Performance Pay and Top-Management Incentives*

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Abstract

Our estimates of the pay-performance relation (including pay, options, stockholdings, and dismissal) for chief executive officers indicate CEO wealth changes $3.25 for every $1,000 change in shareholder wealth. Although the incentives generated by stock ownership are large relative to pay and dismissal incentives, most CEOs hold trivial fractions of their firm's stock and ownership levels have declined over the past 50 years. We hypothesize that public and private political forces impose constraints that reduce the pay-performance sensitivity. Declines in both the pay-performance relation and the level of CEO pay since the 1930s are consistent with this hypothesis.

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PERFORMANCE PAY AND TOP-MANAGEMENT INCENTIVES

Michael C. Jensen and Kevin J. Murphy

The conflict of interest between shareholders of a publicly owned corporation and the corporation's chief executive officer (CEO) is a classic example of a principal-agent problem. If shareholders had complete information regarding the CEO's activities and the firm's investment opportunities, they could design a contract specifying and enforcing the managerial action to be taken in each state of the world. Managerial actions and investment opportunities are not, however, perfectly observable by shareholders; indeed, shareholders don't often know what actions the CEO *can* take or which of these actions will increase shareholder wealth. In these situations, agency theory predicts that compensation policy will be designed to give the manager incentives to select and implement actions that increase shareholder wealth.

Shareholders want CEOs to take particular actions—*e.g.*, deciding which issue to work on, which project to pursue, and which to drop—whenever the expected return on the action exceeds the expected costs. But the CEO compares only his *private* gain and cost from pursuing a particular activity. Abstracting from the effects of CEO risk aversion, compensation policy that ties the CEO's welfare to shareholder wealth helps align the private and social costs and benefits of alternative actions and thus provides incentives for CEOs to take appropriate actions. Shareholder wealth is affected by many factors in addition to the CEO, including actions of other executives and employees, demand and supply conditions, and public policy. It is appropriate, however, to pay CEOs on the basis of shareholder wealth since that is the objective of shareholders.

There are many mechanisms through which compensation policy can provide value-increasing incentives, including performance-based bonuses and salary revisions, stock options, and performance-based dismissal decisions. The purpose of this paper is to estimate the magnitude of the incentives provided by each of these mechanisms. Our estimates imply that each $1,000 change in shareholder wealth corresponds to an average increase in this year's and next year's salary and bonus of about two cents. We also estimate the CEO-wealth consequences associated with salary revisions, outstanding stock options, and performance-related dismissals; our upper-bound estimate of the total change in the CEO's wealth from these sources that are under direct control of the board of directors is about 75¢ per $1,000 change in shareholder wealth.

Stock ownership is another way an executive's wealth varies with the value of the firm. CEOs in our sample hold a median of about .25% of their firms' common stock, including exercisable stock options and shares held by family members or connected trusts. Thus, the value of the stock owned by the median CEO changes by $2.50 whenever the value of the firm changes by $1,000. Therefore, our final all-inclusive estimate of the pay-performance sensitivity—including compensation, dismissal, and stockholdings—is about $3.25 per $1,000 change in shareholder wealth.

CEOs in large firms tend to own less stock and have less compensation-based incentives than CEOs in smaller firms. In particular, our all-inclusive estimate of the pay-performance sensitivity for CEOs in firms in the top half of our sample (ranked by market value) is $1.85 per $1,000, compared to $8.05 per $1,000 for CEOs in firms in the bottom half of our sample.

We believe our results are inconsistent with the implications of formal agency models of optimal contracting. The empirical relation between the pay of top-level executives and firm performance, while positive and statistically significant, is small for an occupation where incentive pay is expected to play an important role. In addition, our estimates suggest that dismissals are not an important source of managerial incentives since the increases in dismissal

probability due to poor performance and the penalties associated with dismissal are both small. Executive inside-stock ownership can provide incentives, but these holdings are not generally controlled by the corporate board, and the majority of top executives have small personal stockholdings.

Our results are consistent with several alternative hypotheses; CEOs may be unimportant inputs in the production process, for example, or CEO actions may be easily monitored and evaluated by corporate boards. We offer an additional hypothesis relating to the role of political forces in the contracting process which implicitly regulate executive compensation by constraining the type of contracts that can be written between management and shareholders. These political forces, operating in both the political sector and within organizations, appear to be important but are difficult to document because they operate in informal and indirect ways. Public disapproval of high rewards seems to have truncated the upper tail of the earnings distribution of corporate executives. Equilibrium in the managerial labor market then prohibits large penalties for poor performance and as a result the dependence of pay on performance is decreased. Our findings that the pay-performance relation, the raw variability of pay changes, and inflation-adjusted pay levels have declined substantially since the 1930s are consistent with such implicit regulation.

1. Estimates of the Pay-Performance Sensitivity

We define the pay-performance sensitivity, b, as the dollar change in the CEO's wealth associated with a dollar change in the wealth of shareholders. We interpret higher b's as indicating a closer alignment of interests between the CEO and his shareholders. Suppose, for example, that a CEO is considering a nonproductive but costly "pet project" which he values at $100,000 but which will diminish the value of his firm's equity by $10 million. The CEO will avoid this project if his pay-performance sensitivity exceeds b=.01 (through some combination of incentive compensation, options, stock ownership, and/or probability of being fired for the poor stock-price performance), but will adopt the project if b<.01.

Incentives Generated by Cash Compensation

The pay-performance sensitivity is estimated by following all 2,213 CEOs listed in the Executive Compensation Surveys published in *Forbes* from 1974-1986. These surveys include executives serving in 1,295 corporations, for a total of 10,400 CEO-years of data. We match these compensation data to fiscal-year corporate performance data obtained from the Compustat and CRSP data files. After eliminating observations with missing data, the final sample contains 7,750 yearly "first-differences" in compensation and includes 1,688 executives from 1,049 corporations. Fiscal-year stock returns are unavailable for 219 of the 7,750 observations; calendar-year returns are used in these cases. (Deleting these 219 observations does not affect the results.) All monetary variables are adjusted for inflation (using the consumer price index for the closing month of the fiscal year) and represent thousands of 1986-constant dollars.

Table 1 summarizes estimates of the relation between CEO cash compensation and firm performance as measured by the change in shareholder wealth. Column (1) of table 1 reports estimated coefficients from the following least-squares regression,

$$\Delta(\text{CEO Salary + Bonus})_t = a + b\Delta(\text{Shareholder Wealth})_t. \tag{1.1}$$

The change in shareholder wealth variable is defined as $r_t V_{t-1}$, where r_t is the inflation-adjusted rate of return on common stock realized in fiscal year t, and V_{t-1} is the firm value at the end of the previous year.

Our measure of firm performance is subject to two qualifications. First, performance should be evaluated *before* compensation expense and yet $r_t V_{t-1}$ is the change in firm value *after* compensation expense—the associated bias in our estimates is, however, small because CEO pay changes are tiny relative to changes in firm value. Second, our measure of perfor-

TABLE 1

ESTIMATES OF PAY-PERFORMANCE SENSITIVITY

Coefficients of Ordinary Least Squares Regressions of Δ(Salary + Bonus), Δ(Total Pay), and Δ(Pay-Related Wealth) on Current and Lagged Δ(Shareholder Wealth)[a]
(t-statistics in parentheses)

	Dependent Variable (in 1000s of 1986-constant dollars):			
Independent Variable	Δ(Salary + Bonus)		Δ(Total Pay)[b]	Total Pay + PV(ΔSalary +Bonus)[c]
	(1)	(2)	(3)	(4)
Intercept	31.7	30.8	36.6	918.0
Change in Shareholder Wealth (1000s of 1986-Dollars)	.0000135 (8.0)	.0000139 (8.4)	.0000235 (5.2)	.000197 (9.7)
Change in Shareholder Wealth in Year t-1	--	.0000080 (5.5)	.0000094 (2.4)	.000103 (5.8)
R^2	.0082	.0123	.0041	.0157
Estimated pay-performance sensitivity, "b"[d] [F-statistic for b]	.0000135 [64.0]*	.0000219 [93.0]*	.0000329 [28.5]*	.000300 [117.7]*
Sample Size	7,750	7,688	7,688	7,688

[a] The sample is constructed from longitudinal data reported in *Forbes* on 1,668 CEOs serving in 1,049 firms from 1974-1986. Δ(Shareholder Wealth) is defined as the beginning-of-period market value multiplied by the inflation-adjusted rate of return on common stock.

[b] The *Forbes* definition of total compensation typically includes salary, bonus, value of restricted stock, savings and thrift plans, and other benefits but does *not* include the value of stock options granted or the gains from exercising stock options.

[c] Present value based on assumption that CEO receives salary and bonus increment until age 70 at a discount rate of 3%.

[d] Estimated b is the sum of the coefficients on the contemporaneous and lagged shareholder-wealth change.

* Significant at .01% level.

mance ignores payments to capital. When capital is an important input, a better performance measure is $r_t V_{t-1} - f_t K_{t-1}$, where f_t and K_{t-1} are the risk free interest rate for period t and the opportunity cost of the capital stock at the beginning of period t. Since f and shareholder return r tend to be uncorrelated, this adjustment will not substantially effect our estimates. Fama and Schwert (1977) find an R^2 of .03 between nominal riskless rates and one-month returns on a value-weighted portfolio of New York Stock Exchange (NYSE) firms.

The coefficient on the shareholder wealth variable of b=.0000135 in column (1) is statistically significant (t=8.0), indicating a positive relation between cash compensation and firm performance. The economic significance of the estimated coefficient, however, is low. The coefficients in column (1) imply, for example, that a CEO receives an average pay increase of $31,700 in years when shareholders earn a zero return, and receives on average an additional 1.35¢ for each $1,000 increase in shareholder wealth. These estimates are comparable to those of Murphy (1985, 1986), Coughlan and Schmidt (1985), and Gibbons and Murphy (1990), who find a pay-performance elasticity of approximately 0.1—salaries and bonuses increase by about one percent for every ten percent rise in the value of the firm. Converting this estimate of the pay-performance elasticity to absolute dollars by multiplying by the median pay to value ratio of .057% (calculated for the 9,976 CEO-Years in the *Forbes* sample from 1974-1986) yields an estimated coefficient b=.000057 which is larger than, but consistent with, the estimate in column (1) of table 1.

The median annual standard deviation of shareholder-wealth changes for firms in our sample is about $200 million, so the average pay change associated with a stockholder-wealth change two standard deviations above or below normal (a gain or loss of $400 million) is $5,400. Thus, the average pay increase for a CEO who's shareholders gain $400 million is $37,300, compared to an average pay increase of $26,500 for a CEO who's shareholders lose $400 million.

Equation (1.1) assumes that current stock-price performance affects current compensation, and yet the timing of performance payments is often ambiguous. At the simplest level, bonus decisions may be made before final fiscal-year earnings data are available. In other cases boards may know this year's earnings, but the earnings and stock-price changes available at the end of the fiscal year may not correctly incorporate the effects of managerial actions during the year. In addition, bonuses reported in proxy statements sometimes represent bonuses paid for performance in the previous year, and the proxies do not

always clearly specify when the bonus-payment year differs from the bonus-measurement year.

Column (2) of table 1 reports coefficients from the following regression which allows current pay revisions to be based on past as well as current performance,

$$(1.2) \qquad \Delta(\text{CEO Salary + Bonus})_t = a + b_1\Delta(\text{Shareholder Wealth})_t + b_2\Delta(\text{Shareholder Wealth})_{t-1}.$$

The coefficient for year t-1 is positive and statistically significant, indicating that last year's performance does matter in the determination of this year's pay revision. The sum of the coefficients, $b \equiv b_1 + b_2 = .0000219$, is statistically significant ($F = 93.0$), suggesting that the CEO receives a total pay revision of 2.2¢ for each $1,000 change in shareholder wealth. We cannot tell how much of this effect represents a real lag of rewards on performance and how much represents simple measurement errors caused by lags in reporting. We also estimate the relation with three years of lagged shareholder wealth changes with little difference from the results reported in column (2) of table 1; the coefficients on the contemporaneous and first lagged performance variables are essentially unchanged and those on the second and third lags are small in magnitude and statistically insignificant.

We re-estimate the regression in column (1) of table 1 using two- and three-year differences; the results are quantitatively unchanged from those in the table. We also re-estimate the regression in column (2) of table 1 after including year dummy variables and separate intercepts for each sample CEO, and the estimated coefficients and their sum are virtually identical to those reported in the table. To allow the pay-performance sensitivity to vary across CEOs, we also estimate separate regressions for each of 717 sample CEOs with five or more observations. The median estimated two-year pay-performance relation for the sample of individually-estimated coefficients is $b = .000073$, or a median pay raise of 7.3¢ per $1,000 increase in shareholder wealth.

The regressions in columns (1) and (2) of table 1 are based only on the CEO's salary and bonus, but CEOs receive compensation in many additional forms—including deferred

compensation, stock options, profit-sharing arrangements, stock grants, savings plans, long-term performance plans, and other fringe benefits. The *Forbes* surveys include data on many of these other components of compensation. The surveys do not, however, include stock-option data prior to 1978, and after 1978 the surveys report gains from exercising options but do not report the value of outstanding options or the value of stock options granted during the year.

Column (3) of table 1 reports the relation between total compensation and firm performance based on the *Forbes* total compensation data, excluding both stock-option grants and the gains from exercising stock options. The *Forbes* definition of total compensation varies somewhat from year to year, but in general includes salary, bonus, value of restricted stock, savings and thrift plans, and other benefits. The sum of the estimated coefficients of current and lagged change in shareholder wealth is b=.0000329, indicating that total compensation changes by 3.3¢ for each $1,000 change in firm value.

The dependent variable in column (3) of table 1 represents the change in the current cash flows accruing to the CEO, while the independent variables represent the discounted present value of the change in all future cash flows accruing to the shareholders. A measure of the change in CEO wealth that is more consistent with the change in shareholder wealth measure is current compensation plus the discounted present value of the permanent component of the change in current compensation. Suppose, for example, that CEOs receive only a base salary, and that firm performance is rewarded by a permanent shift in the base salary. Then, the appropriate measure of the change in CEO wealth is Salary + PV(ΔSalary), where PV(ΔSalary) is the present value of the salary change from next year through the year when the CEO leaves the firm.

Measuring the discounted present value of a change in current compensation is difficult for several reasons. First, *Forbes* reports only the sum of salaries and bonuses, and while it may be appropriate to include PV(ΔSalary) in the measure of Δ(CEO Wealth) it is less clear that PV(ΔBonus) should be included since bonuses may be transitory and not permanent

components of income. In addition, assumptions must be made regarding the number of periods remaining over which ΔSalary will be realized. Even where the firm has a 65-year mandatory retirement age, there is some probability that the CEO will leave the firm before age 65. At the other extreme, pension benefits are generally based on average salaries received during some period shortly before retirement; consequently an increase in salary may increase pension payments to the CEO long after the CEO leaves the firm.

The dependent variable in column (4) of table 1 is Δ(CEO Wealth) measured as,

$$\Delta(\text{CEO Wealth}) = \text{Total Pay} + PV(\Delta(\text{Salary} + \text{Bonus})).$$

The present value of the salary and bonus increment is calculated assuming a real interest rate of 3% per year. In order to get an upper bound on the estimate of the pay-performance sensitivity, we assume that all changes in salary and bonus are permanent. We assume that the CEO receives the increment until age 70; if the CEO is younger than 70 we take the present value of his wage change until he reaches 70, but if he is older than 70 we assume he is in his last year with the firm.

The coefficients in column (4) imply that, on average, CEO wealth increases by $918,000 in years when shareholders earn a zero return (the average CEO total pay excluding stock options for the sample is $575,000). In addition, the estimate for b in column (4) implies that the CEO's pay-related wealth (exclusive of stock options) increases by thirty cents for each $1,000 increase in shareholder wealth. Thus, the average pay-related wealth increase for a CEO who's shareholders gain $400 million is $1.04 million, compared to an average annual wealth increase of $800,000 for a CEO who's shareholders lose $400 million.

Incentives Generated by Stock Options

The *Forbes* definition of total pay excludes stock options, but stock options clearly provide value-increasing incentives for chief executives. Year-to-year stock-option grants provide incentives if the size of the grant is based on performance. More importantly, the change in value of unexercised stock options granted in previous years also provide incentives.

To calculate a more complete measure of the CEO's wealth change which includes options, we analyzed the proxy statements from Murphy's (1985) sample of 73 *Fortune* 500 manufacturing firms during the fifteen-year period 1969-1983. Data on stock options, salaries, bonuses, deferred compensation, and fringe benefits from these statements are used to construct a longitudinal sample of 154 CEOs. Total compensation is defined as the sum of salaries, bonuses, fringe benefits, the face value of deferred compensation unadjusted for the cost of restrictions on marketability and the time value of money, and restricted stock awarded during the year (valued at the end-of-year stock price).

At the end of each year, CEOs typically hold stock options granted in different years at different exercise prices and exercise dates. The value of all options held by the CEO is calculated by applying the Black-Scholes (1973) valuation formula which allows for continuously-paid dividends (Noreen and Wolfson 1981; Murphy 1985). The value of options held at the end of year τ is calculated as,

$$\sum_{t=0}^{\tau} N_t \cdot (S_\tau e^{-dT}\Phi(Z_t) - P_t e^{-rT}\Phi(Z_t - \sigma\sqrt{T})),$$

where N_t is the number of options granted in year t at exercise price P_t, T is the number of months until expiration of these options, r is the average monthly market yield on five-year Government Securities in year τ, d is the dividend yield in year τ-1 defined as ln(1+(Dividends-per-share)/(Closing Stock Price))/12, σ is the estimated standard deviation of stock returns over the previous sixty-month period, S_τ is the stock price at the end of fiscal year τ, $Z \equiv (\ln(P_t/S_\tau) + (r-d+\sigma^2/2)T)/\sigma\sqrt{T}$, and $\Phi(\cdot)$ is the cumulative standard normal distribution function.

The change in the value of options held at the end of each year is calculated as the value of the options awarded during the year plus the change in the value of all outstanding options during the year plus the profits (price minus exercise price) from exercising options during the year. Data on actual exercise prices are not available; to get an upper bound on this measure,

we assume that options are always exercised at the highest stock price observed during the year.

Column (1) of table 2 reports least-squares regression results for the 73-firm sample in which the dependent variable is the change in the value of the CEO's stock options. The sum of the estimated coefficients imply that the value of CEO stock options increases an average of 14.5¢ for each $1,000 increase in shareholder wealth. Therefore, the incentives generated by stock options are large relative to the incentives generated by annual changes in cash compensation (3.3¢ per $1,000 from column (3) of table 1) even though options valued at date of grant account for a relatively small share of the CEO's compensation (8.1% for CEOs in the 73-firm sample).

Column (2) of table 2 reports regression coefficients for the 73-firm sample in which the dependent variable is the change in all pay-related wealth, defined as,

$$\Delta(\text{CEO Pay-Related Wealth}) = \text{Total Pay} + PV(\Delta(\text{Salary} + \text{Bonus})) + \Delta(\text{Value of Stock Options}).$$

The present value of the salary and bonus increment is again calculated assuming that the CEO receives the salary and bonus increment until age 70 at a real interest rate of 3% per year. The sum of the estimated coefficients on the current and lagged shareholder wealth change variables of b=.000307 (F=33.0) implies that CEO wealth changes by over thirty cents for each $1,000 change in shareholder wealth.

To check on potential differences between the 73-firm sample and the *Forbes* sample, we re-estimated the *Forbes* regression in column (2) of table 1 for the 73 manufacturing firms and obtained b=.0000196 (compared to .0000219 for the *Forbes* sample). We also re-estimated column (2) in table 2 after excluding stock options and obtained b=.0000163 (compared to .000300 as reported in table 1 for the *Forbes* sample).

TABLE 2

ESTIMATES OF PAY-PERFORMANCE SENSITIVITY INCLUDING STOCK HOLDINGS AND OPTIONS
Coefficients of Ordinary Least Squares Regressions of Δ(CEO Wealth) on Δ(Shareholder Wealth)
for CEOs in 73 Manufacturing Firms from 1969-1983[a]
(t-statistics in parentheses)

	Dependent Variable (in 1000s of 1986-constant dollars):				
Independent Variable	Δ(Value of Stock Options)	Total Pay + PV(Δ(Salary+Bonus))+ Δ(Value of Stock Options)		Δ(Value of Inside Stock)[b] + Total Pay + PV(Δ(Salary+Bonus))+ Δ(Value of Stock Options)	
	(1)	(2)	(3)	(4)	(5)
Intercept	79.4	815.9	816.1	818.4	892.9
Change in Shareholder Wealth ($1000s)	.000105 (8.6)	.000176 (5.2)	.000174 (5.0)	.00118 (4.4)	.000198 (3.7)
Change in Shareholder Wealth in Year t-1	.000040 (3.3)	.000131 (3.8)	.000130 (3.8)	.00031 (1.2)	.000168 (3.1)
(CEO's Fractional Ownership)x (Change in Shareholder Wealth)	--	--	.00294 (0.7)	—	1.020 (145.0)
R^2	.0807	.0376	.0381	.0216	.9610
Estimated pay-performance sensitivity, "b" [F-statistic for b]	.000145 [58.3]*	.000307 [33.0]*	.000309[c] [33.2]*	.00149 [12.5]*	.0020[c] [565.2]*

[a] Sample size is 877 for all regressions. Δ(Shareholder Wealth) is defined as the beginning-of-period market value multiplied by the inflation-adjusted rate of return on common stock. Δ(Value of Stock Options) includes profits from exercising options, value of options granted in current year, and the change in the value of previously granted options based on Black-Scholes (1973). Total pay includes salary, bonus, value of restricted stock, savings and thrift plans, and other benefits; PV(ΔSalary + Bonus) based on assumption that CEO receives salary and bonus increment until age 70 at a discount rate of 3%.

[b] Inside stock holdings include shares held by family members and shares for which the CEO is a trustee or co-trustee without beneficial ownership. Δ(Value of Inside Stock) is defined as the beginning-of-period value of inside stock multiplied by the inflation-adjusted rate of return on common stock. Stock ownership data are unavailable for 50 of the (73 x 15) = 1,095 possible CEO-years.

[c] Estimated b and related test statistic for a CEO with median fractional ownership for the sample, .0016.

* Significant at .01% level.

Incentives Generated by Inside Stock Ownership

Stock ownership is another way that an executive's welfare varies directly with the performance of his firm, independent of any link between compensation and performance.

Although the process through which CEOs select their equilibrium stockholdings is not well understood, the incentives generated by these shareholdings clearly add to the incentives generated by the compensation package. Stock-ownership data for the CEOs in the 73 firms in the manufacturing-firm sample were obtained from the proxy statements; these executives held an *average* of $4.8 million (in 1986-constant dollars) of their firm's common stock in the period 1969-1983. When we include shares held by family members and shares for which the CEO serves as a trustee or co-trustee, the average increases to $8.8 million. Year-to-year changes in the value of these holdings often exceed levels of total compensation by orders of magnitude (Lewellen 1971; Benston 1985; Murphy 1985).

Column (4) of table 2 reports regression coefficients in which the dependent variable is a measure of the change in the CEO's wealth which *includes* the change in the value of his inside stockholdings. Changes in the value of inside stockholdings are calculated as the value of the shares held at the beginning of the fiscal year multiplied by the realized rate of return on common stock. To get an upper bound on the estimate, inside stock ownership includes shares held by family members and shares for which the CEO is a non-beneficial trustee or co-trustee, as well as shares held directly.

The sum of the shareholder-wealth change coefficients in column (4) implies that the wealth of CEOs increases (or decreases) by about $1.50 whenever shareholder wealth increases (or decreases) by $1,000. The difference between the estimated b in columns (2) and (4) suggests that, on average, inside stock ownership plays an important role in providing managerial incentives.

Our regression specification in column (2) of table 2 assumes that the pay-performance relation is the same for all executives, regardless of their stock holdings, but it is plausible that b is large and positive for executives with negligible stock holdings, but small or even *negative* for executives with large holdings since their wealth may be tied "too closely" to the performance of their firms. We test for this potential heterogeneity by re-estimating the regressions for the 15-year 73-firm sample after including an interaction term (CEO's

Fractional Ownership)xΔ(Shareholder Wealth) to capture the effects of ownership on the sensitivity of pay to performance.

The dependent variable in the regression in column (3) in table 2 is the change in all pay-related wealth (including stock options but excluding stock ownership). The small and insignificantly positive coefficient of the ownership-interaction variable (t=0.7) implies that the relation between compensation and performance is independent of an executive's stock holdings. The result that the pay-performance relation is not affected by stock ownership seems inconsistent with theory since optimal compensation contracts that provide incentives for managers to create shareholder wealth will not be independent of their shareholdings.

The dependent variable in the regression in column (5) of table 2 is the change in CEO wealth, including all forms of compensation plus changes in the value of his individual shareholdings. The coefficient on the interaction term is highly significant (t=145.0) and close to unity, suggesting that the pay-performance sensitivity for a CEO with non-negligible stockholdings is closely approximated by his fractional ownership. Since the total pay-performance relation is given by b=.000366 + 1.020∞(fractional ownership), the sensitivity for a CEO who owns no stock is equivalent, on average, to stockholdings of .0366% of the firm. The total pay-performance sensitivity for a CEO with shareholdings of .16% (the median shareholdings for CEOs in the 73-firm sample) is equal to b=.0020, or $2.00 per $1,000 change in shareholder wealth.

Table 3 summarizes fractional stock ownership data for a much larger sample of CEOs. The 746 CEOs included in the 1987 *Forbes* Executive Compensation Survey hold an average of 2.4% of their firms common stock, including shares held by family members and options that can be exercised within 60 days. The distribution of inside stock ownership is skewed; the median CEO holds only .25% of his firm's stock. Twenty percent of the sample CEOs hold less than .05% of their firms stock, and sixty percent hold less than .42%. Small fractional ownership is even more prevalent in the largest *Forbes* firms (ranked according to

TABLE 3

CEO INSIDE STOCK OWNERSHIP

Summary Statistics and Quintile Boundaries for Percentage and Value of CEO Stock Ownership for 746 CEOs Listed in 1987 *Forbes* Executive Compensation Survey, by Firm Size[a]

	CEO Stock Ownership as Percentage of Shares Outstanding			Value of CEO Stock Holdings ($millions)		
	All Firms	Small Firms	Large Firms	All Firms	Small Firms	Large Firms
	(1)	(2)	(3)	(4)	(5)	(6)
Mean:	2.42%	3.05%	1.79%	$41.0	$19.3	$62.6
Median:	.25%	.49%	.14%	$3.5	$2.6	$4.7
Quintile Boundaries:						
Min	---------Less than .01%---------			---------Less than $0.1---------		
20%	.05%	.11%	.03%	$0.7	$.5	$1.2
40%	.17%	.33%	.10%	$2.5	$1.9	$3.3
60%	.42%	.73%	.20%	$5.1	$3.6	$7.2
80%	1.38%	1.95%	.75%	$17.4	$10.5	$22.6
Max	83.00%	83.00%	53.50%	$2,304.2	$1,041.0	$2,304.2
Median Value of Equity ($millions):				$1,200	$580	$2,590

[a] Stock ownership includes shares held by family members and also includes options that can be exercised within 60 days. Small firms have market value below the sample median ($1.2 billion); large firms have market value exceeding the median.

market value) where eighty percent of the CEOs hold less than .75% of their firm's common stock.

In dollar terms, table 3 shows that CEOs in the *Forbes* survey firms hold an *average* of over $40 million of their firm's stock. Once again, the distribution is skewed; the median stock ownership is only $3.5 million (compared to median 1986 total compensation of $700,000). CEOs in large firms, while owning a smaller fraction of their firm's common stock, tend to have a larger dollar investment in their firm's shares.

Incentives Generated by the Threat of Dismissal

The threat of management dismissal for poor performance also provides value-increasing incentives to the extent that managers are earning more than their opportunity cost.

TABLE 4

THE RELATION BETWEEN CEO TURNOVER AND FIRM PERFORMANCE
Estimated Logistic Models Predicting CEO Turnover Using Current and Lagged Net-of-Market Shareholder Return for CEOs Grouped According to Age[a]
(asymptotic t-statistics in parentheses)

Independent Variable	Coefficient Estimates, by Age Group					
	Full Sample	Less than 50 Years Old	Between 50 and 55	Between 55 and 60	Between 60 and 64	64 Years or Older
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-2.08	-3.30	-3.03	-2.66	-1.97	-.442
Current Net-of-Market Return	-.6363 (-5.1)	-1.921 (-3.4)	-.3946 (-1.0)	-.5307 (-1.8)	-1.216 (-4.3)	-.2453 (-1.1)
Lagged Net-of-Market Return	-.4181 (-3.5)	-.6219 (-1.3)	-.0651 (-0.2)	-.2913 (-1.0)	-.5510 (-2.1)	-.5154 (-2.3)
Sample Size	9,291	1,345	1,935	2,728	2,171	1,112
Number of CEO Turnovers	992	47	87	174	258	426
Significance of Model	.0001	.0021	.5683	.1046	.0001	.0298

[a] The sample is constructed from longitudinal data reported in *Forbes* on 1,896 CEOs serving in 1,092 firms from 1974-1986. Net-of-market return is defined as the fiscal-year shareholder return minus the value-weighted return of all NYSE firms. The dependent variable is equal to 1 if the CEO is serving in his last full fiscal year and 0 otherwise.

Recent studies by Coughlan and Schmidt (1985), Warner, Watts, and Wruck (1988), and Weisbach (1988) have documented an inverse relation between net-of-market firm performance and the probability of management turnover. These results suggest that managers are more likely to leave their firms after bad years than after good years and therefore are disciplined by the threat of termination.

Table 4 reports coefficients from logistic regressions predicting the probability of CEO turnover as a function of firm performance for the thirteen-year sample of 2,213 CEOs listed in the *Forbes* surveys. We estimate the following relation:

$$\ln\left(\frac{\text{Prob[Turnover]}}{\text{1-Prob[Turnover]}}\right) = a + b_1(\text{Net-of-market Return}) + b_2(\text{Lagged Net-of-market Return}).$$

The dependent variable equals one if the CEO is serving in his last full fiscal year, and equals zero otherwise. The 1988 *Forbes* survey was examined to identify CEOs whose last fiscal

year was 1986. The final CEO-year for firms leaving the *Forbes* survey is excluded, since we cannot determine whether or not this is the last year for that CEO. A total of 582 firms were deleted from the *Forbes* surveys during the 1974-1986 sample period. Of these, 293 are still "going concerns" as of 1987, 214 were acquired by or merged with another firm (118 of these were acquired or merged within two years of the *Forbes* delisting), and 35 liquidated, went bankrupt, or went private. Current status data are unavailable for 40 of the 582 firms.

Consistent with the previous studies, column (1) of table 4 shows that the probability that a CEO is serving in his last full fiscal year is negatively related to current and past firm performance as measured by the return realized by shareholders in excess of the value-weighted return on the common stock of all NYSE firms. Converting the regression coefficients into estimated dismissal probabilities, the regression in column (1) implies that a CEO in a firm realizing returns equal to the market return in each of the past two years has a .111 dismissal probability (calculated as $p = \frac{e^x}{1+e^x}$ where x = -2.08 - .6363 (Net-of-Market Return) - .4181 (Lagged Net-of-Market Return)). The same CEO has a .175 dismissal probability when the firm earns a -50% return relative to the market in each of the two previous years. Because it is usually impossible to tell whether the CEO was fired or simply quit or retired, the term "dismissal probability" is used only as shorthand for the more accurate "probability of CEO turnover."

The specification in column (1) of table 4 assumes that the relation between performance and turnover likelihood is the same for all executives, but Vancil (1987) argues that CEOs are more likely to be fired when they are young than when they are closer to normal retirement. Columns (2) through (6) of table 4 report results from logistic dismissal regressions for CEOs grouped according to age—younger than 50, between 50 and 55, between 55 and 60, between 60 and 64, and 64 years or older. The magnitude of the coefficients are largest for the youngest CEOs, confirming Vancil's hypothesis that younger CEOs are more likely to be disciplined by turnover. The relation between turnover and performance is insignificant for 50 to 55 year-old CEOs, and marginally significant for 55 to

60 year-old CEOs, suggesting that managers between the ages of 50 and 60 are unlikely to be dismissed subsequent to poor performance. The dismissal-performance relation is highly significant for CEOs approaching retirement (between 60 and 64), and marginally significant for CEOs at or past normal retirement age.

The authors of the earlier studies documenting the dismissal-performance relation generally interpret their results as being consistent with the hypothesis that management termination decisions are designed to align the interests of managers and shareholders. Each author stresses, however, that managers are rarely openly fired from their positions. Warner, Watts, and Wruck (1988), for example, analyzed 272 firms from 1963-1978 years and found only a single case of an outright firing and only ten cases where poor performance was cited as one of the reasons for the separation. Weisbach (1988) examined 286 management changes from 1974-1983 and found only nine cases in which boards mention performance as a reason why the CEO was replaced.

The data suggest that CEOs bear little risk of being dismissed by their boards of directors. The CEOs in our sample who leave their firms during the thirteen-year sample period hold their jobs an average of *over ten years* before leaving, and most leave their position only after reaching normal retirement age. Sixty percent of the sample CEOs are between 60 and 66 when they leave their firm; 32% are ages 64 or 65. Moreover, CEOs seldom leave in disgrace. Vancil (1987) estimates that 80% of exiting (non-deceased) CEOs remain on their firms' boards of directors; and 36% continue serving on the board as chairman.

The infrequent termination of poorly performing CEOs does not, by itself, imply the absence of incentives since even a low probability of getting fired can provide incentives if the penalties associated with termination are sufficiently severe. Table 5 presents our estimates of the turnover-related penalties for poor performance for four hypothetical CEOs of various ages. Column (2) of table 5 shows the predicted turnover probability (based on the estimated coefficients in table 4) for a CEO in a firm realizing exactly the market return in both the current and past fiscal year. Column (4) shows the predicted turnover probability for a CEO in a firm

TABLE 5

PAY-PERFORMANCE SENSITIVITY FROM CEO DISMISSALS

Implied Turnover Probabilities and Upper-Bound Expected Wealth Losses from Turnover for 46, 53, 58, and 62 Year-Old CEOs[a]

	CEOs in Firms Earning 0% Returns Relative to the Market in Each of the Two Previous Years		CEOs in Firms Earning -50% Returns Relative to the Market in Each of the Two Previous Years		Difference in Expected Wealth Loss from Turnover for 0% and -50% Net-of-Market Returns	Estimated Pay-Performance Sensitivity for CEO Dismissal with 50% Net-of-Market Return in Previous 2 yrs.[d]
CEO Age[a]	Turnover Probability[b]	Expected Wealth Loss[c]	Turnover Probability[b]	Expected Wealth Loss[c]		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
46	.036	$510,000	.116	$1,665,000	$1,155,000	89.0¢ per $1,000
53	.046	$459,000	.057	$571,000	$112,000	8.6¢ per $1,000
58	.065	$407,000	.095	$595,000	$188,000	14.5¢ per $1,000
62	.122	$346,000	.252	$714,000	$368,000	28.4¢ per $1,000

[a] Ages 46, 53, 58, and 62 are sample average ages for CEOs less than 50, between 50 and 55, between 55 and 60, and between 60 and 64, respectively.

[b] Turnover probabilities for each age calculated from the associated age-group logistic regressions in table 4.

[c] Expected wealth loss calculated as turnover probability multiplied by the present value of $1 million per year beginning next year and lasting until the CEO is 66 years old. All amounts are in 1986-constant dollars and the real interest rate is assumed to be 3%.

[d] Based on $1.3 billion shareholder loss, which is the shareholder loss on an average size ($1.73 billion) firm realizing -50% returns in two consecutive years.

realizing a -50% net-of-market return in each of the past two years. A 46 year-old CEO, for example, has a .036 turnover probability after two years of 0% net-of-market returns, but has a .116 turnover probability after two years in which his firm earns -50% below market.

Columns (3) and (5) of table 5 report the expected wealth losses associated with dismissals for CEOs in firms realizing 0% and -50% net-of-market returns, respectively, in each of the two preceding fiscal years. In order to obtain an upper bound on our estimate of the turnover wealth loss, we assume that the CEO has no alternative employment opportunities and that his wealth loss upon dismissal is the present value (at 3%) of $1 million per year starting the year after dismissal and lasting until the CEO is 66 years old. The expected wealth loss is calculated as this present value multiplied by the dismissal probabilities calculated from table 4 and reported in columns (2) and (4) of table 5. Column (6) reports the difference in the dismissal-related wealth loss associated with average performance (0%) and dismal

performance (-50%), and column (7) compares the CEO's dismissal-related wealth loss with the wealth loss of shareholders of an average-size firm ($1.73 billion in our sample) realizing a sequence of two net-of-market returns of -50% (that is, a two-year cumulative return of -75%).

Table 5 predicts, for example, that the expected turnover-related wealth loss for a 62 year-old CEO in a firm realizing a 0% net-of-market return is $346,000, compared to an expected loss of $714,000 if his firm earns -50% below market in each of the two previous years. Although the difference in the expected wealth loss associated with dismal performance (compared to average performance) of $368,000 seems large, it is small compared to the CEO's losses on his own stock holdings and trivial compared to shareholder losses. CEOs in the 1987 *Forbes* survey between 60 and 64 years old hold a median of $3.2 million worth of stock, and therefore the stock-market losses on a -75% return for a median CEO are $2.4 million. Moreover, shareholders lose an average of almost $1.3 billion on a -75% return—the CEOs expected dismissal-related losses of $368,000 imply that CEOs lose 28.4¢ for each $1,000 lost by shareholders.

Column (7) of table 5 shows that our upper-bound estimate of the CEO's dismissal-performance sensitivity for an average size firm with a -75% two-year return is 8.6¢ and 14.5¢ for a 53 and 58 year-old CEO, respectively. We find a much larger dismissal-performance sensitivity for a 46 year-old CEO—89.0¢ per $1,000—but this result is driven by our inappropriate assumption that the CEO will never work again if dismissed, but will work for his firm until age 66 if not dismissed. The dismissal-performance sensitivity for the 46 year-old CEO falls to 44.5¢ per $1,000 is he accepts employment at half his current pay.

Our estimates of the dismissal-performance sensitivity in column (7) represent an upper-bound for several reasons. First, we've assumed that CEOs leave the labor market after turnover; this assumption may be appropriate for older CEOs but is clearly inappropriate for very young CEOs. Second, table 5 is based on extraordinarily poor performance—two years at -50% per year—and the estimated dismissal-performance sensitivity increases with

shareholder losses. For example, the difference in expected wealth loss for a 62 year-old CEO earning 10% less than the market in two consecutive years (compared to 0% net-of-market returns) is $58,000, or about 18¢ per $1,000 (based on cumulative shareholder losses of 19% or $330 million for an average-size firm), compared to 28¢ per $1,000 for the $1.3 billion loss in column (7) of table 5. Finally, most CEOs are covered by employment contracts, severance agreements, or golden parachute arrangements that further reduce or eliminate the pecuniary punishment for failure; and pensions, outstanding stock options, and restricted stock typically become fully vested upon an involuntary separation.

The dismissal-performance sensitivities in column (7) of table 5 can be added to the 30¢ per $1,000 pay-performance sensitivity in column (2) of table 1 and the 15¢ per $1,000 pay-performance sensitivity for outstanding stock options in column (2) of table 2 to construct an estimate of the *total* pay-performance sensitivity under direct control of the board of directors. Using an average dismissal-performance sensitivity (weighted by the number of observations in each age group) of 30¢ per $1,000, our estimate of the total pay-performance sensitivity—including both pay and dismissal—is about 75¢ per $1,000 ($b \approx .00075$). CEO stock ownership adds another $2.50 per $1,000 for a CEO with median holdings for a total sensitivity of $3.25 per $1,000 ($b \approx .00325$) change in shareholder wealth.

2. Is the Small Pay-Performance Sensitivity Consistent with Agency Theory?

Agency theory predicts that compensation policy will tie the agent's expected utility to the principal's objective. The objective of shareholders is to maximize wealth; therefore agency theory predicts that CEO compensation policies will depend on changes in shareholder wealth. The empirical evidence presented in Section 1 is consistent with this broad implication—changes in both the CEO's pay-related wealth and the value of his stock holdings are positively and statistically significantly related to changes in shareholder wealth, and CEO turnover probabilities are negatively and significantly related to changes in shareholder wealth.

Although the estimated pay-performance sensitivity (with respect to compensation, dismissal, and stock ownership) is statistically significant, the magnitude seems small in terms of the implied incentives. Consider again our example of the CEO contemplating a pet project which reduces the value of the firm by $10 million. A risk-neutral CEO with median holdings ($b \approx .00325$) will adopt the project if his private value exceeds $32,500, while a CEO with no stock ownership ($b \approx .00075$) will adopt the project if his private value exceeds $7,500. For comparison, the median *weekly* income of our sample CEOs is approximately $9,400.

The purpose of this section is to explore whether our results are consistent with formal agency models of optimal contracting. Our task is made difficult by the fact that the theory offers few sharp predictions regarding the form of the contract other than predicting that wages generally increase with observed output. One situation where the formal models yield clear predictions regarding the pay-performance sensitivity is when the CEO is risk neutral. Given the impossibility of isolating the CEO's marginal contribution to firm value, a risk-neutral CEO has incentives to pursue appropriate activities only when he receives 100% of the marginal profits, or $b=1$. The optimal contract, in effect, sells the firm to the CEO: the CEO receives the entire output as compensation, but pays the shareholders an up-front fee so that the CEO's expected utility just equals his reservation utility. Jensen and Murphy (1988) show that the $b=1$ contract which provides optimal incentives is also the contract that causes managers to optimally sort themselves among firms.

CEOs are not risk neutral; indeed, the major reason for the existence of the publicly held corporation is its ability to achieve efficiencies in riskbearing. By creating alienable common stock equity claims that can be placed in well-diversified portfolios of widely-diffused investors, riskbearing costs are reduced to a fraction of those borne by owner-managers of privately held organizations. Thus, setting $b=1$ in a risky venture subjects risk-averse executives to large risks and setting $b<1$ to transfer risk from executives to shareholders generates costs from poor executive incentives. Optimal compensation contracts must reflect

the trade-off between the goals of providing efficient risk-sharing and providing the CEO with incentives to take appropriate actions.

Executives are risk averse

It is tempting to attribute the generally low pay-performance sensitivity to CEO risk-aversion, but the amount of income "at risk" for poor performance is a trivial percentage of the CEO's total income. The total compensation pay-performance sensitivity of b=.0000329 in column (3) of table 1 implies, for example, that the pay revision associated with a wealth change two standard deviations below normal (a shareholder loss of $400 million) is about $13,000. The median total compensation for CEOs in our sample is $490,000; therefore the amount of compensation "at risk" for a $400 million corporate loss is only 2.7% of the CEO's total pay.

It is more difficult to compare the amount of the CEO's *wealth* at risk to his total wealth since we cannot calculate the CEO's total wealth. Column (5) of table 2 implies, however, that a CEO's wealth increases an average of $893,000 in years when both the CEO and his shareholders earn a zero return on their shareholdings. In years when shareholders lose $400 million, however, the wealth of a non-stock-holding CEO increases by about $746,000 while the wealth of a large-firm CEO with median inside stockholdings increases by only $93,000.[1] In addition, the expected wealth loss associated with dismissal is approximately 30¢ per $1,000 or $120,000. Therefore, although the wealth effects of dramatically poor performance are substantial, they are not large relative to the normal $893,000 annual change in the CEO's wealth which is independent of performance.

[1] Calculated from column (5) of table 2 as 893+.0020x(-400,000), where .0020 is the estimated pay-performance sensitivity for a CEO owning the 73-firm sample median of .16% of his firm's common stock.

High pay-performance contracts are not feasible

Highly sensitive pay-performance contracts may not be feasible even under risk neutrality, since executives with limited resources cannot credibly commit to pay firms for large negative realizations of corporate performance, and shareholders cannot credibly commit to huge bonuses that amount to "giving away the firm" for large positive realizations. The numerical examples above, however, suggests that it would certainly be feasible to write binding contracts with a much larger share of income or wealth at risk.

Moreover, successful entrepreneurs regularly sell-off large equity claims thereby lowering b; avoiding such sales to maintain a high b is a feasible contracting strategy. Management buyouts (MBOs), in which top managers take the firm private by borrowing large sums to repurchase stock from public shareholders, are a feasible way to undo previous equity sales and are another way to accomplish high b contracts. For example, Kaplan (1989) finds in a sample of 76 MBOs that the median CEO holdings increase from 1.4% to 6.4% (b=.064), and median holdings for the management team as a whole increase from 5.9% to 22.6% (b=.226). These high b contracts are not only feasible but are growing in importance—MBOs of public corporations and divisions have increased from $1.2 billion in 1979 to almost $50 billion in 1986 (Jensen and Murphy 1988).

Franchising, accounting for 12% of gross national product in 1986, is another feasible way to accomplish high b contracts (U.S. Department of Commerce 1987). These contracts are very similar to optimal contracts under risk neutrality that, in effect, sell the firm to the CEO. The franchisee pays a fixed entry fee for purchase of the franchise and receives all profits after payment of an annual fee to the franchisor that commonly amounts to between 5% and 10% of revenues. By granting the franchisee alienable rights in the franchise, these contracts resolve most of the horizon problem associated with motivating managers to make correct tradeoffs among cash flows through time (Jensen and Meckling 1979). This means the franchisee has a 100% claim on the capital value of the franchise on its sale, although the alienability is subject to various restrictions such as approval by the franchisor. Thus, for

these elements of changes in value the franchisee contract has b=1. Franchise contracts have many other characteristics that reduce the conflicts of interest between the franchisee and franchisor and thereby reduce the agency costs that result therefrom (Rubin 1978; Brickley and Dark 1987), but these issues are beyond the scope of this paper.

Firm-value changes are imperfect measures of the CEO's choice of actions

The change in shareholder wealth is the appropriate measure of the principal's objective in the CEO-shareholder agency relationship, but it is an imperfect measure of the CEO's activities or his individual performance. Holmström (1979) shows that optimal compensation contracts for risk-averse CEOs are based not only on the principal's objective (*i.e.*, change in shareholder wealth) but also on any variables that provide incremental information valuable in assessing the CEO's unobservable choice of action. Intuitively, the purpose of these additional factors is to provide better risk-sharing without reducing incentives or to provide better incentives without increasing risk exposure.

Examples of potential determinants of incentive compensation which may be informative about unobservable managerial actions include direct measures of CEO activity, accounting measures of firm performance, and measures of "relative performance" based on other executives in the same industry or market. Gibbons and Murphy (1989) argue, however, that basing compensation on potentially informative additional variables often distorts CEO incentives. Accounting profits, for example, may yield information that is valuable in assessing an executive's unobservable actions. But paying executives based on accounting profits rather than on changes in shareholder wealth not only generates incentives to directly manipulate the accounting system, but also generates incentives to ignore projects with large net present values in favor of less valuable projects with larger immediate profits. Gibbons and Murphy argue that the risk-reduction benefits of including potentially informative

TABLE 6

PAY-PERFORMANCE SENSITIVITY OF CEO PAY USING ADDITIONAL PERFORMANCE MEASURES
Coefficients of Ordinary Least Squares Regressions of Δ(Salary + Bonus) on Various Stock Market and Accounting Measures of Performance[a]
(t-statistics in parentheses)

Independent Variable	Regression Coefficients Dependent Variable[b] is Δ(Salary + Bonus) (in 1000s of 1986-constant dollars)				
	(1)	(2)	(3)	(4)	(5)
Intercept	31.5	31.9	32.5	31.0	32.8
Δ(Shareholder Wealth) (1000s of 1986-Dollars)	.0000140 (7.5)	.0000126 (4.8)	.0000074 (4.3)	.0000120 (7.1)	.0000074 (4.4)
Δ(Wealth Net-of-Industry)[c] (1000s of 1986-Dollars)	-.0000012 (-0.7)	—	—	—	—
Δ(Wealth Net-of-Market)[c] (1000s of 1986-Dollars)	—	.0000013 (0.4)	—	—	—
Δ(Accounting Profits) (1000s of 1986-Dollars)	—	—	.000177 (17.2)	—	.000187 (15.7)
Δ(Sales) (1000s of 1986-Dollars)	—	—	—	.0000122 (7.2)	-.0000034 (-1.7)
R^2	.0083	.0082	.0449	.0148	.0453
Sample Size	7,747	7,747	7,721	7,721	7,721

[a] The sample is constructed from longitudinal data reported in *Forbes* on 1,668 CEOs serving in 1,049 firms from 1974-1986.

[b] The qualitative results are unchanged using Δ(Total Pay) as the dependent variable.

[c] Δ(Wealth Net-of-Industry) defined as $(r_t-i_t)V_{t-1}$, where r_t is shareholder return, V_{t-1} is beginning-of-period market value, and i_t is the value-weighted return for all other firms in the same 2-digit industry. Similarly, Δ(Wealth Net-of-Market) defined as $(r_t-m_t)V_{t-1}$, where m_t is value-weighted return for all NYSE stocks.

variables must be weighed against the incentive-distortion costs which are typically ignored in the current principal-agent literature.

Table 6 reports coefficients of regressions of the change in salary and bonus on changes in shareholder wealth, changes in shareholder wealth in the industry and market, and two accounting measures of performance—changes in accounting profits and changes in sales. We focus on the CEO's compensation and ignore changes in the value of the CEO's options or stock holdings because these latter components are determined exclusively by firm

performance, independent of other variables such as relative performance and accounting profits. Thus, if other variables are more important than shareholder wealth changes in providing CEO incentives, their importance should show up in a strong relation with CEO compensation.

Relative Performance. Basing CEO compensation on performance measured relative to aggregate performance in the industry or market provides CEOs with incentives to increase shareholder wealth while filtering out the risk-increasing effects of industry- and market-wide factors beyond the control of executives (Holmström 1982). Column (1) of table 6 reports coefficients from a regression which includes firm performance measured relative to the performance of other firms in the same industry as an additional explanatory variable. In particular, the net-of-industry shareholder-wealth change variable is defined as $V_{t-1}(r_t-i_t)$, where r_t and V_{t-1} are the inflation-adjusted shareholder return and beginning-of-period market value of the sample firm, respectively, and i_t is the value-weighted inflation-adjusted rate of return in year t for all other Compustat firms in the same two-digit SIC industry. Thus, the industry variable measures the difference between the wealth change shareholders received and what they *would* have received had they invested in other firms in the industry instead of investing in the sample firm. Column (2) repeats the analysis using wealth changes measured net-of-market instead of net-of-industry, where the market return is the value-weighted return of all NYSE stocks.

The shareholder-wealth change coefficients in columns (1) and (2) of table 6 are positive and significant, indicating that firm performance continues to be an important determinant of compensation even after controlling for net-of-industry and net-of-market performance. The net-of-industry and net-of-market variables are insignificant; therefore it does not appear that *relative performance* is an important source of managerial incentives. While we find that pay changes are unrelated to relative *value* changes, $V_{t-1}(r_t-i_t)$, Gibbons and Murphy (1990) find that pay changes are significantly related to relative *rates of return*, r_t-i_t.

Accounting Measures of Performance. Column (3) of table 6 reports estimated coefficients from a regression of change in CEO salary and bonus on change in net accounting income measured before extraordinary items. The estimated coefficient of .000177 indicates that CEOs receive 17.7¢ for each $1,000 change in annual income. The increased explanatory power (compared to column (2) of table 1) indicates that changes in accounting income are an additional important determinant of pay changes. Since income is a flow rather than a stock, however, the implied pay-performance sensitivity for accounting profits is roughly comparable to the pay-performance sensitivity for firm-value changes of .74¢ per $1,000 in column (3). Suppose, for example, that the market value of the firm is the capitalized value of future earnings and that earnings follow a random walk. Then, assuming a real discount rate of 5%, each $1,000 change in earnings corresponds to a pay change of 17.7¢ and a firm-value change of $20,000, or just under a penny per $1,000.

Column (4) of table 6 reports estimated pay-performance coefficients from a regression which includes the change in firm sales as an additional determinant of incentive compensation. The estimated coefficient of .0000122 suggests that CEOs receive 1.2¢ for every $1,000 of increased firm revenues, implying a pay revision of $1,900 for each standard deviation change in sales (based on the median standard deviation for sales changes of $160 million), compared to pay revisions of $2,400 for each standard deviation change in shareholder wealth (based on an estimated pay-performance sensitivity of .000012 and a standard deviation for wealth changes of $200 million). The explanatory variables in column (5) include both accounting measures of performance—changes in sales and earnings—and also include the change in shareholder wealth. The earnings-change coefficient remains large and positive indicating that CEOs receive pay raises of about 19¢ for each $1,000 change in income. The sales-change coefficient in column (5) is *negative* and marginally significant, suggesting that holding constant income and firm value, CEOs receive pay cuts of about one-third penny for each $1,000 increase in firm revenues. Finally, the shareholder wealth change coefficients suggest

that, holding constant earnings and sales, each $1,000 change in shareholder wealth corresponds to a CEO pay change of three-fourths of a penny.

The purpose of including additional variables in the regressions in table 6 is to analyze whether compensation is highly sensitive to variables other than the change in shareholder wealth. The results in table 6 indicate that CEO compensation is related to changes in accounting profits and sales but is unrelated to market and industry performance. While CEO pay appears to be about equally sensitive to accounting profits and shareholder wealth, the estimated magnitude of both effects is still small—the amount of CEO pay "at risk" for a $48 million change in accounting profits (which is twice the median standard deviation) is $9,000, or less than 2% of compensation for a CEO with median earnings of $490,000.

Unobservable Measures of Performance. The small relation between CEO pay and measures of market or accounting performance seems inconsistent with the fact that CEOs receive a large share of their total compensation in the form of explicit incentive bonuses. The Conference Board (1984) reports that over 90% of all large manufacturing firms had bonus plans in 1983, and 87% of firms with bonus plans paid bonuses for 1983 performance. The median bonus award for CEOs in the Conference Board's survey is 50% of base salary; over 20% of the surveyed firms report CEO bonuses exceeding 70% of salary.

It is possible that CEO bonuses are strongly tied to an unexamined and/or unobservable measure of performance. If bonuses depend on performance measures observable only to the board of directors and are highly variable, they could provide significant incentives. One way to detect the existence of such "phantom" performance measures is to examine the magnitude of year-to-year fluctuations in CEO compensation. Large swings in CEO pay from year to year are consistent with the existence of an overlooked but important performance measure; small annual changes in CEO pay suggest that CEO pay is essentially unrelated to all relevant performance measures. To test for the existence of such unobserved but important pay-performance sensitivity, we compare the variability of CEO pay to that of a sample of randomly selected workers.

TABLE 7

COMPARISON OF PAY VARIABILITY OF CEOS AND RANDOMLY SELECTED WORKERS

Frequency Distribution of Annual Percentage Changes in Real Salary and Bonus and Total Pay for CEOs Listed in *Forbes* Compensation Surveys, 1974-1986, and Changes in Real Wages for Workers in the 1975-1980 Michigan Panel Survey of Income Dynamics (PSID)

Inflation Adjusted Annual Percentages	CEOs in Forbes Surveys 1974-1986		Workers in Michigan PSID Sample 1975-1980[b]
	Salary + Bonus	Total Pay[a]	
(1)	(2)	(3)	(4)
More than +50%	4.4%	6.3%	4.6%
+25% to +50%	9.4%	10.5%	6.8%
+10% to +25%	21.1%	21.3%	14.0%
0% to +10%	32.3%	29.1%	34.0%
-10% to 0%	21.9%	18.9%	28.6%
-25% to -10%	7.7%	8.9%	7.8%
Less than -25%	3.2%	5.0%	4.2%
Sample Size	8,027	8,027	10,247
Standard Deviation	30.5	49.3	41.7

[a] Total compensation typically includes salary, bonus, value of restricted stock, savings and thrift plans, and other benefits but does *not* include the value of stock options granted or the gains from exercising stock options.

[b] The wage change distributions for the Michigan Panel Study of Income Dynamics (PSID) were made available to us by Ken McLaughlin and include 10,247 male workers ages 18 to 59 reporting wages earned in consecutive periods.

The data indicate that year-to-year fluctuations in CEO income are not much different than income fluctuations for conventional labor groups. Column (2) in table 7 presents the frequency distribution of inflation-adjusted annual percentage changes in CEO salary plus bonus for all CEOs listed in the *Forbes* surveys from 1974 to 1986. A third of the sample observations correspond to inflation-adjusted pay changes between zero and ten percent, and three-fourths of the observations reflect pay changes between -10% and +25%. Raises in salaries and bonus exceeding 50% account for only 4.4% of the sample, and pay cuts of more than 25% account for only 3.2% of the sample. Column (3) in table (7) summarizes the frequency distribution of the inflation-adjusted total pay (excluding stock options). Changes in CEO compensation exceeding ±25% account for only 21.8% of the sample observations.

Column (4) of table 7 presents the frequency distribution of annual inflation-adjusted percentage wage changes for managerial and nonmanagerial workers in the Michigan Panel

Study of Income Dynamics (PSID). These distributions were made available to us by Ken McLaughlin, who reports similar distributions for logarithmic wage changes in McLaughlin (1987). The subset of the PSID sample analyzed by McLaughlin covers the years 1975 to 1980 and includes 10,247 annual wage changes for male workers ages 18-59. The wage-change distributions for the random sample in column (4) are remarkably similar to the wage-change distribution for CEOs in columns (2) and (3). The standard deviation of percentage wage changes for the PSID sample is 41.7, compared to 30.5 and 49.3 for CEO salary plus bonus and CEO total compensation, respectively. There are a few minor differences which are interesting. CEOs are less likely to receive real pay cuts than workers selected at random; CEOs receive cuts in both salary plus bonus and total pay 32.8% of the time while the workers in the PSID sample received pay cuts 40.6% of the time. CEOs are more likely to receive raises exceeding 10% than random workers, 34.8% and 38% for salary plus bonus and total pay, respectively, for CEOs compared to 25.4% for all workers.

Corporate management is an occupation where *a priori* we would expect incentive compensation to be especially important. It is therefore surprising that the distribution of wage changes for CEOs is so similar to the distribution for randomly selected workers. It appears that annual executive bonuses are not highly variable. These data seem inconsistent with economic theories of compensation—in spite of the fact that bonuses nominally amount to 50% of salary there seem to be too few major year-to-year percentage changes in CEO compensation to provide the incentives that are likely to make a substantial difference in executive behavior.

Direct Measures of Performance. Incentive contracts are unnecessary when CEO activities are perfectly observable and when shareholders (or boards of directors) can tell the CEO precisely which actions to take in each state of the world. When CEO activities are imperfectly observable, CEOs will be evaluated in part by observing output (change in shareholder wealth) and in part by observing input (CEO activities). One explanation for the small pay-performance sensitivity is that boards have fairly good information regarding managerial activity and therefore the weight on output is small relative to the weight on input.

The hypothesis that corporate boards directly monitor managerial input is consistent with the data but inconsistent with generally held beliefs in the business and financial community. Outside members of corporate boards have only limited contact with the CEO—at most one or two days a month—and the meetings that do occur are typically held in the CEO's office with agendas and information controlled by the CEO. More importantly, the hypothesis that "forcing contracts" can be written when managerial actions are observable hinges crucially on the assumption that shareholders or boards know what actions *should* be taken. Managers often have better information than shareholders and boards in identifying investment opportunities and assessing the profitability of potential projects; indeed, the expectation that managers will make superior investment decisions explains why shareholders relinquish decision rights over their assets by purchasing common stock. Basing compensation on observed managerial actions cannot provide CEOs with incentives to engage in value-increasing activities when the expected wealth consequences of alternative actions are unknown to shareholders and board members. Appropriate incentives can be generated in these cases, however, by basing compensation on changes in shareholder wealth.

Nonpecuniary Rewards Provide Adequate Incentives

Our estimates of the pay-performance sensitivity (with respect to compensation, stock ownership, and dismissal) include only *monetary* rewards for performance and ignore potentially important nonpecuniary rewards associated with managing a firm. These nonpecuniary rewards could provide incentives for CEOs to take appropriate actions even when direct monetary incentives are absent.

Nonmonetary rewards such as power, prestige, and honor will definitely affect the level of monetary compensation necessary to attract properly qualified people to the firm, but unless nonmonetary rewards vary positively with the value of the firm they will not increase the CEO's incentives to take appropriate actions (except through the threat of performance-related dismissal). Moreover, because nonpecuniary benefits tend to be a function of position

or rank, it is difficult to vary the amount of nonpecuniary benefits received by an executive from period to period to correspond with increases or decreases in productivity. It is therefore unlikely that nonpecuniary factors are an important source of incentives pushing managers to maximize value.

Nonpecuniary rewards associated with success and accomplishment, and nonpecuniary punishments associated with failure, do provide incentives for managers. However, these nonpecuniary incentives, generally associated with reputation in the firm and standing in the community, will motivate managers to act in shareholders' interest only if the nonpecuniary rewards and punishments are directly associated with firm-value changes. This is a serious problem because there are strong political and organizational forces that tend to define success in dimensions other than shareholder wealth and exert pressures for actions that reduce firm value. Managerial conformance to pressures to maintain employment, peace with unions, or major contributions to communities by keeping unprofitable plants open can easily become synonymous with "success."[2] In such situations, the nonpecuniary rewards come at the expense of shareholder value and economic efficiency.

External Forces Provide Adequate Incentives

Compensation and termination policy are *internal* tools utilized by boards of directors to provide managerial incentives. There are also competitive forces *external* to the corporation that provide incentives, including competition in the product market (Hart 1983), the managerial-labor market (Fama 1980), and the market for corporate control (Manne 1965). Product-market competition disciplines managers since firms that are inefficiently managed will be unprofitable and will not survive. Competition in the managerial-labor market, especially the labor market internal to the organization, includes the incentives of subordinates to replace inferior superiors. The threat of takeovers also provides incentives, since managers are often

[2] For an example of a bank CEO devoted to downtown redevelopment, see Stertz, Bradley A., "Toledo Blues: A Bank Sets Heaviliy on Hometown Revival and Comes Up Empty," *Wall Street Journal*, April 25, 1989.

replaced following a successful takeover. Martin and McConnell (1988) report, for example, that 61% of target-firm managers depart within three years after a successful takeover compared with 21% for a non-merged control sample, and Walsh (1988) reports that 37% of the entire top-management team leaves the target firm within two years of a takeover compared with 13% for a non-merged control sample.

Although these external forces provide incentives for existing management, our focus is on internal incentive mechanisms since these are under the direct control of boards of directors. Moreover, external forces such as takeovers may be a response to, instead of an efficient substitute for, ineffective internal incentives.

3. Alternative Hypotheses

The conflict of interest between managers and shareholders is a classical agency problem, but the small observed pay-performance sensitivity seems inconsistent with the implications of formal principal-agent models. Two alternative hypotheses consistent with the observed relation between pay and performance are: (1) CEOs are not, in fact, important agents of shareholders and/or (2) CEO incentives are unimportant because their actions depend only on innate ability or competence. There has not yet been careful empirical documentation of the ways in which CEOs affect the performance of their firms, but there is considerable evidence that the competence and actions of a CEO are important to the productivity of the firm. The fact that stock prices react significantly to the death (Johnson, *et. al.* 1985) and/or replacement (Warner, Watts, and Wruck 1988) of CEOs, for example, is inconsistent with the hypothesis that CEOs don't matter.

The wave of management buyouts and the improved productivity they generate are consistent with the hypothesis that CEOs and the incentives they face are important to firm performance. There is strong evidence that the 96% average net-of-market increase in value associated with these buyouts is caused by new top-management incentives (Kaplan 1989;

Jensen 1989). The experience with MBOs is inconsistent with the hypothesis that managerial incentives are unimportant because in these transactions the same top managers manage the same assets after the company goes private. Data from takeovers, which are associated with high management turnover and produce average increases in firm value of 50% are also consistent with the hypothesis that top-level managers can have a large effect on firm performance.

Another hypothesis which we believe helps reconcile our empirical results concerns the important role of third parties in the contracting process. Managerial labor contracts are not, in fact, a private matter between employers and employees. Strong political forces operate in both the private sector (board meetings, annual stockholder meetings, internal corporate processes) and the public sector that affect executive pay. Managerial contracts are not private because by law the details of the pay package are public information open to public scrutiny and criticism. Moreover, authority over compensation decisions rests not with shareholder-employers but rather with compensation committees composed of outside members of the boards of directors who are elected by, but are not perfect agents for, shareholders. Fueled by the public disclosure of executive pay required by the SEC, parties such as employees, labor unions, consumer groups, Congress, and the media create forces in the political milieu that constrain the type of contracts written between management and shareholders.

The benefits of the public disclosure of top management compensation are obvious since this disclosure can help provide a safeguard against "looting" by management (in collusion with "captive" boards of directors). The costs of disclosure are less well appreciated. Public information on "what the boss makes" affects contracts with other employees and provides emotional justification for increased union demands in labor negotiations. Media criticism and ridicule and the threat of potential legislation motivated by high payoffs to managers reduce the effectiveness of executives and boards in managing the company. The media is filled with sensational stories about executive compensation each spring at the height of the proxy season. Board members are subject to lawsuits if top-management pay is "too

high" relative to pay observed in similar firms (but never if it is "too low"). Since the subjective "reasonableness" of a compensation package is strongly influenced by the political process, it is natural that well-intentioned but risk-averse board members will resist innovative incentive contracts.

Strong public antagonism towards large pay changes is illustrated by the recent conflict leading to the defeat of Congressional pay increases. National polls indicate that 85% of voters oppose the 50% increase in Congressional salaries (from $89,500 to $135,000) even though this increase would have left salaries lower in real terms than 1969 levels (Rogers 1989).

The Implicit Regulation Hypothesis: Evidence from the 1930s

It is difficult to document the influence of the political process on compensation since the constraints are implicit rather than explicit and the public disclosure of top-management compensation has existed for a half century. One possible way to test this implicit regulation hypothesis is to compare our pay-performance results for 1974-1986 to the pay-performance relation when regulatory pressures were less evident. We construct a longitudinal sample of executives from the 1930s using data collected by the United States Work Projects Administration (WPA) in a 1940 project sponsored by the Securities and Exchange Commission. The WPA data, covering fiscal years 1934 through 1938, include salary and bonus paid to the highest-paid executive in 748 large U.S. corporations in a wide range of manufacturing and nonmanufacturing industries. Three-hundred ninety-four of the WPA sample firms are listed on the NYSE; market value data for these firms are available on the CRSP Monthly Stock Returns Tape.

Comparing corporate data from the 1934-1938 WPA sample to corresponding data from the 1974-1986 *Forbes* sample is difficult because of reporting differences and because of major secular changes in the number of corporations and the size distribution of corporations over the past five decades. The "CEO" designation was rarely used in the 1930s, and therefore

TABLE 8

CEO COMPENSATION IN 1934-38 VS. 1974-86

Sample Compensation Statistics for CEOs in the Top Quartile of NYSE Corporations Ranked by Market Value[a]

(t-statistics in parentheses)

Variable (in 1986 Dollars)	1934-1938	1974-1986	test statistic for difference
CEO Salary & Bonus			
Mean	$813,000	$645,000	t = 9.1
Median	$639,000	$607,000	
Mean Market Value of Firm	$1.6 billion	$3.4 billion	t = -6.1
Mean CEO Salary & Bonus as % of Firm Market Value	.110%	.034%	t = 29.6
Change in CEO Salary & Bonus			
Mean	$31,900	$27,800	t = 0.4
Median	$200	$21,600	
Avg Standard Deviation[b]	$205,000	$127,000	t = 2.7

[a] For the 1934-1938 data, CEOs are defined as the highest-paid executive. Sample sizes are 456 and 3,988 CEO-years for the 1934-1938 and the 1974-1986 samples, respectively.

[b] The standard deviation for Δ(Salary+Bonus) was calculated for each firm with at least three years of data; sample sizes are 108 firms and 436 firms for the earlier and later time periods, respectively. The t-statistic tests the equality of the average standard deviations in the two samples. The sample-wide (pooled) standard deviation of pay changes was $167,500 for 3,928 CEO-years from 1974-1986, compared to $463,500 for 448 CEO-years from 1934-1938.

for comparison purposes we define CEOs as the highest-paid executive. In addition, the WPA data do not reveal the name of the highest-paid executive and therefore some salary and bonus changes reflect management changes rather than pay revisions for a given manager. For comparison purposes, the 1974-1986 pay-change data utilized in tables 8 and 9 were constructed ignoring management changes. Finally, in order to compare similar firms in the two time periods, we restrict our analysis to firms that are in the top quartile of firms listed on the NYSE (ranked by market value). WPA compensation data are available for 60% of the top quartile NYSE firms from 1934-1938 (averaging 114 firms per year), and *Forbes* compensation data are available for 90% of the top-quartile NYSE firms from 1974-1986 (averaging 335 firms per year).

Table 8 presents sample compensation statistics for CEOs in the top quartile of NYSE corporations ranked by market value from 1934-1938, and compares these results to similarly

constructed data from 1974-1986. Measured in 1986-constant dollars, CEOs in the largest quartile firms earned an average of $813,000 in the 1930s, significantly more than the average pay of $645,000 earned by CEOs in the NYSE top quartile from 1974 to 1986. Over this same time period, median pay fell from $639,000 to $607,000. The current popular belief that CEO pay in the largest corporations has increased dramatically over the past several decades is therefore not supported by these sample averages. Over this same time period, there has been a doubling (after inflation) of the average market value of a top-quartile firm—from $1.6 billion in the 1930s to $3.4 billion from 1974-1986. Coupled with the decline in salaries, this means the ratio of CEO pay to total firm value has fallen significantly in fifty years—from .11% in the early period to .03% in the later period. The mean annual change in compensation in the earlier period was $31,900 as compared to $28,000 in the 1974-86 period. More importantly, the variability of annual changes in CEO pay fell considerably over this period; the average standard deviation of the annual pay changes was $127,000 in the 1970s and 1980s, significantly lower than the $205,000 average in the 1930s.

The pronounced decline in the raw variability of salary changes evident in table 8 suggests the possibility of a decreased sensitivity in the pay-performance relation. Table 9 reports estimated coefficients from regressions of change in CEO salary and bonus on this year's and last year's change in shareholder wealth. The 1930s regression indicates that each $1,000 increase in shareholder wealth corresponds to an 11.4¢ increase in this year's pay and a 6.1¢ increase in next years pay—thus the total effect of a $1,000 increase in shareholder wealth is 17.5¢. In contrast, the regression using the 1974-1986 data implies only a 1.9¢ pay change for each $1,000 change in shareholder wealth. Thus, the pay-performance relation for CEOs in the top quartile of NYSE firms has fallen by a factor of ten over the past fifty years. These results, although not conclusive, are consistent with the implicit regulation hypothesis because political constraints and pressures, disclosure requirements, and the overall regulation of Corporate America, have increased substantially over the same period.

TABLE 9

CEO PAY-PERFORMANCE SENSITIVITY IN 1934-38 VS. 1974-86.
Regressions of Change in CEO Salary + Bonus on Change in Shareholder Wealth for CEOs in the Top Quartile of NYSE Corporations Ranked by Market Value[a]
(t-statistics in parentheses)

Independent Variable	Regression Coefficients Dependent Variable is Δ(Salary and Bonus) (in $1000s of 1986-Constant Dollars)	
	1934-1938	1974-1986
Intercept	6.3	22.3
Δ(Shareholder Wealth) (1000s of 1986-Dollars)	.000114 (5.6)	.000012 (7.0)
Δ(Shareholder Wealth) in Year t-1	.000061 (2.8)	.000007 (4.4)
R^2	.0702	.0144
Estimated pay/performance sensitivity, "b"	.000175	.000019
Estimated Pennies per $1,000	17.5¢/per $1,000	1.9¢/per $1,000

[a] For the 1934-1938 data, CEOs are defined as the highest paid executive. Sample sizes are 427 and 3,826 CEO-years for the 1934-1938 and the 1974-1986 samples, respectively.

The incentives generated by CEO stock ownership have also declined substantially over the past fifty years. Table 10 shows time trends in the stock ownership of CEOs for two different samples of firms. The first sample consists of all CEOs in the 120 largest firms (ranked by stock market value) in 1938, 1974, and 1984; we collected stock ownership data for these CEOs from proxy statements. 1938 proxy statements were available for only 53 of the largest 120 firms in 1938; stock ownership data for CEOs in 16 additional firms were obtained using 1939 and 1940 proxy statements.

Panel A of table 10 shows that CEO percent ownership (including shares held by family members and trusts) in the largest 120 firms fell from a median of .30% in 1938 to .05% in 1974, and fell further to .03% in 1984 (*average* percent ownership fell from 1.7% in 1938 to 1.5% and 1.0% in 1974 and 1984, respectively). In addition, the median dollar value

of shares held (in 1986-constant dollars) fell from $2,250,000 in 1938 to $2,070,000 in 1974 and to $1,811,000 in 1986. The decline in the value of shares held between 1974 and 1984 is

TABLE 10

TIME TRENDS IN CEO INSIDE STOCK OWNERSHIP

Median CEO Stock Ownership for Two Samples of Firms[a]

Year	Median Value of Stock Owned (1986 Dollars)	Median Percentage of Firm Owned
A. SAMPLE 1: *120 Largest Firms Ranked by Market Value*		
1938	$2,250,000	.30%
1974	$2,061,000	.05%
1984	$1,801,000	.03%
B. SAMPLE 2: *73 Manufacturing Firms*		
1969-1973	$3,531,000	.21%
1974-1978	$1,397,000	.14%
1979-1983	$1,178,000	.11%
15-Year Sample	$1,697,000	.16%

[a] Stock ownership obtained from proxy statements includes not only shares held directly but also shares held by family members or related trusts.

especially significant since 1974 was a "bust" year in the stock market, while 1984 was a "boom" year. The value-weighted portfolio of all NYSE stocks increased by 113.4% (after inflation) over this interval, so if the median executive had maintained his stock holdings and if these had increased by the same percentage as that of the market portfolio, the value of his holdings would have increased from $2,061,000 in 1974 to $4,400,000 in 1984 instead of falling to $1,801,000.

Panel B of table 10, based on the 73 manufacturing-firm sample, shows the median value of stock owned by CEOs and their percentage ownership for the full fifteen-year sample and for five-year intervals. From 1969-1973, the median CEO in the 73 sample firms held $3,531,000 in common stock (1986-dollars) which accounted for .21% of the shares outstanding. By 1979-1983, the median ownership had fallen 67% to $1,178,000, accounting for only .11% of the shares outstanding. Over the same time period, the *average* stock ownership, which is strongly influenced by a few CEOs with extraordinarily large holdings, fell from $14,100,000 to $8,500,000.

The political pressures associated with high pay-performance contracts do not appear to extend to gains from stock ownership. We therefore expect increases in political pressure to correspond to decreases in pay-performance sensitivity and *increases* in incentives associated with stock ownership. The dramatic decline in CEO stock ownership over the past fifty years is contrary to the implicit regulation hypothesis and suggests a significant downward trend in managerial incentives which is not explained by existing theories.

Other Evidence Consistent with the Implicit Regulation Hypothesis

Anecdotal evidence on the implicit regulation of executive compensation is abundant and consistent. One way to assess the effects of the political process on compensation contracts is to analyze changes in the contracts that occur when private firms go public or when public firms go private. A comprehensive empirical investigation is impossible since most closely held firms are obsessively secretive about their compensation practices. Insights into the differences in the pay practices of public and private firms can be obtained, however, by analyzing the recent public offerings of several investment banking houses.

Phibro-Salomon, formed by the 1981 merger of closely-held Salomon Brothers and the publicly-held Phibro Corp, generated considerable attention in the annual compensation surveys. In its first year as a public firm, roughly 20 top officials received over $1 million each, and one analyst reported "the only thing that embarrasses them is that they have to report the numbers" (*Wall Street Journal (WSJ)*, 3/21/86). In contrast, only 15 CEOs in all other publicly-held firms had salaries and bonuses exceeding $1 million in 1981 (*Forbes*, 6/7/82)[3]

Bear Stearns went public in October 1985, and CEO Alan Greenberg's $2.9 million salary and bonus was the nation's fourth highest. The compensation of the firm's managing directors was initially set at $150,000 with a bonus tied to earnings. Because earnings performance was high in 1986, the bonus pool swelled to $80 million, or an average of

[3] 1981 was a big year for cashing in stock options, and 115 CEOs had *total* compensation of a million or more.

$842,000 for each of the firm's 95 managing directors. Six months after going public, Bear Stearns announced that the bonus pool was reduced from 40% to 25% of the company's adjusted pretax earnings in excess of $200 million because it had "yielded an embarrassment of riches for top executives" (*WSJ* 3/21/86).

Investment banking units in publicly owned corporations have a difficult time attracting and retaining key traders. In 1986 Citicorp announced it was considering radical changes in its compensation policies "in a move to stem the wave of defections from its investment banking unit." The maximum bonuses paid to Citicorp traders at the time amounted to three to four times base salary compared to more than ten times base salaries at private Wall Street firms (*WSJ* 11/19/86).

Pressures from the media to reduce generous pay can also serve as a measure of the influence of the political process on managerial contracts. Recent headlines include: "Reform Executive Pay or Congress Will" (*WSJ* 4/24/84), "Big Executive Bonuses Now Come With a Catch: Lots of Criticism" (*WSJ* 11/19/86), "Congress Thinks It Knows Best About Executive Compensation" (*WSJ* 5/15/85), "Trading Firm's Generous Pay Stirs Questions" (*WSJ* 7/30/84), "Those Million-Dollar Salaries: Some Hefty Pay Hikes Open a Controversy About Executive Compensation" (*Time* 5/7/84), "Chrysler's Bonus Plan for Iacocca Irks UAW" (*WSJ* 4/26/84), and "The Madness of Executive Compensation" (*Fortune* 7/82). *Business Week* (5/87) reports that "General Motors Corp has decided to end its often-criticized bonus plan. The plan came under attack this year when GM set aside $169 million for executive bonuses while deciding to omit profit-sharing payments to 500,000 workers."

Direct government intervention in executive compensation is infrequent but does occur. One example is Thomas Spiegel, CEO of Columbia Savings and Loan Association in California, whose 1985 total compensation of $9,032,000 was the nation's third highest. In April 1986, the Federal Home Loan Bank Board demanded that Columbia's board of directors take "immediate steps" to recover all but Spiegel's $960,000 base salary. As justification, the

Bank Board cited several earlier cases where executives were asked to return their bonuses (*National Thrift News* 8/11/86).

It seems plausible that the implicit regulation of executive compensation is more pronounced in industries that are already heavily regulated in other dimensions. The Columbia Savings case above is a good example—the Federal Home Loan Bank Board explicitly requires that compensation be "reasonable" and has the authority to demand changes in compensation practices. Smith and Watts (1986) and Murphy (1987) show that both the level of compensation and the relation between pay and performance are lower in regulated firms than in non-regulated firms. This empirical regularity is consistent with the hypothesis that compensation practices are constrained by the political sector and that these constraints become more pronounced in highly regulated firms.

Organized labor is another potentially important third party affecting compensation policies. In 1984, for example, UAW leaders used accusations of excessive executive bonuses to rally support for higher compensation to UAW members in its contract negotiations" (*WSJ* 3/6/84). Murphy (1987) reports that executives in heavily unionized industries receive lower levels of total compensation, and a smaller share of their compensation in the form of stock options, than executives in less unionized industries, ceteris paribus. This result is also consistent with the implicit regulation hypothesis.

Political Influence and the Effect of Firm Size on the Pay-Performance Sensitivity

Political influence is likely to be more pronounced in large firms, since larger firms tend to be more visible and more closely scrutinized than smaller firms (Watts and Zimmerman 1986, ch. 10). The implicit regulation hypothesis thus predicts that the pay-performance sensitivity declines with firm size, but our all-inclusive estimate of $3.25 per $1,000 is based on a constant pay-performance sensitivity across firms. Although the *Forbes* sample analyzed in this paper includes the nation's largest firms, the size distribution of firms *within* the sample is highly skewed. The average and median market values of firms in our sample are $1.73

billion and $810 million (1986 dollars), respectively. The average and median market values for firms larger than the sample median are respectively $3.1 billion and $1.6 billion, while the the average and median market values for firms smaller than the sample median are $400 million and $360 million, respectively.

We test for the effect of firm size on the pay-performance sensitivity by re-estimating the results in tables 1, 3, 4, 5, and 6 for firms with market value in a given year above or below the sample median market value for that year. Eighty percent of the 73 manufacturing-firm sample (table 2) fall into the "above median" category (based on the *Forbes* sample); thus we did not re-estimate the results in table 2 by firm size. Our overall results are summarized in columns (2) and (3) of table 11; to save space details of the estimates are not provided but are available upon request. We've previously noted substantial differences in CEO stockholdings in small and large firms (table 3); table 11 suggests other interesting differences between the two samples. Row 1 shows that each $1,000 change in shareholder wealth corresponds to a 4.1¢ pay raise for CEOs in small firms, but only 2.0¢ for CEOs in large firms. Also, current and past net-of-market performance is a strong predictor of CEO turnover in below median-size firms, but performance and turnover are both economically and statistically insignificantly related for large firms. As reported in row 5, the average dismissal-performance sensitivity (weighted by the number of observations in each age group) is $2.25 per $1,000 change in shareholder wealth for CEOs in small firms, but only 4.2¢ per $1,000 for CEOs in large firms. Our all-inclusive estimated pay-performance sensitivity (row 8) for small firms is $8.05 per $1,000, four times greater than our large-firm estimate of $1.85 per $1,000.

Varying degrees of political pressure across firms or decades are not of course the only potential explanations for the size-effect or secular decline in pay-performance sensitivities; thus, the evidence presented is supportive of the implicit regulation hypothesis but not conclusive. For example, higher pay-performance sensitivities for smaller firms could reflect that CEOs are more influential in smaller companies. A thorough empirical investigation of the implicit regulation of executive compensation would be useful, but such an investigation

requires detailed data on the compensation practices of partnerships, closely held corporations, and other non-public organizations. These data are inherently difficult to obtain. In fact, it is precisely this asymmetry in data availability that forms the basis for the implicit regulation of executive compensation in publicly held corporations.

Summary

Our analysis of performance pay and top-management incentives for over two-thousand CEOs in three samples spanning five decades indicates the relation between CEO wealth and shareholder wealth is small, and has fallen by an order of magnitude in the last fifty years. Table 11, based primarily on the *Forbes* sample of 1,295 firms, provides an overview of our final results for the full sample and for firms with market value in a given year above or below the sample median market value for that year. In sum, our evidence indicates:

1. On average, each $1,000 change in shareholder wealth corresponds to an increase in this year's and next year's salary and bonus of about two cents. The CEO's *wealth* due to his cash compensation—defined as his total compensation plus the discounted present value of the change in his salary and bonus—changes by about 30¢ per $1,000 change in shareholder wealth. In addition, the value of the CEOs stock options—defined as the value of the outstanding stock options plus the gains from exercising options, changes by 15¢ per $1,000.

   Our final upper-bound estimate of the average compensation-related wealth consequences of a $1,000 change in shareholder value is 45¢ for the full sample, 40¢ for large firms, and 90¢ for small firms.

2. Our weighted-average estimate of the CEO's dismissal-related wealth consequences of each $1,000 shareholder loss for an average size firm with -50% net-of-market returns for two consecutive years is 30¢ for the full sample, 5¢ for large firms, and $2.25 for small firms. Therefore, the total pay-performance sensitivity—including both pay and dismissal—is about 75¢ per $1,000 change in shareholder wealth for the full sample (45¢ and $3.15 per $1,000 for large and small firms, respectively).

TABLE 11

ESTIMATED PAY-PERFORMANCE SENSITIVITY.
Total Effects (Over Two Years) on CEO Compensation-Related Wealth Corresponding to Each $1,000 Change in Shareholder Wealth for CEOs in *Forbes* Sample from 1974-1986, by Firm Size[a]

		Predicted CEO-Wealth Change per $1,000 Change in Shareholder Wealth		
		All Firms	Large Firms[a]	Small Firms[a]
		(1)	(2)	(3)
1.	Change in This Year's and Next Year's Salary & Bonus[b]	**2.2¢**	2.0¢	4.1¢
2.	Total Compensation + Present Value of the change in Salary & Bonus[c]	**30¢**	25¢	75¢
3.	Change in the Value of Stock Options[d]	**15¢**	15¢	15¢
4.	Change in Direct Pay-Related Wealth (row 2 + row 3)[e]	**45¢**	40¢	90¢
5.	Change in wealth due to dismissal from poor performance[f]	**30¢**	5¢	225¢
6.	Change in Total Pay-Related Wealth (row 4 + row 5)	**75¢**	45¢	315¢
7.	Change in Wealth Related to Stock Ownership for CEO with Median Stockholdings[g]	**$2.50**	$1.40	$4.90
8.	Change in All Pay- and Stock-Related Wealth[h]	**$3.25**	$1.85	$8.05

a Estimates rounded to the nearest nickel (except for row 1). Large firms have market value in a given year above the *Forbes* sample median for that year, while small firms have market value below the median. Details of the estimates by firm size are not provided in the text but are available upon request.

b Table 1, column (2).

c Table 1, column (4).

d Table 2, column (1), estimated for the 73-firm sample. We assume that the option-performance sensitivity is the same for both size groups.

e The direct estimate from the 73 manufacturing-firm sample is only 31¢ (table 2, column (2)); we've reported the larger estimate as an upper bound.

f Table 5, column (7). Weighted-average of estimates for each age group.

g Table 3, columns (1), (2), and (3). Stock ownership includes shares held by family members and connected trusts. Ownership also includes options that can be exercised within 60 days; thus there is some "double counting" in rows 3 and 7.

h Columns (3) and (5) of table 2 show that fractional stockholdings can be added to other sources of incentives to construct an overall pay-performance sensitivity.

3. The largest CEO performance incentives come from ownership of their firm's stock, but such holdings are small and declining. Median 1986 inside stockholdings for 746

CEOs in the *Forbes* compensation survey are .25%, and 80% of these CEOs hold less than 1.4% of their firm's shares. Median ownership for CEOs of large firms is .14% and for small firms is .49%.

Adding the incentives generated by median CEO stockholdings to our previous estimates gives a total change in all CEO pay- and stock-related wealth of $3.25 per $1,000 change in shareholder wealth for the full sample, $1.85 per $1,000 for large firms, and $8.05 for small firms.

4. Boards of directors do not vary the pay-performance sensitivity for CEOs with widely different inside stockholdings.

5. Although bonuses represent 50% of CEO salary, such bonuses are awarded in ways that are not highly sensitive to performance as measured by changes in market value of equity, accounting earnings, or sales.

6. The low variability of changes in CEO compensation reflects the fact that in spite of the apparent importance of bonuses in CEO compensation, they are not very variable from year to year. The frequency distributions of annual percentage changes in CEO salary plus bonus and total pay are comparable to that of a sample of 10,000 randomly selected workers. Thus, our results indicating a weak relation between pay and performance are not due to boards of directors using measures of managerial performance that are unobservable to us.

7. Median CEO inside stockholdings for the largest 120 NYSE firms fell an order of magnitude from .3% in 1938 to .03% in 1984.

8. The average standard deviation of pay changes for CEOs in the top quartile (by value) of all NYSE firms fell from $205,000 in 1934-1938 to $127,000 in 1974-1986.

9. The pay-performance sensitivity for top-quartile CEOs fell an order of magnitude from 17.5¢ per $1,000 in 1934-1938 to 1.9¢ per $1,000 in 1974-1986.

10. The average salary plus bonus for top-quartile CEOs (in 1986 dollars) fell from $829,000 in 1934-1938 to $645,000 in 1974-1986, while the average market value of the sample firms doubled.

The lack of strong pay-for-performance incentives for CEOs indicated by our evidence is puzzling. We hypothesize that political forces operating in both the public sector and inside organizations limit large payoffs for exceptional performance. Truncating the upper tail of the payoff distribution requires that the lower tail of the distribution also be truncated in order to maintain levels of compensation consistent with equilibrium in the managerial labor market. The resulting general absence of management incentives in public corporations presents a challenge for social scientists and compensation practitioners.

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