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Regulatory Constraints on CEO Compensation

THE LEVEL AND STRUCTURE of executive compensation have attracted considerable academic and public policy interest in recent years. The enormous human and financial resources controlled by CEOs and the high compensation levels accompanying these responsibilities make the market for CEOs especially interesting. Economists have examined CEO compensation to explore theories of the structure and consequences of incentive schemes and the nature of monitoring and control relationships among corporate management, boards of directors, and shareholders. The public debate has focused on whether CEOs earn "excessive" compensation, a concern raised by media reports of the largest compensation payments. As a consequence, some large corporate stakeholders, labor and consumer representatives, and public officials have called for imposing political constraints on executive pay.

The academic literature has assumed, for the most part, that the market for executives is efficient and that their high market wage reflects high marginal products. In contrast, the current public antagonism to

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executive salaries reflects a belief that top executives are paid substantially more than their contribution to productivity or, at least, far more than what is equitable given the compensation earned by other workers. This conflict between relying on the market to set compensation and using some "fair and reasonable" standard echoes a longer standing, if less obtrusive, conflict within regulatory agencies. The state and federal agencies responsible for overseeing private but regulated firms have some opportunity to influence the executive compensation packages offered by those firms. In this paper we explore the extent to which regulatory agencies have exercised their discretion to alter the level and structure of CEO compensation.

Economic (price and entry) regulation both increases the visibility of executive pay, through enhanced public scrutiny of corporate accounts, and provides a set of instruments (price and allowable cost decisions) to penalize firms perceived to pay their senior executives "too much." Regulators, because their interests are different from shareholders and because the political process makes them responsive to prevailing public sentiment, also have an incentive to promote compensation packages that differ from those found in the unregulated sector. We argue that the influence of regulators will lead to lower pay for CEOs of regulated firms and to compensation packages that are less responsive to firm profitability than are packages at unregulated firms.

This view is consistent with previous empirical studies that have found that CEOs of regulated firms are paid less, *ceteris paribus*, than CEOs of unregulated firms, and that more of their compensation is cash compensation not directly tied to firm performance.[1] This paper provides a more complete analysis of differences in the structure and level of CEO compensation associated with regulation and investigates the source of these differences.

Using a sample of 2,000 CEOs employed by more than 1,000 firms during the period 1970 to 1990, we examine the patterns of compensation for CEOs employed by regulated and unregulated firms. After controlling for firm size, firm financial performance, and CEO characteristics, we find that CEOs of regulated firms earned substantially less than CEOs of unregulated firms. The discount is greatest in

1. Carrol and Ciscel (1982); and Murphy (1987).

those industries in which regulators review costs and set rates on a firm-by-firm basis (electric and gas utilities, interstate natural gas pipelines, and telephone companies). CEOs of electric utilities, the regulated industry best represented in our sample, earn from 30 percent to 50 percent of the compensation earned by the average CEO in unregulated industries, all else being equal. The discount on CEO compensation in industries where rates are set on an industry-wide basis (railroads, trucking, and airlines) is smaller and not always statistically distinguishable from zero.

We believe these discounts reflect, at least in part, political pressures to constrain CEO compensation, as mediated through the regulatory process. Regulation, however, also might have an indirect effect on compensation. Regulation affects the firm's decisions, thereby giving the regulators an opportunity to alter compensation policy, and the economic environment in which firms and their CEOs operate. By changing the environment, regulation may reduce the ability of even exceptional managers to substantively affect firm performance. An alternative explanation of regulatory discounts, then, is that regulation reduces the returns to superior management and greater managerial effort, limiting potential CEO productivity. This could affect the optimal level and structure of compensation independent of any political constraints imposed by regulation. Of course, political constraints *and* inherent productivity differences may both contribute to observed compensation differentials.

While it is difficult to disentangle these two explanations, the pattern of evidence presented in this paper suggests political constraints on CEO compensation. First, compensation discounts (relative to unregulated firms) are larger the more direct is regulatory oversight of the firm. Within the electric utility industry, discounts are largest when a single state regulatory agency has jurisdiction over the entire firm. The discount is smaller when the firm is organized as a multistate utility holding company, in which case jurisdiction is shared by regulators in several states and the federal government. The discount also is smaller when the firm is organized as an exempt holding company with both utility and nonutility business, in which case the state regulatory agency has direct oversight over only the utility subsidiary. Notably, this result holds even when the nonutility business is financially inconsequential.

The legal form rather than the economic implications of the exempt holding company status appears to account for the higher compensation level.

Second, the discounts vary directly with regulatory intensity. For electric utilities, discounts are deepest in the 1975–84 period when regulatory constraints were tightest. This observation is consistent with the outcome of political pressures on compensation but not with the productivity hypothesis. Tightening regulation in the late 1970s and early 1980s increased the risk facing regulated firms, suggesting that the CEO's potential impact on stockholder return would be larger during this period. If observed compensation discounts reflect limitations on the scope for CEO effects, the discount should have declined, not increased, in this period.

Finally, the compensation earned by CEOs of regulated firms is less responsive to company profitability than is the compensation for CEOs of unregulated firms. Compared with CEOs of unregulated firms, CEOs of regulated firms earn more of their compensation as salary and bonus and less of it in stock options and other forms of long-term incentive compensation. The salary and bonus they receive are less sensitive to variation in stockholder earnings. Stock options introduce a potential for huge compensation reports when options eventually are exercised. Avoiding this risk is consistent with a model in which regulators are averse to politically unpopular, large lump-sum payouts. This compensation structure also is consistent with a model in which regulators want the compensation scheme to reflect the interests of both the consumer and the firm and therefore prefer a scheme that is less tied to firm profitability. Less reliance on pay-for-performance is not necessarily consistent with differences in optimal compensation under productivity differences, however.

The paper is organized as follows. First, we present the political constraint hypothesis and review the literature on CEO compensation. Second, we develop the specific predictions of cross-sectional and intertemporal variations in compensation implied by our view of regulation. We describe how we exploit variations in regulatory regimes to gain insight into the mechanisms driving the observed compensation discounts. Third, the data and the empirical specification of our compensation model are discussed. We incorporate in the model the effects of regulation on the structure and level of compensation and explore

the structural stability of CEO compensation patterns over time. Finally, we present the estimation results, discussing first CEO compensation overall and next the results for regulated industries. Concluding comments follow.

Compensation, Political Pressure, and Economic Regulation

Our analysis of regulatory impacts on CEO compensation lies at the intersection of the literatures on managerial compensation and the political economy of regulation. The theoretical and empirical literatures on managerial compensation have analyzed the incentive and allocation problems addressed by executive compensation contracts. They also have addressed the role of compensation contracts in allocating executives within and across firms and in aligning CEO and shareholder interests when ownership and control of the firm are separated. The literature has established and tested predictions about relationships between pay and performance, pay and firm size, and pay and CEO characteristics.

These predictions, summarized later in the paper, are incorporated in our econometric model of executive compensation. Because compensation schemes serve the same (private) ends in regulated and unregulated firms, these predictions might apply equally well to regulated firms. Shareholders in both types of firms want compensation arrangements that attract and retain suitable managerial talent, and they want the compensation structured to align the interests of shareholders and managers. The literature on political economy, however, suggests that the compensation scheme, like other firm decisions, might be affected by regulation.

This literature has analyzed how private and public interests interact to produce outcomes that would not occur in an unregulated environment. One strand focuses on how regulation affects the economic environment in which firms operate and constrains the behavior of the regulated firm. In this literature the regulator is viewed as a maximizer of social welfare, and the conflict is between the stockholders (who care only about profit) and the regulator (who cares about profit and

consumer welfare).[2] Another strand recognizes that the firm-regulator interaction is embedded in a political system that is responsive to the desires of various interest groups.[3] In this literature regulators respond to powerful and effective interest groups (including the regulated firm), rather than maximize social welfare. Both strands predict that the choices made by the firm will be influenced by regulation.

Regulation could affect compensation policies in two primary ways. First, because it changes the economic context in which the firm operates, regulation could affect the CEO's influence on the firm's profitability. If the CEO has less effect on outcomes in a regulated firm, the stockholders might choose to offer a different and less remunerative compensation contract than would be offered to the CEO of a firm of equal size in the unregulated sector. We refer to this potential effect as the "inherent productivity effect."

Second, regulators could directly affect the kinds of contracts the stockholders offer. For example, regulators, because they care about outcomes other than firm profit, might want to make executive compensation less responsive to profitability and more responsive to prices or service levels. Regulators also might respond to public concern over "excessive" CEO pay by acting to limit the level of CEO compensation. Stockholders, who prefer a privately optimal compensation scheme, may be willing to trade off some of the incentive and allocation power of their compensation scheme for reduced regulatory stringency in another area. We refer to this potential effect as the "political constraint effect."

Both of these mechanisms suggest that CEO compensation will be lower in regulated industries, a prediction supported by prior studies. Hendricks, using 1970 Census data, finds that managers in regulated industries earn $500 to $5,200 per year less than those in manufacturing and that regulation reduces the pay differential between managers and mechanics by about 40 percent. Carroll and Ciscel find that CEOs of regulated utility and transportation firms earn only 50 percent to 70 percent of the salary and bonus reported by CEOs of unregulated industrial firms over the 1970–76 period, even after controlling for firm size and profitability. Murphy compares CEO compensation at eighteen

2. This literature is summarized in Joskow and Rose (1989); and Baron (1989).
3. Stigler (1971); Peltzman (1976); Becker (1983); and Noll (1989).

electric and gas utilities and seventy-two unregulated manufacturing firms. After controlling for CEO characteristics and firm size and risk, he finds that utility CEO compensation is about half that for manufacturing CEOs. He also finds that compensation is tilted toward salary and away from long-term incentive pay in the regulated firms.[4]

Prior studies do not explore the source of these discounts.[5] In particular, they do not differentiate between differences in inherent productivity and differences in vulnerability to political pressure. To investigate these competing explanations, we assess how *variations* in regulatory regimes affect both the structure and level of CEO compensation.

In the remainder of this section, we first review the relevant executive compensation literature. We then return to the competing hypotheses of inherent productivity differences and political pressure, discussing some institutional characteristics that motivate our views on the impact of political constraints. Finally, we offer some concluding comments on the welfare consequences of political constraints.

The Market for CEOs: Theoretical and Empirical Foundations

Both regulated and unregulated firms search for, hire, monitor, and compensate CEOs in an active labor market for CEO talent. Understanding the distinctive effects of regulation on compensation arrangements requires first understanding the operation of an efficient, unregulated labor market for executives. The market for CEOs and other executives performs three primary functions: it allocates executives to the firms and positions within firms where they will have the highest productivity; it provides incentives for executives to act in the interest of shareholders; and it identifies new managerial talent, providing a mechanism for selection and promotion that replaces aging managers with new talent. Rosen provides an excellent survey of the literature on these functions.[6]

An efficient allocation of managerial talent implies that the most able

4. Hendricks (1977); Carroll and Ciscel (1982); and Murphy (1987).

5. Murphy (1987) attempts to explain the pattern of results for regulated industries by exploring how compensation within manufacturing industries varies with the variance of stock returns, Tobin's q, four firm concentration ratios, and unionization rates. Although novel, this approach seems incapable of convincingly explaining the regulation results.

6. Rosen (1992a).

CEOs will be in positions where they can have the greatest effect on productivity. Early empirical work loosely connected greater productivity with firm size, arguing for a relation between firm size and CEO compensation. Rosen supplies the theoretical underpinnings for this connection by analyzing the firm as a hierarchy. The CEO controls, directly or indirectly, the performance of all managers and workers in the firm's hierarchy.[7] The marginal product of managerial talent increases as we move up the hierarchy to the CEO because managerial skill affects the productivity of workers at all lower levels. This effect, aptly termed the "chain letter effect," is greatest for the CEO: a little more talent at the top of the hierarchy has a large cumulative effect on firm productivity. If large firms tend to have more hierarchical levels and a larger span of control at each level, scarce managerial talent will be used most productively if the most talented are allocated to the largest firms. Rents, in the form of high earnings, will accrue to these executives, reflecting their impact on productivity for the enterprise as a whole. As a result, executive compensation and firm size should be correlated. Firm size is a highly significant variable in virtually all empirical work on executive compensation. The elasticity of compensation with respect to size, usually measured by total sales, is quite stable across studies at about 25 percent. This probably is the most consistent finding of the empirical literature on compensation.

The second important role of compensation arrangements is to provide CEOs with incentives to pursue their shareholders' interest. Simple penalties (for example, firing or demotion) are too crude to provide proper incentives. Therefore, various other mechanisms for providing incentives have been proposed, including tying pay to stockholder gains, creating various forms of firm-specific capital, and reputational bonding between the CEO and the firm's owners. The theoretical literature focuses on the structure of performance-based compensation contracts in which some fraction of the CEO's compensation is made contingent on the profitability of the firm. Typically, these models suggest that the optimal compensation scheme will reflect a trade-off between efficient managerial incentives (which require increasing the share tied to firm performance) and efficient insurance for risk-averse managers (which requires reducing the share tied to stochastic movements in firm per-

7. Rosen (1982).

formance). In theory, the performance component of the compensation schemes should reward managers for variations in performance over which they have control. In practice, the available performance measures (accounting profit, stock market valuation, output, and so on) are quite noisy signals of managerial effort. Measurement methods that increase the signal-to-noise ratio, such as relative performance targets, can increase the power and value of incentive payment mechanisms.

A considerable empirical literature demonstrates that CEO compensation is at least partially related to observable measures of firm performance (profit levels, accounting rates of return, and stock market returns), all of which are measured in absolute levels or relative to overall industry or market performance.[8] The precise measures of firm performance and estimated elasticities of compensation with respect to firm performance vary substantially across studies.

Finally, the managerial labor market provides mechanisms to identify managers with superior skills, to train and promote them, and ultimately to transfer managerial control across generations. The literature on career incentives emphasizes this dynamic function of the labor market. Much of this work focuses on the incentive effects of competition among managers for promotions, typically conceptualized as a tournament in which the prize (promotion) is a higher wage and an option to continue to compete for additional promotions.[9] Other research has focused on the relationship between learning and incentives in a dynamic context.

The primary results of empirical interest are twofold. First, the relation between compensation and current performance changes over the career-cycle. Second, the difference in compensation for the CEO and the next highest managers in the hierarchy must reflect the fact that winning the CEO position is the end of the game and has no option value. In the early years of a career, the possibility of high future compensation can serve as an incentive for high performance today. This literature suggests that there may be an especially large compensation gap between the CEO and senior executives one level down from the CEO. The empirical evidence is broadly consistent with the implications of this literature.[10]

8. See, for example, Murphy (1985); Coughlan and Schmidt (1985); Gibbons and Murphy (1990); and Jensen and Murphy (1990).

9. Lazear and Rosen (1981).

10. Murphy (1985); Antle and Smith (1986); and Gibbons and Murphy (1992).

Although we incorporate the predictions of these models of the unregulated market in our empirical specification, our primary interest is in how regulation affects compensation schemes. It is to this issue that we turn next.

Political Constraints and Inherent Productivity

Economic regulation imposes political outcomes in place of some private decisions or market outcomes. While the precise characterization of regulation varies widely across industries, two general effects are important for our analysis. First, the regulatory process, in Stigler's words, "automatically admits powerful outsiders to industry's councils."[11] This could provide a mechanism for translating political antagonism toward high executive-pay levels into reduced CEO pay. Second, the regulatory process may insulate firm performance from variations in managerial actions and abilities. This could change the shareholders' preferred level and structure of CEO compensation.

REGULATION AND POLITICAL CONSTRAINTS ON CEO COMPENSATION. Our working hypothesis is that regulators and firms have different objectives for CEO compensation that lead them to prefer different policies. To the extent that the regulator can influence the firm's decisions, a political constraint on compensation is imposed. This constraint may affect both the level and the structure of compensation. The level of compensation will be affected primarily through the regulator's reluctance to allow compensation levels that the public will judge to be excessive. If public antagonism toward high compensation for executives is particularly affected by large nominal payouts, regulation also may affect the structure of compensation, biasing pay toward base salary and away from lump-sum incentive payments. The structure of compensation also might be affected by differences in what the parties view as "good" performance. Regulators may be more reluctant than are shareholders to reward firm profitability, thereby applying pressure to limit standard pay-for-performance schemes.

CEO compensation in regulated industries is particularly vulnerable to political pressure for a variety of reasons. First, executive compen-

11. Stigler (1971, 7).

sation is more visible than it is in unregulated industries. CEOs of regulated firms are likely to interact more with members of the legislature and the executive branch and to attract media attention, especially in connection with rate increases and service quality issues. The regulatory process itself provides for more public disclosure and public scrutiny of executive compensation than is generally the case in unregulated industries. At least for these state-regulated utilities, CEO compensation arrangements appear to be subject to the same type of political scrutiny accorded the compensation for senior government officials and the CEOs of large charitable and nonprofit organizations.

Second, many regulatory agencies examine compensation in rate cases and are openly critical of compensation arrangements they believe do not benefit consumers. Also reviewing the most recent decisions of the California Public Utility Commission in the general rate applications of each of the three major electric utilities in the state, we found explicit consideration of executive compensation levels in all three cases. In two of the decisions, the commission expressed concern that incentive programs that tie pay to firm profitability would lead executives to act in the interest of shareholders rather than in the combined interests of shareholders and consumers.[12] In the Southern California Edison case the commission disagreed with the argument that "what is good for shareholders is also good for ratepayers."[13] It excluded two-thirds of the expenses for the executive incentive compensation program from the company's base electric rates.

Finally, regulators have instruments to constrain CEO compensation that go well beyond jawboning and unpleasant media attention. Although there is considerable interindustry variation in regulatory regime, government regulators ultimately determine prices and allowable costs, giving them ways to penalize firms they feel are paying excessive compensation to senior executives. Some regulatory commissions have the authority to disallow specific expenditures, including expenditures on CEO compensation. Moreover, the perception that the CEO is abusing the system through excessive pay or perks may have important

12. See California Public Utilities Commission Decision 91-12-076, 1991, pp. 40–44; and Decision 89-12-057, 34 Cal PUC2d 199, 254-260 (1989).

13. California Public Utilities Commission Decision 91-12-076, December 20, 1991, p. 44.

consequences for the overall treatment of the company in the regulatory process.

Our hypothesis that regulation lowers compensation for CEOs contrasts with a common perception of regulatory impacts on wages and work rules for lower level workers. In this view economic regulation makes it possible for workers, particularly unionized workers, to negotiate higher wages than they would get in equivalent jobs in unregulated industries. This may reflect bargaining over rents created by the regulatory process, or it may occur because regulated firms can pass cost increases on to consumers and therefore have less incentive to hold wages to competitive levels. This argument implicitly assumes either that it is difficult for regulators to identify excessive wage levels and penalize the regulated firm accordingly or that regulators have been captured by labor. Given evidence of supranormal wages in some regulated industries, one is tempted to assume that CEOs could similarly benefit from regulation.[14]

There is little reason, however, to believe that the regulatory process will treat compensation for CEOs and for workers symmetrically. The political and regulatory constraints governing wages for unionized workers in regulated industries and those governing highly paid senior executives are likely to be quite different. Much of the political antagonism to CEO compensation seems to be a visceral response to "salaries" that are large in absolute dollars (hundreds of thousands, millions, or tens of millions of dollars). Consumers may have more difficulty detecting (or less aversion to paying) worker wages that are high relative to comparable competitive wages but within the range of earnings that consumers themselves receive. Workers also may have a greater voice—directly and through their unions—than do individual CEOs. These differences may lead regulators to treat compensation for these groups asymmetrically. For example, in a decision in which the California Public Utility Commission objected to incentive compensation programs for executive bonuses, it also accepted an efficiency wage

14. The wage-increasing effect of economic regulation has been documented for drivers in the regulated trucking industry (Rose, 1987). Hendricks (1977) suggests that this effect is not widespread but is confined to a few occupations in certain regulated industries. His conclusion differs, however, from the literature on interindustry wage differentials. In that literature heavily regulated sectors (for example, utilities and transportation) typically exhibit wage levels that are higher than average. See, for example, Katz and Summers (1989).

justification for above-average compensations for production workers.[15]

REGULATORY EFFECTS ON CEO PRODUCTIVITY. Regulation affects more than the stringency of the political constraints governing CEO compensation. It also affects the economic environment in which regulated firms and their CEOs operate. Regulators may sharply constrain decisions that CEOs and their boards would make in unregulated companies. Price and profit regulation may restrict the ability of even a well-managed firm to earn high returns, and it may protect firms from very low profit realizations. This could reduce the returns to superior management and greater managerial effort, and in turn the optimal level of CEO compensation, independent of any political constraints. These indirect effects could have some of the same implications for compensation levels as do political and regulatory constraints on CEO compensation.

It is important, however, not to overstate the likely significance of regulation for potential CEO productivity. First, the CEO's responsibilities and position are qualitatively similar across regulated and unregulated firms. The CEO must supervise the development of proposals for major investment, product introduction, diversification, and corporate reorganization initiatives. He[16] must sell these plans to the board of directors and other interested parties, and he must oversee their implementation and execution. While regulators replace the board or even the CEO as the final arbiter of some decisions (most frequently market entry and price-setting decisions), they neither manage regulated firms nor obviate the need for top management.

Second, the need to persuade regulators as well as traditional corporate interests may increase rather than reduce the difficulty of the CEO's job. Many regulated firms operate under state or federal rules that require them to obtain certificates of public convenience and necessity (CPN) to proceed with major investment projects or to serve new markets. The decision about which projects to pursue and when to pursue them ultimately is made by the firm's CEO, who must then

15. California Public Utilities Commission Decision in Application 91-11-036, November 13, 1992, pp. 21–24. See also *Industrial Energy Bulletin*, February 26, 1993, pp. 1–2.

16. There are very few women in our sample of more than 2,000 CEOs.

convince the regulatory authority to grant a CPN. Moreover, a CPN generally does not provide any guarantees for ultimate rate recovery for the associated investment projects, as the owners of many nuclear power plants have learned.

Third, the empirical evidence on wage differentials among members of the executive team is inconsistent with the inherent productivity view. The executive compensation literature predicts that the gap between CEO compensation and compensation levels for the other executive team members must be large to motivate other members of the team to compete for the CEO position. If regulation substantially reduces the scope for executive action, there would be little reason for a large pay differential; the CEO would be merely a kind of team leader. The most convincing evidence against this team reinterpretation of the CEO position is provided by Agrawal, Makhija, and Mandelker, who analyze compensation for the top management in a sample of sixty-nine electric utilities. They find average compensation premiums for CEOs relative to presidents and vice-presidents that are at least as large as those Murphy reports for a sample of seventy-two manufacturing firms: about 25 to 30 percent relative to presidents and 80 to 85 percent relative to vice-presidents.[17] The hierarchical structure of managerial compensation is quite similar across regulated and unregulated firms, although the compensation levels are considerably reduced in the regulated sector.

Finally, the notion that regulatory agencies and the associated protections of regulation leave little room for managerial discretion, and in particular for variations in success or failure, is not supported by the experience of regulated firms. Regulated firms bear substantial risks for the outcomes of managerial decisions. Profitability varies significantly across firms in the same regulated industry. Several regulated firms have declared bankruptcy in just the past few years, with significant associated losses in shareholder value. Others have made dramatic

17. Agrawal, Makhija, and Mandelker (1991); and Murphy (1985). There is a notable difference in compensation premiums for chairmen of regulated and unregulated firms. Agrawal, Makhija, and Mandelker find that chairmen of electric and gas utilities earn about as much as CEOs, while Murphy reports a compensation premium for CEOs of nearly 50 percent over that of chairmen. Executives who hold the rank of chairmen-only in utilities are relatively rare (81 observations out of 690 firm-years) and most likely are recently retired CEOs. Further investigation into this phenomenon seems warranted, but it is beyond the scope of our data set.

recoveries after encountering serious financial difficulties. This is true even for firms in industries naively characterized as operating under pure "cost-plus" regulatory regimes, such as electric utilities.

Even excluding extreme cases of failure and near-failure, the cross-sectional variation in profitability and total returns to shareholders in regulated industries is sufficient to warrant increased executive compensation if higher pay attracts and motivates more able executives. For example, within the electric utility industry, often believed to have little scope for firm-level variation in profitability, the standard deviation of market rates of return across firms in our database in a given year ranges from 7 percent to 29 percent over the 1970–90 period. Now consider an electric utility with the median equity market value of $2.1 billion in 1990. An additional two percentage points in the market rate of return, about one-fifth of the 1990 standard deviation of return in our utility sample, would generate an additional $42 million for shareholders. Yet median CEO compensation in these electric utilities was only $503,000.

Both the political pressure model and the productivity difference model may help explain the observed differences in compensation across regulated and unregulated firms. Our analysis suggests, however, that a significant fraction of the difference is attributable to political constraints rather than to inherent productivity differences.

The Welfare Effects of Political Constraints

Depending on one's view about the efficiency of the unconstrained market for executive talent, regulatory constraints may either ameliorate existing imperfections in shareholder control or introduce inefficiencies that lead to suboptimal firm performance. In the first case, regulation may constrain excessive CEO compensation with no effect on productivity. In the second case, constraints on CEO compensation may have adverse productivity effects.

The argument that CEO pay is excessive when not politically constrained rests on presumed inefficiencies in the market for corporate control and in the oversight role played by boards of directors.[18] Cor-

18. The models of executive compensation discussed earlier in the paper assume away these potential imperfections and therefore address only efficient compensation schemes.

porate boards of directors are responsible for hiring, monitoring, and compensating top executives on the stockholders' behalf. Crystal and others have argued that boards are not sufficiently well informed or well motivated to set compensation contracts that are in the stockholders' best interest.[19] Instead, they argue, compensation packages are controlled by the CEO and other insiders. If the market for corporate control were perfect, it could substitute for an effective board of directors. If CEOs who fail to maximize shareholder returns are quickly replaced through mergers or acquisitions, then excessive compensation would be prevented. There is some evidence, however, that the market for corporate control is imperfect.[20] Changing corporate control is costly and will not be undertaken for relatively minor improvements in efficiency. Given the size of payments to investment bankers, legal advisers, and others that typically accompany changes in corporate control, savings resulting solely from reducing executive compensation are likely to be more than offset by these transactions costs.

Noneconomists widely share the view that CEOs are overpaid.[21] Compensation levels that place CEOs of large corporations near the top of a skewed income distribution, particularly during a period of stagnant earnings for most lower level employees and increasingly frequent layoffs as part of corporate restructurings, have attracted considerable media attention and public criticism. General dissatisfaction with compensation policies also has generated efforts to facilitate more effective control by stockholders or to impose other limits on compensation. For example, legislation to eliminate the corporate tax deduction for executive compensation in excess of $1 million per year was introduced in both houses of Congress in 1991 and has reappeared on President Clinton's economic agenda. In 1992 the Securities and Exchange Commission (SEC) substantially expanded disclosure requirements for stock options, restricted stock grants, and other forms of long-term performance-based compensation. The Financial Accounting Standards Board is considering new accounting rules that would recognize the market

19. Crystal (1991).

20. See Jensen and Ruback (1983); and Morck, Shleifer, and Vishny (1989).

21. The economics and corporate finance literatures typically focus on whether stockholders are earning an adequate return on their investment in CEO compensation. Much of the nonacademic debate also is shaped by concerns related to equity.

value of stock options granted to CEOs on corporate financial statements.

Others believe that large payments to top executives are reasonable compensation for the effects these executives have on firm profitability. Indeed, Jensen and Murphy hypothesize that political pressures already constrain the ability of firms to create efficient performance incentives through compensation policy. They argue that the visibility of top executive salaries combined with public opposition to large compensation increases "limit large payoffs for exceptional performance," particularly for large, public corporations.[22] As a result, CEOs are not sufficiently well motivated to pursue stockholder interests.

Unfortunately, the economics literature does not provide sufficient information to determine which of these conflicting views of compensation is most reasonable, nor does it provide any convincing benchmark for assessing whether current levels of CEO pay are "excessive." Our study is no exception: we document that pay is lower in many regulated industries and argue that the discount is the result of political constraints, but we cannot offer guidance for assessing the welfare effects of these discounts. It is not the purpose of our research to draw normative conclusions about the welfare effects of binding political constraints on the markets for executive talent. Given the current state of the empirical literature on CEO productivity, risk preferences, and behavior, responsible normative judgments of this type cannot be made. Instead, we seek to provide evidence on whether political constraints have had sustained effects on CEO compensation in the regulated sector.

Modeling Regulatory Effects on Compensation

We focus on four dimensions of regulatory control: whether regulatory decisions are based on and applied to individual firms or groups of firms; whether regulatory authorities operate at the local or federal level; the degree to which regulatory jurisdiction is centralized in a single agency; and the intensity of regulatory scrutiny over time. Our analysis spans a broad range of economic regulation and includes seven

22. Jensen and Murphy (1990, 262).

regulated industries: railroads, trucking, airlines, telephones, electric utilities, natural gas distribution utilities, and natural gas pipelines. The predicted effects of regulation on compensation in each of these industries are described. The predictions are summarized at the end of this section.

Firm-Level Versus Industry-Level Regulation

Our seven industries divide into two groups: industry-regulated and firm-regulated companies. In the railroad, trucking, and airline industries, regulators established industry-wide rate structures based on cost and revenue data for all the firms operating in the industry throughout the United States or within large regions of the United States. In these industry-regulated industries, regulators scrutinized aggregate data on costs and revenues for large groups of firms, rather than the detailed accounts of individual firms. This aggregation reduced the visibility of executive compensation for any individual firm and provided regulators with much coarser instruments for controlling compensation at the firm level. The aggregation effects are likely to have been most significant in trucking, where regulated firms numbered in the thousands, of somewhat less significance in railroads (with dozens of regulated firms), and of least significance in airlines (with only a dozen major "trunk" carriers).

In the telephone, electric utility, natural gas distribution, and natural gas pipeline industries, regulators set allowable rates based on individual reviews of each firm's costs and revenues. For these firm-regulated industries, the relevant regulatory agency scrutinizes each firm's costs, including its wage and benefit costs, often pursuant to public hearings. As a result, if CEO compensation is constrained by regulators, we expect the effect to be most pronounced in firm-regulated industries, other things being equal.

A deeper discount in firm-regulated industries does not in itself distinguish between the regulatory constraints and inherent productivity differences, however. Railroads, trucking firms, and airlines all compete in multifirm industries, while electric utilities, telephone companies, and gas distribution companies have operated as franchised local monopolies during most of the past twenty years. The CEO may have had more direct impact on firm performance in the multifirm transpor-

tation industries than in the monopoly utility industries, implying that differences in compensation levels could reflect job heterogeneity. This argument does not work well for gas pipelines, however. Natural gas pipelines, while regulated on a firm-by-firm basis, compete in a multi-firm industry. Deeper discounts in pipelines than in the regulated transportation industries are predicted by the political constraint explanation but not by the productivity hypothesis.

Federal Versus State Regulation

The political pressures on regulators may depend on the geographic expanse of firms' operations and the location of the regulators vis-à-vis the dominant customer groups. We expect the political pressures to be most intense and most effectively mobilized when the locus of firm operations and the primary regulatory authority coincide at the local level. For example, electric utilities, with some exceptions, tend to operate within single states and are subject to regulation by that state's public utility commission. Rate cases and construction reviews in this industry often attract considerable attention from politicians and local media.

Industries regulated at the local level include electric and gas utilities and local telephone operating companies (although regulatory authority for the latter group typically is diffused across several states). Interstate telephone, railroad, trucking, airline, and pipeline firms are all regulated at the federal level, and most firms in these industries operate in regional markets. We expect political pressures to be less effective in constraining compensation for this group. An exception might be large, national firms in these industries, which may be subject to extensive media coverage and centralized pressure. Airlines come most immediately to mind.

Central Versus Diffuse Regulatory Authority

Political pressures on executive compensation are likely to be more effectively mediated through the regulatory process when regulatory authority is centralized in a single agency rather than diffused across a number of agencies. Therefore, discounts in compensation arising from regulatory constraints are likely to be more severe when a firm is subject to the jurisdiction of a single state (or a federal agency) than when it

is regulated by a number of different agencies. Our sample has considerable variation along this dimension, both across and within industries.

The industry-regulated industries and the natural gas pipelines are each subject to the jurisdiction of a single federal agency; centralization of authority enhances the mediation of political pressures, but the federal level probably discourages mobilization of political pressures. For the telephone industry, regulatory responsibility is split between federal and state agencies (long-distance service versus local and intrastate service, respectively). Since most telephone operating companies provide local service in more than one state, their costs typically are apportioned across states and reviewed by several regulatory agencies. If the CEOs are formally the executives of telephone holding companies, not operating companies, their compensation is reviewed only to the extent that it is charged back to the operating companies.

Regulatory authority for electric and gas distribution utilities depends upon the organization of the individual firm. Utilities operating in a single state are subject to regulatory oversight by that state's public utility commission. This tight, central authority is likely to increase compensation discounts under the political pressure hypothesis. Utilities organized as multistate holding companies under the Public Utility Holding Company Act of 1935 are subject to regulation by each state they service and by the SEC and Federal Energy Regulatory Commission. Aside from the differences in corporate form and regulation, there is little real difference between single-state electric utilities and multistate holding companies. Although the compensation of the CEO of the holding company usually is charged back to its affiliates under intercompany allocation procedures approved by the federal regulators, and the state commissions can object to these allocations, regulatory responsibility is more diffuse for these holding companies than it is for the typical utility.[23] We expect this legal form to be associated with smaller compensation discounts than those for single-state utilities.

Finally, utilities that have diversified into unregulated businesses may exclude some of their costs and revenues from direct regulatory review. For these firms regulatory control will be more diffuse than for firms

23. At least one electric utility holding company does not charge the CEO's compensation to its regulated affiliates but absorbs the cost from shareholders' profits.

with only regulated businesses. Five of the seven gas distribution firms in our sample are heavily diversified out of gas distribution, and a number of electric utilities had begun to diversify their business by the late 1980s. Of course, diversification also may increase the complexity of the CEO job, changing the optimal level and structure of compensation. We will use data on the electric utility industry to attempt to disentangle this explanation from the political pressure hypothesis. In the electric utility industry some firms have diversified essentially in name only (the unregulated subsidiary is financially inconsequential to the firm), and others have embarked on more ambitious diversification campaigns. CEOs of the first group of firms should realize higher compensation only to the extent that legal diversification relaxes political and regulatory constraints.

Temporal Variations in Regulatory Intensity

Several of the industries in our sample were completely or partially deregulated during the sample period. The airline and trucking industries were deregulated in the late 1970s, the railroads by the early 1980s. The break-up of AT&T in 1984 and the reform of telecommunication regulation substantially altered the regulatory and competitive environment in the telephone industry. If regulation reduced CEO compensation in these industries, the differences should have shrunk by the late 1980s. This pattern could be consistent with either a political constraints model or the productivity hypothesis, however.

While the basic regulatory structure was largely unchanged for natural gas pipelines, electric utilities, and local natural gas distribution companies, the stringency of regulatory oversight varied significantly over the sample period, particularly for the electric utility industry. In this industry regulatory restraints tightened in the late 1970s as inflation, increased fuel costs, and nuclear construction programs put unprecedented upward pressure on electric rates. Regulators responded by intensifying their scrutiny of allowable costs and resisting price increases. This scrutiny relaxed somewhat during the late 1980s as the economic pressures on cost abated.

The political pressure hypothesis predicts that relative compensation for CEOs at electric utilities will be lowest over the 1975–85 period.[24]

24. Joskow (1974, 1989).

The productivity hypothesis appears to predict the reverse. As regulation tightened, the management problem at electric utilities became more severe. Costs that had been routinely allowed were subject to review and sometimes disallowed. Rate increases substantially lagged behind cost increases. In this environment variations in CEO quality and effort affect stockholder returns more. If inherent productivity differences are the dominant source of differences in relative pay, the compensation of electric utility CEOs should rise rather than fall during the 1975–85 period.

Similar periods of regulatory tightness may have occurred in the natural gas distribution and pipeline industries. For the distribution companies, natural gas shortages and rapid increases in the costs of new gas supplies during the late 1970s increased the political saliency and stringency of regulatory oversight. These pressures eased by the mid-1980s, particularly after natural gas prices began to fall dramatically. This would generate a predicted pattern of compensation discounts similar to that for electric utilities.

For pipelines, this decrease in natural gas prices and increased competition for customers because of oil price reductions created severe economic pressures. Many pipelines were locked into very expensive long-term contracts with substantial take-or-pay provisions. Political pressures on these firms are likely to have been severe in the late 1980s, as regulators decided how to allocate losses from high-priced gas contracts between customers and shareholders.[25] The political pressure model would imply steeper pay discounts for pipeline CEOs during the late 1980s; the productivity model, smaller discounts.

Summary of Predictions

In general, we hypothesize that CEOs of regulated firms will earn less than their regulated counterparts, and they will have a compensation scheme that is less tied to firm profitability. Within the regulated sector, we hypothesize that firms in industries subject to regulation at the firm level (electric utilities and local gas distribution, telephone, and gas pipeline firms) will have deeper discounts than those in industries where regulation occurs at the industry level (trucking, airline, and railroad

25. Joskow and Noll (forthcoming).

firms). This differential will be increased for electric utilities and local gas distribution companies because they are regulated primarily at the state rather than the federal level. Among electric utilities, we predict that CEOs of those organized as multistate holding companies or diversified into nonutility lines of business will earn more. We expect that discounts will be deeper during times of increased regulatory stringency. For electric utilities and gas distribution companies, this means deeper discounts in the 1975–85 period; for pipelines, this means deeper discounts in the late 1980s. For the industries deregulated within the sample period (trucking, telephones, airlines, and railroads), discounts should decline following deregulation.

Many of these predictions follow from either the political constraint hypothesis or the inherent productivity hypothesis. Some, however, distinguish between the two. First, the inherent productivity view does not generally predict that pay should be less responsive to private performance, but the political constraint hypothesis does. Second, since natural gas pipeline firms compete in a multifirm industry, the inherent productivity hypothesis does not imply steeper discounts for this industry relative to trucking, airlines, and railroads, but the political constraint hypothesis does. Third, the inherent productivity view does not imply that compensation discounts will be lower at electric utilities operated as multistate holding companies, but the political constraint hypothesis does. Similarly, the political constraint hypothesis predicts milder discounts at legally diversified electric utilities even when the diversification is financially inconsequential, but the inherent productivity hypothesis does not. Finally, the two hypotheses have conflicting views of the intertemporal pattern of discounts in electric utilities, gas distribution, and pipelines.

An Empirical Model of CEO Compensation

Our analysis of CEO compensation begins with an empirical specification that is standard to much of the executive compensation literature. The dependent variable is the natural logarithm of CEO compensation. The independent variables include measures of firm size (which may reflect scale and hierarchical characteristics), CEO characteristics (for example, tenure), firm financial performance (for ex-

ample, return to common stock owners), industry characteristics (modeled by industry-fixed effects), and changes in real compensation levels over time (modeled by year-fixed effects). Unlike some previous studies, our model shows the *level* of compensation rather than the *change* (first difference) in compensation. Our specification allows us to estimate the effect of firm, industry, and regulatory variables on both the structure and the level of CEO compensation.[26] We extend the usual specification by allowing the effect of the independent variables to vary over time and to differ for regulated and unregulated industries.

After describing the variables and data we use to estimate this model, we present our empirical specification. Summary statistics for the sample are displayed in table 1. All dollar values have been inflated to 1990 constant dollars using the gross national product (GNP) implicit deflator.

Data

Three sources of data were used in constructing our executive compensation database: *Forbes* annual surveys of CEO pay, COMPUSTAT, and the Center for Research on Security Prices (CRSP) stock return files. The *Forbes* surveys contain data on compensation and individual characteristics for the CEOs of roughly 800 large U.S. firms each year. We have used these surveys as the source of compensation and CEO data for the 1970–90 period, and we have attempted to identify the CUSIP for each unique firm name in the *Forbes* surveys.[27] These CUSIPs were used to match the information in *Forbes* to data from the firm's financial statements (found in COMPUSTAT) and to data on the firm's stock market returns (found in CRSP). The final database consists of matched *Forbes* and COMPUSTAT and CRSP observations for firms in the nonfinancial sectors.[28] Year-to-year variation in the firms surveyed by *Forbes,* missing CUSIPs, nonmatches to COMPUSTAT, and

26. The industry-fixed effects we use to estimate differences in pay levels are removed by first differencing.

27. For many firms we constructed detailed corporate histories to trace name changes and corporate restructurings over time.

28. We believe that firm characteristics (assets, accounting rates of return, returns on common equity, and so on) are qualitatively noncomparable for firms in the financial services sector. We therefore chose to exclude them from our analysis.

missing data yield an unbalanced panel of 10,833 observations on 1,041 firms and 2,083 CEOs over the twenty-one-year data period.

Of the sampled firms, 885 (8,630 observations) are in the unregulated sector. The remaining 156 firms (2,203 observations) are in industries we define as regulated: railroads, trucking, airlines, telephone, electric and gas utilities, and natural gas pipelines. As we have noted, firms in the first three industries fall into the industry-regulated category; the last four are firm-regulated industries.

COMPENSATION MEASURES. CEO compensation is difficult to measure consistently, either across firms or over time. While some firms pay CEOs only salaries and cash bonuses, the large firms in our sample tend to have more complex compensation structures involving contingent and deferred compensation. Nonsalary components often are imperfectly recorded and hard to value, making cross-sectional comparisons difficult. Intertemporal comparisons are difficult because compensation structures have tended to become increasingly complex as firms have added new forms of payment to their executive compensation packages. Additional intertemporal variation is introduced by modifications in SEC disclosure rules that change how the components of compensation are reported by firms and affect the compensation categories that *Forbes* chooses to record.

The complexity of CEO compensation and data limitations make it difficult to define a single best measure of compensation. We have defined three broad conceptual measures of compensation, each of which has been constructed to be as consistent over time as the data allow: salary and bonus (*SALARY*, available for 1970 to 1990), total compensation (*TOTAL1*, available for 1972 to 1990), and total compensation excluding gains associated with stock options (*TOTAL2*, available for 1980 to 1990). We have inflated each of these to 1990 constant dollars using the implicit GNP deflator. Each of these measures has inherent shortcomings, but using all three allows us to assess the robustness of our conclusions to alternative definitions of executive pay.

SALARY is the most primitive compensation measure in our database. In the early years it includes cash salary and bonus; by the end of the period it includes all cash and cash-equivalent compensation. Real *SALARY* grew at an average annual rate of about 3.3 percent over the sample period: from an average of $522,000 (standard deviation $233,000) in

Table 1. Descriptive Statistics

Item	*Total*	*Unregulated*	*Regulated*	*Industry regulation*	*Firm regulation*
Salary and bonus, thousands	676.76	729.78	469.05	657.84	431.81
	(529.52)	(566.63)	(259.56)	(286.24)	(236.89)
Total compensation excluding stock gains, thousands[a]	932.51	1,027.90	594.31	861.16	546.53
	(900.79)	(977.02)	(396.89)	(495.44)	(356.31)
Total compensation, thousands[b]	1,005.45	1,113.34	587.42	940.92	517.14
	(1,768.33)	(1,941.41)	(648.14)	(1,195.52)	(436.32)
Salary and bonus/total compensation[b]	0.85	0.84	0.91	0.87	0.92
	(0.20)	(0.21)	(0.15)	(0.20)	(0.13)
Total compensation excluding stock gains/ total compensation[a]	0.91	0.89	0.96	0.89	0.97
	(0.19)	(0.20)	(0.13)	(0.19)	(0.11)
CEO age at appointment	48.89	48.38	50.89	51.02	50.87
	(8.03)	(8.28)	(6.60)	(7.08)	(6.50)
Tenure as CEO	8.48	8.94	6.71	6.79	6.69
	(7.71)	(8.10)	(5.60)	(6.80)	(5.92)
Outside hire	0.17	0.17	0.18	0.28	0.16
Tenure with firm at appointment (nonoutside hires)	19.69	19.12	21.95	20.03	22.28
	(10.46)	(10.54)	(9.82)	(9.74)	(9.80)

Company founder	0.08	0.10	0.02	0.01	0.02
Total assets, millions	4,669.95 (10,500.46)	4,098.22 (9,094.56)	6,909.64 (14,559.03)	4,748.26 (3,713.45)	7,336.04 (15,810.97)
Employees, thousands	33.91 (63.44)	37.35 (62.28)	20.45 (66.11)	31.90 (17.87)	18.19 (71.69)
Total assets/employees	250.30 (340.75)	154.65 (259.60)	625.02 (361.55)	152.71 (129.64)	718.20 (317.01)
Sales, millions	4,714.92 (9,514.00)	5,087.65 (10,114.72)	3,245.78 (6,455.41)	3,671.48 (2,354.64)	3,172.58 (6,983.24)
Market return	0.17 (0.39)	0.18 (0.41)	0.17 (0.32)	0.19 (0.47)	0.16 (0.28)
Accounting return	0.13 (0.11)	0.14 (0.12)	0.09 (0.10)	0.08 (0.21)	0.12 (0.06)
Number of firms	1,041	885	156	28	128
Number of CEOs	2,083	1,680	403	75	328
Number of observations	10,833	8,630	2,203	363	1,840

Source: Authors' executive compensation database. Standard deviations are in parentheses.
a. Excluding gains from stock options, etc. Data available since 1980. Number of observations = 5,568.
b. Total reported. Data available since 1972. Number of observations = 9,846.

1970 to $1,026,000 (standard deviation $961,000) in 1990. Over the entire period, the CEO salary in the unregulated sector averaged $730,000 ($567,000) in 1990 dollars, compared with an average of $469,000 ($260,000) in the regulated sector.

TOTAL1 is the most inclusive construct of compensation in our database, although the degree of inclusivity varies considerably over time. Real *TOTAL1* grew at an average rate of about 6.2 percent over the 1972–90 period for which it is available. This is faster than *SALARY* growth and reflects changes in the mix of compensation and changes in SEC disclosure requirements over the sample period. As a result of these differential growth rates, the average share of total compensation accounted for by *SALARY* fell from 94 percent from 1972 to 1975 to about 81 percent from 1985 to 1990. Over the 1972–90 period, *TOTAL1* averages $1,005,000 ($1,768,000), with the average for unregulated industries almost twice as large as the average for regulated industries.

TOTAL2 falls between *SALARY* and *TOTAL1* in its inclusivity and therefore in its average values ($933,000 with a standard deviation of $901,000 over the 1980–90 period for which it is available). It includes benefits (for example, company-paid life insurance, private automobiles, and drivers) and contingent compensation, but it excludes the net gains from the exercise of stock options, stock appreciation rights, and stock accrual rights that are included in *TOTAL1*. Because these stock gains are recorded by *Forbes* only when options are exercised, they combine both past and current compensation.[29] Therefore, *TOTAL1* tends to overstate current compensation, and *TOTAL2* tends to understate current compensation.

Options gains average 9.2 percent of *TOTAL1* compensation over the 1980–90 period for which we have stock gains data. These gains tend to be quite lumpy, and the distribution is highly skewed. Less than one-quarter of the CEO-years record options gains between 1980 and

29. If options grants are an attempt to tie future compensation to future performance, excluding their entire *ex post* value from current compensation will mismeasure current compensation and understate the sensitivity of executive pay to firm performance. One ideally might want to include in current compensation the *ex ante* value of options grants at the time they are made, and the annual change in the *ex post* value of the options in each subsequent year's compensation. We do not have the data to make this adjustment, even if we were able to solve the valuation problem for the particular form of the options executives typically are granted. We believe that our treatment is unlikely to alter the results we report in any substantial way.

1984; this rises to one-third of the sample by the 1985–90 period. For the CEOs receiving stock gains, the gains averaged one-third of total annual compensation and 115 percent of *SALARY*. For the CEOs with the largest options gains, compensation through exercise of stock options is 25 to 30 times *SALARY*, with a high of 126 times *SALARY* for Frederick Smith, founder of Federal Express, in 1982.

FIRM SCALE. Hierarchical models of the firm imply that CEO compensation should be correlated with firm size, typically measured in the empirical CEO compensation literature by the firm's annual revenues, *SALES*. In addition to capturing the underlying concept imperfectly, *SALES* may be a particularly poor indicator of cross-sectional differences in firm scale when there are substantial differences in capital and labor intensity across firms and industries. Distortions caused by differences in factor intensities are likely to be particularly relevant when comparing regulated and unregulated industries. As table 1 indicates, average sales are less than half of average total assets for the regulated firms in our sample, but they are 24 percent above average total assets for the unregulated firms.[30] Average revenue per employee also differs considerably across regulated and unregulated industries, especially for the firm-regulated industries. We therefore depart from the usual specification by including both *ASSETS* (the firm's total capitalization reported on its balance sheet) and *EMPLOYEES* to capture scale effects in our model.[31] For the data set overall, 1990 constant dollar *SALES* average \$4.7 billion (\$9.5 billion standard deviation), *ASSETS* average \$4.7 billion (\$10.5 billion), and *EMPLOYEES* average 33,910 (63,440). Sales and employees are lower on average for regulated industries; assets are higher on average.

FIRM FINANCIAL PERFORMANCE. Following much of the CEO compensation literature, our model controls for variations in compensation resulting from differences in firm performance. We explore variations in the structure of pay-for-performance across regulated and unregulated industries and over time. Much of the previous literature has measured

30. See also Murphy (1985, 1987).

31. We also have estimated the model using measures of gross or net property, plant, and equipment and measures of firm capital/labor ratios, as well as specifications that allow the scale elasticities to vary across firms when grouped by their average capital/labor ratios. The data do not prefer these specifications to the ones reported in the paper, and the remaining slope coefficients are robust to changing the scale measure.

firm performance by the current-year stock market return (*RETURN*). We estimate models using stock market return and accounting rates of return on book equity. We have no strong priors about which of these measures might better capture performance, although our results suggest a slightly better fit in the models that use accounting rates of return. Market rates of return average about 17 percent (39 percent standard deviation) in our database, with relatively little variation in the mean across regulated and unregulated industries. Accounting rates of return average 13 percent, with a standard deviation of 11 percent overall.[32] Regulated firms, particularly firms subject to industry regulation, have slightly lower mean accounting returns than do unregulated firms. Firms subject to firm-level regulation exhibit less variation in the return measures than do other firms.

Our specification implicitly measures relative performance sensitivity. By including year and industry effects, our models identify the sensitivity of compensation to deviations in the firm's return relative to the overall market return in each year and to the industry average return over the sample period.[33] We depart from the earlier literature on executive compensation by allowing the coefficient on the financial performance variable to vary over the sample period. The increasing emphasis on designing compensation to align CEO and shareholder objectives and the rising prevalence of incentive pay suggest that the pay-for-performance relation is unlikely to be the same in 1990 as it was in 1970. Despite this, most previous studies have estimated constant performance sensitivities over their entire sample periods. We investigate the validity of this restriction in our data set.

CEO Characteristics. The compensation model includes four characteristics of the CEO: age at the time of appointment as CEO (*AGE*), years as CEO of this firm (*TENURE*), whether the CEO was an internal hire or an outside hire (*OUTSIDE*), and whether the CEO also is the company's founder (*FOUNDER*). *OUTSIDE* is a dummy variable in-

32. Accounting rates of return are defined only for firms with positive shareholder book equity, which implies that companies with substantial negative earnings over time are omitted from the sample. We also exclude from the analysis eight extreme outliers in accounting rates of return. These exclusions have no substantive impact on the pattern of results we report.

33. For regulated firms, performance sensitivity is identified by the deviation of the firm's return relative to the industry's return for that year.

cluded to assess whether CEOs who are brought in from outside the firm are paid proportionally more than those who are promoted from within the firm. *OUTSIDE* is set equal to one for a CEO who was an employee of the firm for less than three years before promotion to CEO and is not a founder. Internal hires are the norm, accounting for 83 percent of our observations overall. Outside hires are more common in industry-regulated industries, where they account for 28 percent of our observations. There is evidence of an increase in outside hires over time, rising to about 22 percent of the new CEO hires in the 1985–90 period. Given this pattern, we are particularly interested in whether the *OUTSIDE* premium or discount varies over time.

AGE and *TENURE* as CEO have been hypothesized to affect compensation through a variety of mechanisms: human capital accumulation, learning about the individual by the board of directors, signaling that affects the probability of outside offers, and optimal career incentives. All these hypotheses imply that CEO compensation should increase with age and job tenure, and we include these variables to isolate these effects. The average CEO in our sample reached this position at age forty-nine (standard deviation, eight years). Unregulated firms appointed somewhat younger CEOs. The average age of new CEOs in unregulated firms is forty-eight (eight years) compared with fifty-one (seven years) for regulated firms. Perhaps corresponding to the differential age at appointment, tenure in the CEO position is less for the regulated sample, at 6.7 years (5.6 years), compared with the unregulated sample average tenure of 8.9 years (8.1 years).

The average inside hire had been with the firm for 19.7 years (standard deviation 10.5 years) before becoming CEO. Consistent with their greater age at time of appointment, the inside hires at regulated firms had been with the company slightly longer (22 years, standard deviation 9.8 years) than inside hires at unregulated firms (19.1 years, standard deviation 10.5 years).

Finally, we distinguish between founders and other CEOs. Although the theoretical literature on executive compensation has not spent much time addressing the special circumstances of founders as CEOs, we believer a founder is likely to have a different relationship with the firm and the board of directors and may have a larger ownership share in the firm. We explore how founder status affects the level of compensation by including a dummy variable that takes on a value of one for

company founders. Only 8 percent of our overall observations are on CEO founders. These are almost exclusively in the unregulated sector, with only four founders in the regulated sector. We cannot sign the coefficient on this variable *a priori*.

Econometric Specification

Our basic econometric specification of the compensation relation is

$$
\begin{aligned}
ln\ (CEO\ COMPENSATION_{ijkt}) &= \beta_1 * CEO\ TENURE_{ijt} \\
&+ \beta_2 * CEO\ AGE_{ijt} + \beta_3 * FOUNDER_{ij} \\
&+ \beta_4 * OUTSIDE_{ij} + \beta_5 * ln(ASSETS_{jt}) \\
&+ \beta_6 * ln\ (EMPLOYEES_{jt}) + \beta_7 * RETURN_{jt} + \varepsilon_{ijkt},
\end{aligned} \tag{1}
$$

where i denotes the CEO, j denotes the firm, k denotes the industry, and t denotes the year. This specification assumes a constant elasticity of compensation with respect to firm size, which was not rejected in our early explorations of the compensation relation. Performance, tenure, and age are all assumed to have a constant proportional impact on compensation, and *OUTSIDE* and *FOUNDER* are dummy variables that shift the compensation curve up or down.

We model the error term as

$$
\varepsilon_{ijkt} = \delta_t + (1 - D) * \alpha_k + D * \gamma_{kt} + \eta_{ijkt}, \tag{2}
$$

where D is a dummy variable that takes on a value of one when the firm is in a regulated industry. For firms in unregulated industries, we include a simple industry-fixed effect (α_k). These effects incorporate the impact of industry-level characteristics on compensation levels. To measure these effects, we used COMPUSTAT primary standard industrial classification codes to assign firms to two-digit industry groups and then grouped similar two-digit industries into a common industry code. For firms in regulated industries, we allow a fixed effect for each industry year (γ_{kt}). This richer specification allows us to investigate how the level of compensation changes over time for each of the regulated industries. We also include a time-fixed effect (δ_t) to measure changes in the average level of real compensation across all industries and firms. We prefer the time-fixed effects to a time trend since they

do not impose a constant growth rate on real compensation over the twenty-one years of our panel data. We assume the final error component (η_{ijkt}) is a random component specific to the observation.[34]

Empirical Results

This section describes our estimated model of CEO compensation. We first analyze how firm and CEO characteristics influence compensation. An assessment of the effect of regulation on average levels of CEO compensation follows. Finally, we describe the effect of variations in regulatory oversight on compensation levels within the electric utility industry.

The Structure of Compensation

The effects on CEO compensation of CEO characteristics, firm characteristics, and firm performance are explored in a series of regressions. We first estimate a model of *SALARY* compensation based on a standard specification used in the literature. We then relax the restrictions imposed by this specification as we search for an empirical model that is parsimonious yet consistent with the pooling implied by the data. The specification emerging from this search is then used to explore the sensitivity of the results to alternative measures of compensation and firm financial performance. All the reported regressions include year-fixed effects, industry-fixed effects for observations from unregulated

34. We implicitly assume that η_{ijkt} is an independent and identically distributed white-noise error term. This error may, in reality, include a firm-specific or CEO-specific component. We have experimented with models that include fixed or random CEO effects in the error. These experiments suggest that there may be some correlation of unobserved CEO or firm effects with the scale and performance measures. In estimates that employ two-stage generalized least squares techniques (Hausman and Taylor, 1981) to correct for the presence of these CEO effects, the pay-for-performance relationship is dampened. The scale elasticity of compensation is more highly weighted toward employees and less highly weighted toward assets, although the sum of the two coefficients is roughly the same. The average of the CEO effects within regulated industries suggests discounts on the order of those we report, but the point estimates of both regulated and unregulated industry effects appear somewhat less stable as we vary these specifications. Because of this instability, we choose to report the ordinary least squares results in this paper.

industries, and industry-year effects for observations from regulated industries.

Table 2 reports results for a series of specification using *SALARY* as the measure of compensation and market rate of return on common equity as the measure of firm performance. Our first model, reported in column I, is a benchmark specification estimated to compare the results from our data set to those obtained in previous compensation studies. Our estimate of the elasticity of salary with respect to annual sales is 0.26 (standard error 0.004), replicating the results of prior studies. In the remaining regressions we measure firm scale by assets and employees. Substituting these two variables for sales produces a slightly better fit and has no substantive effect on other coefficient estimates (compare columns I and II). The elasticity of salary in this basic model (column II) with respect to assets is 0.234 (standard error 0.007) and with respect to employees is 0.022 (0.007).

We find evidence of a positive pay-for-performance relationship: in column II, a 10 percentage point increase in stock market return generates a 9.3 percent (1.0 percent) increase in salary. This is at the low end of the range of performance sensitivities reported by Rosen for previous empirical studies, perhaps because we use compensation *levels* rather than compensation *changes* as the dependent variable.[35] If we estimate our model in first differences, we get pay-for-performance results very similar to those found in previous studies, but we lose the ability to identify many of the parameters we are interested in—particularly the industry-fixed effects.

CEO characteristics influence compensation in the expected directions. Using the results in column II, a CEO's *SALARY* increases with his tenure in position, at the annual rate of about 0.9 percent (standard error 0.1 percent). This suggests a fairly flat compensation structure apart from the overall market increases that are captured in the year effects. *SALARY* also increases slightly in age at appointment: an additional year of age at appointment increases *SALARY* by 0.3 percent (standard error 0.1 percent). Finally, we find a modest compensation premium (about 8 percent, standard error 0.9 percent) for CEOs who have been hired from outside the firm, and we find substantial discounts (about 15 percent) for founders.

35. Rosen (1992a).

Table 2. Structure of Salary Compensation[a]

Independent variable	*I*	*II*	*III*	*IV*	
				A[b]	B[c]
CEO TENURE	0.009	0.009	0.009	0.009	0.008
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
AGE	0.003	0.003	0.003	0.003	
	(0.001)	(0.001)	(0.001)	(0.001)	
FOUNDER	−0.166	−0.159	−0.167	−0.164	
	(0.014)	(0.014)	(0.014)	(0.014)	
OUTSIDE	0.063	0.078			
	(0.009)	(0.009)			
ln(SALES)	0.259				
	(0.004)				
ln(ASSETS)		0.234	0.234	0.235	
		(0.007)	(0.007)	(0.007)	
ln(EMPLOY)		0.022	0.022	0.022	
		(0.007)	(0.007)	(0.007)	
RETURN					
1970–90	0.086	0.093			
	(0.010)	(0.010)			
1970–74			0.029	0.029	0.009
			(0.023)	(0.023)	(0.114)
1975–79			0.047	0.050	−0.020
			(0.018)	(0.018)	(0.075)
1980–84			0.108	0.116	−0.064
			(0.018)	(0.019)	(0.055)
1985–90			0.200	0.223	−0.221
			(0.022)	(0.023)	(0.071)
OUTSIDE					
Pre-1970			0.038	0.037	
			(0.014)	(0.014)	
1970–79			0.107	0.107	
			(0.013)	(0.013)	
1980–90			0.080	0.087	
			(0.019)	(0.019)	
Number of observations	10,833	10,833	10,833	10,833	
SSR	1,259.48	1,234.60	1,228.61	1,223.74	

Source: Authors' executive compensation database. Standard errors are in parentheses. Regressions include year-fixed effects for all firms, SIC-year interaction effects for regulated firms, and SIC effects for unregulated firms.

a. The dependent variable is *ln(SALARY)*.

b. Base coefficients for all firms.

c. Additive coefficients for regulated firms, measuring the differential effect of regulation.

Given the strong similarities between our results and those in the literature, we are confident that our data set is representative of the data used in previous research. We now turn to the results that extend the findings of prior studies.

STRUCTURAL STABILITY OVER TIME. We conduct extensive tests to determine the appropriate degree of pooling to impose on our final specification. Earlier studies tend to assume that the structural equation is unchanged over the entire sample period. There seems little reason to impose this assumption on the data, particularly since trade press discussions suggest that there have been substantial changes in compensation policy as well as compensation levels over the past twenty years. The estimated year effects (reported in table A-1 in the appendix) confirm that real compensation levels have increased greatly over time.[36] More interestingly, we have discovered significant changes in the coefficients of some structural variables as well: compensation has become more sensitive to performance, and the premium to outside hires has changed markedly over time.[37]

In column III of table 2, we present estimates in which the coefficients of the financial performance and outsider variables are allowed to differ over time. When the return coefficient is allowed to differ over four subperiods, the estimates indicate a monotonic increase in performance sensitivity over time.[38] The estimate of the coefficient of *RETURN* for the earliest period (1970–74) is small and not significantly different

36. The time pattern of real CEO compensation looks substantially different from the time patterns of compensation for lawyers or average college-educated white-collar workers in Rosen (1992b). For his sample Rosen constructs an index of real compensation in each year divided by the mean real compensation over the 1967–87 period. His index suggests higher than mean earnings from 1970 to 1975, about mean earnings from 1975 to 1980, substantially below mean earnings from 1980 to 1985, and about mean earnings in 1986 and 1987. We constructed a similar index for our CEO sample, based on the total compensation for representative CEOs in machinery manufacturing in our figure 2-A. This index suggests lower than mean compensation during most or all of the 1970s, about mean compensation during the 1980–85 period, and substantially higher than mean compensation during the 1985–90 period.

37. Early experiments with temporal pooling restrictions on the entire compensation model suggested that the outside premium and return coefficients were the only parameters with substantial variation over our sample period.

38. The time periods—1970–74,1975–79, 1980–84, and 1985–90—were based on our estimates of separate year-by-year coefficients and a judgment of which years most readily pool. The results are not substantially different (although they are noisier) when these coefficients are allowed to vary by year.

from zero. By the 1985–90 period, a 10 percentage point increase in stock market return is estimated to raise compensation by 2.0 percent (0.2 percent). Even cash compensation, as measured by *SALARY*, is now more closely aligned with firm financial performance. This suggests that empirical results based on earlier data or stable performance effects over long periods may understate the current significance of corporate pay-for-performance policies.[39]

We also find that the compensation premium for CEOs brought in from outside the firm changes over time. We have divided the sample by the date at which the CEO is hired (before 1970, during the 1970–79 period, and during the 1980–90 period). For each of the hiring date cohorts, the coefficient reports the premium observed for that cohort over the sample period. For those hired before 1970, the premium is 3.9 percent (1.4 percent). CEOs hired from outside the firm in the 1970s receive a premium of 11.3 percent (1.3 percent), and those hired in the 1980s receive a premium of 8.3 percent (1.9 percent). These results may reflect changes in the market for corporate control, changes in recruitment policies by corporate boards, premiums necessary to induce executives to move to new organizations, or a signal of executive quality. We intend to explore these results in more detail in future research.

Structural Stability Across Regulated Industries. We next explore the extent to which the structural equation pools across regulated and unregulated industries. In unreported regressions, we allowed all the structural coefficients to vary across regulated and unregulated regimes.[40] The data seemed to prefer separate coefficients for regulated and unregulated industries on the CEO tenure and return variables. In column IV of table 2, we report results that relax the assumption of a common slope coefficient for these variables. Column IV-A reports the

39. If we estimate the model with CEO-fixed effects, so that the return variables are identified only by within-CEO variation (and the *AGE*, *FOUNDER*, *OUTSIDE*, and industry variables are dropped), the change in the pay-for-performance relationship remains evident but less pronounced than in these results. The compensation increase associated with a ten percentage point increase in return is 0.6 percent (0.1 percent) in the earliest period and 1.0 percent (0.1 percent) in the latest period.

40. The industry-specific effects in the regression capture differences in the *levels* of compensation across regulated and unregulated industries. We also have estimated models that allow all the structural parameters to vary across regulated and unregulated industries and to differ across firm-regulated and industry-regulated companies. This disaggregation yields little additional insight.

"base" estimates for all firms, and column IV-B reports an estimated *additive* adjustment to the base estimate for the CEOs of regulated firms.

The responses of salary to CEO tenure and firm performance differ considerably for regulated and unregulated firms. The estimates suggest that tenure-associated increases in compensation are twice as large in regulated industries: adding a year to tenure increases salary by 1.7 percent, compared with 0.9 percent for CEOs in the unregulated sector. The results also suggest that regulated firms provide less reward to their CEOs for superior financial performance. Compensation in the unregulated sector has become more sensitive to firm performance over time, but performance sensitivity in the regulated sector has remained relatively constant and low, although the point estimates are rather imprecise. By the 1985–90 period, compensation in regulated firms exhibits little or no performance sensitivity, a striking difference from compensation in the unregulated sector.[41]

Taken together, these results suggest that the compensation schemes at regulated firms are more bureaucratic—rewarding service time more and relative performance less—than those at unregulated firms. This finding, based on "salary and bonus" as a measure of compensation, reinforces the observation we made in discussing table 1—namely, that regulated firms rely less on performance sensitive components of compensation than do unregulated firms.

ALTERNATIVE COMPENSATION AND FIRM PERFORMANCE MEASURES. Using the specification reported in column IV of table 2, we next explore the sensitivity of our results to alternative measures of CEO compensation and firm financial performance. Table 3 reports compensation estimates for the 1972–90 period over which we have measures of *TOTAL1* compensation. We include results for *SALARY* to benchmark any effects of changing the sample period, which are minimal.

When compensation is measured as total compensation (*TOTAL1*) rather than salary plus bonus or "cash compensation," its sensitivity to firm financial performance increases for all periods. This is not surprising, since the realized value of long-term compensation instru-

41. The large negative coefficients for RETURN*REG in the 1985–90 period is heavily influenced by the airline industry. If we allow airlines to have a separate coefficient on return, the net financial performance sensitivity for regulated industries remains smaller than for the unregulated firms, but it is closer in magnitude to the net effect for the regulated firms in the earlier time periods.

Table 3. Alternative Performance and Compensation Measures, 1972–90

	Return = market return		*Return = accounting return*	
Dependent variable	*I* *ln(SALARY)*	*II* *ln(TOTAL1)*	*III* *ln(SALARY)*	*IV* *ln(TOTAL1)*
CEO TENURE	0.009	0.009	0.008	0.008
	(0.001)	(0.001)	(0.001)	(0.001)
CEO TENURE*REG	0.008	0.008	0.008	0.008
	(0.001)	(0.002)	(0.001)	(0.002)
AGE	0.003	0.003	0.003	0.003
	(0.001)	(0.001)	(0.001)	(0.001)
FOUNDER	−0.163	−0.212	−0.156	−0.200
	(0.015)	(0.021)	(0.015)	(0.020)
ln(ASSETS)	0.231	0.271	0.235	0.276
	(0.007)	(0.010)	(0.007)	(0.010)
ln(EMPLOY)	0.027	0.014	0.026	0.013
	(0.007)	(0.010)	(0.007)	(0.010)
RETURN				
1970–74	0.043	0.071	0.406	0.609
	(0.029)	(0.041)	(0.114)	(0.160)
1975–79	0.049	0.103	0.537	0.868
	(0.018)	(0.026)	(0.081)	(0.113)
1980–84	0.116	0.240	0.769	1.180
	(0.019)	(0.027)	(0.064)	(0.090)
1985–90	0.224	0.318	0.718	1.123
	(0.023)	(0.033)	(0.046)	(0.065)
RETURN*REG				
1970–74	−0.036	−0.077	0.025	0.181
	(0.141)	(0.198)	(0.641)	(0.900)
1975–79	−0.019	−0.001	0.137	0.400
	(0.076)	(0.106)	(0.390)	(0.549)
1980–84	−0.064	−0.243	−0.562	−0.785
	(0.056)	(0.078)	(0.121)	(0.170)
1985–90	−0.223	−0.300	−0.339	−0.302
	(0.071)	(0.100)	(0.159)	(0.223)
OUTSIDE				
Pre-1970	0.038	0.043	0.045	0.054
	(0.016)	(0.023)	(0.016)	(0.022)
1970–79	0.114	0.147	0.133	0.177
	(0.013)	(0.018)	(0.013)	(0.018)
1980–90	0.087	0.064	0.096	0.076
	(0.019)	(0.027)	(0.019)	(0.027)
Number of observations	9,846	9,846	9,846	9,846
SSR	1,132.91	2,248.79	1,099.19	2,169.47

Source: Authors' executive compensation database. Standard errors are in parentheses. Regressions include year-fixed effects for all firms, SIC-year interaction effects for regulated firms, and SIC effects for unregulated firms.

ments like options and stock grants, which are included in *TOTAL1*, is highly correlated with the performance of the company's stock. As in the *SALARY* regressions, performance sensitivity rises substantially over time, and the coefficients on the regulated-performance interactions suggest less performance sensitivity in the regulated industries. *TOTAL1* compensation shows a slightly stronger elasticity with respect to *ASSETS*, a slightly lower elasticity with respect to *EMPLOYEES*, and a smaller discount for founders, relative to *SALARY* compensation. Changing the dependent variable has little effect on the other coefficients.

Columns III and IV of table 3 explore the effect of substituting accounting rate of return for market return as the measure of firm performance. Although other coefficients are substantively unchanged by this substitution, the pay-for-performance relationship changes in interesting ways. First, the base performance coefficients are much larger for accounting rates of return than for market rates of return. This is consistent with previous research and may be the result of institutional factors as well as the statistical properties of the return measures. Compensation contracts specify performance objectives more frequently in terms of accounting than market rates of return. Accounting rates of return exhibit much less variability than do market rates of return, with an overall standard deviation of 12 percent compared with the market rate of return standard deviation of 41 percent for unregulated firms (table 1). Notably, an increase of one-quarter standard deviation in either return measure generates roughly equivalent percentage increases in *SALARY* (about 2.2 percent) or *TOTAL1* (3.1 to 3.4 percent) during the 1985–90 period.

Second, although the accounting rate of return coefficients exhibit a substantial increase in performance sensitivity over time, the relative magnitude of the change is not as large as that for market rates of return. Between the first and last periods, the accounting rate of return coefficients approximately double, but the market rate of return coefficients more than quadruple. Moreover, the performance sensitivity is approximately constant over the past decade for accounting rate of return.

Finally, and perhaps of most interest, regulated firms exhibit much more performance sensitivity when performance is measured by accounting rates of return. Although compensation is less sensitive to performance than in unregulated firms during the 1980s, the net effect

of accounting rate of return remains positive and statistically significant throughout the sample period. The focus on accounting rates of return in many regulatory settings (especially for public utilities) suggests that this might reflect real differences in compensation structure. Compensation committees in regulated firms may benchmark CEO performance more by accounting return, or higher accounting returns may be associated with periods of less stringent regulation, which also imply fewer constraints on compensation. These competing explanations clearly merit further investigation.

Table 4 presents estimated compensation equations for total compensation excluding gains from the exercise of stock options and similar instruments (*TOTAL2*). These data are available only for the 1980–90 period. For comparison, we include *SALARY* and *TOTAL1* estimates for this period, but the coefficients are largely unaffected by the change in sample. The result of most significance in this table is the dampening of the pay-for-performance sensitivity when options gains are excluded from total compensation (compare the performance coefficients for market return in columns II and III, and for accounting return in columns V and VI). The performance sensitivity for *TOTAL2* is quite close to that for *SALARY* and about two-thirds the magnitude of the performance sensitivity for *TOTAL1*. This suggests that options and stock appreciation rights are an important source of incentive pay.

The Effect of Regulation on Compensation

Differences in compensation levels across regulated and unregulated industries are estimated by industry-specific effects, which measure the deviation of mean compensation in each industry from the mean for our reference industry, machinery manufacturing. Machinery manufacturing is a natural reference industry, with average compensation that is extremely close to the average of all unregulated industries, controlling for firm and CEO characteristics. For convenience, we therefore will refer to the industry effects as measuring deviations from the unregulated mean compensation, although the precise measurement is relative to machinery manufacturing. We report the industry-specific effects for each compensation measure (*SALARY*, *TOTAL1*, and *TOTAL2*) using the basic structural specification with market return as the performance variable.

Table 4. Alternative Performance and Compensation Measures, 1980–90

	Return = market return			*Return = accounting return*		
Dependent variable (ln)	*I SALARY*	*II TOTAL1*	*III TOTAL2*	*IV SALARY*	*V TOTAL1*	*VI TOTAL2*
CEO TENURE	0.009	0.009	0.010	0.009	0.008	0.009
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CEO TENURE*REG	0.008	0.007	0.007	0.008	0.007	0.008
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)
AGE	0.002	0.001	0.003	0.002	0.002	0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
FOUNDER	−0.173	−0.229	−0.222	−0.159	−0.205	−0.206
	(0.021)	(0.032)	(0.024)	(0.021)	(0.032)	(0.024)
ln(ASSETS)	0.229	0.284	0.252	0.236	0.292	0.259
	(0.010)	(0.015)	(0.011)	(0.010)	(0.015)	(0.011)
ln(EMPLOY)	0.017	−0.009	0.004	0.013	−0.014	−0.001
	(0.010)	(0.014)	(0.011)	(0.009)	(0.014)	(0.011)
RETURN						
1980–84	0.103	0.226	0.118	0.750	1.155	0.818
	(0.021)	(0.032)	(0.024)	(0.070)	(0.106)	(0.080)
1985–90	0.211	0.305	0.234	0.711	1.111	0.758
	(0.025)	(0.038)	(0.029)	(0.051)	(0.077)	(0.058)
RETURN*REG						
1980–84	−0.053	−0.229	−0.056	−0.555	−0.772	−0.611
	(0.060)	(0.092)	(0.069)	(0.131)	(0.198)	(0.149)
1985–90	−0.212	−0.288	−0.246	−0.327	−0.278	−0.380
	(0.077)	(0.117)	(0.088)	(0.172)	(0.261)	(0.196)
OUTSIDE						
Pre-1970	−0.015	−0.018	−0.013	0.008	0.018	0.012
	(0.032)	(0.048)	(0.036)	(0.031)	(0.047)	(0.035)
1970–79	0.151	0.207	0.160	0.173	0.242	0.184
	(0.019)	(0.029)	(0.022)	(0.019)	(0.029)	(0.022)
1980–90	0.082	0.062	0.076	0.090	0.072	0.084
	(0.021)	(0.032)	(0.024)	(0.021)	(0.032)	(0.024)
Number of observations	5,568	5,568	5,568	5,568	5,568	5,568
SSR	754.88	1,734.58	976.03	726.60	1,668.56	944.37

Source: Authors' executive compensation database. Standard errors are in parentheses. Regressions include year-fixed effects for all firms, SIC-year interaction effects for regulated firms, and SIC effects for unregulated firms.

The fixed effects for the unregulated industries provide a gauge for the effects estimated for the regulated industries. We report the fixed effects for unregulated industries in table 5. For *SALARY*, the estimated effects range from −0.13 (0.03) in oil and gas extraction to 0.21 (0.03) in services II, implying average industry salaries that range from 87 percent to 123 percent of the unregulated mean *SALARY*. The variance in industry effects is larger for *TOTAL1*, with estimated effects ranging from −0.17 (0.03) in petroleum refining to 0.43 (0.05) in services II.[42]

For the regulated industries, we disaggregate the industry-fixed effects into industry-year specific effects. These measure the difference in the regulated industry mean compensation from the machinery manufacturing mean compensation in each year.[43] For parsimony in presentation, table 6 reports the regulated industry-year effects pooled over five-year intervals, rather than twenty-one individual-year effects for each industry.[44] The annual movements in the regulatory effects are plotted in figures 1 and 2. Figures 1-A and 1-B graph the predicted *SALARY* path over time for a "representative" CEO in each of the regulated industries and machinery manufacturing, grouped by industry-regulated industries (figure 1-A) and firm-regulated industries (figure 1-B).[45] Figures 2-A and 2-B are the corresponding graphs for *TOTAL1*.

Overall, CEOs in regulated industries earn substantially less, and the regulated industry effects are both statistically and economically significant. Except for railroads and trucking, the regulated industry effects all are well below the lowest unregulated industry effects, and railroads and trucking are in the lower tail of the unregulated industries distribution. The regulated industry compensation *discount* from machinery manufacturing is as high as 62 percent for salary and as high as 71 percent for total compensation, with the lowest compensation level in electric utilities over the 1975–85 period. Other things being

42. The fixed effect for services II is a substantial outlier in the unregulated industry distribution. This sector includes hospitals and health services, engineering and design firms, and consulting services. The second largest effect is 0.11 (0.04), for publishing.

43. The machinery manufacturing mean compensation for each year is reported in appendix table A-1, which records the estimated year-fixed effects.

44. Standard *F*-tests fail to reject pooling at this level for each of the regulated industries.

45. The representative CEO is defined to be fifty years old when appointed CEO and to be a nonfounder hired from within the firm. The representative CEO has eight years of tenure in the CEO position and manages a firm with $4.7 billion total assets (1990 constant dollars), 30,000 employees, and a market return of 17 percent.

Table 5. Fixed Effects for Unregulated Industries

Industry, SIC category	Number of observations, 1970–90	Compensation measure and regression specification: ln(SALARY) Table 2, column IV	ln(TOTAL1) Table 3, column II	ln(TOTAL2) Table 4, column III
Mining, 10	134	−0.018	−0.129	−0.226
		(0.032)	(0.049)	(0.064)
Oil & gas extraction, 13	184	−0.135	−0.090	−0.103
		(0.031)	(0.046)	(0.052)
Construction, 15	146	0.002	0.029	−0.007
		(0.031)	(0.046)	(0.055)
Food, 20	665	0.081	0.032	0.105
		(0.018)	(0.027)	(0.033)
Paper, 26	402	−0.081	−0.157	−0.199
		(0.021)	(0.031)	(0.036)
Publishing, 27	221	0.067	0.114	0.097
		(0.026)	(0.039)	(0.043)
Chemicals, 28	1,074	0.092	0.077	0.064
		(0.016)	(0.024)	(0.029)
Petroleum refining, 29	487	−0.111	−0.174	−0.184
		(0.022)	(0.033)	(0.039)
Other manufacturing, 30	670	0.082	0.022	0.112
		(0.018)	(0.027)	(0.033)
Metals, 33	490	−0.056	−0.158	−0.129
		(0.020)	(0.030)	(0.036)
Electronic equipment, 36	759	0.028	−0.005	0.006
		(0.017)	(0.026)	(0.030)
Transport equipment, 37	620	−0.021	0.036	0.018
		(0.018)	(0.028)	(0.033)
Transportation/Utilities, unreg. 40	258	−0.023	−0.010	−0.049
		(0.025)	(0.037)	(0.041)
Wholesale trade, 50	355	−0.011	−0.125	−0.080
		(0.022)	(0.033)	(0.038)
Retail trade, 59	961	−0.027	−0.101	−0.033
		(0.017)	(0.026)	(0.031)
Services I, 70	283	0.059	0.026	0.079
		(0.024)	(0.035)	(0.039)
Services II, 80	130	0.207	0.427	0.255
		(0.033)	(0.048)	(0.050)

Source: Authors' executive compensation database. Standard errors are in parentheses. All coefficients relative to machinery manufacturing (791 observations in 1970–90 sample).

equal, CEOs in regulated industries receive significantly less compensation than does the average CEO in unregulated industries.

ELECTRIC UTILITIES. Electric utilities are the group of firms most susceptible to the exercise of political constraints on compensation: they are regulated on a firm-by-firm basis, typically by a single state regulatory agency, and they have been subject to quite intense regulatory scrutiny over much of the sample period. They also are the firms with the deepest discounts of CEO compensation relative to the unregulated sector. For salary and bonus, the discounts average 50 to 60 percent off the unregulated mean compensation. For the measures of compensation that include long-term incentive compensation such as stock options, electric utility CEOs do even worse, with discounts of 60 to 70 percent.

Moreover, the pattern of discounts over time conforms to the predicted effects of the political constraints model. Relative CEO compensation declines after the mid-1970s and recovers only slowly and modestly by the late 1980s. This pattern is consistent with the time pattern of regulatory stringency in the electric utility industry, and it supports an explanation of discounts based on political constraints.[46] Further evidence in support of the political constraint model of compensation discounts is explored in the last section of the results discussion.

NATURAL GAS DISTRIBUTION UTILITIES. Although natural gas utilities are in principle subject to firm-level regulation at the state level quite similar to that of the electric utilities, there are two significant differences. First, the firms in our sample are heavily diversified out of natural gas distribution.[47] Although the largest single line of business for all

46. The time pattern of utility CEO compensation does not mimic Rosen's earnings patterns for lawyers or other white-collar professionals during the 1970–90 period (Rosen 1992b). Indices of real total compensation and real salary compensation for electric utility CEOs, for example, exhibit modest declines between 1970 and 1975, relatively flat compensation from 1975 to 1980, and significant and monotonic increases over the 1980–90 period. The indices rise from about 75 percent of the mean 1970–90 compensation in 1975 to about 150 percent of the 1970–90 mean compensation in 1990. There is no evidence of the cubic "wave" pattern that Rosen observes in his data on white-collar professionals.

47. Most local gas distribution companies are relatively small, and hence do not make it into the *Forbes* survey, or they are part of combination gas and electric companies that we have treated as electric utilities. For the latter firms the electricity portion of the business generally predominates the gas.

Table 6. Fixed Effects for Regulated Industries

Compensation measure (ln) *Regression model*	*N*[a] *Table 2:IV*	*SALARY* *Table 2:IV*	*TOTAL1* *Table 3:II*	*TOTAL2* *Table 4:III*
Railroads				
1970–74	33	−0.173 (0.062)	−0.216 (0.109)	—
1975–79	35	−0.088 (0.061)	−0.267 (0.087)	—
1980–84	29	−0.061 (0.067)	−0.159 (0.096)	−0.170 (0.086)
1985–90	29	−0.122 (0.066)	−0.253 (0.094)	−0.210 (0.084)
Trucking				
1970–74	16	−0.454 (0.087)	−0.438 (0.150)	—
1975–79	25	0.002 (0.070)	−0.049 (0.100)	—
1980–84	24	0.062 (0.072)	0.034 (0.102)	0.039 (0.091)
1985–90	19	−0.150 (0.080)	−0.303 (0.115)	−0.185 (0.102)
Airlines				
1970–74	30	−0.339 (0.065)	−0.444 (0.122)	—
1975–79	38	−0.290 (0.060)	−0.481 (0.086)	—
1980–84	47	−0.410 (0.054)	−0.502 (0.077)	−0.504 (0.070)
1985–90	38	−0.413 (0.059)	−0.240 (0.084)	−0.252 (0.075)
Telephone				
1970–74	27	−0.505 (0.067)	−0.707 (0.117)	—
1975–79	30	−0.580 (0.065)	−0.774 (0.093)	—
1980–84	42	−0.428 (0.057)	−0.626 (0.082	−0.490 (0.075)
1985–90	84	−0.262 (0.044)	−0.431 (0.062)	−0.260 (0.058)
Electric utilities				
1970–74	285	−0.719 (0.030)	−0.885 (0.052)	—
1975–79	277	−0.957 (0.032)	−0.166 (0.046)	—

Table 6. (continued)

Compensation measure (ln) *Regression model*	*N*[a] *Table 2:IV*	*SALARY* *Table 2:IV*	*TOTAL1* *Table 3:II*	*TOTAL2* *Table 4:III*
Electric utilities (*continued*)				
1980–84	332	−0.960 (0.030)	−1.223 (0.044)	−1.106 (0.045)
1985–90	380	−0.865 (0.029)	−1.157 (0.043)	−0.974 (0.043)
Pipelines				
1970–74	66	−0.414 (0.047)	−0.537 (0.083)	—
1975–79	82	−0.346 (0.047)	−0.425 (0.067)	—
1980–84	90	−0.258 (0.042)	−0.312 (0.060)	−0.371 (0.057)
1985–90	65	−0.328 (0.048)	−0.468 (0.069)	−0.358 (0.064)
Gas utilities				
1970–74	14	−0.388 (0.093)	−0.521 (0.173)	—
1975–79	20	−0.438 (0.079)	−0.552 (0.113)	—
1980–84	25	−0.504 (0.071)	−0.479 (0.102)	−0.501 (0.092)
1985–90	21	−0.396 (0.077)	−0.370 (0.110)	−0.380 (0.099)

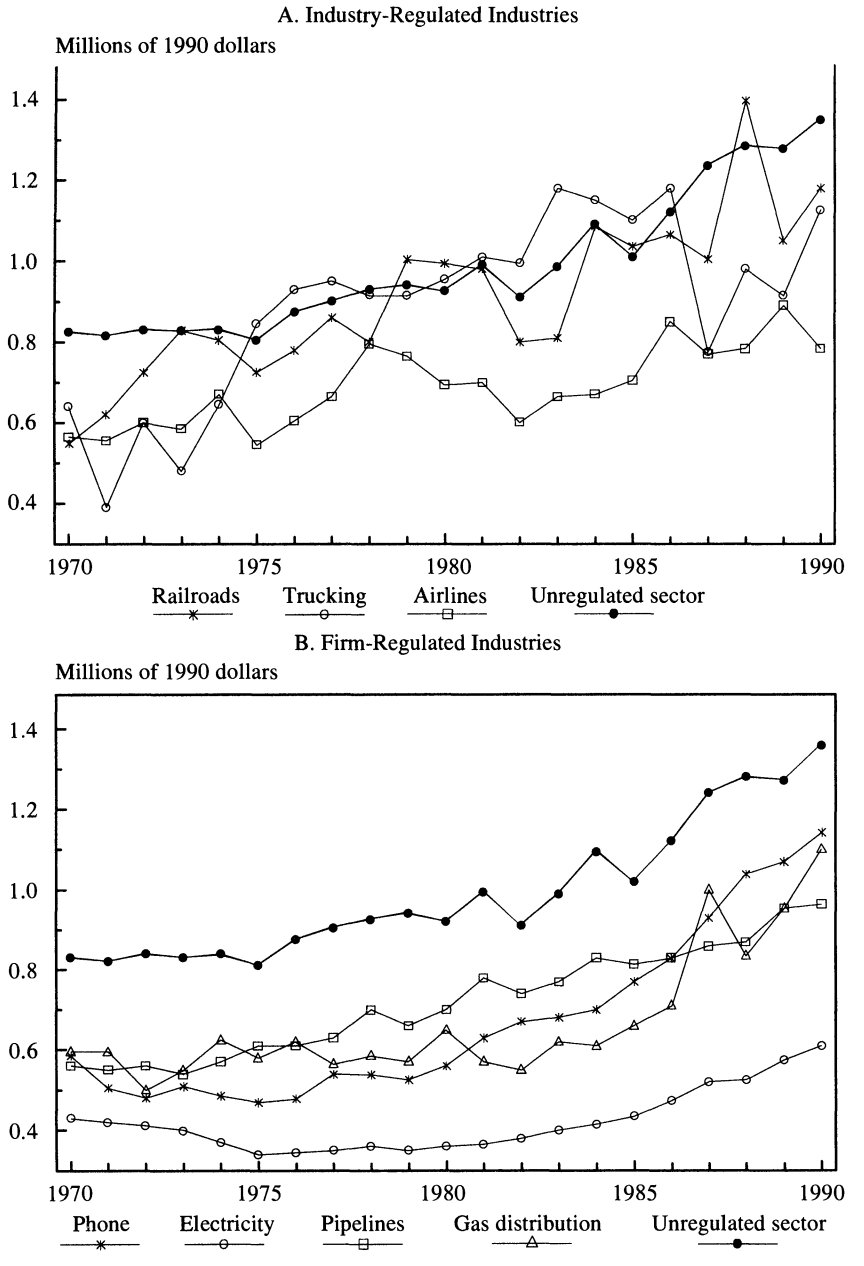
Source: Authors' executive compensation database. Standard errors are in parentheses. All coefficients are relative to machinery manufacturing.

a. Number of observations in industry over five-year period.

seven firms in our sample is natural gas distribution, five are diversified holding companies with significant financial interests in oil and gas exploration and production, pipeline transport, shipping, retailing, or other ventures. This diversification may relax regulatory constraints on compensation as well as contribute to higher compensation by raising potential CEO productivity. Second, most of our firms operate gas distribution companies in more than one state. This diffuses regulatory control even further.

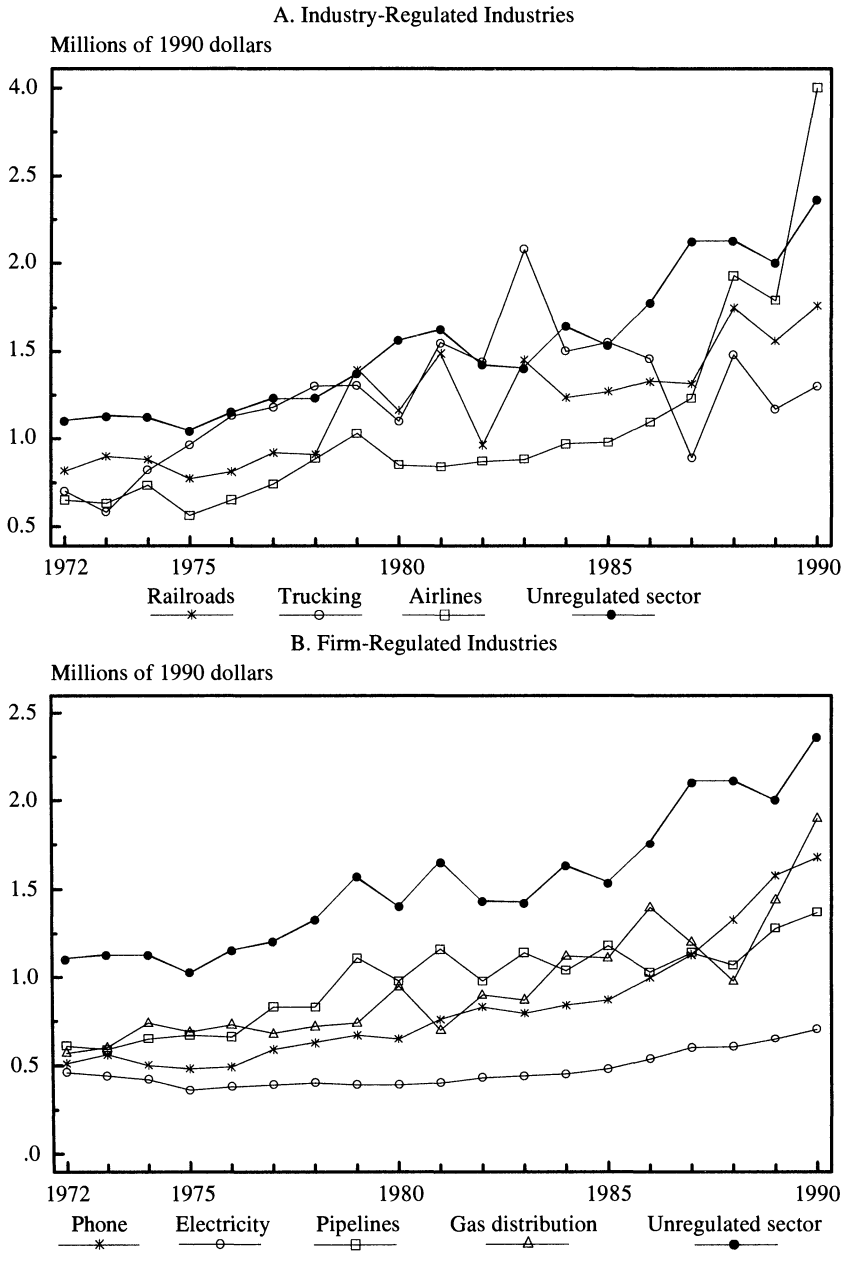
Given these distinctions, it is not surprising that the compensation discounts for CEOs of gas distribution companies are smaller than those for electric utility CEOs. The discounts average 32 to 40 percent relative to machinery manufacturing *SALARY*, and 30 to 42 percent relative to

Figure 1. Salary and Bonus for a Representative CEO, 1970–90



Source: Authors' executive compensation database.

Figure 2. Total Compensation for a Representative CEO, 1972–90



Source: Authors' executive compensation database.

TOTAL1. This discount is still quite substantial—about twice the largest discount in the unregulated industry sample. Although the time pattern suggests some reduction in relative compensation during the late 1970s and early 1980s when regulatory pressures may have been most intense, the point estimates are sufficiently imprecise that we cannot be confident in that pattern.

TELEPHONES. Telephone companies are regulated on a firm-by-firm basis, although regulatory authority over any given company can be quite diffuse, often involving regulatory agencies in a number of states and (for long-distance service) the Federal Communications Commission. Consistent with this and the predictions of our model of political constraints, compensation of telephone company CEOs has been discounted substantially relative to unregulated industries, but the discounts are not as large as those in the electric utility industry. From 1970 to 1985, *SALARY* discounts averaged about 40 percent and total compensation discounts about 50 percent, relative to the unregulated sector.

These discounts declined significantly after the break-up of AT&T in 1984 and the associated changes in the competitive and regulatory environment of the industry. From 1985 to 1990, compensation discounts averaged less than 25 percent of *SALARY* and about 35 percent of total compensation. Although smaller, these discounts continue to be substantially larger than any in the unregulated sector. The direction of the change is consistent with both the political constraints and differential productivity hypotheses.

GAS PIPELINES. Interstate natural gas pipeline companies exhibit discounts of 25 to 35 percent in salary and bonus and slightly larger discounts in total compensation, relative to the unregulated sector. Although substantial, these discounts are smaller than the average discounts in the remaining firm-regulated industries. This is consistent with the view that state regulation of firms supplying primarily local services provides a more binding political constraint on CEO compensation than does federal regulation. We expected possible increases in compensation discounts during the late 1980s as a result of worsening economic and regulatory conditions in the industry. The data are suggestive of some additional discounting relative to the 1980–84 position of the industry, but the declines are statistically significant only for total compensation.

RAILROADS. The discounts in the industry-level regulated industries are much smaller than those in the firm-level regulated industries, although the small sample sizes increase the imprecision of our estimates. In railroads the discount for salary and bonus averages about 10 percent, within the range of discounts exhibited by unregulated industries. The discount is larger (15 to 20 percent) when we use as our compensation measure total compensation, including gains on stock options and stock holdings. Despite substantial deregulation of the rail industry over the 1975–85 period, as well as organizational changes and CEO turnover, there is no clear trend in the discounts to suggest they narrowed over time.[48]

TRUCKING. In trucking, compensation discounts in *SALARY* appear to be modest to nonexistent in most periods, although the point estimates are fairly imprecise. The notable exception is the 1970–74 period, which is largely because of the CEO of Roadway Express. As in railroads, there is no clear effect of deregulation on compensation. Indeed, the discount in both salary and total compensation rises over the 1985–90 period. The similarity of the rail and trucking results is unlikely to be entirely coincidental. Both these industries, and only these industries, were subject to industry-level rate regulation by the same federal agency, the Interstate Commerce Commission.

AIRLINES. In airlines, *SALARY* was discounted 25 to 30 percent relative to the unregulated mean *SALARY* during the 1970s, when airlines were subject to regulation by the Civil Aeronautics Board. Total compensation was discounted about 35 percent during this period. Although these discounts are larger than those for other industry-regulated industries, they are smaller than those for firm-regulated industries. They are substantially larger than the largest discounts observed in the unregulated sector. This pattern could be consistent with industry aggregation providing less "anonymity" for the few airlines regulated by the Civil Aeronautics Board. It may also be that the coincidence of national firms and federal regulation provides effective political constraints on these firms.

Despite the dramatic changes in the economic and regulatory environment affecting the airline industry after 1978, CEO compensation

48. On organizational changes and CEO turnover in the railroad industry, see Friedlaender, Berndt, and McCullough (1992).

did not respond quickly to the enhanced managerial challenges that these companies faced. Compensation discounts increased after deregulation of the industry, with the exception of total compensation in 1990 (see figure 2-A).[49] It has been suggested to us that this behavior may reflect three phenomena. First, although the airline industry was largely deregulated by the early 1980s, the industry, especially the largest firms that appear in our sample, continues to be subject to intensive political scrutiny and periodic threats of reregulation. Second, many airlines went through major restructurings that reduced wages, relaxed work rules, and laid off workers. Concomitant large increases in compensation for CEOs might have reduced their effectiveness in accomplishing these tasks. Finally, despite relatively healthy stock market returns over much of the period, most major airlines suffered enormous accounting losses during the 1980s. In at least one case, these arguments apparently motivated a CEO to request that the board of directors rescind a substantial stock grant to him.

With the exception of the "before and after" deregulation patterns, these findings support the compensation patterns one would expect if regulation imposed political constraints on CEO pay. The closing empirical section looks within the electric utility industry for sharper distinctions between the political pressure and productivity hypotheses.

Organizational Variation Within Electric Utilities

The electric utility industry is the industry with the deepest compensation discounts, as well as the regulated industry for which we have the most data in our sample and, based on previous research, for which we have the most extensive knowledge of and direct experience with the regulatory process and the changes in industry structure. We therefore exploit information on variations across firms in this industry to provide additional evidence on regulatory discounts and, in particular, to distinguish between political constraints and inherent productivity differences as explanations of those discounts. We focus on two ways in which corporate structures differ across firms: (1) diversification into unregulated businesses, and (2) organizing as a holding company

49. The huge increase in 1990 is attributable to sizable noncash compensation for the CEOs of American Airlines and United Airlines.

corporate form. Each of these may affect the scrutiny that regulators apply to CEO compensation.

The first way in which utilities may relax regulatory constraints is to diversify into unregulated businesses. Although very few electric utilities have less than 80 percent of their business activities associated with the production and sale of electricity, several have embarked on ambitious diversification programs. Others have only financially inconsequential diversification. We record substantial diversification by a dummy variable (*DIVERSE*) that takes on the value one in any year in which we judged a utility to have achieved significant diversification. Our judgment was based on a review of utility annual reports, 10Ks, and financial analysts' reports on utility diversification. Among the factors considered to construct the classifications were the fraction of utility revenues, costs, and assets in nonutility businesses; discussions of diversification plans in annual reports; and perceptions of stock analysts. Twenty-one firms in our data base achieved substantial diversification some time during the sample period, most in the late 1980s. Together, they have ninety-nine firm-years of *DIVERSE* operation in our database.

Substantial diversification will loosen any political constraint on compensation, because compensation can be charged to the unregulated operations. But it also may change the impact the CEOs can have on stockholder returns through their success with unregulated subsidiaries. This, in turn, may lead to changes in the potential productivity of CEOs, the optimal compensation arrangements, and the type of CEO hired by the firm.[50]

The second potential way to relax regulatory constraints is to adopt a holding company structure. In utilities that are organized as holding companies, the CEO is the chief executive of the holding company, but not necessarily of the regulated utility operating company. As such, the CEO's compensation may be partially or wholly removed from the purview of any particular regulatory commission.[51] There are two types

50. For a discussion of these effects in the rail industry, see Friedlaender, Berndt, and McCullough (1992) and John Meyer's comments at the end of this paper.

51. In general, the CEO's compensation will be subject to regulatory oversight only to the extent that it is charged back to a regulated operating subsidiary. As noted earlier, some companies choose to charge back none of the CEO's compensation.

of holding company structures in the electric utility industry: registered holding companies and exempt holding companies.

Registered holding companies are multistate utilities that are registered as holding companies under the Public Utility Holding Company Act of 1935. There are about a dozen of these firms in the industry. In contrast to most utilities, which operate in a single state and are regulated by a single-state regulatory commission, registered holding companies operate utility subsidiaries in at least two states and are regulated in part by each state's public utility commission and by the Federal Energy Regulatory Commission. Apart from differences in corporate form and associated differences in regulatory oversight, these companies are indistinguishable from other electric utilities of similar size. To examine whether the associated diffusion of regulatory authority relaxes political constraints on CEO compensation, we have created a dummy variable (*RHC*) that takes on the value one for each of the eight registered holding companies we have in our database of 164 firm-years.

Exempt holding companies (EHCs) are holding companies that are exempt from registration under the 1935 Act because they have regulated utility subsidiaries that operate in a single state. They typically also have one or more subsidiaries in unregulated lines of business. As we have argued, the holding company form should partially mitigate the force of political constraints on CEO compensation, thereby reducing compensation discounts. Potential diversification of EHCs into unregulated businesses also may imply changes in executive compensation independent of any political constraints. To control for this, we exploit variations across this group in the degree of substantive diversification.

Exempt holding companies typically are legally diversified into unregulated businesses, but the financial significance of their diversification varies substantially across firms. Exempt holding companies with no consequential diversification ($DIVERSE = 0$) differ from other undiversified utilities in legal form only. There is no reason to believe that the CEO's position at a largely undiversified exempt holding company is substantively different from that at other electric utilities; there simply is not sufficient diversification to make the position inherently more productive from the shareholders' perspective. EHC status is sufficient to relax political constraints, however. Even substantially undiversified firms can charge a share of executive compen-

Table 7. Holding Company and Diversification Effects in the Electric Utility Industry

Specification/variable	*Coefficient*
ln(SALARY)[a]	
Registered holding company (RHC)	0.121
	(0.029)
Exempt holding company (EHC)	0.113
	(0.037)
Diversified (DIVERSE)	0.139
	(0.039)
ln(TOTAL1)[b]	
Registered holding company (RHC)	0.091
	(0.043)
Exempt holding company (EHC)	0.085
	(0.053)
Diversified (DIVERSE)	0.266
	(0.056)
ln(TOTAL2)[c]	
Registered holding company (RHC)	0.100
	(0.050)
Exempt holding company (EHC)	0.102
	(0.049)
Diversified (DIVERSE)	0.206
	(0.053)

Source: Authors' executive compensation database. Standard errors are in parentheses.
a. Regression specification table 2, column IV.
b. Regression specification table 3, column II.
c. Regression specification table 4, column III.

sation to their unregulated affiliate(s), reducing compensation payments that appear in rate cases as attributable to the regulated utility. By estimating the effect of EHC status controlling for the level of diversification (through *DIVERSE*), we can isolate the political constraint effect. We record exempt holding company status by a dummy variable (*EHC*) that takes on the value one in any year that a utility is organized as an exempt holding company. We have twenty-two firms and 115 firm-years in this category. Of these twenty-two firms, eleven are substantially diversified at some point in the sample period.

Table 7 reports the estimated coefficients of the *RHC*, *EHC*, and *DIVERSE* variables, which have been added to the basic specifications used to derive table 5. The remaining coefficients in the model generally

are robust to the introduction of these variables and are therefore not reported. The estimated holding company and diversification coefficients are positive, and most are statistically significant. Holding company status (*RHC* and *EHC*) raises CEO *SALARY* by about 12 percent to 13 percent relative to the *SALARY* of single-state, undiversified utility CEOs; *TOTAL* compensation is about 9 percent higher for holding company CEOs. These effects may be interpreted as the compensation gains from having more diffuse regulatory oversight and an ability to shield some compensation from regulatory review. Substantive diversification adds an additional 15 percent to salary and 30 percent to total compensation. For diversified companies that also are organized as exempt holding companies, the additive effect is about 25 percent higher salaries and about 40 percent higher total compensation. The premium for substantively diversified companies, relative to single-state, undiversified electric utilities, may reflect relaxation of political constraints, increases in CEO value to shareholders, or both. Given the modest diversification by even the "diversified" utilities in our sample, the frequently poor financial results for the undiversified subsidiaries, and no apparent change in CEO characteristics as utilities diversify, we suspect the effect reflects eased political pressures rather than increases in potential CEO productivity.

Conclusions

This study finds substantial and persistent differences in the level and structure of CEO compensation between firms subject to economic regulation and those in unregulated industries. On average, CEOs of regulated corporations are paid much less than their counterparts at unregulated corporations. Moreover, the pattern of compensation discounts across and within regulated industries is broadly consistent with the presence of binding political constraints on CEO compensation, as mediated through the regulatory process.

First, compensation levels across industries and over time generally match variations in regulatory oversight and intensity. Compensation discounts are largest when regulators scrutinize the accounts of individual firms, somewhat smaller when they regulate very small groups of firms, and small or nonexistent when they base decisions on aggregate data for large groups of firms. Discounts are largest in local industries

that are regulated at the state level, and they are smaller for firms regulated by multiple agencies or federal agencies, other things being equal. Periods of greatest regulatory intensity are associated with the deepest discounts in the electric utility industry; the data do not have sufficient power to determine whether discounts also increase with regulatory stringency in the natural gas distribution and pipeline industries. Divestiture and partial relaxation of regulation reduced compensation discounts in the telephone industry, although we do not find similar patterns in the deregulated transportation industries.

Second, the pattern of compensation within the regulated electric utility industry supports the political pressure hypothesis. Specifically, firms that are organized in ways that reduce the centrality or completeness of regulatory oversight of CEO compensation tend to have higher compensation. CEOs of utilities organized as holding companies have smaller compensation discounts than do CEOs of firms organized as single-state, undiversified electric utilities, despite the virtually identical nature of the CEO's responsibilities and authority in the two types of firms. Firms that have diversified into unregulated businesses, to which they may charge a portion of CEO compensation, also have smaller compensation discounts. Although some of the higher pay may reflect productivity differences that accompany diversification, this effect is likely to be relatively minor.

Finally, the structure of CEO compensation differs across the regulated and unregulated sectors in ways consistent with the exercise of political constraints. "Salary and bonus" (cash compensation by the late 1980s) accounts for a much larger share of total compensation in regulated firms than it does in the unregulated sector. This appears largely to reflect less reliance on stock options and other forms of market-based incentive pay among regulated firms, particularly in the utilities sector. Moreover, compensation in the regulated sector, whether measured by salary and bonus or total compensation, is less responsive to firm profitability and more heavily weighted toward "automatic" increases based on tenure than is compensation in the unregulated sector. This structure is consistent with the differences in the objective functions of stockholders and regulators implied by the political constraint hypothesis, particularly with regulatory incentives to avoid large compensation payouts even when (or especially when) firm profits are high.

What are the implications of apparent political constraints on execu-

tive compensation in regulated industries? The normative significance of even the substantial discounts we observe is unclear. Without reliable measures of CEO productivity, we cannot assess the relative importance of political constraints and productivity differences as sources of reduced compensation. Similarly, without a way to measure inherent productivity differences of CEOs in different regulatory settings, we are unable to determine whether our observed discounts result from "excessive" pay in the unregulated sector or constraints that prevent shareholders of regulated firms from adopting optimal compensation schemes for their CEOs. Our results do suggest, however, that intervention in the compensation process by well-informed and influential outsiders may affect the contracts between shareholders and top executives. The current political focus on executive compensation more broadly could significantly affect how CEOs at unregulated firms are compensated.

Appendix

Table A-1. Year-Fixed Effects, 1970–90

Year	*Number of observations, 1970–90*	*ln(SALARY), 1970–90 Table 2, column IV*	*ln(TOTAL1), 1972–90 Table 3, column II*	*ln(TOTAL2), 1980–90 Table 4, column III*
1970	461	4.191 (0.048)		
1971	526	4.168 (0.048)		
1972	546	4.199 (0.048)	4.076 (0.071)	
1973	547	4.194 (0.048)	4.102 (0.071)	
1974	546	4.203 (0.048)	4.097 (0.072)	
1975	542	4.160 (0.050)	4.007 (0.073)	
1976	521	4.247 (0.049)	4.117 (0.072)	
1977	515	4.277 (0.049)	4.180 (0.072)	
1978	528	4.298 (0.049)	4.296 (0.072)	
1979	533	4.315 (0.049)	4.428 (0.073)	
1980	555	4.295 (0.050)	4.324 (0.074)	4.431 (0.082)
1981	549	4.367 (0.049)	4.461 (0.072)	4.513 (0.081)
1982	570	4.284 (0.050)	4.327 (0.074)	4.419 (0.082)
1983	539	4.358 (0.050)	4.318 (0.074)	4.386 (0.082)
1984	519	4.461 (0.050)	4.469 (0.074)	4.503 (0.082)
1985	513	4.386 (0.051)	4.402 (0.075)	4.440 (0.084)
1986	504	4.485 (0.050)	4.547 (0.075)	4.564 (0.083)
1987	467	4.586 (0.051)	4.725 (0.075)	4.642 (0.084)
1988	454	4.624 (0.052)	4.726 (0.076)	4.711 (0.085)
1989	440	4.618 (0.052)	4.665 (0.077)	4.687 (0.085)
1990	458	4.675 (0.051)	4.832 (0.076)	4.848 (0.085)

Source: Authors' executive compensation database. Standard errors are in parentheses.

Comments and Discussion

Comment by John R. Meyer: The paper by Joskow, Rose, and Shepard is highly intriguing, creative, and provocative. Through linkage of different data sets, they develop a unique and useful body of data for testing a variety of hypotheses about executive compensation. All in all the paper represents a very significant and interesting contribution.

Their central concern is exploring whether political pressures, as expressed through regulatory regimes, limit executive compensation. Like most who have preceded them, they find that CEOs of regulated firms are paid less, *ceteris paribus*, than are CEOs of unregulated firms. Furthermore, and quite originally, they find that CEOs of firms operating under very tight regulatory regimes are paid less, *ceteris paribus*, than are CEOs of firms operating in looser or only moderately regulated industries; in short, they find that CEO compensation seems to vary inversely in regulated industries with the strength of regulation. Accordingly, they conclude that "the pattern of compensation discounts across and within regulated industries is broadly consistent with the presence of binding political constraints on CEO compensation, as mediated through the regulatory process."

The difficulty with all this, as the authors fully recognize, is that the productivity or potential contribution of a CEO is likely to vary inversely with the strength or pervasiveness of the regulatory regime. As the authors observe, "political constraints *and* inherent productivity differences may contribute to observed compensation differentials," and unfortunately these two effects may be quite collinear.

The authors explore several arguments to escape this collinearity quagmire. Some are more convincing than others. Among the less convincing is the observation that "compensation discounts . . . are

larger the more direct is regulatory oversight of the firm'' and therefore the strength of political constraints on compensation. Unfortunately, the potential general management or productivity contribution of the CEO is almost certainly more limited the more direct is the regulatory oversight, except in very special circumstances. This probably would be true for variations in regulatory oversight both over time and industries. For example, it is not obvious that ''the political pressure hypothesis predicts that relative compensation for CEOs at electric utilities will be lowest over the 1975–85 period'' (when regulation was tightening), while ''the productivity hypothesis appears to predict the reverse.'' The argument that ''as regulation tightened [from 1975 to 1985] the management problem at electric utilities became more severe'' could almost as plausibly be restated to be ''as regulation tightened, conventional management's potential to solve problems was reduced.''

About the only certain prediction in circumstances of tightened regulation, such as those facing electric utilities between 1975 and 1985, is that a different kind and *mix* of management might be needed. If ''costs'' that had been routinely allowed were now subject to review and sometimes disallowed, or if ''rate increases substantially lagged cost increases,'' then higher priced (and, it is hoped, more effective) lawyers and public relations people (external or in-house) might be needed. CEOs more sensitive to and effective in dealing with these regulatory problems also would be desirable, but whether they would be more expensive relative to CEOs of more regulated industries than was previously the case is not obvious. The productivity-enhancing skills that would lead to large CEO compensation in unregulated industries would not necessarily be that adaptable to solving the problems of ''tightening'' regulation. Basically, rather different labor markets would seem to be involved. In the one case, the retired admiral or astronaut might seem like the right choice (rightly or wrongly), while in the other, more traditional general management skills might be sought. This might be particularly true where the technology, procedures, and controls were otherwise well established, as in many utilities.

More convincing evidence for hegemony of the political hypothesis over the productivity hypothesis resides in the analysis of organizational variations within electric utilities. The authors find that the CEO salary discount is smaller when the firm is organized as an exempt holding

company (and therefore has only one utility operating company), but the firm does have some nonutility involvements. More importantly, this holds even when there is little diversification into nonutility activities, in which case the exempt holding company "differs from other undiversified utilities in legal form only." However, the size of the discount is also substantially smaller when the exempt holding company is actually diversified rather than just incipiently so. Of course, incipient diversification could lead to a perceived need and search for CEOs with greater potential for contributing value or productivity gains, explaining why the CEO discount is smaller when the firm is organized as an exempt holding company but not yet actually diversified to any extent.

As a more general argument for the political hypothesis over the productivity hypothesis, the authors observe that regulated firms, compared with unregulated firms, generally pay a larger percentage of their CEO compensation as salary and bonus rather than in stock options or other forms of long-term incentive compensation. Certainly this choice of salary instruments is more consistent with the political hypothesis. It also may be explained, at least in part, by the fact that regulated industries, particularly electric utilities (which dominate their regulated industry sample) have had much lower betas (roughly in the 0.8 range) than has the manufacturing sector (usually well above 1.0) used as the comparative base case. A company that has a relatively stable stock valuation would seem to have fewer needs, or opportunities, to use incentive compensation schemes to align management's incentives with those of stockholders.

One also might speculate that risk differentials play a role in some of the observed difference in CEO salary compensations in regulated and unregulated industries. If beta is correlated not only with investor risks but also with senior management exposure to abrupt dismissal or termination, then the higher CEO pay in the unregulated industries might reflect this risk exposure to at least some limited extent. Unfortunately, the broad descriptive statistics provided in table 1 for the different sample groups are not very supportive of this hypothesis: average CEO tenure is actually lower in the regulated industries than in the unregulated. These data, however, might be consistent with a behavioral pattern in which CEOs in unregulated industries come to their offices rather earlier in life (as the data in table 1 indicate) but also step down earlier. In this connection it would be interesting to

know the typical retirement ages of CEOs in unregulated and regulated industries.

All this leads to still another interesting possibility—that of potential differences in lifetime compensation packages. While CEOs in regulated industries may earn less, *ceteris paribus*, than do their peers in unregulated industries at any one point in time, do they earn less over their entire careers? Probably they do, but it would be interesting to know if the relative discounts are the same when measured by lifetime earnings rather than yearly compensation. My guess would be that the lifetime discounts are somewhat less, mainly because of a career pattern wherein CEOs of regulated industries typically assume their posts later in life but perhaps retire later as well.

With regard to measurement problems, mention should also be made of the possibility of evaluating performance by what is known as EVA (economic value added), a current and surging fad in industry, especially for setting executive compensation. To a good first approximation, EVA is equal to net operating profits after taxes less the weighted average cost of capital multiplied by the amount of capital employed in the enterprise. Accordingly, EVA is much the same as net income *except* that rather than simply taking into account historical depreciation and actual interest payments, an attempt is made to measure capital charges more realistically or precisely. The discounted present value of EVA can be shown on fairly conventional and straightforward assumptions to be equivalent to discounted cash flow. Furthermore, changes in market value added for a firm's equity seem to be somewhat more closely correlated with changes in EVA than with other commonly used performance measures such as return on capital or equity. At any rate, the increasing use of EVAs in actual compensation deliberations suggests that it might be useful in external analyses as well.

In sum, Joskow, Rose, and Shepard make a reasonably convincing case but not one that achieves overwhelming certainty. As they point out, we need to know more, particularly about the measurement and elicitation of CEO productivity, before making too many policy recommendations or normative judgments about these matters. Requiring corporate boards to make more information available on how they determine management compensation would do little harm and might help answer several remaining questions of considerable importance.

Comment by Sam Peltzman: Joskow, Rose, and Shepard (JRS) have provided the most thorough investigation I have seen of CEO compensation in regulated industries. Their paper will undoubtedly be the point of reference for future work on the subject. JRS have developed an unusually rich data set that can answer heretofore unexamined questions, and they have done so with consummate skill. My only reservations concern some of their interpretations. I offer these less as a criticism than as a suggestion for future work.

JRS confirm what all previous work on the subject has found. CEOs of firms in regulated industries are paid much less than are those in comparable unregulated firms. For electric utilities, this CEO "discount" is more than 50 percent. JRS go beyond this old result in interesting ways. They show, and make much of, a changing time pattern in this discount from the early 1970s. They document a radically different pay-performance relationship for CEOs of regulated and unregulated firms, and they show that this difference has been widening.

The one area where I think JRS make the least progress is in rationalizing the large average regulatory discount for CEOs. They are attracted to an explanation based on political constraints on CEO compensation in regulated industries. But the best evidence for this explanation is in the time pattern of the discount, not its average level. The notion that regulators can successfully monopsony this sort of mobile talent indefinitely seems dubious. Surely some difference in the nature of the talents in the two sectors must contribute to the CEO pay gap.

JRS shy away from exploring nonhomogeneities in talent. But an examination of the industry-fixed effects in their table 5 suggests that these may be important. Depending on the compensation measure, these fixed effects for unregulated industries have a range of 0.3 to 0.5 (in log units), roughly half the corresponding figure for the electric utility CEO discount. The fixed effects tend to be lowest for extractive and producer good industries and highest for industries where consumer goodwill is an important asset (publishing, drugs, food, services). Arguably, preservation of this intangible asset will be less important for utilities, given the regulatory barrier to entry. Thus, to continue the argument, whatever premium has to be paid to attract the skill needed to preserve this asset will not be paid to utility CEOs.

Some successor to JRS will quite likely pursue such an argument.

The important industry attributes underlying the fixed effects in the unregulated sector must be identified and the impact of these effects on utilities must then be measured. This procedure, however, is unlikely to resolve the mystery completely. For *SALARY*, the lowest fixed effect is only −0.14 for oil and gas extraction. This is still a good 0.5 above the fixed effect for the electric utility industry. Therefore, the measurable differences between the utility industry and unregulated industries will have to be quite substantial for such an "industry characteristics" model to carry much weight.

One possibility, of course, is that regulation itself is the relevant industry characteristic. In other words, the regulation of rates and entry so narrows the scope of a utility CEO's decisionmaking that lower levels of skill are required for the position.[1] In this view, utility CEOs are being paid less because they are providing less than a "standard" CEO input. JRS acknowledge the possibility, but they dismiss it too quickly. If the CEO talent in the regulated and unregulated sectors were roughly comparable, we would see attempts to arbitrage the large differential in pay. This would take the form of frequent migration of utility CEOs to the unregulated sector. This does not seem to happen. There are other indications in the authors' data that utility CEOs do not compete in the same market as do other CEOs. JRS show a striking increase in performance-based pay in the unregulated sector but none in the regulated sector. Indeed, their table 3 indicates a virtual absence of any link between CEO pay and stock returns in the regulated sector. By contrast, the link between pay and tenure is twice as strong for utility CEOs. JRS describe the overall pattern as "more bureaucratic" for CEOs of regulated firms. If the pattern is more bureaucratic, perhaps the typical utility CEO is more like a bureaucrat than is his counterpart in an unregulated firm.

This possibility may account for some of the time pattern of the utility CEO discount, which is reproduced in column 1 of table 1 below. The discount widened by more than 20 percent from the early to late 1970s, stayed down in the early 1980s, and retraced only part of the lost ground in the late 1980s. JRS attribute this pattern to political

1. "Skill" is being used as shorthand for the set of attributes that boards of directors usually seek when hiring CEOs (including, for example, implementation of successful pricing policies).

Table 1. Change in Pay Differentials Against CEOs in Unregulated Firms[a]

	Change in differential from previous period (natural logs)		
Period	*Electric utility CEOs*[b] *(1)*	*All managers*[c,d] *(2)*	*All workers with five or more years of college*[e] *(3)*
1975–79	−0.238	−0.085	−0.131
1980–84	−0.003	−0.131	−0.101
1985–90	+0.095	−0.151	−0.130
Total	−0.146	−0.367	−0.362

a. Utility CEOs and others. Base period is 1970–74.

b. Data from JRS, table 6. Entries under *SALARY* for electric utilities are expressed as changes from previous period.

c. ln of real income for group is averaged over four periods beginning with 1970–74. The period average of the year-fixed effects (for CEOs in unregulated firms) from JRS, table A-1, under *SALARY* is then subtracted. The entries show the change in this differential.

d. Based on median weekly earnings of all managerial and executive workers. Source: *Statistical Abstract of the United States* (Department of Commerce, Bureau of the Census).

e. Based on median annual earnings of all individuals with five or more years of college (households headed by those with more than four years for 1988–90). Source: *Digest of Education Statistics* and *Statistical Abstract*.

pressures. Utility CEOs were made to bear part of the brunt of the unfavorable cost shocks that hit the industry in the 1970s. Then as cost pressures ebbed so did regulatory pressure on CEO compensation. The net result of these forces has been a widening of the utility CEO discount by 15 percent.

The remaining columns in table 1 put this political economy story in some perspective, I think. They show analogous data for genuinely bureaucratic types. Column 2 shows what happened to the median manager, and column 3 refers to workers with graduate education. Since there are around 10 million in each group, we are going deeply into the ranks here. The data reveal that typical highly educated or managerial types (or virtually any large group) fared poorly relative to typical CEOs in this period. Thus, if one views a utility CEO as simply a highly educated manager, it is no surprise that he, too, did relatively poorly. That he did not fare as poorly as those with lesser titles (see the last line of table 1) suggests that he is indeed more than a bureaucrat but less than a full-blooded CEO. That he did more poorly than ordinary bureaucrats in the late 1970s and better in the late 1980s lends credence to the authors' political economy story.

This view of the utility CEO as part bureaucrat–part "true" CEO may not survive more rigorous examination. But it is, I think, worth pursuing. Here is how this might be done. Find the level in the hierarchy

of the typical unregulated firm where average pay is comparable to that of the utility CEO. This might be, for example, the chief operating officer or chief financial officer. Then provisionally treat the COO or CFO at unregulated firms as the reference group against which utility CEOs are to be compared. That is, rerun all JRS regressions on this new sample consisting of utility CEOs and COOs and CFOs at unregulated firms. The goal would be to see if the range of disparities between regulated and unregulated firms uncovered by JRS is narrowed. For example, does the greater weight on tenure and smaller weight on performance in regulated firms survive in this sample? Does the long-run decline in relative pay of utility CEOs survive? Negative answers would be consistent with the "part bureaucrat" model of utility CEO compensation.

Progress in this area may require abandoning the title-tells-all presumption that has been unquestioningly accepted. We do not automatically attach great economic significance to the names of goods transacted on other markets. And we may be missing insights by doing so here.

General Discussion: Several participants focused on the likely effects on regulated firms if political constraints were placed on the pay of chief executive officers. Margaret Blair argued that the long-term effect might be that less talented people would be attracted to these positions. This hypothesis could be tested by examining over time the variance within industries of pay discounts for CEOs. In industries that become less regulated or that undergo a period of turmoil, there should be more room for value added by the CEO, according to Blair, which, in turn, should result in a much wider variation in compensation across firms within an industry.

Richard Schmalensee said that if regulated firms accept the fact that they are constrained to paying CEOs lower wages, thereby attracting, as Blair noted, less talented people to those positions, these firms might be inclined to structure other inputs differently. For example, Schmalensee said, they might try to attract talent at lower levels where they could get away with paying more than other firms. Peter Reiss noted that the conventional wisdom said workers below the CEO level in regulated firms were already paid more than their counterparts in unregulated firms. He wondered, however, why political pressures would

force CEO salaries down but not salaries at lower levels, where more savings could be realized.

Robert Hall said that he could imagine two ways that firms could determine CEO compensation. The first would be a tournament system, where the very high compensation given to a CEO is really compensation given in expected value terms to all the potential CEOs of the company. The second would be a competitive bidding market. If these two compensation systems would contribute to a firm's value relatively equally, then it would not be clear which one would be used. In that case, even if a regulatory agency prohibited the use of the tournament system, there would be little loss to the firms involved. Noting that executive pay had risen dramatically compared with the wages of other workers, Hall wondered whether this increase had simply been the result of movement from one pay system to the other. Although the costs of switching between these two alternatives might appear to be significant, what they actually cost shareholders and what they deliver to them might be nearly identical. That might mean, according to Hall, that all regulation of compensation is capable of doing is to induce the almost universal adoption of one of two alternatives, at a very low social cost.

John Pencavel suggested the hypothesis that CEO pay is correlated not so much with the presence or absence of regulation, but with certain intrinsic characteristics of the industry such as the variability of net returns and the sensitivity of returns to entrepreneurial skills. What would help in evaluating this hypothesis is to compare the pattern of executive compensation across countries. Although regulated industries in this country tend also to be those in which the state figures prominently in other countries, the correlation is far from perfect. Moreover, the state's role in managing these industries has shrunk in Europe in the last fifteen years, so a cross-country comparison could also provide information about the effect on executive compensation of *changes* in regulation. Pencavel doubted that a simple regulation–no regulation dichotomy would account for much of the variation in executive pay and that a more appropriate description would be one in which the effect of regulation varied with certain attributes of the industry such as the typical size of firms.

Martin Neil Baily suggested that it might be that the CEOs of unregulated firms were overpaid rather than that the CEOs of regulated firms were underpaid. He argued that evidence from wages paid to

production workers suggests that economic rents are available in some companies, particularly in large corporations. CEOs might be able to pay themselves out of these rents because the corporate boards that monitor their salaries are to some extent beholden to them and because the takeover market, which might discipline such rent extraction, is not perfect.

Baily also attempted to explain the authors' results showing very large discounts in CEO compensation in the airline industry following deregulation. He noted that as a result of deregulation, airlines knew that they would have to cut basic labor costs, which usually meant either breaking a union or forcing it to accept wage concessions. At such a time, according to Baily, a firm might find its workers less amenable to wage cutbacks if its CEO is earning a very high salary.

Richard Gilbert noted that several regulated firms had diversified into unregulated industries. He said that the authors could gather evidence about relative CEO quality by looking at the performance of these regulated companies relative to others in unregulated markets.

Ariel Pakes suggested that an alternative way to determine CEO quality would be to see whether the pay of CEOs of regulated firms remained low when they switched firms. Nancy Rose, however, said that this method would not be useful because there was little job mobility at the CEO level.

Frank Wolak argued that CEO compensation is usually associated with the amount of risk a firm faces. He felt that because returns of regulated firms are generally less risky, CEOs in regulated industries might have different preferences for risks from their counterparts in unregulated industries. He suggested that the authors might control for these differences in CEO risk preference by including measures of the riskiness of the firm—such as firm betas—in the CEO compensation regressions.

With respect to modeling, Linda Cohen argued that an asymmetry is presumed in the political response toward regulated firms when returns are better than average but not when they are worse than average. It might be useful, she said, for the authors to separate their return variable into two variables, one for the positive side and one for the negative side, to see whether the coefficients are substantially different between the regulated and unregulated industries.

Regarding the authors' findings that tenure is shorter for CEOs of

regulated firms than for CEOs of unregulated firms, Bronwyn Hall argued that what really mattered was the cost of losing one's job. The cost included not only the probability of job loss, but also the type of job one found afterward and the length of time it took to get a new job, factors that might differ for CEOs, depending on whether they were with regulated or unregulated firms.

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