in the firm. The agency problem derives from two limitations, one cognitive and the other behavioral, on the human ability to make allocative decisions. The cognitive limitation is “hidden information” (also known as “adverse selection” or “bounded rationality”) that prevents investors from knowing *a priori* whether the managers whom they have employed as their agents are good or bad resource allocators. The behavioral limitation is “hidden action” (also known as “moral hazard” or “opportunism”) that reflects the proclivity, inherent in an individualistic society, of managers as agents to use their positions as resource allocators to pursue their own self-interests and not necessarily the interests of the firm’s principals. These managers may allocate corporate resources to build their own personal empires regardless of whether the investments that they make and the people whom they employ generate sufficient profits for the firm. They may hoard surplus cash or near-liquid assets within the corporation, thus maintaining control over uninvested resources, rather than distributing these extra revenues to shareholders. Or they may simply use their control over resource allocation to line their own pockets. According to agency theory, in the absence of corporate governance institutions that promote the maximization of shareholder value, one should expect managerial control to result in the inefficient allocation of resources.

The manifestation of a movement toward the more efficient allocation of resources, it is argued, is a higher return to shareholders. But, why is it shareholders for whom value should be maximized? Why not create more value for creditors by making their financial investments more secure, or for employees by paying them higher wages and benefits, or for communities in which the corporations operate by generating more tax revenues? Neoclassical financial theorists argue that among all the stakeholders in the business corporation only shareholders are “residual claimants.” The amount of returns that shareholders receive depends on what is left over after other stakeholders, all of whom it is argued have guaranteed contractual claims, have been paid for their productive contributions to the firm. If the firm incurs a loss, the return to shareholders is negative, and vice versa.

By this argument, shareholders are the only stakeholders who have an incentive to bear the risk of investing in productive resources that may result in superior economic performance (O’Sullivan, 2000, 2002). As residual claimants, moreover, shareholders are the only stakeholders who have an interest in monitoring managers to ensure that they allocate resources efficiently. Furthermore, by selling and buying corporate shares on the stock market, public shareholders, it is argued, are the participants in the economy who are best situated to reallocate resources to more efficient uses. The agency problem—the fact that public shareholders as the (purported) “principals” who bear risk are obliged to leave the corporate allocation of resources under the control of managers as their “agents”—poses a constant threat to the efficient allocation of resources.

Within the shareholder-value paradigm, the stock market represents the corporate governance institution through which the agency problem can be resolved and the efficient allocation of the economy's resources can be achieved. Specifically, the stock market can function as a "market for corporate control" that enables shareholders to "disgorge"—to use Michael Jensen's evocative term—the "free cash flow." As Jensen (1986: 323), the leading academic proponent of maximizing shareholder value, put it in a seminal 1986 article:

Free cash flow is cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital. Conflicts of interest between shareholders and managers over payout policies are especially severe when the organization generates substantial free cash flow. The problem is how to motivate managers to disgorge the cash rather than investing it at below cost or wasting it on organization inefficiencies.

How can those managers who control the allocation of corporate resources be motivated, or coerced, to distribute cash to shareholders? If a company does not maximize shareholder value, shareholders can sell their shares and reallocate the proceeds to what they deem to be more efficient uses. The sale of shares depresses that company's stock price, which in turn facilitates a takeover by shareholders who can put in place managers who are willing to distribute the "free cash flow" to shareholders in the forms of higher dividends and/or stock repurchases. Better yet, as Jensen (1986: 324) argued in the midst of the 1980s corporate takeover movement, let corporate raiders use the market for corporate control for debt-financed takeovers, thus enabling shareholders to transform their corporate equities into corporate bonds. Corporate managers would then be "bonded" to distribute the "free cash flow" in the form of interest rather than dividends. Additionally, as Jensen and Murphy (1990), among others, contended, the maximization of shareholder value could be achieved by giving corporate managers stock-based compensation, such as stock options, to align their own self-interests with those of shareholders. Then, even without the threat of a takeover, these managers would have a personal incentive to maximize shareholder value by investing corporate revenues only in those "projects that have positive net present values when discounted at the relevant cost of capital" (Jensen 1986: 323), and distributing the remainder of corporate revenues to shareholders in the forms of dividends and/or stock repurchases.

3. A critique of the shareholder-value perspective

During the 1980s and 1990s, "maximizing shareholder value" became the dominant ideology for corporate governance in the United States, and, through a variety of institutional channels, gained acceptance around the world. Top managers of US

industrial corporations became ardent advocates of this perspective; quite apart from their ideological predispositions, the reality of their stock-based compensation inured them to “maximizing shareholder value” (Lazonick and O’Sullivan, 2000a). According to one study, the value of stock options accounted for 19% of CEO compensation in large US corporations in 1980, but 48% in 1994 (Hall and Leibman, 1998: 661). A more recent study of CEO remuneration in S&P500 companies found that average compensation in 2003 dollars rose from \$3.5 million in 1992 to a peak of \$14.8 million in 2000, declining to \$8.7 million in 2003 (Jensen *et al.*, 2005: 33). The value of stock options accounted for 28% of this pay in 1992, 49% in 2000, and 38% in 2003. Of the change in pay from 1992 to 2000, 10.5% came from salaries, 15.4% from bonuses, and 56.7% from stock options. Of the decline in pay from 2000 to 2003, 14.1% came from salaries, 11.2% from bonuses, and 65.0% from stock options. It has been estimated that, largely as a result of gains from the exercise of stock options, the ratio of the pay of CEOs of major US corporations to that of the average worker increased from 42:1 in 1980 to 85:1 in 1990 to 531:1 in 2000 (Dash, 2006). Notwithstanding the less ebullient stock markets that prevailed in the first half of the 2000s, this ratio stood at 411:1 in 2005.¹

The long stock market boom of the 1980s and 1990s combined with the remuneration decisions of corporate boards to create this bonanza for corporate executives. During the decade of the 1970s, the stock market had languished, and inflation had eroded dividend yields. In the 1980s and 1990s, however, high real yields on corporate stock characterized the US corporate economy. As can be seen in Table 1, these high yields came mainly from stock-price appreciation as distinct from dividends yields, which were low in the 1990s despite high payout ratios.

As a whole, US corporations were not skimping on dividends in the 1980s and 1990s. It is simply that when a company’s stock price increases, its dividend yield—the amount of dividends paid out as a percentage of the stock price—will fall unless the amount of dividends increases proportionately. In the 1980s, dividends paid out by US corporations increased by an annual average of 10.8%, while after-tax corporate profits increased by an annual average of 8.7%. In the 1990s, these figures were 8.0% for dividends (including an absolute decline in dividends of 4.0% in 1999, the first decline since 1975) and 8.1% for profits. The payout ratio—the amount of dividends as a percentage of after-tax corporate profits (with inventory evaluation and capital consumption adjustments)—averaged 48.4% in the 1980s and 56.5% in the 1990s compared with 38.8% in the 1960s and 41.3% in the 1970s. In 2000–2005, the payout ratio was 61.5% (US Congress 2007, B-90).

High stock yields reflected a combination of three distinct forces at work in the US corporate economy: (i) *redistribution* of corporate revenues from labor incomes to

¹<http://www.aflcio.org/corporatewatch/paywatch/pay/index.cfm> (accessed March 30, 2007).

Table 1 US corporate stock and bond yields, 1960–2006

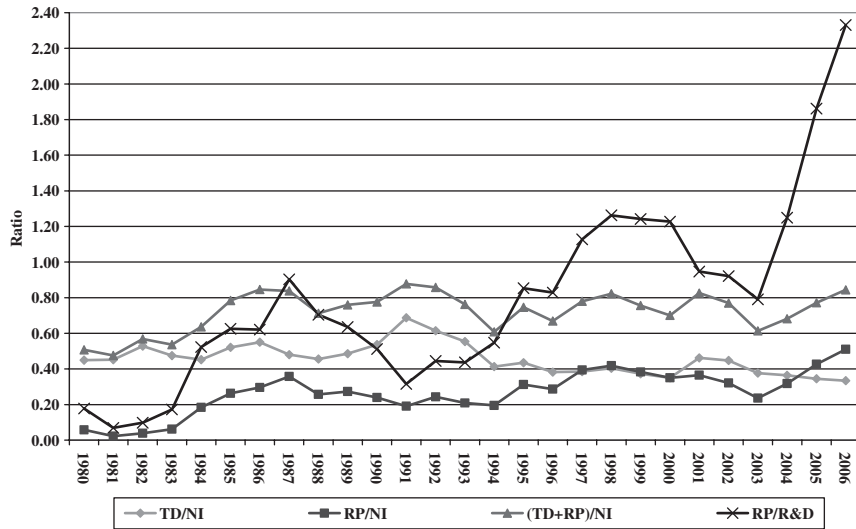
	1960–1969	1970–1979	1980–1989	1990–1999	2000–2006
Real stock yield	6.63	−1.66	11.67	15.01	−0.58
Price yield	5.80	1.35	12.91	15.54	0.57
Dividend yield	3.19	4.08	4.32	2.47	1.61
Change in CPI	2.36	7.09	5.55	3.00	2.76
Real bond yield	2.65	1.14	5.79	4.72	3.42

Average annual percent change.

Notes: Stock yields are for Standard and Poor's composite index of 500 US corporate stocks (about 75% of which are NYSE). Bond yields are for Moody's Aaa-rated US corporate bonds. *Source:* Updated from Lazonick and O'Sullivan (2000a), using US Congress, Economic Report of the President 2007, Tables B-62, B-73, B-95 and B-96.

capital incomes, especially by older corporations, through a combination of downsizing of the labor force and increased distributions to shareholders in the forms of dividends and stock repurchases; (ii) *innovation*, especially by newer technology companies, that boosted earnings per share; and (iii) *speculation* by stock market investors, encouraged, initially at least, by stock price increases due to the combination of redistribution and innovation. An understanding of these three sources of an ebullient stock market is essential for a critical evaluation of the efficiency claims of the shareholder-value perspective.

Firstly, in the 1980s and 1990s older companies, many with their origins in the late 19th century, engaged in a process of redistributing corporate revenues from labor incomes to capital incomes. Engaging in what can be called a “downsize-and-distribute” allocation regime, these companies downsized their labor forces and increased the distribution of corporate revenues to shareholders (Lazonick and O'Sullivan, 2000a). This allocation regime represented a reversal of the “retain-and-reinvest” regime that had characterized these companies in the post-World War II decades; they had retained corporate revenues for reinvestment in organization and technology, expanding their labor forces in the process. Coming into the 1980s, employees—both managerial personnel and shop-floor workers—had expectations, based on over three decades of experience of “retain-and-reinvest,” of long-term employment with these corporations (Lazonick, 2004, 2007a). Downsizing augmented the so-called “free cash flow” that could be distributed to shareholders. In the early and mid-1980s, this redistribution of corporate revenues often occurred through debt-financed hostile takeovers, favored by the proponents of the “market for corporate control.” Post-takeover downsizing facilitated the servicing and retirement of the massive debt that a company had taken on (Shleifer and Summers, 1988; Blair, 1993).



RP, repurchases; TD, total dividends (common and preferred); NI, net income (after tax with inventory evaluation and capital consumption adjustments); R&D, research and development expenditures.

Source: Compustat database

Figure 1 Repurchases, dividends, net income, and R&D expenditures, 1980–2006 (293 corporations in the S&P500 in October 2007 in operation in 1980).

From the mid-1980s, the distribution of corporate revenues increasingly took the form of corporate stock repurchases, which boosted stock prices, and complemented dividend payments. Figure 1 shows the relation of repurchases to dividends, net income, and R&D expenditures for 1980–2006 for the 293 companies in the S&P500 Index in October 2007 that were in operation in 1980.²

Repurchases as a proportion of net income trended upward over the quarter century, and at the height of the stock-market boom of the late 1990s equalled the sum of common and preferred dividends (with common dividends constituting 93.4% of total dividends in 1980 and 99.1% in 2006). At that time, repurchases for these 293 companies exceeded expenditures on R&D. From 1996 to 2000 while net income rose 57%, dividends 44%, and R&D expenditures 29%, stock repurchases rose 91%. After retracting somewhat in the stock-market downturn of 2001–2002, repurchase activity accelerated among these companies during 2003–2006. This surge in repurchases may have constrained the growth of R&D. From 2003 to 2006, while total repurchases for these 293 companies increased from \$78.8 billion to \$280.8

²For a study with similar results, see Dittmar and Dittmar (2004). According to their data, in 1984 repurchases represented 13.5% of the earnings of US corporations, and dividends 35.8%. In 1997, the amount of repurchases surpassed dividends, and in 1999 repurchases were 35.8% of earnings while dividends were 26.3%.

billion, total R&D expenditures only increased from \$99.7 billion to \$120.4 billion, thus accounting for the dramatic rise in the ratio of repurchases to R&D in recent years displayed in Figure 1.

Second, newer technology companies such as Intel, Microsoft, Oracle, Sun Microsystems, and Cisco Systems experienced significant growth in both revenues and employment during the 1980s and 1990s by means of a “retain-and-reinvest” allocation regime; they retained corporate revenues, paying little if any dividends (although most of them did some stock repurchases), and reinvested earnings in innovative products and processes. In general, both the revenues and employment levels of these companies grew over this period, especially during the 1990s, and these companies were highly profitable (Lazonick, 2006a). By creating new value, innovation boosted a company’s stock price.³ In contrast, by definition, redistribution transfers value from labor incomes to capital incomes, raising the stock price as workers are laid off and as wages and benefits are reduced, with no new value being created.

Third, sophisticated stock market investors recognized that the combination of redistribution and innovation provided a real foundation for stock price increases, and speculated on further upward movements. Other less knowledgeable investors followed suit. Over certain periods (from the fourth quarter of 1985 to the third quarter of 1987, and from the first quarter of 1995 to the third quarter of 2000) speculation became an increasingly important factor in the rise of stock prices. Professional insiders, within corporations and on Wall Street, encouraged and generally gained from this speculation because of the existence of a long queue of unprofessional outsiders who bought shares at inflated prices, implicitly assuming that “greater fools” than themselves remained ready to buy the over-priced shares on the market. At some point, however, the “greatest fools” were left holding these shares, as happened in the fourth quarter of 1987 and, more profoundly, from the fourth quarter of 2000 when stock prices fell precipitously, and the speculation that helped to sustain the longest “bull run” in US stock market history was put to rest.

The “behavioral” school in financial economics has recognized the importance of stock market speculation as a determinant of stock prices, but has not in general embraced the “greater fools” perspective. For example, in a best-selling book published at the height of the Internet boom, financial economist Robert Shiller (2000) characterized the stock market bubble as “irrational exuberance.” Shiller (2000: 18) made the assumption that all players on the stock market,

³For an exemplary statistical study of the relation between innovation (using patent citation data) and the market value (including both equity and debt) of companies, see Hall *et al.* (2005). The framework that I present in this article suggests that considerable insight into the forces that drive the stock market could be derived from a statistical study that seeks to construct measures of innovation (for example, patent citations), speculation (for example, trading volume), and redistribution (for example, stock repurchases) as determinants of market capitalization.

professionals and nonprofessionals, have access to the same information, implying that irrational exuberance was a general phenomena among stock-market investors. Yet the assumption is contradicted by widespread use of inside information by professionals, as revealed in stock-fraud investigations in the aftermath of the Internet crash as well as in documents produced in numerous class action lawsuits by shareholders who bought shares and allegedly lost money because of false information provided by professional insiders. Investigations by the Securities and Exchange Commission have revealed the widespread corporate practices of backdating executive stock option awards to dates at which prices were lower and granting stock options to executives just ahead of “good news” announcements that could be expected to boost the company’s stock price, both of which served to increase the gains of corporate executives from stock options (Lie, 2005; Forelle and Bandler, 2006). Insofar, as insiders have the incentive and ability to manipulate stock market prices in these ways for their own personal gain, their exuberance is anything but “irrational.”

Under the heading, “Cultural Changes Favoring Business Success or the Appearance Thereof,” Shiller (2000: 22–24) recognized, but in my view understated, the incentive that top corporate executives, as the ultimate professional insiders, had to contribute to that speculation, given the importance of stock-based compensation to their pay packages. Ironically, after the crash, Michael Jensen, a leading academic proponent in the 1980s and 1990s of using stock-based compensation to align the interests of managers with shareholders (Jensen and Murphy, 1990), chastised corporate executives for failing to say “no” to Wall Street, as, spurred on by the prospect of greater stock-based compensation, they had taken actions during the boom for the purpose of inflating stock prices (Fuller and Jensen, 2002). Corporate insiders had much to gain, moreover, from the volatile stock market, not only as prices rose but also as they fell; while the outsiders continued to buy, the insiders sold (Gimein *et al.*, 2002).

During the 1980s and 1990s, growing numbers of employees acquired a direct interest in stock price increases as corporate stock became increasingly important as a mode of compensation (Pearl Meyer and Partners, 2002). From the late 1930s, US corporations had granted stock options to top executives, primarily to give them access to a form of compensation that would be taxed at the low capital-gains rate (Lazonick, 2003a). From the 1960s, however, high-tech start-ups based in what would become known as Silicon Valley began to use stock options to lure technical and administrative personnel away from secure careers with established companies, and subsequently to compete for these employees among themselves. By the 1980s and 1990s, broad-based employee stock option plans had become widespread among newer technology companies, and in the late 1990s diffused to many older corporations, not only in the United States but also abroad, that competed for this highly mobile labor (Carpenter *et al.*, 2003; Glimstedt *et al.*, 2006). While top executives continued to get highly disproportionate shares of the stock options that

a company allocated, a broad base of the high-tech labor force, especially in high-tech industries, acquired an interest in corporate policies aimed at “maximizing shareholder value.”

But did this financial behavior lead to a more efficient allocation of resources in the economy, as the shareholder-value proponents claim? There are a number of flaws in agency theory’s analysis of the relation between corporate governance and economic performance. These flaws have to do with (i) a failure to explain how, historically, corporations came to control the allocation of significant amounts of the economy’s resources; (ii) the measure of “free cash flow;” and (iii) the claim that only shareholders have “residual claimant” status. These flaws stem from the fact that agency theory, like the neoclassical theory of the market economy in which it is rooted, lacks a theory of innovative enterprise. These flaws are, moreover, amply exposed by the history of the industrial corporation in the United States, the national context in which agency theory evolved and in which it is thought to be most applicable.

Firstly, agency theory makes an argument for taking resources out of the control of inefficient managers without explaining how, historically, these corporations came to possess the vast amounts of resources over which these managers could exercise allocative control. From the first decades of the 20th century, the separation of share ownership from managerial control characterized US industrial corporations (Berle and Means, 1932). This separation occurred because the growth of innovative companies demanded that control over the strategic allocation of resources to transform technologies and access new markets be placed in the hands of salaried professionals who understood the investment requirements of the particular lines of business in which the enterprise competed. At the same time, the listing of a company on a public stock exchange enabled the original owner–entrepreneurs to sell their stock to the shareholding public, and, enriched, to retire from their positions as top executives. The departing owner–entrepreneurs left control in the hands of senior salaried professionals, most of whom they had recruited decades earlier to help to build their enterprises. The resultant disappearance of family owners in positions of strategic control enabled the younger generation of salaried professionals to view the particular corporations that employed them as ones in which, through dedicated work effort over the course of a career, they could potentially rise to the ranks of top management.

With salaried managers exercising strategic control, innovative managerial corporations emerged as dominant in their industries during the first decades of the century (Chandler, 1977, 1990). During the post-World War II decades, however, many of these industrial corporations grew to be too big, especially during the 1960s conglomerate movement (Lazonick, 2004). Top managers responsible for corporate resource allocation became segmented, behaviorally and cognitively, from the organizations that would have to implement these strategies. Behaviorally, they came to see themselves as occupants of the corporate throne rather than as members of the

corporate organization, and became obsessed by the size of their own remuneration (Patton, 1988; Crystal, 1991). Cognitively, the expansion of the corporation into a multitude of businesses made it increasingly difficult for top management to understand the particular investment requirements of any of them.

In the 1970s and 1980s, moreover, many of these US corporations faced intense foreign competition, especially from innovative Japanese corporations (also, it should be noted, characterized by a separation of share ownership from managerial control). An innovative response required governance institutions that would reintegrate US strategic decision-makers with the business organizations over which they exercised allocative control. Instead, guided by the ideology of “maximizing shareholder value” and rewarded with stock options, what these established corporations got were managers whose prime objective was to boost their companies’ stock prices, even if the stock-price increase was accomplished by a redistribution of corporate revenues from labor incomes to capital incomes and even if the quest for stock-price increases undermined the productive capabilities that these companies had accumulated from the past (Lazonick and O’Sullivan, 2000b).

Second, agency theory does not address how, at the time when innovative investments are made, one can judge whether managers are allocating resources inefficiently. Any strategic manager who allocates resources to an innovative strategy faces technological, market, and competitive uncertainty. Technological uncertainty exists because the firm may be incapable of developing the higher quality processes and products envisaged in its innovative investment strategy. Market uncertainty exists because, even if the firm succeeds in its development effort, future reductions in product prices and increases in factor prices may lower the returns that can be generated by the investments. Finally, even if a firm overcomes technological and market uncertainty, it still faces competitive uncertainty: the possibility that an innovative competitor will have invested in a strategy that generates an even higher quality, lower cost product that enables it to win market share and drive down product prices.

One can state formulaically, as Jensen does, that the firm should only invest in “projects that have positive net present values when discounted at the relevant cost of capital”. But, quite apart from the problem of defining the “relevant cost of capital,” anyone who contends that, when committing resources to an innovative investment strategy, one can foresee the stream of future earnings that are required for the calculation of net present value knows nothing about the innovation process. It is far more plausible to argue that, if corporate managers really sought to “maximize shareholder value” according to this formula, they would never contemplate investing in innovative projects with their highly uncertain returns (Baldwin and Clark, 1992).

Third, it is simply not the case, as agency theory assumes, that all the firm’s participants other than shareholders receive contractually guaranteed returns according to their productive contributions. The argument that shareholders are

the sole “residual claimants” is a deduction from the theory of the market economy. It does not, however, accord with the reality of the innovative enterprise. The argument may hold when, in an open, competitive market, one firm purchases a physical commodity as a productive input from another firm. But, as I elaborate subsequently, one cannot assume contractually guaranteed returns when the inputs are made available to business enterprises by the state. Nor can one make the assumption when the inputs are made available to the business enterprise in the form of the labor services of employees. Finally, once one recognizes that the innovative enterprise cannot be understood as a “nexus of contracts,” one can ask whether public shareholders actually perform the risk-bearing function that the proponents of agency theory claim.

Given its investments in productive resources, the state has “residual claimant” status. Any realistic account of economic development must take into account the role of the state in (i) making infrastructural investments that, given the required levels of financial commitment and inherent uncertainty of economic outcomes, business enterprises would not have made on their own; and (ii) providing business enterprises with subsidies that encourage investment in innovation. In terms of investment in new knowledge with applications to industry, the United States was the world’s foremost developmental state over the course of the 20th century. As a prime example, it is impossible to explain US dominance in computers, microelectronics, software, and data communications without recognizing the role of government in making seminal investments that developed new knowledge and infrastructural investments that facilitated the diffusion of that knowledge (National Research Council, 1999; Abate, 2000). Nor can one explain US dominance in biotechnology without recognizing the persistent investments of the National Institutes of Health in the knowledge base and the government subsidies provided to companies through legislation such as the Orphan Drug Act of 1983 (Lazonick *et al.*, 2007).

The US government has made investments to augment the productive power of the nation through federal, corporate, and university research labs that have generated new knowledge as well as through educational institutions that have developed the capabilities of the future labor force. Business enterprises have made ample use of this knowledge and capability. While these business enterprises may pay fees for these services—for example, the salary of an engineer whose education was supported in whole or in part by state funds—one would be hard put to show that there exists a nexus of contracts that guarantees the state a return on these investments for the productive contributions that the outputs of these investments make to the enterprises that use them. In effect, in funding these investments, the state (or more correctly, its body of taxpayers) has borne the risk that the nation’s business enterprises would further develop and utilize these productive capabilities in ways that would ultimately redound to the benefit of the nation, but with the “return” to the nation in no way contractually guaranteed.

In addition, the US government has often provided cash subsidies to business enterprises to develop new products and processes, or even to start new firms. Sometimes these subsidies have been built into the rates that firms in particular industries could charge as regulated monopolies. For selected industries, tariff protection has provided firms with the time to develop higher quality, lower cost products. The public has funded these subsidies through current taxes, borrowing against the future, or by making consumers pay higher product prices for current goods and services than would have otherwise prevailed. By definition, a “subsidy” lies beyond the realm of a market-mediated contract; one dictionary defines “subsidy” as “a grant paid by a government to an enterprise that benefits the public.”⁴ Multitudes of business enterprises have benefited from these subsidies without having to enter into contracts with the public bodies that have granted them to remit a guaranteed return for the productive contributions that the subsidies have helped to finance.

Like the government, workers can also find themselves in the position of having made investments in their own productive capabilities that they supply to firms without a guaranteed contractual return. In an important contribution to the corporate governance debate, Margaret Blair (1995) argued that, alongside a firm’s shareholders, workers should be accorded “residual claimant” status because they make investments in “firm-specific” human capital at one point in time with the expectation—but without a contractual guarantee—of reaping returns on those investments over the course of their careers. Moreover, insofar as their human capital is indeed “firm-specific,” these workers are dependent on their current employer for generating returns on their investments. A lack of interfirm labor mobility means that the worker bears some of the risk of the return on the firm’s productive investments, and hence can be considered a “residual claimant.” Blair goes on to argue that if one assumes, as the shareholder-value proponents do, that only shareholders bear risk and “residual claimant” status, there will be an underinvestment in human capital to the detriment of not only workers but also the economy as a whole.

For those concerned about the propensity of US corporations to “downsize-and-distribute,” Blair’s focus on investments in firm-specific human capital provides a “stakeholder” theory of the firm in which workers as well as shareholders should be viewed as “principals” for whose benefit the firm should be run. While accepting Blair’s “stakeholder” amendment to the shareholder argument, however, a corporate executive intent on downsizing his labor force could logically argue that the productive capabilities of workers in, say, their 50s who had made investments in “firm-specific” human capital earlier in their careers have now become *old* because of competition from equally adept but more energetic younger workers or, alternatively, *obsolete* because of technological change. The executive could then

⁴<http://dictionary.reference.com/search?q=subsidy> (accessed March 30, 2007).

argue that, in making investments in “firm-specific” human capital in the past, these (now) older workers had taken on the risk-bearing function, and like any risk-bearing investor must accept the possibility that their investments would at some point lose their market value.

The workers could respond by arguing that the corporate executive is wrong; that their accumulated capabilities are not old and obsolete, but rather, given a correct understanding of technological, market, and competitive conditions in the industry, remain critical to the innovation process. They might even, as “principals,” accuse the executive, as their “agent,” of acting opportunistically, perhaps because he has stock options that align his interests with shareholders. They might claim that what the proposed downsizing actually entails is a redistribution of income from labor to capital rather than a restructuring of the workforce for the purpose of innovation. Clearly, even from the workers’ point of view, agency theory’s concerns with hidden information and hidden action on the part of managers are relevant. The problem is that agency theory provides no guide to analyzing whether or not the executive is in fact acting innovatively or opportunistically because agency theory, like neoclassical theory more generally, has no theory of innovative enterprise.

Investments that can result in innovation require the strategic allocation of productive resources to particular processes to transform particular productive inputs into higher quality, lower cost products than those goods or services that were previously available at prevailing factor prices. Investment in innovation is a direct investment that involves, first and foremost, a strategic confrontation with technological, market, and competitive uncertainty. Those who have the abilities and incentives to allocate resources to innovation must decide, in the face of uncertainty, what types of investments have the potential to generate higher quality, lower cost products. Then they must mobilize committed finance to sustain the innovation process until it generates the higher quality, lower cost products that permit financial returns (Lazonick, 2007b).

What role do public shareholders play in this innovation process? Do they confront uncertainty by strategically allocating resources to innovative investments? No. As portfolio investors, they diversify their financial holdings across the outstanding shares of existing firms in order to minimize risk. They do so, moreover, with limited liability, which means that they are under no legal obligation to make further investments of “good” money to support previous investments that have gone bad. Indeed, even for these previous investments, the existence of a highly liquid stock market enables the public shareholders to cut their losses instantaneously by selling their shares—what has long been called the “Wall Street walk.”

But for this ability to exit an investment easily, public shareholders would not be willing to hold shares of companies over whose assets they exercise no direct control. It is the liquidity of a public shareholder’s portfolio investment that differentiates it from a direct investment, and indeed distinguishes the public shareholder from a private shareholder who, for lack of liquidity of his or her shares, must remain

committed to his or her direct investment until it generates financial returns. The modern corporation entails a fundamental transformation in the character of private property, as Adolf Berle and Gardiner Means (1932) recognized. As property owners, public shareholders own tradable shares in a company that has invested in real assets; they do not own the assets themselves.

Indeed, the fundamental role of the stock market in the United States in the 20th century was to transform illiquid claims into liquid claims on *the basis of investments that had already been made*, and thereby separate share ownership from managerial control. Business corporations sometimes do use the stock market as a source of finance for new investments, although it would appear that the cash function has been most common in periods of stock market speculation when the lure for public shareholders to allocate resources to new issues may have been the prospect of quickly “flipping” their shares to make a rapid, speculative return (O’Sullivan, 2004; Lazonick *et al.*, 2007). Public shareholders want financial liquidity; investments in innovation require financial commitment. It is only by ignoring the role of innovation in the economy, and the *necessary* role of insider control in the strategic allocation of corporate resources to innovation, that agency theory can argue that superior economic performance can be achieved by maximizing the value of those actors in the corporate economy who are the ultimate outsiders to the innovation process.

4. The five functions of the stock market and innovative enterprise

A business enterprise seeks to transform productive resources into goods and services that can be sold to generate revenues. A theory of the firm, therefore, must, at a minimum, provide explanations for how this productive transformation occurs and how revenues are obtained. Furthermore, if such a theory purports to capture the essential reality of a modern capitalist economy, it must explain how, in competing for the same product markets, some firms are able to gain sustained competitive advantage over others. For a perspective on corporate governance to have any claim to relevance for understanding how a firm achieves superior economic performance, it must be rooted in a theory of innovative enterprise (for elaborations, see O’Sullivan, 2000; Lazonick and O’Sullivan, 2000b; Lazonick, 2007b).

The innovation process is uncertain, collective, and cumulative. As a result, innovative enterprise requires *strategy, organization, and finance* (O’Sullivan, 2000; Lazonick, 2007b). The role of strategy is to confront uncertainty by allocating resources to investments that, by developing human and physical capabilities, can enable the firm to compete for specific product markets. The role of organization is to transform technologies and access markets to generate products that buyers want at prices that they are willing and able to pay. The role of finance is to sustain the

accumulation of capabilities from the time at which investments in productive resources are made to the time at which financial returns are generated through the sale of products.

Innovation is a social process, supported in certain times and places by “social conditions of innovative enterprise.” Three distinct but interrelated social conditions—*strategic control*, *organizational integration*, and *financial commitment*—can transform strategy, finance, and organization into social processes that result in innovation. The social conditions of innovative enterprise manifest themselves as social relations that, embedded in the business enterprise, are central to the performance of the firm.

Strategic control gives decision-makers the power to allocate the firm’s resources to confront the technological, market, and competitive uncertainties that are inherent in the innovation process. For innovation to occur, those who occupy strategic decision-making positions must have both the abilities and incentives to allocate resources to innovative investment strategies. Their abilities to do so will depend on their knowledge of how the current innovative capabilities of the organization over which they exercise allocative control can be enhanced by strategic investments in new, typically complementary, capabilities. Their incentives to do so will depend on the alignment of their personal interests with the interests of the business organization in attaining and sustaining its competitive advantage.

Those who exercise strategic control must be capable of understanding the technological, market, and competitive characteristics of the industries in which their firms are competing as well as the learning capabilities of the business organizations upon which they rely to implement their innovative investment strategies. This integration of strategic decision-makers into the business organization can break down because the firm overextends itself by expanding into too many lines of business, as happened for example in the US conglomerate movement of the 1960s. Those who exercise strategic control may no longer understand the organizational and technological requirements of the innovation process. If so, the corporate governance challenge is to find ways of reintegrating strategic decision-making with the learning organization.

The social condition that can make an organization innovative is *organizational integration*: a set of relations that creates incentives for people to apply their skills and efforts to generate higher quality, lower cost products than had previously been available. To develop high quality products, participants in the innovation process must engage in organizational learning. The more this learning is collective and cumulative, the higher the fixed costs of the learning process. If investments in organizational learning are to be a source of competitive advantage rather than disadvantage, the enterprise must generate sufficient sales to transform the high fixed costs of these investments into low unit costs (Lazonick, 2007b). Modes of compensation (in the forms of promotion, remuneration, and benefits) are important instruments for integrating individuals into the organization. To generate

innovation, however, a mode of compensation cannot simply manage the labor market by attracting and retaining employees. It must be part of a reward system that manages the productive processes that are the essence of innovation. Most importantly, the compensation system must motivate employees to engage in collective learning and to ensure a high level of utilization of the resultant productive capabilities.

The social condition that enables finance to support the innovation process is *financial commitment*: a set of relations that ensures the allocation of funds to sustain the cumulative innovation process until it can generate financial returns. What is often called “patient” capital enables the capabilities that derive from organizational learning to cumulate over time, notwithstanding the inherent uncertainty that the innovation process entails. Strategic control over internal revenues is the foundation of financial commitment. The size and duration of investments in innovation that are required may demand that such “inside capital” be supplemented by external sources of finance such as stock issues, bond issues, or bank debt. In different times and places, depending on varying institutional arrangements, different types of external finance may be more or less committed to sustaining the innovation process (Lazonick, 2007c).

Control over internal funds, leveraged if need be by external funds, enables corporate executives to commit to innovative investment strategies of large size and long duration. Given the uncertain character of the innovation process, the full extent of financial commitment required to generate higher quality, lower cost products is not known at the outset of an investment strategy, but only unfolds over time. There will be cases in which corporate executives squander corporate resources on ill-conceived investment strategies, as agency theorists contend. Given the cumulative character of the innovation process, however, an investment strategy that at any point in time entails costs without generating returns may turn out to be successful at a later point in time. The corporate governance challenge is to evaluate the often-escalating demands of corporate executives for financial commitment so that innovation is not nipped in the bud, while ensuring that good money is not thrown after bad.

Of central importance to the accumulation and transformation of capabilities in knowledge-intensive industries is the *skill base* in which the firm invests in pursuing its innovative strategy. Within the firm, different functional specialties and hierarchical responsibilities characterize the division of labor, and define the firm’s skill base. In the effort to generate collective and cumulative learning, those who exercise strategic control can choose how to structure the skill base, including how employees move around and up the enterprise’s functional and hierarchical division of labor over the course of their careers. At the same time, however, the organization of the skill base will be constrained by both the particular learning requirements of the industrial activities in which the firm has chosen to compete and the alternative employment opportunities of the personnel whom the firm wants to employ.

The innovative enterprise requires that those who exercise strategic control be able to recognize the competitive strengths and weaknesses of their firm's existing skill base and, hence, the changes in that skill base that will be necessary to mount an innovative response to competitive challenges. These strategic decision-makers must also be able to mobilize committed finance to sustain investment in the skill base until it can generate higher quality, lower cost products than were previously available. To build the types of organizations that can generate innovation, corporate governance institutions must concern themselves with financial commitment and strategic control.

What, then, is the role of the stock market in the innovative enterprise? Does it support or undermine the innovation process? How does the stock market influence strategic control, organizational integration, and financial commitment? A research agenda that seeks answers to these questions must consider the ways in which a business enterprise actually makes use of the stock market.

For the business enterprise, the stock market can perform five distinct functions—labeled, alliteratively, “creation,” “control,” “combination,” “compensation,” and “cash” (Lazonick and O’Sullivan, 2004).

- *Creation*: By providing a means to transform privately owned shares in a company into tradable securities, and thus facilitating the “exit” of financiers from further participation in the new firms that they have funded, the stock market can encourage a flow of finance into venture creation. By providing the prospect of financial liquidity at a later point in time, therefore, the stock market can induce financial commitment at an earlier point in time.
- *Control*: By enabling the selling and buying of shares, the stock market can affect the concentration or fragmentation of shareholding in a corporation, and thus influence the relation between ownership of corporate assets and control over the allocation of corporate resources. The stock market can therefore influence who exercises strategic control over corporate resource allocation.
- *Combination*: By giving corporate stock the status of an exchange currency, the stock market enables a corporation to tender its own stock, rather than cash, as a form of payment in mergers and acquisitions. The stock market can therefore influence the financial conditions that enable one company to gain strategic control over the resources of another company.
- *Compensation*: By giving corporate stock the status of an exchange currency, the stock market enables a corporation to use its own stock, most typically in the form of stock options, as a form of employee compensation. The stock market can therefore serve as a means of organizational integration.
- *Cash*: By providing liquidity to investments in a company while also limiting the liability of the owners of shares to the investments that they make, the stock market increases the sources from which a company can raise cash that can be used to fund capital expenditures, pay off debt, cover operating expenses, or augment the

corporate treasury. The stock market can therefore function directly as a source of financial commitment.

Complicating matters is the fact that these five functions of the stock market can interact with one another, at times reinforcing and at times undermining their combined impact on the innovation process. In-depth research on the evolution of the leading companies in US high-technology industries sheds considerable light on the functions and impacts of the stock market in corporations that are noted for their innovative capabilities (Carpenter *et al.*, 2003; Lazonick, 2006a, 2007a; Lazonick *et al.*, 2007; O'Sullivan, 2004, 2006a, 2006b). The following summary discussion of the creation, control, combination, compensation, and cash functions of the stock market asks under what conditions the stock market encourages innovation, redistribution, or speculation. To illustrate the operation and impact of each of these functions, I draw on the experience of the US ICT industries.

5. Creation

The creation function of the stock market can support innovation by inducing investors to commit financial resources to highly uncertain new ventures with no immediate prospect of a financial return. The stock market enables equity holders to “exit” from their investments through an initial public offering (IPO). Alternatively, equity holders can sell the firm in which they have invested to an established company. While a well-developed stock market is not a necessary condition for such a private sale, the presence of an active IPO market tends to raise the sale price because equity holders also have the possibility of exiting via an IPO. A stock-market listing by the established company also provides the acquirer with the option to make the purchase with its tradable (and hence liquid) stock rather than with cash.

In the late 1990s, the booming US stock market enabled young companies to go public much more quickly and at much higher prices than had previously been the case, and thus encouraged venture capital to invest in start-ups. As Table 2 shows, both the number and size of disbursements to companies by venture capital firms soared in the speculative boom of the late 1990s, before falling sharply in the 2000s. As can be seen in Table 2, the “Internet” boom was characterized by a significant increase in the percent of venture-backed companies and disbursements that were ICT. Even with the much more subdued stock market of the first half of the 2000s, however, the number of companies in which venture capital firms invested and the size of disbursements (in 2006 dollars) remained at historically high levels, suggesting that the Internet boom led to a permanent ratcheting up of venture capital activity in the United States.

After a slump in the IPO market in 1988–1990, the following decade saw a boom in venture-backed IPOs, culminating in an ICT-fueled explosion in 1999 and 2000.

Table 2 Venture-backed capital investments in the United States, 1987–2006: Number of venture-backed companies and size of disbursements

Year	No. of venture-backed companies	Total disbursements 2006\$m	Average disbursement per company 2006\$m	Venture-backed companies in ICT (%)	Disbursements in ICT (%)
1987	1905	8925	4.69	48.1	42.8
1988	1804	9930	5.50	45.3	42.5
1989	1814	9762	5.38	45.0	36.7
1990	1531	6282	4.10	44.1	43.6
1991	1312	5146	3.92	47.3	39.1
1992	1597	9317	5.83	46.1	41.4
1993	1469	8341	5.68	43.9	36.6
1994	1612	9714	6.03	44.5	36.4
1995	2261	14,297	6.32	48.1	44.1
1996	3392	21,487	6.33	50.2	48.7
1997	3803	25,747	6.77	53.4	54.1
1998	5194	40,471	7.79	53.7	60.3
1999	6964	92,360	13.26	70.1	75.4
2000	11,985	175,390	14.63	74.4	81.1
2001	7959	78,007	9.80	66.6	68.7
2002	5288	46,044	8.71	62.5	60.2
2003	6193	45,258	7.31	52.1	48.4
2004	6388	47,109	7.37	51.4	49.5
2005	6111	44,788	7.33	51.3	48.4
2006	6408	53,891	8.41	51.1	45.2

Source: Thomson Financial, Venture Xperts.

In the speculative mania, the amounts raised per IPO were far higher than previously, while the average age of the floated companies was much younger (Table 3). Many of the IPOs done in these years were examples of worthless flotations that the journalist John Cassidy (2002) called “dot.con.” In the wake of the stock market crash, however, there was apparently a reversion to quality, with a much smaller number of IPOs by more seasoned companies that, even adjusted for inflation, were able to raise far larger amounts of funds on average than had been the case throughout most of the 1990s.

Private sales of ventured-backed firms also picked up from 1992, with the numbers and average real proceeds reaching their peaks in 2000 (Table 4). During the 1990s, and especially in the speculative mania of 1999 and 2000, there was a

Table 3 IPOs of venture-backed companies in the United States, 1987–2006

Year	No. of venture-backed IPOs	Gross offer amount 2006\$m	Average offer amount 2006\$m	Median age at IPO	IPOs in ICT (%)	Offer amount in ICT (%)
1987	127	4190	33.0	5.4	38	46
1988	54	1441	26.7	5.3	44	45
1989	65	1989	30.6	6.3	38	43
1990	70	2153	30.8	5.9	40	44
1991	157	7286	46.4	6.6	31	29
1992	197	10,807	54.9	5.9	33	22
1993	221	9331	42.2	6.7	46	47
1994	167	6354	38.0	7.6	47	45
1995	205	10,777	52.6	7.5	57	55
1996	272	14,753	54.2	5.7	48	45
1997	138	6062	43.9	6.4	49	51
1998	78	4677	60.0	5.2	65	72
1999	270	25,256	93.5	4.3	92	92
2000	264	29,853	113.1	4.9	70	75
2001	41	3973	96.9	6.1	27	24
2002	22	2364	107.4	7.5	45	47
2003	29	2216	76.4	7.7	38	41
2004	93	11,755	126.4	6.8	43	59
2005	56	4605	82.2	6.1	46	57
2006	57	5117	89.8	8.2	44	58

Source: Thomson Financial, Venture Xperts.

growing tendency for the acquirer to use its own highly valued stock rather than cash to purchase the target (Rappaport and Sirower, 1999). Whereas the high levels of proceeds in IPOs in 1999 and 2000 reflected the speculative demand for IPO shares, the high levels in private sales reflected the speculative valuations of the stocks of the acquirers. When the price of these stocks fell, so did the average real value of acquisitions of venture-backed firms. Nevertheless, as can be seen by the extraordinarily high number of deals in every year during the 2000s, venture capitalists could now have wholly different expectations compared with the 1980s and 1990s of exiting from their investments in new ventures by means of an M&A deal.

Well, over two-thirds of the world's venture capital is invested in the United States. California's Silicon Valley is the world's leading district for venture capital with 37% of the value of investments and 30% of the number of deals in

Table 4 M&A deals in the United States with disclosed values of venture-backed companies, 1987–2006

Year	No. of deals	No. of deals, value disclosed	Total disclosed deal value 2006\$m	Average disclosed deal value 2006\$m
1987	14	4	707	177
1988	17	7	924	132
1989	17	5	604	121
1990	19	9	331	37
1991	18	4	297	74
1992	77	47	4152	88
1993	75	44	2373	54
1994	101	65	4727	73
1995	99	60	5011	84
1996	118	77	10,961	142
1997	172	119	9826	83
1998	221	139	12,534	90
1999	247	166	45,499	274
2000	329	209	80,940	387
2001	387	185	20,621	111
2002	341	158	9382	59
2003	306	125	8542	68
2004	345	188	16,527	88
2005	365	178	21,304	120
2006	358	155	17,283	112

Source: Thomson Financial, Venture Xperts.

the United States over the period 2001–2005.⁵ The primacy of Silicon Valley in venture capital dates back to the 1960s and early 1970s when it became involved in a proliferation of microelectronics start-ups. In 1973, the founding of the National Venture Capital Association (NVCA), with its main base in Silicon Valley, signaled that venture capital had emerged as an industry in its own right.

Meanwhile, the launching in 1971 of the National Association of Security Dealers Automated Quotation System, or NASDAQ, out of the existing over-the-counter markets meant that IPOs could be carried out on a national stock market that had minimal listing requirements (O’Sullivan, 2006b). Further enhancing the liquidity of the stock market, and hence the conditions for lucrative IPOs, was the 1975 ruling

⁵PriceWaterhouseCoopers MoneyTree, available at www.pwcmoneytree.com.

by the Securities and Exchange Commission (SEC) that barred stock exchanges from charging fixed commissions on stock-trading transactions, thereby putting an end to a practice that had prevailed on Wall Street since 1796.⁶ With the end of fixed commissions, the investing public became more willing to absorb new share issues of firms without a history of profits from which dividends could be paid, thus creating the possibility for venture capitalists to exit from their venture investments more quickly than had previously been the case.

In 1978, in response to intensive lobbying led by the American Electronics Association and the NVCA (both of which were dominated by Silicon Valley interests), the US Congress reduced the capital gains tax from 49% to 28%, thus reversing a 36-year trend toward higher capital gains taxes (Pierson, 1978). Venture capitalists saw lower capital gains taxes as encouraging both entrepreneurial investment in new companies and portfolio investment by individuals in the publicly traded stocks of young, potentially high-growth companies. During the 1970s, however, venture capitalists faced constraints on the amount of money that they could raise because they had not yet tapped the vast accumulation of household savings held by pension funds. Even the small amount of pension fund money that had been placed with venture capitalists by the early 1970s vanished in 1974 when the passage of the Employment Retirement Income Security Act (ERISA) made pension fund managers personally liable for making “imprudent” investments (Niland, 1976). On July 23, 1979, however, the US Department of Labor declared that pension fund money could be invested in not only listed stocks and high-grade bonds but also more speculative assets, including new ventures, without transgressing the “prudent man” rule.⁷ As a result, pension fund money poured into venture capital funds from the end of the 1970s (Gompers and Lerner, 2002: 8).

As already mentioned, in the post-World War II decades government support was critical to the development of computer and biotechnology capabilities that could potentially be employed by high-tech start-ups. Meanwhile, however, the US government found itself accumulating intellectual property rights, most of which were not being commercialized. At the end of the following year, therefore, the US Congress passed the Patent and Trademark Amendments Act, also known as Bayh-Dole, that enabled nonprofit organizations and small businesses (and from 1984 large businesses as well) to retain title to, and hence gain from the commercialization of, inventions that resulted from federally funded research (Mowery *et al.*, 2004). Bayh-Dole was of particular importance to encouraging start-ups in the emerging biotechnology industry, as was the Orphan Drug Act of 1983 that subsidized the research and protected the markets of biotech products that could treat rare diseases (Lazonick *et al.*, 2007).

⁶‘SEC moves closer to goal of ending fixed fees by May 1,’ *Wall Street Journal*, October 25, 1974, p. 4.

⁷‘The death of equities,’ *Business Week*, August 13, 1979, p. 54.

Venture creation requires the employment of key people with the expert knowledge to transform intellectual property into a commercializable product. By providing liquidity to stock options as a form of employee compensation, the stock market played a central role in enabling high-tech start-ups to lure away professional, managerial, and administrative personnel from much more secure, and typically better remunerated, positions with established companies. From the 1960s, the practice of making regular grants of stock options to a broad base of nonexecutive employees evolved first and foremost in Silicon Valley (Lazonick, 2003a). At a start-up, these options would become valuable if and when the firm did an IPO or a private sale to a listed company (which would assume responsibility for the unvested stock options of the acquired company's employees). Without the stock market to provide liquidity to the stock options that employees exercised, start-ups would have had a difficult time attracting key personnel, and the inducement to venture creation would have been significantly diminished.

In sum, venture creation has been central to innovation in key high-tech sectors of the US economy, and, by facilitating IPOs, the stock market has acted as a powerful inducement to venture creation. Nevertheless, it has been most advantageous for new ventures to do IPOs during periods of rampant stock market speculation; the late 1920s when aviation issues were hot, the early 1960s when electronics yielded "glamour" stocks, the early 1980s when microelectronics and biotechnology issues were the rage, and the late 1990s when the Internet revolution generated the dot.com boom (Cassidy, 2002; O'Sullivan, 2006a). During such periods, the prospect of a quick and lucrative IPO or private sale has generated *too much* of an inducement to venture creation at the ultimate expense of the speculating public. The dot.com boom of the late 1990s was particularly problematic because of the extent to which US households had become active participants in the highly liquid stock markets. Subsequent investigations by the New York State Attorney General documented the extent to which Wall Street investment banks as insiders had privileged access to the new shares issued in IPOs, and then quickly sold them to lock in gains as outsiders clamored to buy the stocks once they became traded on the stock market.

Speculation in dot.coms and other Internet-related new ventures resulted in a redistribution of income from the investing public as outsiders, be they day traders or unknowing households, who played the role of "greater fools" to Wall Street as insiders. In addition, on the supply side, such speculation caused problems for the accumulation of innovative capabilities. At technology start-ups more effort was often devoted to getting to an IPO than to developing a commercializable product. Speculation could also disrupt the innovation process at established high-tech companies when key technical and administrative personnel "jumped ship" to start-ups as well as when top executives of established companies acquired technology start-ups in an attempt to convince the investing public that their companies had become "new economy," and hence were worthy of higher stock prices (Carpenter *et al.*, 2003).

6. Control

The integration of ownership and control in a new venture provides a powerful incentive for those who have an equity stake in the firm to succeed. These equity holders include not only founder-entrepreneurs and venture capitalists (who typically play an active role in determining the strategic direction of the company) but also employees who have an equity stake either in the form of shares or stock options. As discussed earlier, the stakes of these equity holders generally become much more valuable when the firm is able to do an IPO or private sale.

A private sale inherently entails the separation of ownership and control, although the former owner-managers of the company that is sold may stay on with the acquirer as executives and will often have equity stakes in the acquirer as a result of the sale. An IPO also inherently entails a degree of separation of ownership and control, with the extent of the separation depending on the dilution of the original stakes of the founder-entrepreneurs and venture capitalists both before and after going public as well as on whether they retain their positions of strategic control. It is common for owner-managers of US high-tech companies who have had their equity stakes diluted to a small minority share to stay on in positions of strategic control after an IPO. But now they cannot assume that they, or their descendants, will retain these positions by virtue of majority ownership. In most cases, after a generation, and often much sooner, strategic control passes to salaried managers who have never held substantial equity in the company.

Elsewhere, I have compiled lists from the Fortune 500 of the top 20 Old Economy and top 20 New Economy companies by 2005 revenues in the ICT industries (Lazonick, 2007a). As shown in Table 5, among 15 of the top 20 Old Economy companies, there is a complete separation of ownership from control, as well as substantial separation at Qwest (where major shareholder Philip Anschutz has retired from active management). The four exceptions are Cox Communications, which is a subsidiary of privately-held Cox Enterprises (where the grandson of the founder is the chairman and CEO); DirecTV, a direct broadcast satellite provider that traces its origins to Hughes Aircraft founded in 1932, and in which media mogul Rupert Murdoch acquired a large stake in late 2005; Comcast, where chairman and CEO Brian Roberts, a son of the company's founder, controls one-third of the shareholders' votes; and IAC, where another media mogul, Barry Diller, owns a majority of the shares. Both Comcast and IAC would be classified as New Economy companies but for the fact that their growth depended on assets of Old Economy firms.

As can be seen from Table 6, shares in 19 of the top 20 New Economy companies that are publicly traded are widely held. At the same time, primarily because the New Economy companies are, by definition, younger than their counterparts in Table 5, they still have many founders in active management, many of them with substantial ownership stakes. At two of the younger New Economy companies, EchoStar and

Table 5 Share ownership by insiders and institutions at the “top 20” Old Economy companies, 2006

Company	Year founded	Shares held by directors and top executives (%)	Number of directors and executives	Shares held by institutional and mutual fund owners (%)	Number of institutions holding shares	Largest founder, director or executive shareholder (year of birth)	Position	Holding (%)
Lucent Technologies	1869	0.7	21	47	603	Patricia F. Russo (1953)	Chairman, CEO	0.3
First Data	1871	0.6	24	88	871	Henry C. Duques (1943)	Chairman, CEO	0.1
NCR	1884	1.1	17	85	341	Jonathan S. Hoak (1950)	Senior VP	0.1
Verizon	1885	0.6	17	60	1078	Ivan G. Seidenberg (1946)	Chairman, CEO	0.2
AT&T	1885	0.5	20	63	1001	Edward E. Whitacre, Jr. (1941)	Chairman, CEO	0.3
Bellsouth	1885	0.7	19	59	843	F. Duane Ackerman (1942)	Chairman, CEO	0.3
Qwest Communications	1885	17.5	19	80	347	Richard C. Notebaert (1947)	Chairman, CEO	0.7
						Philip F. Anschutz (1939)	Retired Chairman	16.1
Sprint Nextel	1899	0.6	26	85	833	Timothy M. Donahue (1949)	Chairman	0.2
Xerox	1906	1.4	27	87	427	Anne M. Mulcahy (1952)	Chairman, CEO	0.6
IBM	1911	0.5	18	57	1257	Samuel J. Palmisano (1951)	Chairman, CEO	0.1
Motorola	1928	0.2	23	72	915	Edward J. Zander (1947)	Chairman, CEO	0.1
Freescale Semiconductor ^a	1928	0.2	17	97	197	Michel Mayer (1960)	Chairman, CEO	0.1
Texas Instruments	1930	1.2	17	73	938	Thomas J. Engibous (1953)	Chairman	0.4
DirecTV	1932	36.9	15	68	316	Rupert Murdoch (1931)	Chairman	36.8
Hewlett-Packard	1939	0.4	23	76	987	Ann M. Livermore (1958)	Executive VP	0.1
						Carleton S. Fiorina (1954)	Former CEO	0.2
Alltel	1943	6.9	16	71	663	Warren A. Stephens (1957)	Director	2.8
Electronic Data Systems	1962	0.6	16	84	421	Jeffrey M. Heller (1940)	President	0.2
Comcast, Class A ^b	1963	0.2	18	0	0	Brian L. Roberts (1959)	Son of founder,	0.1
Comcast, Class B		100.0	18	0	0	Brian L. Roberts	Chairman,	100.0
Comcast, Class A Special		4.2	18	na	na	Brian L. Roberts	CEO	2.0
IAC/InterActiveCorp	1977	56.5	15	74	331	Barry Diller (1942)	Chairman, CEO	56.2

Sources: Yahoo! Finance; www.hoovers.com; company proxy statements; for the top 20 US-based Old Economy companies by 2005 revenues, see Lazonick, 2007a.

^aFreescale, which was spun off from Motorola in 2004, has Class A shares with one vote each and Class B shares with five votes each. Class B shares are almost all held by institutional investors, of which Fidelity Management and Research Co. is the largest with 12.1% of the Class B shares and 12.3% of the voting power.

^bComcast has Class A shares with 0.2077 votes per share and a total of two-thirds of the voting power and Class B shares with 15 votes per share and the remaining one-third of the voting power, as well as Class A Special shares with no voting rights. Brian L. Roberts controls 33.4% of the voting rights, almost entirely through his exclusive ownership of Class B shares.

na, not available

Table 6 Share ownership by insiders and institutions at the “top 20” New Economy companies, 2006

Company	Year founded	Shares held by directors and top executives (%)	Number of directors and executives	Shares held by institutional & mutual fund owners (%)	Number of institutions holding shares	Largest founder, director or executive shareholder (year of birth)	Position	Holding (%)
Computer Sciences	1959	2.2	15	84	453	Van B. Honeycutt (1945)	Chairman, CEO	1.4
Jabil Circuit	1966	15.4	21	84	423	William D. Morean (1956)	Son of founder, Chairman	9.2
Applied Materials	1967	1.2	21	73	717	James C. Morgan (1938)	Chairman	0.4
Qualcomm	1968	3.5	22	71	924	Irwin M. Jacobs (1933)	Founder, Chairman	2.3
Intel	1968	3.5	22	55	1310	D. James Guzy (1936)	Director	0.1
						Gordon E. Moore (1929)	Founder, Chairman Emeritus	3.0
AMD	1969	1.5	13	80	420	Hector de J. Ruiz (1945)	Chairman, CEO	0.9
Microsoft	1975	13.8	25	57	1514	William H. Gates III (1955)	Founder, Chairman	9.5
Apple	1977	2.0	17	70	755	Steven P. Jobs (1955)	Founder, CEO	1.2
Solelectron	1977	1.6	19	85	305	Michael R. Cannon (1953)	CEO, President	0.5
Oracle	1977	25.0	14	52	887	Lawrence Ellison (1944)	Founder, CEO	24.5
EMC	1979	1.3	20	71	859	Michael C. Ruetters (1942)	Sr. Advisor, Ret. Chairman	0.3
Sanmina-SCI	1980	3.5	15	75	305	Jure Sola (1951)	Founder, Chairman, CEO	1.6
Sun Microsystems	1982	2.7	16	62	529	Scott G. McNealey (1954)	Founder, Chairman	2.2
Cisco Systems	1984	2.0	20	66	1304	John Morgridge (1933)	Chairman	1.0
Dell	1984	11.3	26	66	915	Michael S. Dell (1965)	Founder, Chairman	9.5
EchoStar, Class A ^a	1993	6.5	15	41	267	James DeFranco (1953)	Founder, Executive VP, Director	3.7
EchoStar, Class B		100.0	15			Charles W. Ergen (1953)	Founder, Chairman, CEO	79.0
Amazon.com	1994	26.3	15	74	331	Jeffrey P. Bezos (1964)	Founder, Chairman, CEO, President	24.3
Yahoo!	1995	11.9	16	74	637	David Filo (1966)	Founder, Chief Yahoo	5.9
Google, Class A ^a	1998	4.1	15	55	593	Michael Moritz (1954)	Venture Capitalist, Director	1.7
Google, Class B		86.9	15			Sergey Brin (1973)	Founder, President of Technology	31.8
						Larry Page (1973)	Founder, President of Products	31.7

Source: Yahoo! Finance; www.hoovers.com; company proxy statements; for the top 20 US-based New Economy companies by 2005 revenues, see Lazonick 2007a.

^aBoth EchoStar and Google have dual-class common shares, with each Class A share having one vote and each Class B share having 10 votes.

Google, the founders maintain the integration of share ownership and management control through dual-class shares. Even then at Google, as was also the case at Yahoo!, the youthful founders quickly brought in a professional manager as CEO. In a number of cases, including Microsoft, Apple, Oracle, Sun Microsystems, Dell, and Amazon.com, the continued presence of the founders in top management reflects their youth when the company was launched. College drop-out William Gates was only 19 when he co-founded Microsoft. At Apple, co-founder Steven Jobs, at the age of 30, left the then 8-year-old company in 1985 only to return as CEO 12 years later. Of the companies formed in the 1970s, Lawrence Ellison at Oracle has been most successful at maintaining the integration of ownership and control. Jeffrey Bezos at Amazon.com has a similar ownership stake, but Bezos founded his company some 17 years later than Ellison founded Oracle. Amazon.com did its IPO during the speculative environment of the Internet boom when the flotation of a small proportion of a company's stock could net a large amount of money.

In contrast, at older New Economy companies such as Computer Sciences, Applied Materials, Intel (where co-founder Gordon Moore is the largest individual shareholder but no longer active in management), AMD, and EMC, there is a complete separation of ownership and control. So too at Cisco, launched by the husband and wife team of Leonard Bostock and Sandra Lerner in 1984. After they brought venture capital and professional management into the company from 1987, Bostock and Lerner found themselves marginalized, and after Cisco's 1990 IPO sold their entire stake in the company, about 27% of the shares. The 1% stake of John Morgridge, CEO of Cisco from 1988 to 1995, and recently retired as chairman, is large for a nonfounder. It appears that he has had a greater propensity than most other top executives to hold on to his company's stock after he has exercised his options. The more usual practice among top executives seems to be to sell much of the stock received from exercising options in order to lock in the gains as well as to pay taxes that are due.

For those companies in which there remains an integration of ownership and control, the use of a company's stock as combination and compensation currencies will generally result in substantial dilution of the stakes of founders over time. Nevertheless in New Economy companies, many founders who still maintain active roles in their companies owe the enormity of their wealth to the stock market.⁸ In addition, as we shall see when we discuss the compensation function of the stock market, many of the top executives of ICT companies, Old and New, who occupy their positions of control solely as professional managers have accumulated considerable wealth by virtue of the stock-based compensation that their boards of directors have lavished on them. From their personal standpoint, these owners and managers have no reason to cast doubt on the ideology that the maximization of

⁸Many of the largest shareholders listed in Table 6 are on the Forbes list of the world's wealthiest people, including five in the top 30. Available at <http://www.forbes.com/billionaires/>.

shareholder value benefits not only their corporations but also the economy and even the society in which they operate.

From the shareholder-value perspective, as we have already seen, the separation of ownership and control poses the fundamental agency problem. But, the notion that salaried managers will as agents rather than principals have a natural propensity to misallocate corporate resources begs the question of how, given the ubiquity of the separation of ownership and control, the US corporate enterprise drove the development of the US economy during the 20th century (Lazonick, 1992). Moreover, it is incorrect to assume that the solution to the supposed agency problem is to give salaried executives an equity stake in the publicly traded corporation by, for example, granting them stock options. A volatile stock market provides these executives with ample opportunities to gain for themselves by selling their shares even when these gains are not warranted by the performance of the company.

The likelihood of such an event is all the greater if, as is generally the case in United States, the realization of gains from stock option grants does not depend on the *superior* performance of the company's stock over a *sustained* period of time relative to the performance of the industry in which the company competes. Moreover, given the susceptibility of the stock market to speculation, there are also ample opportunities for those who exercise strategic control to allocate resources, or, as has been typically the case, *account* for the allocation of resources, in ways that influence stock price movements for their own personal gain. Such behavior, I might point out, should not be seen as "short-termism," as has often been alleged, but rather as the self-interested pursuit of personal financial gain by those in positions of strategic control.

There are lots of ways to govern the behavior of corporate executives to ensure that they take actions that enhance the productive performance of their companies, but giving them US-style stock-based compensation is clearly not one of them. Indeed, as mentioned earlier, in the wake of the bursting of the Internet bubble, the excesses of the late 1990s even brought a critique of overvalued equities from Michael Jensen who throughout the 1980s and 1990s had been chief academic cheerleader for "maximizing shareholder value." Jensen had argued in particular for the need to increase the stock-based pay of top executives to align their interests with those shareholders (Jensen and Murphy, 1990). In "Just Say No to Wall Street: Putting a Stop to the Earnings Game," Fuller and Jensen (2002) exhort CEOs to resist the demands of Wall Street financial analysts for companies to report higher earnings to justify higher stock prices. They blame corporate executives for collaborating with Wall Street in the overvaluation of their companies' shares, with a resultant misallocation of resources. As one of their two examples (the other being Enron), Fuller and Jensen (2002: 44) find fault with the telecommunications equipment company Nortel Networks for spending over \$32 billion in 1997–2001 on acquisitions, purchased mainly with overvalued stock instead of cash, that subsequently had to be written off or shut down. Encouraging Nortel's top

management in this behavior, Fuller and Jensen (2002: 44) recognize, was “the incentive to maintain the value of managerial and employee stock options.”

7. Combination

The one nonpublic company among the top 20 New Economy companies in 2005, employee-owned SAIC, did an IPO in October 2006. The stated reasons: not to raise cash, but so that the company would no longer have to use its cash flow to purchase the stock of its retiring employees (they can now sell their shares on the market) and so that it would be able to use its stock for acquisitions.⁹ The use of stock to make acquisitions was particularly popular among ICT companies in the late 1990s when the speculative boom provided them with a “private” currency that appeared to be more valuable than cash. As Steven Ballmer, then president of Microsoft, put it in an interview in early 1998 (quoted in Cusumano and Yoffie 1998: 302):

We’ve had to step up and either make or not make big investments on Internet time. Like WebTV. Like HotMail. Some of them, I think, will prove smart. Maybe some of them won’t prove smart. But they’re not huge decisions. We have a currency [with our stock price] that makes them relatively small decisions. These deals [WebTV and HotMail] were both done for stock. I still think it’s real money, whatever it is – \$400 million of so per acquisition. But I can stop and say, ‘OK, that’s half of one percent of Microsoft.’ That’s probably a reasonable insurance policy to pay.

No company made such systematic use of its stock as an acquisition currency as did Cisco Systems from 1993 through 2003. In the process, Cisco came to dominate the Internet router market, growing from \$340 million in revenues and 882 employees in 1992 to \$18.9 billion and 34,000 employees in 2000. Founded in Silicon Valley in 1984, Cisco did its IPO in 1990, a year in which it had \$70 million in revenues and 254 employees. From 1993 through 2000, Cisco did 71 acquisitions for \$35.2 billion, of which over 98% was paid in Cisco stock (Table 7). Cisco became well known for its ability to integrate the acquisitions into its organization and for a relatively low level of employee turnover (Mayer and Kenney, 2004).

Yet, since late 2003 Cisco has almost completely stopped this practice, acquiring 41 companies for \$13.9 billion from November 2003 through May 2007, with a minimal use of stock as an acquisition currency. Indeed, stock rather than cash played the major role in only two of these 41 acquisitions. There could be a number of reasons why Cisco reversed its practice of using stock as an acquisition currency.

⁹See the communications from CEO Kenneth Dahlberg, available at <http://www.saic.com/saic-ipo/communications.html> (accessed September 26, 2006).

Table 7 Cisco Systems acquisitions, by value, employees, and mode of payment, 1993–2006

Calendar year	No. of firms acquired	Total value paid (\$m)	Average value per acquisition (\$m)	Percent of acquisition value paid in shares	No. of employees at acquired firm	Value per employee (\$m)	“Acquired” employees/Cisco employees Percent ^a
1993	1	89	89	100.00	60	1.48	4.1
1994	3	423	141	71.63	320	1.32	13.1
1995	4	702	176	100.00	205	3.42	5.0
1996 ^b	7	5618	803	97.67	1547	3.63	17.6
1997 ^c	6	614	102	72.13	210	2.92	1.9
1998	9	1144	127	99.85	722	1.58	4.8
1999	18	14,435	802	99.83	2363	6.11	11.3
2000	23	12,254	533	98.80	2045	5.99	6.0
2001	2	331	166	100.00	91	3.64	0.2
2002	5	1789	358	100.00	418	4.28	1.2
2003	4	754	189	88.59	550	1.37	1.6
2004	12	793	66	0.00	886	0.90	2.7
2005 ^d	12	7996	666	6.39	8112	0.98	21.5
2006 ^e	8	695	87	0.00	592	1.18	1.2
Totals	116	47,637	443	78.72	18,121	2.63	

Sources: Cisco Systems press releases at www.cisco.com; various newspaper articles.

^aCalculated as proportion of total number of people employed by target companies at the time that they were acquired by Cisco divided by the number of Cisco employees at the end of its fiscal year (last week of July). It is not known what proportion of these target-company employees actually became Cisco employees.

^bAcquisition cost of Metaplex, with 19 employees, not disclosed, but estimated from average value paid per employee in other 1996 acquisitions.

^cAcquisition cost of Telesend, with 10 employees, not disclosed but estimated from average value paid per employee in other 1997 acquisitions.

^dNumber of employees of Sipura Technology, acquired for \$68 million, M.I. Secure, acquired for \$13 million, and Nemo Systems, acquired for \$12.5 million, not disclosed, but estimated from average value paid per employee in other 2005 acquisitions.

^eAcquisition costs of Greenfield Networks, with 60 employees, and Tivella, with 10 employees, not disclosed, but estimated from average value paid per employee in other 2006 acquisitions.

Since, July 2001 the Financial Accounting Standards Board (FASB) has outlawed pooling-of-interests accounting, a practice that enabled a company that did an all-stock acquisition to put the book value rather than the market value of the acquisition on its balance sheet, thus reducing future amortization charges and

increasing future reported earnings. Cisco was known for its use of this accounting device, one that by inflating the company's reported earnings presumably boosted its stock price (Donlan, 2000). This explanation, however, is clearly only a partial one since Cisco made 10 all-stock acquisitions between July 2001 and March 2003, when the new FASB ruling was in place. At best the ruling made Cisco indifferent from an accounting point of view between the use of cash and stock in acquisitions. In fact, Cisco's stock price was generally higher from November 2003 to December 2004 than it had been from July 2001 to October 2003, which, all other things equal, should have encouraged the use of stock rather than cash for acquisitions—just the opposite of what Cisco actually did.

What probably tilted Cisco toward the use of cash were the facts that it had current assets of over \$14 billion on its balance sheet throughout fiscal 2004, and, given its massive stock repurchase program, the use of stock to acquire companies would have just increased the number of shares it would then have to repurchase to reduce dilution to a desired level (Domis, 2003). It is also the case that Cisco paid much less on a per-employee basis for its cash acquisitions than it had paid for its stock-based acquisitions, reflecting perhaps a preference by the owners of the acquired firms for hard cash rather than volatile stock. With 183 employees, the cost per employee of the Latitude acquisition in November 2003 was \$470,000, the lowest of Cisco's 82 acquisitions up to that point. And, at \$860,000, the average cost per employee of Cisco's 2004 acquisitions was only 21% of the average of \$4,140,000 for all its 94 acquisitions through 2004 (Table 7), and would be much less if one were to correct for price inflation.

In late 2005, Cisco agreed to purchase Scientific-Atlanta, a Georgia-based home-entertainment company with 7500 employees that had been founded in 1961, for \$6.9 billion. To complete the acquisition in early 2006, Cisco did a \$6.5 billion bond issue, the first time in its history that it had ever issued debt, and indeed the largest debt debut ever by a US company. Cisco claimed that it had its cash tied up abroad (Aubin, 2006). I would conjecture, however, that Cisco did this bond issue because it wanted to preserve its cash for, as is discussed subsequently, its massive annual stock repurchases.

During the 1990s, not all ICT companies used their stock as an acquisition currency as effectively as Cisco. As shown in detail elsewhere (Carpenter *et al.*, 2003), at the height of the Internet boom, Lucent and Nortel, trying to emulate the Cisco strategy, used billions of dollars worth of overvalued stock to acquire technology companies that brought little in real value to the acquirer. In 1998–2000 Nortel paid \$29.2 billion, 98% in the form of stock, for 17 acquisitions, nine of which had less than 200 employees; while Lucent paid \$41.1 billion, 95% in the form of stock, for 32 acquisitions, 19 of which had less than 200 employees (Carpenter *et al.*, 2003; Lazonick and March, 2007). Many of the key people in the acquisitions quit to spend their newly acquired wealth or to do new start-ups. Most of the start-ups that were acquired in 2000, at the height of the boom, moreover, had only the promise of

a commercializable technology, and were subsequently written off. Nevertheless, these New Economy acquisitions were hailed as the future of ICT, and in the short run helped to boost the acquirer's stock price. At both Lucent and Nortel, the CEOs who approved these acquisitions made enormous gains from stock-based compensation and bonuses before being ousted as it became evident in the downturn that their "New Economy" behavior had brought their "Old Economy" companies to the brink of bankruptcy.

8. Compensation

From the 1950s, *executive* stock options became a widespread mode of compensation in US industrial corporations. Given marginal income tax rates of 91% on the highest brackets of personal incomes in the post-World War II era, the Revenue Act of 1950 gave corporate executives the right to pay the capital gains tax rate of 25% on income from stock options. The gains that top executives reaped from a rising stock market spawned a political backlash in the 1960s that threatened to bring this privileged form of executive compensation to an end (Industrial Union Department, 1959; Griswold, 1960).

From that time, however, a very different type of firm began to make use of stock options for a very different purpose. From the 1960s, high-tech start-ups began to use stock options to lure *nonexecutive* technical and administrative employees away from secure employment at established companies. The practice became particularly widespread in Silicon Valley, where by the 1980s it was common for new technology companies to award stock options to virtually all employees, executive and nonexecutive. As they grew, these companies maintained the compensation practice of broad-based stock option plans, even as, in some cases, their employees came to number in the tens of thousands. In the tight high-tech labor markets of the late 1990s, most Old Economy companies in ICT began to compete for "talent" by offering comparable plans (Lazonick, 2003a).

Microsoft, for example, started giving its 200 or so employees stock options in 1982, and 4 years later, with about 1000 employees and \$200 million in revenues, went public to give liquidity to the stocks that employees purchased when they exercised their vested options (Lazonick, 2003a). As the company grew to employ over 20,000 people in 1996 and almost 40,000 4 years later, virtually all Microsoft employees got options. In May 2001, with stock prices tumbling, Microsoft doubled everybody's option grant, but just over 2 years later, with 55,000 employees, the company announced that it would no longer award stock options. Since then, as Table 8 shows, Microsoft's "overhang"—its stock options as a proportion of outstanding shares—has been on the decline.

Cisco, however, with almost 50,000 employees at the end of fiscal 2006, still gives almost everyone options. As it has taken shares off the market with huge stock

Table 8 Stock options outstanding as a percentage of common stock outstanding, selected ICT companies, 2000–2006

	2000	2001	2002	2003	2004	2005	2006
Cisco Systems	12.94	13.89	15.53	17.60	19.50	21.56	23.35
Dell	13.33	12.77	13.33	14.27	15.00	14.83	12.90
Hewlett-Packard	7.04	9.79	13.58	15.76	17.63	18.81	17.58
IBM	8.70	9.77	11.64	13.65	14.80	15.11	14.44
Intel	9.33	10.49	12.17	12.98	13.64	14.73	14.93
Microsoft	15.38	16.22	15.83	14.67	11.56	8.40	7.67
Oracle	9.45	9.23	8.13	8.52	8.60	8.81	9.07
Sun Microsystems	13.87	14.86	16.29	17.67	18.09	17.18	15.61

Source: Company 10-K filings.

Fiscal years ending: January: Dell; May: Oracle; June: Microsoft, Sun Microsystems; July: Cisco; October: Hewlett-Packard; December: IBM, Intel.

repurchases, the overhang has soared to over 23%. Like Cisco, Dell, Oracle, and Sun have historically given options to all employees, Intel gave options to only about one-half its labor force until 1997. As the Internet boom heated up, and as the word spread among Intel's almost 50,000 employees that in 1996 CEO Andrew Grove had raked in some \$98 million from exercising stock options, the company expanded the program to include almost all of its employees.

Hewlett-Packard, an Old Economy company located in the heart of Silicon Valley, awarded stock options only to upper-level employees in the early 1980s, but then gradually extended stock options to a larger proportion of the labor force from the mid-1980s to 1998. In 1985, the proportion of HP employees holding options was only 8%, but it increased to 18% in 1990, 25% in 1995, and 30% in 1998. At the height of the New Economy boom, this proportion jumped sharply, first to 57% in 1999 and then 98% in 2000. At the end of fiscal 2006 the proportion of HP employees holding options had declined to 71%, or 110,000 employees, but since 2000 all regular HP employees have been eligible to receive options.

At the beginning of the 1990s, IBM, like most Old Economy companies, reserved stock options for top-level executives, but in making the transition to the "New Economy business model" (Lazonick, 2006a), the company increasingly and substantially broadened the base of recipients. As can be seen in Table 8, the overhangs of HP, IBM, and Intel were steadily on the rise in the first half of the 2000s, in large part because, as we shall see, these companies have spent billions of dollars annually buying back shares, and hence reducing the number of shares outstanding.

Table 9 Average gains (thousands of US dollars) per top5 executive from the exercise of stock options, selected ICT companies, 1995–2006

Year	Cisco	Dell	HP	IBM	Intel	Microsoft	Oracle	Sun
1995	4065	387	534	152	4892	2505	4301	727
1996	15,790	830	1074	5383	24,585	0	8302	2786
1997	3124	1977	2161	3764	12,516	4127	3620	4425
1998	5972	14,417	1114	10,239	40,137	3271	3752	11,515
1999	60,586	36,937	8732	24,457	4796	30,178	6754	5619
2000	51,302	98,791	4360	13,293	32,063	50,653	83,504	25,180
2001	11,884	75,151	0	29,296	4117	31,531	169,674	18,441
2002	805	28,612	127	943	3514	1405	0	5406
2003	1291	2103	502	2139	6298	6860	13,001	1323
2004	14,207	14,019	182	2876	6338	8564	8633	1432
2005	15,804	9364	2319	3550	4208	5	21,953	2397
2006	17,614	31,466	4903	3210	2929	0	12,998	564

Source: Company proxy statements.

Who gains from stock options? And how much? In their proxy statements, companies provide data on the gains from the exercise of stock options of the CEO and four other highest paid executives (labeled hereafter the “top5”). Table 9 shows the average annual income per top5 executive from the exercise of stock options at the same eight companies that are listed in Table 8. In general, the gains from exercising stock options peaked in fiscal 2000 or 2001, although Intel’s top5 experienced their peak in 1998. At Oracle the top5 averaged almost \$170 million from exercising stock options in 2001, although they reaped no gains in 2002, which was not a good year, relatively, for stock option gains at all the companies (in the case of Dell its fiscal year ends on January 31, and hence its 2002 average gains figure of \$28.6 million refers primarily to options exercised in calendar 2001). Even before Microsoft ceased to award stock options, neither William Gates, its current chairman, nor Steven Ballmer, its current CEO, derived any earnings from the exercise of stock options (their stakes in Microsoft placed them in 2007, however, at numbers 1 and 31 respectively among the richest people in the world¹⁰). Unlike most of the other companies, whose top5 did very well from exercising options, Microsoft’s highest paid executives averaged a paltry \$5180 in 2005 and zero in 2006, in sharp contrast to the \$22.0 million in 2005 and the \$13.0 million in 2006 that the

¹⁰http://www.forbes.com/lists/2007/10/07billionaires_The-Worlds-Billionaires_Rank.html

Table 10 Average gains (dollars) per employee (excluding the “top5”) from the exercise of stock options, selected ICT companies, 1995–2006

	Cisco	Dell	HP	IBM	Intel	Microsoft	Oracle	Sun
1995	60,894	3833	2362	671	18,746	51,829	na	2468
1996	93,399	7194	2213	1823	16,010	79,022	7367	7992
1997	85,159	11,219	3156	3615	25,295	154,196	6588	7626
1998	92,947	40,547	2676	4066	75,890	238,377	5019	10,799
1999	193,476	126,639	6613	5790	56,589	369,693	5650	27,477
2000	290,870	84,818	17,987	4200	112,018	449,142	37,214	60,431
2001	105,865	76,122	1498	4011	18,235	143,772	88,723	46,763
2002	13,596	33,167	838	1195	10,413	95,310	6950	4550
2003	8917	10,739	936	1553	10,406	80,283	6193	1182
2004	32,804	12,216	638	1842	8405	50,690	7908	1960
2005	24,432	11,297	1739	1256	8347	14,500	6926	1187
2006	25,487	8724	6809	1857	3396	6208	9514	1249

Source: Company 10-K filings.

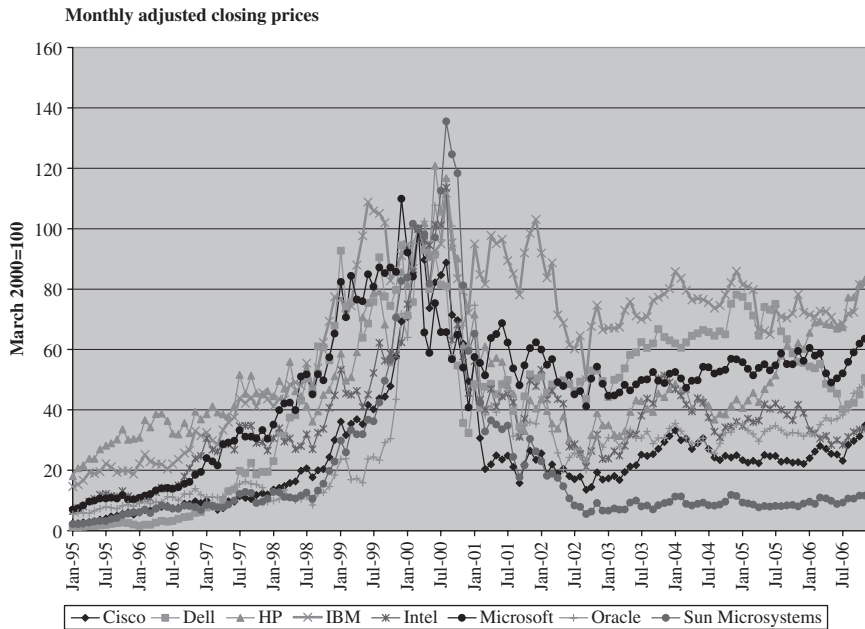
na, not available (Oracle did not report a weighted average exercise price for 1995).

top5 received on average at Oracle, one of Microsoft’s most important software rivals.

In addition to the information on top5 compensation, the notes to company 10-K financial statements provide data that permit an estimate of the average gains per employee from the exercise of stock options, and hence also the ratio of the average gains of the top5 to those of the average employee.¹¹ Table 10 shows the average gains per employee (excluding the top5) from exercising options for the same eight companies listed in Table 9.

Note the very significant gains that could be made *on average* by employees at these companies at the peak of the Internet boom, especially at Cisco, Dell, Intel, Microsoft, Oracle, and Sun, companies that coming into the second half of the 1990s

¹¹Since the mid-1990s, companies have reported not only the number of options exercised in any given year but also the weighted average exercise price (WAEP) of the options exercised. To generate these estimates of employee gains from the exercise of stock options, I assume that employees exercise options evenly over the course of the year in all months in which the highest market price of the stock is greater than the WAEP for the year. I then use the difference between the mean market price and WAEP during each such month to derive the gains over the course of the year shown in Table 10. For Table 11, I use the highest monthly market price rather than the mean market price to calculate the average gains per employee to avoid biasing the calculations of relative gains from exercising options in favor of high top5/employee ratios. I am grateful to Yue Zhang for her assistance in developing these estimates.



Source: Yahoo! Finance.

Figure 2 Stock-price movements, selected ICT companies, January 1995–December 2006 monthly adjusted closing prices.

awarded options to virtually all of their employees. At the apex of the Internet boom, the CEO and four other highest paid executives at Cisco Systems reaped an average of \$60.6 million in 1999 and \$51.3 million in 2000 from the exercise of stock options, while some 21,000 other employees averaged \$193,000 in 1999 and some 34,000 employees averaged \$291,000 in 2000. For the decade 1996–2005, the total average gains of Cisco's top5 were \$180.8 million and the total average gains for a hypothetical nontop5 employee who was with the company over this decade was \$941,000. Microsoft's average gains from stock options per employee were even more dramatic; an average of \$449,000 per non-top5 employee in 2000 (when Microsoft had 39,100 employees) and a total of \$1.675 million for the hypothetical non-top5 employee who was with the company from 1996 through 2005.

The gains that have been reaped more recently pale in comparison to those achieved during the boom. Such is even the case at Cisco where the average employee gains in 2004–2006 are substantially above their 2002–2003 levels, largely because of an increase in Cisco's stock price (Figure 2), but well below those that were being achieved on the eve of the boom in 1995–1996 when the size of the company's labor force was less than 20% of its current level. The cessation of new option grants at Microsoft from 2003 accounts for the sharp decline in average

employee gains at that company in 2005 and 2006. At Intel, which as already mentioned only began awarding stock options to all employees in 1997, the average gains per employee shot up at the height of the boom, although in 2000 the average Intel gains were only 25% of those at Microsoft.

At IBM, the average gains from the exercise of stock options for 1996–2005 were \$95.9 million for the top5 and \$29,000 for the hypothetical average employee. In the mid-1990s, IBM was at the beginning of a transition from the Old Economy practice of awarding stock options only to upper level executives to the New Economy practice of distributing options to a broader base of nonexecutive employees. The relatively low average gains per employee at IBM throughout the period 1995–2006 reflect the facts that (i) this broader base remained much more partial than for the other companies; (ii) with almost 356,000 employees at the end of 2006, IBM's headcount is more than three times that of Intel, the next largest employer among the eight companies; and (iii) the movement of IBM's stock price was much more damped than those of the other six companies during the Internet boom (Figure 2).

At the height of the New Economy boom, as we have seen, HP also substantially broadened the base of those who received stock options. The spike in average gains per employee to almost \$18,000 reflects the spike in HP's stock price in 2000 (which, as shown in Figure 2, was second only to that of Cisco) as well as substantial increases in the number of stock options granted per option holder in the late 1990s, even as the number of option holders grew. The numbers of option holders and average option awards per option holder at HP were, respectively, 33,000 and 242 in 1997, 37,000 and 576 in 1998, and 48,000 and 785 in 1999.

Table 11 shows the ratios of the average top5 gains from the exercise of stock options to the average gains of other employees at each of the eight companies, using the highest monthly stock prices to estimate their gains (see note 11). As can be seen, the top5/average employee ratios have varied markedly from year-to-year, but in 2005 shot up to extraordinarily high levels at Cisco, Oracle, and Sun. For fiscal 2006 (year ending January 31), the ratio for Dell was 3153:1 as average options gains per employee fell to \$8724, the lowest level since 1996. Meanwhile, the average top5 gains from exercising options stood at \$31.5 million.

The widespread distribution of the gains from stock options within a New Economy company serve to legitimize the enormous sums that top executives derive from this mode of employee compensation. The data that I have presented suggest that, despite the sluggish stock market of the first half of the 2000s, the ability of these top executives to reap these rewards remained intact. It would appear that the same cannot be said for the average New Economy employee. In the 1980s and 1990s, these nonexecutive employees in effect traded employment security in the Old Economy corporation for stock-based remuneration in the New Economy corporation. In the 2000s, they face the insecurity of the New Economy business model, exacerbated by the globalization of the ICT labor force (Lazonick, 2006b),

Table 11 Ratios of average top5 gains from the exercise of stock options to average gains of other employees, selected ICT companies, 1995–2006

	Cisco	Dell	HP	IBM	Intel	Microsoft	Oracle	Sun
1995	60	83	202	200	232	45	na	221
1996	150	93	426	2462	1388	0	989	288
1997	33	149	623	909	440	25	487	506
1998	58	307	334	2234	477	13	643	929
1999	202	252	1186	3755	75	74	949	175
2000	156	1000	214	2758	246	101	1807	364
2001	94	835	0	6442	194	192	1575	324
2002	48	745	123	682	290	13	0	951
2003	119	175	452	1268	531	77	1728	834
2004	386	1031	221	1459	566	156	1266	571
2005	585	745	1077	2557	454	0	2709	1527
2006	621	3153	616	1581	737	0	1227	345

Source: Company proxy statements and 10-K filings.

na, not available

but with the gains from stock options—in historical perspective, their rewards for eschewing employment security—much harder to come by.

9. Cash

If there is a conventional wisdom about the functions of the stock market in the corporate economy, it is that firms issue stock to raise cash for investment in productive resources. This view of the main function of the stock market serves to support the ideology that public shareholders are risk bearers who finance economic growth without a guaranteed contractual return, and hence have “residual claimant” status. The stock market was, however, only a relatively minor source of cash for companies over the course of the 20th century. Moreover, even when, as in the boom of the late 1920s, established companies sold large amounts of overpriced stock, they typically did so to take advantage of the speculative market to restructure their balance sheets rather than to make new investments (O’Sullivan, 2004). As a result of this financial restructuring, these companies were better able to withstand the subsequent stock market crash and downturn in economic activity.

In contrast, in the Internet boom of the late 1990s, it tended to be speculative new ventures that took advantage of the speculative stock market to raise huge sums through initial and secondary public offerings that could then be used to fund investment in productive resources. A particularly dramatic example is Sycamore

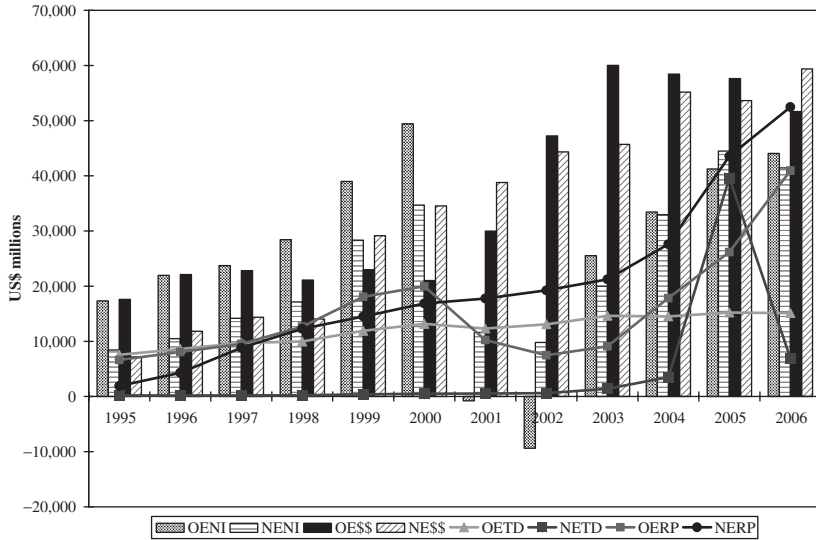
Networks, an optical networking company founded in February 1998 in Massachusetts' Route 128 by two men who had already built up and sold a highly successful data equipment company, Cascade. With one customer (whose top executives were given "friends-and-family" stock options in Sycamore), previous year revenues of \$11 million, losses of \$19 million, and 155 employees, Sycamore did its IPO in October 1999, raising \$284 million for less than 10% of its outstanding shares (Bulkeley, 1999; Warner, 2000; Carpenter *et al.*, 2003). In December 1999 Sycamore ranked 117th in market capitalization in the United States, just behind Emerson Electric, a company founded in 1890 that had revenues of \$14.3 billion and 117,000 employees! Sycamore then did a secondary offering in March 2000, at the very apex of the boom, with its stock at \$150, and netted another \$1.2 billion for the corporate treasury. At the same time, top executives and board members of Sycamore sold a portion of their own stockholdings for \$726 million (Gimein *et al.*, 2002).

In effect, those who speculated in Sycamore's stock functioned as "accidental" venture capitalists, although they also permitted the company's top executives to gain huge returns from the company before what remained a start-up had gotten off the ground. By October 2001 Sycamore's stock price was around \$4, a level at which it has subsequently remained. As of July 31, 2006, with revenues of only \$87 million and 246 employees, the company had rung up losses of \$862 million since 2001, but was still sitting on \$844 million in cash and short-term investments (but down from \$955 million a year earlier).¹²

Less speculative, and (thus far at least) more productive among New Economy ICT companies in the 1980s and 1990s was Nextel's 1999 stock offering of \$2.4 billion as part of an externally financed "war chest" to fund its expansion in mobile phones (Knight, 1999). Founded in 1987 as Fleet Call, a radio dispatch company, in 1999 Nextel Communications had revenues of \$3.3 billion and 15,000 employees, but had sustained losses of \$4.6 billion over the last 3 years. Indeed, the company was in the red in every year from 1990 to 2001 for a total loss of over \$9.2 billion. Nextel, however, steadily increased its revenues, and in 2002 showed a \$1.9 billion profit. By 2004 Nextel was the 8th largest New Economy ICT company in the Fortune 500 list, with revenues of \$13.4 billion, net income of \$3.0 billion, and 19,000 employees. In 2005, Nextel merged with Sprint in a \$35 billion deal.

Some New Economy start-ups of the 1980s and 1990s that experienced rapid growth in the 1990s had little if any resort to the stock market as a source of funds. For example, the only public stock issue that Cisco Systems has ever done was for \$48

¹²In 2005, Sycamore showed a gain from the sale of investments of \$467 million, increasing its cash and near-cash on hand from \$45 million at the end of fiscal 2004 to \$508 million at the end of fiscal 2005 (Sycamore 2005 10-K, 24–25). On June 21, 2007 Sycamore Networks released its Form 10-K for the year ending July 31, 2006. The cause of the delay in releasing its 2006 10-K was the need for the company to restate its financial statements for prior years in the wake of a SEC investigation into the backdating of stock options.



^aNETD for 2005 includes Microsoft's special dividend of \$32.64 billion.
^bIncludes all of the top 20 Old Economy (OE) companies by revenues in 2005 except Cox Communications and Freescale Semiconductor and all the top 20 New Economy (NE) companies by revenues in 2005 except SAIC and Google (Lazonick, 2007a). In 2006 BellSouth is included as part of AT&T.
 NI, net income; \$\$, cash balances; TD, common plus preferred dividends; RP, stock repurchases
 Source: Compustat database.

Figure 3 Net income, cash balances, dividends,^a and repurchases at the top Old Economy and New Economy companies,^b 1995–2006.

million when it went public in 1990. In that year, the company had \$70 million in revenues, net cash from operating activities of \$10 million and capital expenditures of \$4 million. Subsequently, until its 2005 bond issue of \$6.5 billion to acquire Scientific-Atlanta (see above), Cisco relied entirely on internally generated funds to finance its growth. From 1991 through 2006, Cisco received payments totaling \$11.9 billion for its shares, but these were sales to employees who were exercising their stock options, not public issues on the stock market.

Of far more significance than public or private stock issues in the financial behavior of ICT companies are stock repurchases. As indicated earlier, in Figure 1, the overall trend of the “cash” function is for going concerns, such as those included in the S&P500, to give money to the stock market, not get money from it. Figure 3 shows the trend toward more repurchases from 1995 through 2006 at the top 20 Old Economy and the top New Economy companies by revenues in 2005. With net income and cash balances up in both groups in 2003–2006, dividends and repurchases have both climbed. Except for Microsoft’s one-off special dividend of \$32.64 billion in fiscal 2005—the largest single dividend in corporate history and one that was in 2005 4.5 times the total amount of regular dividends of the 18 New Economy companies in the top 20 for which there are

Table 12 Stock repurchases (\$ millions), selected ICT companies, 2000–2006

	2000	2001	2002	2003	2004	2005	2006	2000–2006
Cisco Systems	0	0	1854	5984	9080	10,235	8295	35,448
Dell	1061	2700	3000	2290	2000	4219	7249	22,519
HP	5570	1240	671	751	3309	3514	6057	21,112
IBM	6700	5293	4212	4403	7275	7671	8022	43,576
Intel	4007	4008	4014	4012	7516	10,637	4593	38,787
Microsoft	4900	7441	6069	6486	3383	8057	19,207	55,543
Oracle	5307	4341	2792	2653	1499	1343	2067	20,002
Sun Microsystems	631	1321	591	499	0	0	0	3042
Total, eight companies	28,176	26,344	23,203	27,078	34,062	45,676	55,490	232,780

Source: Compustat database and company 10-K filings.

data—buybacks far exceeded dividends in New Economy companies. Indeed, for the years 2001–2006, repurchases alone exceeded net income for these companies as a group.

As shown in Table 12, some of the most successful high-tech companies have been in the forefront of this movement. Over the period 2000–2006, Microsoft repurchased \$55.5 billion (including a record \$19.2 billion in 2006), IBM \$43.6 billion, Intel \$38.8 billion, Cisco \$35.4 billion, Dell \$22.5 billion, Hewlett-Packard (HP) \$21.1 billion, and Oracle \$20.0 billion. Moreover, during the first half of the 2000s stock repurchases were escalating. Cisco, for example, did no repurchases in 2000 and 2001 but then progressively ramped up its purchases from \$1.9 billion in 2002 to \$10.2 billion in 2005, before “cutting back” to \$8.3 billion in 2006. Combined repurchases by the eight companies listed in Table 12 increased from \$23.2 billion in 2002 to \$55.5 billion in 2006.

During this period, IBM was the leading repurchaser among Old Economy companies, with HP a distant second, while the other six companies in Table 12 were the leading repurchasers among New Economy companies. In 2000 and 2001, Cisco did not do repurchases because speculation sufficed to raise its stock price to the point where, in March 2000, Cisco had the highest market capitalization in the world. When, with the bursting of the Internet bubble, its stock price had fallen from an all-time high of \$82.00 on March 28, 2000 to a temporary low of \$11.04 on September 27, 2001, Cisco’s management decided that it was time to repurchase shares to support the company’s stock price, and it has done so with a vengeance ever since. Compared with the other seven companies in Table 12, Sun Microsystems has spent much less on stock repurchases, including none during 2004–2006, not because it does not want to support its stock price but because it has been in weak financial condition (Sun Microsystems 2005 10-K, 46).

Some New Economy companies such as Advanced Micro Devices (AMD), Amazon.com, Jabil Circuit, Solectron, and Sanmina-SCI have never paid appreciable dividends and have not been substantial repurchasers of their own stock. It should also be noted that Cisco, Dell, Oracle, and Sun Microsystems pay no cash dividends, a typical New Economy practice. In 1992, Intel began to make small dividend payments, with increases from the late 1990s moving its yield toward its current 2%. Microsoft began to pay modest dividends in 2003, generating a current yield of about 1.3%, except for its huge one-time dividend in November 2004 that was over 11% of its stock price. IBM's current dividend yield of only 1% reflects the fact that, in making the transition from the Old Economy to New Economy business model, the company cut its dividends substantially from 1993 while it stepped up its stock buybacks (Lazonick, 2006a).

Are these massive distributions to shareholders at the expense of innovation? A New Economy CEO would argue that repurchases support the company's stock price, which in turn enhances the value of its stock as a combination and compensation currency that can be used to accumulate innovative capabilities. Indeed, he or she might go on to point out that large-scale repurchases are necessitated by the dilution of earnings per share as a result of the use of stock to do acquisitions and the exercise of stock options by a broad base of employees. One could counter with the logic that if the uses of stock as a combination and compensation currency were in fact supporting innovation, there should be no need to worry about dilution of earnings per share; over the long run, one would expect that these investments in innovative capabilities would generate returns. There is every reason to suspect that such arguments about the importance of repurchases for the accumulation of innovative capabilities are simply self-serving, coming as they do from executives who persistently generate millions, or tens of millions, or even at times hundreds of millions, of dollars for themselves from the exercise of their abundant stock option awards.

Indeed, in the 2000s, as shown in Table 13, the extent of stock repurchases by some of the companies listed in Table 12 went well beyond an offset to dilution resulting from the exercise of stock options.¹³ For 2000–2006, the multiples of shares repurchased to stock options exercised ranged from Sun's 0.9 to IBM's 4.6. Sun's

¹³Through fiscal 2004, Dell stated explicitly that the purpose of its share repurchase program was "to manage the dilution resulting from shares issued under Dell's equity compensation plans" (Dell 2004 10-K, 23). In 2005 and 2006, however, the company stated that the purposes of repurchases were "both to distribute cash to shareholders and to manage dilution resulting from shares issued under Dell's equity compensation plan" (Dell 2005 10-K, 16; Dell 2006 10-K, 18). Similarly, prior to 2001 Sun explicitly tied repurchases to stock-based compensation plans, but in 2001 introduced "a new opportunistic stock repurchase program to acquire shares in the open market at any time" (Sun Microsystems 2003 10-K, 84). Of the value of shares that Sun repurchased in 2001, 2002, and 2003, 47%, 25%, and 100%, respectively were bought under the opportunistic plan. HP has stated that it repurchases shares "to manage the dilution created by shares issued under employee stock plans as well as to repurchase shares opportunistically" (HP 2005 10-K, 30).

Table 13 Ratios of shares repurchased to options exercised, selected ICT companies, 2000–2006

Year	Cisco			Dell			HP			IBM		
	EX	RP	RP/EX	EX	RP	RP/EX	EX	RP	RP/EX	EX	RP	RP/EX
2000	176	0	0.0	77	56	0.7	34	97	2.8	18	61	3.4
2001	133	0	0.0	95	65	0.7	8	45	5.9	20	51	2.5
2002	54	124	1.5	63	68	1.1	9	40	4.3	8	49	6.5
2003	45	424	9.4	22	50	2.3	15	40	2.7	11	50	4.5
2004	96	408	4.3	35	63	1.8	13	172	13.4	14	79	5.6
2005	93	540	5.8	45	119	2.6	47	148	3.2	12	90	7.7
2006	136	435	3.2	44	204	4.6	101	190	1.9	22	98	4.5
2000–2006	733	1931	2.6	381	625	1.6	227	732	3.2	105	478	4.6

Year	Intel			Microsoft			Oracle			Sun		
	EX	RP	RP/EX	EX	RP	RP/EX	EX	RP	RP/EX	EX	RP	RP/EX
2000	108	76	0.7	396	110	0.3	101	291	2.9	70	23	0.3
2001	68	133	2.0	246	178	0.7	110	142	1.3	63	59	0.9
2002	51	183	3.6	198	246	1.2	29	210	7.2	28	64	2.3
2003	64	176	2.8	234	238	1.0	48	270	5.6	26	126	4.9
2004	48	301	6.2	198	124	0.6	38	118	3.1	41	0	0.0
2005	65	418	6.4	138	312	2.3	71	115	1.6	36	0	0.0
2006	47	226	4.8	76	754	9.9	87	147	1.7	41	0	0.0
2000–2006	451	1513	3.4	1486	1962	1.3	484	1292	2.7	305	272	0.9

Source: Company 10-K filings.

Number of options exercised and shares repurchased in millions.

EX, number of options exercised; RP, number of shares repurchased.

financial situation prevented it from making purchases from 2004 to 2006, but for the other companies the only explanation of these multiples is that in the 2000s they are using their financial resources to boost their stock prices. At Microsoft, for the period 2000–2005, the number of shares repurchased only covered 86% of options exercised. Yet, in 2005, when Microsoft repurchased over \$8 billion in shares, the number of shares involved was more than two times the number of options exercised. In 2006, Microsoft's repurchase ratio soared to 9.9, only in part because, given the 2003 cancellation of the company's stock option program, option exercises were down. As we shall see in the conclusion to this article, Wall Street effectively

pressured Microsoft to use its financial muscle to do a major buyback to boost its sagging stock price.

What is the impact of these massive stock repurchases on innovation? It will require in-depth company-level case studies to answer this question in anything that approaches a definitive way. As an example, Intel and AMD are long-time rivals in the semiconductor industry, both having been founded in Silicon Valley in the late 1960s as spinoffs from Fairchild Semiconductor. One can ask whether AMD's recent incursion into Intel's market share in microprocessors (Yi, 2005; Spooner, 2006) has something to do with the following facts:

- (1) For the period 1995–2006, AMD's R&D expenditures were 20% of Intel's even though its revenues were only 13% of Intel's.
- (2) Over this period AMD paid no dividends and did only minor buybacks (the only significant one was for \$77.2 million in 2001), while Intel paid a total of \$8.4 billion in dividends and did \$55.9 billion in repurchases, with the combined distributions to shareholders representing 91% of its net income.
- (3) During 2001–2006, when AMD captured some of Intel's market share, Intel's repurchases were 111%, and its total distributions 133%, of net income.

At the same time, it must be recognized that, whereas AMD cannot afford to do buybacks given its R&D requirements, Intel is not faced with this tradeoff. Intel's wealth means that it can afford to invest for the future, while making massive distributions to shareholders. In 2006, Intel had net income of \$5.0 billion even after R&D expenditures of \$5.9 billion (surpassing AMD's *revenues* of \$5.6 billion). In doing \$4.6 billion in repurchases, therefore, Intel was not necessarily cutting into what it would otherwise have spent on R&D. The question is whether, in competition with a company like AMD, Intel will find that in the future it has not been investing enough in innovation, and that its shareholders, and Wall Street, will be reluctant to let it kick the habit of disgorging its "free" cash flow.

10. Implications for the governance of innovative enterprise

I reiterate that only in-depth studies at the company level, and ideally ones that are comparative among major competitors in an industry, can generate robust conclusions about the relation between the functions that the stock market performs in the corporate enterprise and the generation of innovative capabilities (Carpenter *et al.*, 2003; Lazonick and Prencipe, 2005; Lazonick *et al.*, 2007). Such studies need to be guided by a theory of innovative enterprise that asks who exercises strategic control, how they integrate people with different functional specialties and hierarchical responsibilities into a collective and cumulative learning process, and what sources of finance they mobilize to sustain this learning process until it can generate financial returns. The analysis of the functions of the stock market is

indispensable to the study of innovative enterprise, at least in the United States where the stock market has emerged over the past quarter century as a central economic institution. As I have argued in this article, the stock market influences not only corporate finance but also corporate strategy and corporate organization. Moreover, the impact of these functions on innovative performance can change over time; for example employee stock options can support innovative enterprise in one era or at one stage in the growth of the firm, but they may undermine innovation in another era or at another stage. The analysis of the relation of the stock market to innovative enterprise, therefore, must be not only firm-based and comparative; it must be historical as well.

In the case of the US ICT industries, the influence of the stock market has become deeply embedded in the operations of its major companies, first and foremost because of the use of stock options as a mode of compensation. In the 2000s, the most conspicuous function of the stock market has been stock repurchases—that is, as a negative supply of cash. Microsoft's decision to repurchase \$20 billion in shares in August 2006 provides insight into the implications of buybacks for the governance of innovative enterprise.

In June 2004, with a dividend yield of just 0.6% on its stock, Microsoft's corporate treasury was bursting with \$56 billion in cash and short-term investments, and the balance sheet showed no debt. The highly profitable company, moreover, had generated almost \$16 billion in cash flow in the previous year. Given these conditions, in mid-2004 Wall Street began to exert pressure on Microsoft to increase its distributions to shareholders, and increase its stock price. A Goldman Sachs report by its software analyst suggested that, by borrowing \$30 billion, Microsoft could do a \$100 million stock repurchase (Bishop, 2004). A month later, in July 2004, the Microsoft board approved a \$30 billion repurchase plan to take place over 4 years, a doubling of the dividend from \$0.16 per annum to \$.08 quarterly, and a special one-time dividend of \$3 per share, over 12% of the current share price.

The company press release that announced these distributions assured the public that “[t]his payout will not affect Microsoft's commitment to research and development to fuel growth in the years ahead.”¹⁴ In support of this commitment, it quoted Chairman Gates: “We see incredible potential for our innovation to help businesses, individuals and governments around the world accomplish their goals, and we will continue to be one of the top innovators in our industry – as evidenced by the fact that we will file for more than 3000 patents this fiscal year.” The press release also quoted CEO Ballmer: “We will continue to make major investments across all our businesses and maintain our position as a leading innovator in the industry, but we can now also provide up to \$75 billion in total value to shareholders over the next four years.”

¹⁴<http://www.microsoft.com/presspass/press/2004/jul04/07-20boardPR.msp>x (accessed March 30, 2007).

Just over a year and a half later, on April 27, 2006, Microsoft announced that it would be making major new technology investments, including a large-scale commitment of resources to its online business to confront Google and Yahoo!. The company predicted earnings per share of \$1.36 to \$1.41 for fiscal 2007, well below the expectations of Wall Street analysts of \$1.57. Rick Sherland, the same Goldman Sachs analyst who had previously encouraged Microsoft to do a \$100 million repurchase, was not pleased with the Microsoft announcement: "It's bad to surprise the Street. It's harmful to the stock because investors are looking for the rewards of this big product cycle next year flowing through to earnings" (Romano, 2006). The next day Microsoft's stock price fell over 11%, reducing the company's market capitalization by some \$30 billion. The stock price continued to decline during most of May, amid criticism from Wall Street's top-rated software analysts that Microsoft was a mature firm that had attracted "value investors" who wanted returns from dividends and buybacks. An article from Bloomberg News (Bass, 2006a) quoted Richard Pzena, head of an investment company that held 14.3 million Microsoft shares, as saying: "They are not managing the business with an acknowledgment the shareholders have changed. People expecting 25 percent annual growth don't own the stock anymore."

On May 31, Ballmer defended the company's "big, bold bets" on Internet technology at a conference at Sanford C. Bernstein & Company, the Wall Street investment research firm (Bass, 2006b). Wall Street remained critical of Microsoft's technology strategy.¹⁵ Microsoft's stock price, which had trended downward during May but had moved upward in the days before the Bernstein conference, resumed its decline, reaching a low on June 13, almost 21% down from its level on April 27. Finally, on July 20, Microsoft announced that it was accelerating by 2 years the completion of its \$30 billion buyback program. At the same time, Microsoft also announced a plan to repurchase another \$20 billion in stock from 2007 to 2011. Over the next four days, Microsoft's stock price rose by almost 7%.

The Microsoft example illustrates the pressure that Wall Street can exert on even the most powerful high-tech company, once that company becomes committed to using its cash flow to "create" shareholder value. Wall Street's argument is that Microsoft is now a mature company that has lost its innovative capability, at least relative to the start-ups that the US economy is adept at spawning. As a mature company, the analysts argue, Microsoft should disgorge its cash flow to shareholders. As far as these "old" New Economy companies are concerned, the Wall Street consensus is that redistribution, not innovation, should be driving the stock market.

This relation between Wall Street and Corporate America is very different from the one that prevailed during the boom of the late 1990s, even though, with the exception of a few of the most exuberant players on both sides who have gone to jail, most of the actors are the same. Quite apart from the Enrons, WorldComs, and

¹⁵See "Microsoft to use cash for development, not share buybacks," *New York Times*, June 1, 2006. The full text of the Bernstein conference is available from Factiva.

Tycos, it is now quite clear that during the late 1990s top executives of major US corporations, especially those in high-tech sectors, were actively supporting the rosy pronouncements of the Wall Street analysts and the speculative strategies of stock-market investors by hyping their technology acquisitions and rigging their reported earnings. Armed with US-style stock options—that directly transform market speculation into capital gains—top executives reaped huge financial rewards.

In the mid-2000s, however, speculation is no longer driving the stock market. Regulation and jail-time in the wake of the scandals have made it more difficult or risky to cook the books. Stock-market losses and the publicity of the scandals may also have made many of the “greater fools” of the late 1990s much more aware of the irrationality of their former exuberance. In the absence of speculation, Wall Street now wants redistribution. Obliging, Corporate America has returned to what in the mid-1980s Jensen (1986) so appropriately called disgorging the cash flow. In playing the new “earnings game,” top executives who, with the approval of their boards, allocate corporate resources to increased dividends and buybacks still have their bountiful stock option awards to reward themselves for their efforts. With this shift from speculation to redistribution, the incentive for top executives remains the same: the high stock-based pay that was supposed to solve the “agency problem.”

The stock market, therefore, does play an important role in the corporate economy, but its functions are hardly those that agency theory contemplates. If from the perspective of innovation theory, we ask what role the stock market plays, an entirely different research agenda comes to light. We can analyze, for example, how the speculative stock market boom of the late 1990s influenced strategic control, organizational integration, and financial commitment in an innovative sector such as ICT (Carpenter *et al.*, 2003; Lazonick, 2006a; Lazonick and March, 2007). We can witness how, in seeking to boost the price of its already overvalued stock, the top executives of Old Economy companies such as Lucent Technologies and Nortel Networks made “strategic” moves, including ill-advised technology acquisitions, overstated revenues, and speculative vendor financing, that would help to tear once-great companies apart. We can ponder why at the peak of the speculative stock-market boom, US ICT companies, both Old and New, failed to emulate their counterparts in the US stock market boom of the late 1920s, when corporations *sold* their own stock to the speculators to pay off debt or put more cash in the corporate treasury rather than *buy* stock to push stock prices even higher. Eschewing stock sales in the boom, for example, Lucent and Nortel were compelled to sell stock in the crash at fractions of their former values in order to stave off bankruptcy (Carpenter *et al.*, 2003). And we can question whether in the boom stock options served to integrate talented employees into the processes of organizational learning of these companies, or rather just gave the option recipients incentives to take the money and run.

In the more normal economic environment of the 2000s, we can investigate whether the corporate obsession with maintaining high stock prices supports the innovation process by, for example, permitting a company to retain highly mobile

“talent,” or whether the massive, and apparently escalating, stock buybacks are just a new mechanism for disgorging the cash flow and boosting top executive pay. Does the outflow of cash that repurchases entail support the innovation process by maintaining the value of the firm’s own private combination and compensation currency, or does it deprive the firm of resources that it needs to compete? Are top executives who spend much of their time and energy thinking about how to manipulate the stock market devoting sufficient time and energy to thinking about how to confront the technological, market, and competitive uncertainties with which, in a globalized economy, even the most powerful high-tech companies must be concerned?

Once we have addressed these microeconomic questions in a serious way, we can begin to investigate the macroeconomic issues of whether innovative companies that seek to “maximize shareholder value” improve or exacerbate the distribution and stability of income in the society of which they are part. A combination of innovation, redistribution, and speculation drives the stock market. Rather than repeat the mantra of “maximizing shareholder value,” we would far better off if those who occupy positions of strategic control over the allocation of corporate resources would contemplate what happens to stable and equitable growth when they allow the stock market to drive the companies that they head, and supposedly lead.

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