

EXECUTIVE PAY AND FIRM PERFORMANCE

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This study examines the effects of executive compensation policy and organizational structure on the performance of 439 large U.S. corporations between 1981 and 1985. Companies with long-term incentive plans enjoyed significantly greater increases in ROE (return on equity) than did companies without such plans, and by 1985 long-term incentive plans had been nearly universally adopted by large corporations. Corporate success was not significantly related to the level of, or degree of equity in, executive pay, or to the steepness of pay differentials across executive ranks; it was, however, positively related to the extent of hierarchical structure, which appears to have been the primary mechanism for sorting individuals by human capital endowments and performance.

AN executive who earns tens of millions of dollars in pay per year provokes a certain critical regard no matter how efficient his operations. Extremely high compensation tends to raise questions concerning the competitive nature of the labor market determining executive compensation, and the effective degree of shareholder oversight and control. It has been justified, however, as part of incentive systems designed to align executives' interests more closely with those of shareholders.

This paper examines evidence on the

competitive nature of executive and managerial labor markets. Most previous studies of executive compensation have been limited to the CEO and a few other officers whose compensation must be divulged in accord with SEC regulations. This paper instead makes use of a large sample of executives without regard to whether their pay is in the public domain. Specifically, I examine executive pay patterns for more than 20,000 executives at 439 corporations between 1981 and 1985, with particular attention to the role of human capital, hierarchical structure, and employer in determining executive pay, and to evidence of persistent pay differentials across firms. I also present evidence on the extent of sorting across hierarchies, and on the responsiveness of executive base and bonus pay to unit and corporate performance.

Evidence on those matters cannot, in its nature, conclusively establish whether the net effect of high executive salaries is to transfer wealth from shareholders or, through their incentive effects, to elicit effort from executives that results in improved firm performance and a gain

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for shareholders. To explore that question, I discuss some problems in the design of incentive mechanisms and issues in estimating their effects, and I examine the impact on corporate performance of long-term incentive systems, bonus schemes, hierarchical structure, promotion rates, and pay equity.

Theories of Firm Effects

In the simplest model of a spot market for labor, firms have no pay policies and do not differ in their pay for a given skill employed under the same conditions. Pay is set by the market clearing conditions. A precondition for any discussion of pay policy is the absence of perfect information or of costless mobility.

Consider the puzzle raised by firm pay effects—differences in pay across firms that are widely shared among different occupations. Several theories may be employed to attempt an explanation of such effects. First, the classical theory of compensating differentials can account for firm pay effects among executives if those effects stem from omitted factors that differ across firms but are common to all executives within a firm. Among the omitted factors may be unmeasured components of compensation, such as long-term incentives and various perquisites, as well as unmeasured corporate characteristics, such as expected profitability, specificity of human capital, promotion probabilities, and the threat of unfair discharge. Second, equity theory may be consistent with firm effects, provided it is assumed that executives care more about internal equity than external equity and that some mechanism exists that causes key wages to differ across employers. Third, if the cost of shirking or monitoring differs across firms but is similar across positions within a firm, efficiency wage theories may predict such firm effects. In all three cases, the underlying causal factors plausibly change only slowly, so these models may explain persistent firm effects.

Also possibly useful in explaining firm pay effects for executives are rent sharing models, in which imperfect monitoring by

shareholders (executive theft) or large fixed costs of turnover are responsible for interfirm differences in pay. Under such conditions, executives may succeed in appropriating part of the rents that a firm with market power achieves. Only if the underlying rents persist, however, are such models consistent with persistent firm effects.

Data

Much can be learned about the nature and operation of the labor market by matching information for firms and employees over time. All of the information analyzed in this study is derived from a private survey of executive and managerial compensation conducted between 1981 and 1985. The survey was not designed to cover a representative sample, and there was considerable turnover of survey firms from year to year. Nonetheless, the firms span a broad spectrum of the largest corporations in the United States, and their Betas (Valuelines) averaged 1.03 in 1983, so along this dimension they closely represent the stock market. In 1985, survey companies had employment-weighted average sales of \$3.9 billion, assets of \$3.3 billion, and profits of \$182 million. Employment ranged from 132 to 252,000 employees, with an average of 33,000.

Participating firms were asked to report on the pay and personal characteristics of a representative sample of 75 to 100 incumbents in a variety of job families, managerial levels, and organizational units. *Pay* in this paper shall refer to the sum of base plus bonus paid in a given year. It does not include fringe benefits, pension benefits, or long-term incentive pay such as stock options, which can be substantial components of total compensation for some top executives. The combination of information on the personal characteristics of managers, with data on their employers in a longitudinal sample of firms, facilitates the testing of a number of fundamental models of the labor market. It also allows an examination of how pay,

power, and prestige are allocated in major American corporations.

Analysis of Variance of Executive Pay

Although the firm wage effects estimated here cover a wide range, they are not of great significance in accounting for individual variation in executive pay. The standard deviation of estimated firm wage effects is .21 for the logarithm of pay including bonus. This value is roughly similar to the magnitude of dispersion of firm effects for production workers estimated by Groshen (1987) in some industry and area wage surveys, although it is considerably greater than Leonard's (1988) estimates for the electronics industry.

Table 1 presents an analysis of the variance of the logarithm of pay in a pooled non-rectangular sample of executives from 1981 to 1985. This table reports the proportion of variance that can be unambiguously attributed to each of six

Table 1. Components of Variation of Logarithm of Executive Pay (Base + Bonus), 1981-1985.

Factor	Percent of Total Sum of Squares (Degrees of Freedom)
1. Company	7.9 (439)
2. Occupation	2.2 (144)
3. Hierarchical Position	10.4 (36)
4. Human Capital	1.1 (4)
5. Unit Sales	0.1 (1)
6. Year	2.0 (4)
7. Joint Effects	63.6
8. Total	87.3 (626)
9. Interactions	12.7

Notes: Each of the main effects in lines 1 through 6 is conditional on the other 5. Line 8 is the R-squared of the full model presented in Table 2. Line 7 is the difference between line 8 and the sum of lines 1 through 6. Line 9 is one minus line 8. Hierarchical position includes sets of dichotomous variables indicating levels beneath board of directors (11), subordinate levels (16), chief responsibilities at corporate, division, or plant levels (3), international responsibility (1), and board membership (1), as well as continuous variables for number of subordinate exempt and non-exempt employees. Human capital includes variables for age, tenure with the firm, job tenure, and education. N=98,587. TSS (Total Sum of Squares)=34566.

main factors. Conditional on the other controls listed in Table 2, the marginal contribution to R^2 of each factor is presented. Individual company effects can unambiguously account for 8% of pay variance, with controls for occupation, hierarchy, human capital, unit sales, and year. This percentage is a measure of the importance of firm effects that persist over the period (up to five years) that firms remain in the sample. The variance decomposition for each of the five years closely resembles that for the pooled sample. Despite sample turnover, the relative importance of each of the main factors remains stable over time. Firm effects thus appear to be of minor direct consequence in all years studied.¹

Pay differences across these firms appear to have been slowly fading. The correlation between firm wages in 1981 and 1985 (with all the controls in Table 2) is .77. After a decade at this rate of decay, half of the distinctive firm effects would remain. There is evidence of both error correction and mean reversion in the time series behavior of firm pay effects. Above-average wage growth in a firm in one year tended to be followed by below-average growth the next year. Firms with above-average wage levels also tended to have below-average wage growth in the subsequent year.

There are considerable lags in the adjustment process. Firm pay in 1985 was significantly and strongly related to pay in 1982, even with controls for pay in 1983 and 1984. Above-average pay raises in 1983 depressed subsequent raises in 1984 and 1985. Thus, pay does adjust, but slowly.

In the organizations studied here, pay is strongly hierarchically structured. Position in the corporate hierarchy unambiguously accounts for 10% of pay variance. The occupations considered here, on the other hand, appear surprisingly homogeneous

¹ Although it is possible that firms choose not to participate in surveys in which they will be outliers, firms that compete for talent in the same managerial labor markets are more likely to self-select into the same surveys.

Table 2. The Logarithm of Executive Pay (Base + Bonus) as a Function of Personal and Firm Characteristics, 1981-1985.

Variable	Coef- ficient	(Standard Error)
Age	.0082	(.0001)
Tenure with Firm	.0001	(.0001)
Job Tenure	.0008	(.0002)
Years of Schooling	.0174	(.0005)
Unit Sales	.0051	(.0002)
International Responsibility	.0657	(.0020)
Corporate Responsibility	.0534	(.0026)
Division Responsibility	-.0117	(.0019)
Plant Responsibility	-.0169	(.0043)
Board Member	.174	(.0027)
Eligibility for Long-Term Incentive	.159	(.0021)
Exempt Subordinates	.0055	(.0006)
Non-exempt Subordinates	.0021	(.0003)
<i>Number of Subordinate Levels:</i>		
0	-1.08	(.151)
1	-.99	(.151)
2	-.91	(.151)
3	-.84	(.151)
4	-.75	(.151)
5	-.67	(.151)
6	-.59	(.151)
7	-.51	(.151)
8	-.46	(.151)
9	-.41	(.151)
10	-.36	(.151)
11	-.38	(.151)
12	-.43	(.152)
13	-.45	(.155)
14	-.46	(.178)
15	-.38	(.172)
16	.53	(.211)
<i>Number of Superior Levels:</i>		
1	.64	(.109)
2	.64	(.095)
3	.48	(.095)
4	.38	(.095)
5	.30	(.095)
6	.23	(.095)
7	.17	(.095)
8	.12	(.095)
9	.09	(.095)
10	.07	(.096)
11	.06	(.103)
<i>Year:</i>		
1981	-.292	(.0025)
1982	-.198	(.0024)
1983	-.155	(.0024)
1984	-.076	(.0023)
R ²	.873	
N	98587	
SEE	.211	

Note: Controls indicating employment in one of 439 companies and one of 144 occupations are also included. "Subordinate Levels" refers to the number of layers of management an incumbent supervises. "Superior Levels" are the number of levels between the position and the Board of Directors; the CEO is Level 1.

in terms of pay. Differences in occupation (which range from CEO to foreman) can unambiguously account for only about 2% of pay variance.

The other main effects are of minor importance in terms of their unambiguous effects. Human capital variables can unambiguously account for 1.1% of pay variance, unit sales for 0.1%, and calendar year for 2.0%.

Sorting models predict a high correlation between measures of human capital and hierarchy or occupation, as firms sort the most able managers into the most important positions.² Given that prediction, the highly correlated main effects shown in Table 1 are not surprising. In combination, the variables included here can account for 87% of the variance in pay. Seventy-four percent of this "explained" variance—64% of total pay variance—occurs through joint effects that cannot be unambiguously credited to a single factor. This result is consistent with the prevalence of sorting, as are the highly correlated measures of corporate position and human capital.

The maximum proportion of pay variance that each factor could account for includes part of these joint effects and is simply the R² obtained with only that factor on the right-hand side of the equation. By themselves, the human capital variables can account for 28% of pay variance, not unlike standard log-wage equations with education and experience controls. Pay is very much a function of position, and measures of hierarchical position and of occupation can account for 69% and 52% of pay variance, respectively. By themselves, company effects account for 33% of pay variance.

The proportion of pay variance accounted for here (.87) is far higher than that usually estimated (~.30) for individual workers. It might be supposed that this high level of explanation simply reflects

² The latter two factors are themselves likely to be highly correlated in this study, given the type of occupational definitions used here: vice-presidents for marketing tend to be at the top of executive hierarchies, branch managers near the bottom.

the homogeneity of the sample; but a human capital wage equation similar to those typically estimated yields a similar R^2 (.28). At least along this dimension, the residual variation in this sample is similar in magnitude to that commonly observed. Instead, the high level of explanation is likely due to the additional controls used here. Position in the corporate hierarchy, employer, and detailed occupation all are significant correlates of pay.

In the executive suite, where individual performance is supposed to matter greatly and is often closely observed by colleagues and superiors, pay is often presumed to depend more on individual performance than on a job title. Although bargaining costs might be reduced (or merely redirected) by making pay a function of position, individual tailoring of pay is almost certainly less costly when used for a few executives than it would be if used for the mass of non-exempt workers. Executives are also more likely to voice allegiance to pay for performance systems than to group solidarity. Yet, we observe a strong systematic component in pay even near the tops of these hierarchies. The nonstandard and complex output of executives may be more difficult to measure than that of other employees. To the extent that individual performance and human capital endowments affect pay, they do so primarily by affecting the allocation of people to occupations and positions in the corporate hierarchy.

The tightness with which executive pay is administered can be judged from the fact that, with salary range mid-point controlled for, the standard error of base salary is 13%, allowing some individualistic pay adjustment. If individuals are sorted into companies, hierarchical levels, or occupations partly on the basis of productivity, then these variables will pick up part of the effect of unmeasured absolute productivity. Thus, Table I indicates that within position an executive has only modest scope to increase his or her salary, relative to that of the average incumbent in the same company, hierarchical position, and occupation, by means of exceptional performance.

Internal Labor Markets

Models of internal labor markets are commonly assumed to apply to corporate hierarchies with firm-specific skills, a strong policy of promoting employees within the firm, and external hiring limited to a few lower-level entry positions. In such models, market forces most directly affect wages in the entry-level positions. Competitive forces could be expected to equalize the expected present value of career earnings across employers. If this condition is fulfilled (and post-entry interfirm mobility is barred, and all executives have the same discount rate and expected working life), then the distribution of earnings over a career is indeterminate. Post-entry-level positions may then differ in pay across firms, and the relative pay of occupations within a job ladder may differ across firms. If such internal labor markets were prevalent in the firms studied here, we would expect to see strong occupation-employer interactions. On the contrary, no more than 13% of pay variance is accounted for by all possible interactions and omitted variables. These firms apparently tend not to differ greatly in terms of pay structure or average pay.³

Internal labor market models predict that the lowest cross-firm variance in pay will be found in entry-level positions directly exposed to market pressure.⁴ Among the executives studied here, however, the cross-firm pay variance is similar across levels of the job ladder.⁵ For example, the standard error of pay for executives to whom no managers report is .15, the same as for executives to whom between 1 and 10 levels of management report. (This correspondence is less per-

³ This uniformity may, in part, reflect an endogenous response to previous surveys.

⁴ More homogeneous pay is also expected in jobs that are more exposed to outsiders, so that competition is not limited by firm-specific information. Note also that some hierarchy levels may contain numerous salary grades.

⁵ From the perspective of tournament models, in which absolute rather than percentage differences are relevant, equal proportionate variation indicates greater absolute heterogeneity across firms at higher levels.

fect at the top of more extensive hierarchies.) Within functional groups (finance, marketing, manufacturing, purchasing, and so on), there is no case in which the standard error of the lowest observed position is less than that of the top position in the job ladder. The only exception is the position of CEO, which shows the least homogeneity of any position. CEO pay is the least mechanically determined and the most subject to individual negotiation. To the extent that market forces impose wage uniformity, this effect appears to be similar across levels of the job ladder below CEO.

In fact, the premise of this internal labor market model appears not to hold for most sample firms. Rates of entry into high-level positions from outside the firm are substantial (Leonard 1989). The average employer in this sample does not pursue a pure promote-from-within policy. On the one hand, at all levels of the corporate hierarchies sampled here, at least 80% of the 1985 incumbents were hired before 1981; company tenure averages 15.6 years; and no pure entry-level positions are observed. But on the other hand, these companies do frequently hire top executives from outside. Two levels beneath the CEO, one in five of the 1985 incumbents have been with the company less than 5 years.

Most individuals in the sample for this study did some shopping among firms before being appointed as executives; the average age at which a 1985 executive was hired by his current employer was 34. An additional sign of the value of job shopping (or of those who job-shop) is that although managers at the lowest observed levels of the hierarchy are no older than managers at higher levels, they have, on average, accumulated 2 to 3 years more company tenure. By Baye's rule, those who settle with a company earlier in life are less likely to ascend or be hired into the top. Managers who settle with their current employer at an earlier age are more likely

to remain at the lower levels. They are unlikely to ascend or to leave.⁶

Hierarchical Pay

Position in the corporate hierarchy is one of the strongest determinants of pay. In a number of economic models, this link is attributed to the greater sensitivity of corporate success to the acts of higher-level executives than to those of lower-level executives. Executives with a wider span of control are expected to have greater marginal revenue products. In contrast to such efficiency explanations, however, equity theories may predict that hierarchical structure generates pressure for pay differentials across steps even in the absence of productivity differentials.⁷ Why shareholders should agree to such transfers and what determines reference groups are questions left unanswered in such models.

One approach for testing these competing models is to consider two executives in the same occupation with the same numbers of exempt and non-exempt employees reporting to them directly or indirectly, a condition that, in principle, holds the span of control—the organizational multiplier on individual decisions—fixed. Now consider the effect on pay of differences in the number of hierarchical levels that these subordinate employees are organized into. In the sample for this study, executives in flat organizations (with only one subordinate level of management) received 32% lower pay than executives in hierarchical organizations

⁶ Asymmetric information models allow for complex equilibria. For example, it is possible that moves early in a career do not carry negative signals, but that a lower-level manager seeking to move late in a career is suspect. The results reported here may also be an artifact of the sample design: managers who move with less success are more likely to be employed in smaller companies or in lower positions, and so drop out of the sample. Furthermore, a firm's reports may have varied from year to year in the extent of their coverage of the corporate hierarchy and in the kinds of positions included.

⁷ This argument is in contrast to the argument that title differentiation serves as a *substitute* for pay differentiation.

(with five subordinate levels, an increase of about two standard deviations). (See Table 2.) This finding is obtained with controls on the number of subordinate exempt and non-exempt employees, unit sales, occupation, and location in corporate headquarters or plant.

An efficiency explanation for this result is that some differences among employers that remain uncontrolled are accompanied by both greater hierarchy and higher productivity.⁸ In pure tournament models, executive pay serves as an incentive only for those in lower positions, not as a return to productivity in the current position.⁹ The pay differentials observed in more hierarchical structures, however, cannot be rationalized purely in tournament terms. Conditional on the number of exempt subordinates (contestants), adding runner-up prizes (intermediate levels in the hierarchy) should reduce the first-prize payoff. Here, we observe higher pay with more levels of subordinate hierarchy, suggesting at the least that part of managerial pay is a return to current productivity. Alternatively, hierarchical pay differentials may satisfy equity norms without clear efficiency support. In the absence of a model of the determinants of hierarchical structure, the possibility that some other factor produces both greater hierarchy and greater productivity cannot be ruled out.¹⁰ (At the end of this paper I return to an analysis of the effect of hierarchical structure on corporate performance and test for the efficiency of hierarchy.)

Pay differentials across levels do increase with level in the hierarchy, consistent with tournament theory. The proportional pay differences between adjacent levels, starting from those reporting di-

rectly to the CEO, are 16, 10, 8, 7, 6, 5, 3, 2, and 1 percent. In other words, 1% of pay separates level 10 from level 11 below the CEO, whereas 16% separates level 2 from level 3. This increasing spread between higher levels is consistent with models in which greater pay differentials are necessary to motivate managers at higher levels, for whom there are fewer superior positions to be promoted into and (often) less remaining time to reap rewards.

Other measures of position in the corporate hierarchy are also strongly associated with pay. Executives with corporate-wide responsibilities are paid 7% more than those at the plant level. International responsibilities bring 7% higher earnings than for those with only domestic responsibilities; board membership, 17% higher earnings than for those without board membership.¹¹ Although the value of long-term incentives is unmeasured here, eligibility for such incentives is known and is associated with 16% higher pay (not including the value of long-term incentives). Heterogeneity across jobs swamps any reduction in base pay by the risk-adjusted expected value of long-term incentives.

Sorting and the Returns to Education and Experience

Executives are rewarded for both experience and education. In regressions that control only for tenure in the firm and tenure in a particular job, each additional year of education is associated with an 11% increase in pay and each additional year of experience with a 3% increase. (See Table 3.) The return to firm-specific tenure is 0.6%, much less than the return to general experience.¹² This finding, which is consistent with the

⁸ Hierarchical structure that itself increases managerial productivity may create firm-specific rents that should not be captured by employees under competitive conditions.

⁹ The market equilibrium conditions for such tournament models are not well established.

¹⁰ Relative rather than absolute position in a hierarchy may be relevant in some contexts. Table 2 identifies some of these effects as combinations of the coefficients on superior and subordinate levels.

¹¹ O'Reilly (1989) argues that such a pattern is due in part to social norms affecting standards for pay comparison in small groups.

¹² General experience is measured here as age, with years of schooling controlled for, and may include industry-specific components of human capital.

Table 3. The Logarithm of Executive Pay (Base and Bonus) as a Function of Tenure, Age, and Education, 1981-85.

Variable	Coefficient	(Standard Error)
Age	.0280	(.0002)
Tenure with Firm	.0057	(.0002)
Job Tenure	-.0208	(.0005)
Years of Schooling	.1064	(.0009)
Intercept	8.2077	(.0172)
R ²	.276	
N	98587	
SEE	.504	

earlier finding that pay diversity is no higher in upper-level positions than in lower-level positions, implies that managers make little investment in firm-specific human capital.¹³

Sorting does occur in lower-level executive positions. Some managers remain stuck in position rather than advancing through the ranks, and so they have job tenure that increases along with company tenure. Each additional year in the same position is associated with 2% less pay than would be received if the manager were promoted. This pattern is exactly what we would expect if the most productive managers were quickly promoted into higher positions, with the less productive managers accumulating longer job tenure and earning smaller raises.¹⁴

Almost all of these effects occur through the process of allocation to positions within the corporation. In regressions with the full set of controls, firm tenure and job tenure have no effect on pay, and an additional year of experience and of education increase pay by only 1% and 2%, respectively. These last two effects cannot be ascribed to the receipt of new information about managers' productivity by those setting pay. Observable measures of potential productivity, such as age, experience, and education, are important

¹³ An alternative interpretation of the observed return to tenure is that good matches result in both higher pay and longer eventual tenure. However, pay is only 6% higher when uncompleted spells of tenure are a decade longer.

¹⁴ For models of this sort, see Weiss and Landau (1985). This type of behavior may help explain an anomaly noted by Medoff and Abraham (1980).

determinants of starting pay. Their importance fades over time with the company, however, as information about the employee's true productivity in the company is revealed (Leonard 1989).

Fixed-Effects Estimates of the Change in Pay

Wage rigidity is nearly everywhere held to be a sin, and unions the chief sinners. Executives commonly preach the virtues of wage flexibility, a sermon delivered with greatest fervor when profits and sales are falling. Of course, of all workers, executives presumably have the greatest investment in firm-specific human capital, and so should have more inelastic labor supply and more variable pay. At the same time, executive pay increases that might otherwise seem exorbitant are justified as efficient incentives in view of increased profits supposedly resulting from gain-sharing mechanisms.

In this section I report the results of a longitudinal analysis of changes in pay over time for a sample of 2,511 executives who maintained employment in the same occupations in the same firms from 1981 to 1985. There are 10,043 observations of pay change (about four per manager). Fixed effects estimates allow us to difference out the stable effects of unchanging omitted factors such as individual productivity or working conditions. Table 4 presents results of a regression of the annual change in the logarithm of pay on changes in corporate profits and sales,¹⁵

¹⁵ It is possible that the sales and profit measures used here measure with error some index of corporate performance, such as share price, that is more relevant to the reward of executives, and so underestimates the true elasticity of response. The estimated relationship between corporate earnings and stock returns is typically weak (Lev 1989). Also, part of corporate performance, however measured, is beyond executive control, and so should not affect executive pay. The independent variables are the change in the logarithm of billions of current dollars of corporate and unit sales, equity and assets, measured at the end of the most recent fiscal year. Because profits are often negative, the measure used here is the change in billions of dollars of profits, and the coefficient is not an elasticity.

Table 4. Change in the Logarithm of Executive Pay (Base + Bonus) as a Function of Firm Characteristics, 1982-1985.

Variable	Coefficient	(Standard Error)
<i>Change in Logarithm of:</i>		
Unit Sales	.028	(.003)
Corporate Sales	.122	(.011)
Equity	-.011	(.009)
Assets	-.011	(.010)
Employment	.003	(.009)
<i>Change in Profits</i>		
1982-1981	.043	(.003)
1983-1982	-.023	(.003)
1984-1983	.024	(.002)
Intercept	.075	(.057)
R ²	.196	
N	10,043	
SEE	.105	

Notes: Controls indicating employment in one of 119 companies and one of 137 occupations are also included. Estimated in a sample of executives who did not change occupation or employer.

and on sets of dichotomous variables controlling for company, occupation, and year. Pay includes bonuses, but does not include long-term incentives such as stock options, stock appreciation rights, or other long-term capital accumulation plans. For the 53% of sample executives eligible for such long-term incentives, compensation variability over time may well be understated.¹⁶

For most managers, pay (base plus bonus) is inflexible with respect to sales. The elasticities of executive pay (base plus bonus) with respect to unit sales and corporate sales are, respectively, .028 and .122. These are both significant but inelastic responses.¹⁷ A corporation that saw its sales fall by half could expect to see executive pay reduced by about 9%. Of course, if the value of stock rights were included in these calculations, the elasticities might be higher.

¹⁶ Murphy (1986) and Jensen and Murphy (1988) suggest this understatement is minor, and that inside stock holdings are of greater importance than stock options.

¹⁷ Over longer periods of time pay is more responsive to corporate performance, indicating longer and more complex lags in adjustment (Leonard 1989).

Executive pay appears to be more significantly linked to profits, although the effect is still modest. The elasticity is not directly estimated because profits are often negative. A corporation in which profits fall by \$157 million (1 standard deviation below the mean change) could expect to see executive pay reduced by about 2%. This yields a standardized Beta of .18, which is a modest response. The level of executive pay cannot be justified in terms of contingent pay schemes when such a small proportion of executive pay is so weakly contingent. The threat of opportunistic behavior by executives, who cannot be bound to the firm when a bad state (poor firm performance) occurs, may limit the use of contingent pay.

Executive pay shows other patterns that are puzzling if it is viewed as an incentive device. Absent other complications, pay that is supposed to elicit optimum performance should be linked most closely to the success of the corporate unit for which an executive is responsible. On the contrary, pay appears to be more significantly and strongly related to corporate sales than to unit sales. The stronger link with corporate sales may reflect equity norms that call for uniform corporate gain sharing. It may also be that unit performance measures are more subject than corporate measures to strategic manipulation or to measurement error, or that units have large potential negative spillovers.¹⁸ That sales are linked to pay even independently of profits may simply reflect the divergence of accounting profits from economic profits.

There are several theoretical reasons why contingent pay should be used more in high- than in low-level positions. Top executives have a more direct impact on corporate profits than do their subordinates. Given this connection, the CEO's

¹⁸ Alternatively, if pay contingent upon unit performance would provide outsiders with information about unit performance that management would prefer to keep confidential, the costs of such finely contingent contracts might exceed their benefits. However, neither the pay formulas necessary to infer unit performance nor the pay of lower-level executives need typically be disclosed.

performance is also more directly observable by outsiders. Since other firms may be willing to hire him based on his current firm's performance, his current firm will have to compensate him on the same basis to keep him. At lower levels, the potential for promotions within the company offers an alternative incentive mechanism not applicable to the CEO. Profit-sharing and share ownership embody the common problem of group piece-rate incentive schemes: the larger the group, the less manageable the free-rider problem. A tenth-level manager who shirks will have only a small effect on the company's profits, but will derive the full personal benefit of shirking. This free-rider problem generally extends to the co-supervision that group incentives are sometimes asserted to induce. For all these reasons, less contingent pay should be expected at lower levels in the corporate hierarchy than at higher levels.

That pattern is exactly what we observe. The estimated change in pay as a function of change in profits, with controls for employer, year, and changes in equity, assets, and employment, is .22, .18, .10, and .02, respectively, when estimated separately for the following levels of the hierarchy: (1) the CEO; (2) level 2 reporting to the CEO; (3) levels 3 and 4; and (4) all other levels. Replacing profits with sales growth in the above regressions yields estimated responses of .007, .003, .002, and .001. In regressions including both profits and sales, the same pattern obtains, although the effects are small: contingent pay is most important at the top, but even at the top it is a small effect.

The estimated response of pay to profits is conditional on changes in assets, equity, and total employment. None of these three variables has a strong or significant effect on pay. Neither changes in capital-labor ratios nor in scale significantly affect pay.

Over the five years studied, there was no significant realignment of occupational pay structure. Occupation dummies are insignificant jointly and singly. This finding is consistent, of course, with a policy by firms of maintaining fixed pay relation-

ships between occupations. Alternatively, it could be that the occupations are close substitutes or that they experience parallel shifts in supply and demand.¹⁹

Executives enjoyed real wage gains in each year. Deflated by the GNP implicit price deflator, real executive wages increased by 5.3, 1.4, 5.8, and 4.2 percent, respectively, in each year from 1982 to 1985. The last three changes very roughly parallel the growth of real GNP, but in 1982 real wages rose by 5.3 percent while real GNP fell by 2.5 percent. These executives have little reason to fear that either recession or inflation will dramatically cut their base plus bonus pay. Perhaps the supply of skilled executives has fallen relative to demand, leading to an increase in their pay relative to that of other workers.

The results described above pertain to a sample of managers who did not change employer or occupation between 1981 and 1985, but expanding the sample does not make much practical difference. When occupation indicators are dropped from the equation and the sample is extended to include managers who changed occupations, resulting in 49,627 observations of pay change (up to four observations per manager), even smaller responses to sales and profits are obtained. The elasticities of pay with respect to unit and company sales are then .004 and $-.005$, respectively. Both are significant. If firms enjoying great success were more likely to promote managers, then restricting the sample to those in the same occupation would underestimate responsiveness. These results do not support such a selection bias. Rather, promotion rates appear higher in firms suffering sales declines.

One might also suspect that growing firms hire more people into entry positions at lower pay, and that these low-

¹⁹ Of the 118 company effects estimated, 23 are significantly different from zero at the .05 level. Since only six effects could be expected to be significant at random, this result is evidence of significantly different trends in corporate pay, even after controlling for changes in profits, sales, and assets.

tenure, low-pay employees are the first to be let go in a downturn. The sample evidence does not suggest this type of selection bias either.²⁰ The mean pay of newly hired managers and that of departing managers are both equal to the mean pay of all managers in the same firm. This result holds true both in firms with sales gains and in those with sales declines.

A fundamental characteristic of incentive pay schemes is compensation that is an increasing function of desired performance. Although nonlinear compensation structures may well be optimal under certain conditions, compensation that falls with better performance cannot serve as an incentive for such performance. The data analyzed here show significant, although small, asymmetries in the response of pay to sales gains and losses. The elasticity of pay is .005 with respect to sales increases and $-.015$ with respect to sales losses. In other words, among firms with declining sales, pay gains are greater the greater the loss of sales. Both of these responses are quite small, although both are precisely measured and the difference is significant. Thus, in general, executive pay is not very responsive to sales changes; but to the extent that the two are linked, the relationship appears U-shaped, with bigger pay raises in firms with bigger sales losses. The response to profits shows a similar U-shaped pattern that is inconsistent with simple incentive models.

One possible explanation for the finding of higher executive pay in firms with high losses than in those with more moderate losses is that failing firms may need to pay a compensating differential to attract and retain skilled managers. Executives may discount future compensation more heavily when they consider employment with a failing firm, demanding a greater share of compensation in the form of current cash. Excessive executive pay raises may also reduce profits, which are measured net of compensation.

²⁰ Selection on the change rather than the level of pay might still lead to underestimation of the elasticity of pay offers with respect to sales, if managers who were offered the greatest pay cuts quit.

Managers' raises do depend somewhat on their employer's fortunes, but the response is not immediate. The relationship is smoothed over a number of years. F-tests fail to reject the joint significance of firm effects on pay changes in Table 4. Even after controlling for the past year's change in accounting measures of firm performance, 23 of the 118 firm effects are significantly different from zero at the .05 level. In part, these trends in the rate of change of pay at individual firms appear to be a response to long-run changes in firm performance.

First difference estimates such as the one in Table 4 emphasize transient elements, including noise. Here, over 80% of the variance in the change in wages remains unaccounted for, and only about half of the remaining variance is related to changes in corporate profits, sales, or assets. Although the portion of wage variance explained by those factors is high compared to the corresponding value in most wage change estimates, most executive pay changes are not driven by contemporaneous changes in observed corporate performance.

Bonus Pay Compared to Base Pay

Bonus pay that never changes is really just base pay under a different guise. Differences among the bonuses observed in this sample, however, persist far less than do differences in base pay. The correlation between firm effects on bonus pay in 1981 and in 1985 is .23. Thus, bonus pay in a given year provides only a negligible indication of what bonus pay will be a decade hence.

Still, autoregressions indicate that one-third of a given year's firm bonus effect carries forward into the next year. The stock market returns for 1981-85 give little reason to suppose that this carry-over reflects similarly persistent good corporate performance; a more plausible explanation is that smoothing is built into the bonus plans of executives (as, indeed, we know it is in at least some cases). Lags in adjustment are evident because an above-average increase in bonus in 1982 is

followed by below-average increases in bonus in each of the three succeeding years.

There are persistent differences across firms in their use and level of bonuses. In pooled regressions from 1981 to 1985, 302 of 438 company dummies are significant at the .01 level, even though changes in unit sales are controlled for. The elasticity of bonus pay with respect to unit sales is .022—a low value, but more than four times as high as the elasticity of base pay with respect to unit sales. Bonus pay is also far more variable over time than is base pay. For example, from 1984 to 1985 average base pay increased 5.6%, whereas bonus pay increased 64%. Although it is not strongly tied to unit performance, bonus pay is far more flexible over time than is base pay.

The Effect of Compensation Systems and Organizational Structure on Profits

The owners of a firm face a moral-hazard problem in attempting to elicit optimum performance from executives. In theory, one solution to this principal-agent problem is for the shareholders to sell the company to the risk-neutral managers. The moral-hazard problem may then be replicated at lower levels of the corporate hierarchy, but at the top it will have been collapsed. The closer the executive payout function is to that of shareholders, the more closely aligned executives' actions should be to those desired by shareholders. Both short-term bonus schemes and long-term incentive systems have been offered as approximations to such a solution. But such systems are not without problems. Not only do they increase the uncertainty of executives' earnings, but lower-level executives who are offered such plans in lieu of cash may suspect the offerers have inside information indicating a decline in the firm's success.

The apparently simple proposition that an incentive system that ameliorates the principal-agent problem creates greater incentives for executives to maximize

profits, and so increases profits, is not easily tested. First, consider tests that are at heart correlations of total executive compensation with earnings. By themselves, such correlations cannot reveal anything about the desirability or effectiveness of various compensation policies. In particular, from a correlation between high compensation and high profits, no causation can be inferred. If compensation is a function of profits, as incentive design suggests it should be, any accident that increases profits will increase compensation, producing a positive correlation between the two even if compensation systems have no direct effect on profits. Conversely, the absence of a correlation need not indicate the absence of desirable incentive effects. For example, suppose the executives capture all rents, and that corporate profits are measured net of compensation. In that case, even if an incentive system does produce greater gross profits, there will be no correlation between net profits and compensation.²¹

These difficulties suggest that a more fruitful approach is to test whether the presence or absence of certain incentive structures (rather than the level of pay) is associated with higher profits. Of course, such a test cannot be made using a sample with homogeneous firms and executives; a profit-enhancing mechanism is, in that case, adopted by all, leaving no testable variation. Under such conditions we must suspect the assumption that all relevant unobservable conditions are identical when we observe a non-adopter. In the present case, it is necessary to model the underlying heterogeneity of the firms sampled. Any heterogeneity that makes adoption of long-term incentives profitable for only some firms may also independently cause differences in profits. The omitted vari-

²¹ Replacing profits with returns on equity in the above argument leaves other problems. The expected impact of any policy on future earnings streams should be capitalized in current share prices. Risk-adjusted returns on equity (at market rather than book value) should be arbitrated to equality. Differences in returns on equity (at market value) are then due to noise or to news that has not yet been capitalized.

able may cause both profits and the adoption of an incentive structure, yielding correlation without causation between the two.

Consider next the innovation model, in which long-term incentive plans are desirable, but diffuse slowly across employers. Slow adopters might be slow in other ways (low ability), leading to overstatement of the effects of the incentive plan itself.

Yet another kind of test with difficulties is a study of changers—a before and after test of those who switch compensation systems. Such an approach is prone to all the criticisms above and one more. Executives with inside information that corporate profits are about to jump should be eager to adopt bonus or incentive plans. Observing *ex-post* that adoption of such plans is correlated with increases in profits may then tell us no more than that executives timed adoption to take advantage of inside information.

There are also non-trivial problems of incentive mechanism design, as well as a number of puzzles raised by the nature of actual incentive systems currently in use. Commonly observed bonus and incentive plans make pay a function of (a) sales, (b) earnings, (c) market share, or (d) share value. The last criterion is rare (nonexistent?) in bonus plans, but common in long-term incentive plans. Systems based on such indicators of corporate performance have a number of undesirable properties. Two of them (those based on “a” or “c”) are subject to profit-decreasing manipulation by lowering output price. Three (those based on a, b, or d) reward executives for nominal changes such as inflation, particularly if the reward schedule is concave; they reflect industry- or economy-wide shifts outside the executives’ control. Systems based on “a” or “b” (or, indirectly, “d”) are also subject to accounting manipulation. Concavities in reward structure create incentives for bunching in time sales or earnings.²²

²² If the return to market share is concave, an incentive is also created for collusion. Executives of two competing firms would then stand to gain by

Finally, share price is a very noisy measure of corporate performance.

An alternative mechanism free from some of these defects ties executive compensation to excess returns measured in a Capital Asset Pricing Model. This mechanism has several virtues: it rewards real rather than nominal improvements; it filters out general increases in the market index and, presumably, economy- and industry-wide changes outside the executive’s control; it rewards relative rather than absolute performance; and it is not as subject to strategic manipulation as are the other mechanisms.

If such an incentive mechanism has so many advantages, the interesting question is why no firms have adopted it.²³ Clearly, the excess returns are noisy measures of success, and depend on the appropriateness of the underlying CAPM model. These excess returns are not as easy for an executive to verify as are sales or earnings results. Paying bonuses to the executives of a company that is dying, but dying more slowly than expected or more slowly than its competitors, may be desirable *ex ante* for an incentive structure, but may be difficult to explain to shareholders *ex post*. Furthermore, executives could limit their company-specific risk by selling options in their own company, or buying their competitors’ options, thereby undoing the incentive system.²⁴

The use of both short-term bonuses and long-term capital incentives increased over time in the cross-sections studied here, reaching near universal coverage by 1985. Between 1981 and 1985 the proportion of sampled corporations using bonus systems increased from 95.6% to 98.3%, and the proportion of those using long-term incentive systems increased from 91.8% to

taking turns serving the entire market, rather than splitting it evenly each year.

²³ Some function of the variables commonly observed in incentive pay schemes might approximate excess returns in the CAPM.

²⁴ Furthermore, it is not clear that excess returns are the proper measure of corporate success. Corporate restructuring allows strategic manipulation of the correlation between firm and market performance.

97.2%. The increasing and near-universal use of such plans makes a *prima facie* case for their desirability.²⁵ It also leaves only a small number of non-adopters for tests of the plans' impact on firm performance.

Firms implementing a bonus system have significantly higher average return on equity than do firms without bonus systems (Table 5). Firms with long-term incentive plans have a lower average return on equity (ROE). The degree of hierarchical structure is not significantly correlated with average ROE. These findings are based on regressions for 80 companies of ROE on dummy variables indicating the presence of a long-term incentive plan or a bonus plan, an index of the number of levels of hierarchy per 100 employees, indicators for other personnel practices, and vectors of dichotomous variables for companies' 2-digit industry codes.

An additional test is provided by examining changes in ROE over time within firms. On average, ROE fell in sample firms between 1981 and 1985. The presence of a bonus system did not significantly affect this result; but ROE declined significantly less in firms with long-term incentive plans and more hierarchical structure.

These results are subject to many of the criticisms noted above. Overall, they present a mixed picture of the impact of long-term incentives, bonuses, and hierarchy on corporate success. Bonuses are associated with higher average ROE, but have no significant effect on changes in ROE. Firms with long-term incentive plans and more hierarchy average lower ROE, but their ROE falls significantly less from 1981 to 1985. The early 1980s appear to have been poor years for such firms. The results on change in ROE may be more persuasive, because unchanging differences across firms are differenced out. Long-term incentives and hierarchy may both serve useful purposes.

²⁵ I have ignored possible tax and misinformation advantages of long-term incentives. The costs of long-term incentives are much less obvious to shareholders than are immediate cash payments, both because accounting rules do not in general value such options correctly and because payment is often ultimately made in the form of share dilution.

Table 5. Corporate Performance, 1981–1985, in Relation to Compensation Policies and Internal Organization.

<i>Variable</i>	<i>Mean ROE</i>	<i>Change in ROE</i>
Long-Term Incentives	-.34 (.06)	2.38 (.29)
Bonus Pay Policy	.18 (.06)	.38 (.28)
Hierarchy	-.10 (.10)	1.38 (.50)
Promotion Rate	.06 (.09)	-.53 (.44)
Exit Rate	.19 (.08)	.20 (.38)
Steepness of Pay Profile	.10 (.32)	.36 (1.53)
Mean Pay	.01 (.03)	.16 (.16)
Standard Deviation of Pay	.29 (.16)	-.98 (.78)
R ²	.70	.73
SEE	.064	.316
Mean of the Dependent Variable	.138	-.113

Notes: N = 80. Standard errors in parentheses. Both equations also control for 20 approximate 2-digit industry groups. Only corporations reporting data for all 5 years are included. Long-Term Incentives and Bonus Pay are dummies indicating use of these policies in 1981. The hierarchy index is measured as the number of levels of management in the firm's longest chain, divided by the number of employees in hundreds, with mean .10 and standard deviation .14. Promotion Rate (mean = .13) is the proportion of 1981 managers with the firm in a higher position by 1985. Exit rate (mean = .56) is the proportion of 1981 incumbents departing the sample by 1985. Steepness (mean = 1.11) is the ratio of mean pay in levels 1 and 2 to mean pay in levels 5 and 6 in 1981. The mean and standard deviation of pay are for all managers in 1981.

Corporate Performance, Pay Equity, and Tournaments

What impact does internal pay structure have on firm performance? In the absence of much systematic evidence, a number of conflicting theories have been advanced. Some assert that reducing pay differentials improves employee morale and cooperation and leads to greater productivity. The opposite effect is claimed by those who assert that the positive incentive effects of pay differentials—including the inducement of both effort and self-selection—dominate.

The regressions in Table 5 show how the level of and change in ROE vary as a function of the variance of managerial pay, the steepness of the managerial pay hierarchy, and the promotion rate. Again, such tests rely heavily on the *ceteris paribus* assumption. The data reveal no strong association between managerial pay equity and corporate performance. There is no significant correlation between the variance of managerial pay within a firm and the firm's subsequent change in ROE.

There is some evidence consistent with a tournament or lottery view of executive compensation. In such models, high pay in top executive positions is used to motivate lower-level executives to compete for promotions. The expected value to executives of such a scheme can be maintained if the pay differential across levels narrows while promotion probabilities increase.

Steeper pay differentials are indeed associated with lower promotion rates. (See Table 6.) The promotion rate is measured as the proportion of level 5 and 6 managers in 1981 staying with the company through 1985 who reached a higher level by 1985. The steepness of the pay hierarchy in 1981 is given by the ratio of mean pay in levels 1 and 2 to mean pay in levels 5 and 6. The correlation between

Table 6. Steepness of Pay Profile in Relation to Promotion and Exit Rates and Within-Level Pay Variance.

Variable	Coefficient	(Standard Error)
Promotion Rate	-.073	(.025)
Exit Rate, levels 1+2	-.010	(.017)
Exit Rate, levels 5+6	-.029	(.023)
Standard Deviation of Pay, levels 5+6	-.0003	(.048)
Intercept	1.16	(.025)
R ²	.11	
N	80	
SES	.034	
Mean of the Dependent Variable	1.11	

Note: Dependent Variable is ratio of mean pay in levels 1 and 2 to mean pay in levels 5 and 6 in 1981. The Promotion Rate (Mean = .20) is the proportion of 1981 level 5 and 6 managers with the firm in a higher level by 1985. Exit Rates are the proportion of 1981 incumbents departing the sample by 1985.

these two variables across firms is significantly negative.

Desire for pay equity within a managerial level is apparently not a great enough constraint to force the use of promotions across levels as a substitute for pay increases within each level. The variance of pay in levels 5 and 6 in 1981 is uncorrelated with the subsequent promotion rate out of these levels. Mean pay is also uncorrelated with the promotion rate. If both promotion rates and relative mean pay are stable over time, this suggests few managers are willing to accept better promotion possibilities as a substitute for current pay.

Conclusion

The impact of incentive mechanisms on executives' performance is likely to be important, particularly at the highest executive levels, where individual output is crucial to the success of the firm but nonstandard. This paper has analyzed new data on pay for executives ranging from CEO to foreman at a few hundred major U.S. corporations from 1981 to 1985. The major findings include the following:

Executive pay (base plus bonus) is widely dispersed across firms, but not much more so than for many production workers. Although firm effects persist, they account unambiguously for only 8% of individual pay variance.

Pay is strongly hierarchically determined. Level in the corporate hierarchy is the single most important correlate of executive pay. Consistent with tournament theory, pay differentials between ranks are greater higher up the ladder, and are also greater the lower the promotion rate. Managers in more hierarchically structured organizations are paid more than those in flat organizations: executives whose subordinates are more hierarchically ranked earn up to a 60% pay premium over those in flat organizations. Hierarchical structure is also associated with greater growth in ROE.

Human capital and individual performance affect pay primarily by affecting

the allocation of individuals to jobs, rather than by affecting pay within each position. This finding is evidence of extensive sorting of people into positions. There is considerable turnover at every executive level, and pure promote-from-within systems are rare. One-fifth of the top executives in the sample for this study had been with their current company less than five years.

The odds of eventual employment in the highest ranks are higher for executives who do not lock themselves into one corporation early in their careers. Bonus pay should be particularly useful as an incentive for those left behind who remain stuck in the same position in the same company. The best managers are promoted out; those who remain for long periods in the same position suffer slower wage growth.

Accounting measures of corporate success are not significantly related to the level of, or degree of equity in, executive pay, or to the steepness of pay differentials across executive ranks. Corporations appear able to succeed with a variety of internal pay and promotion practices.

Most executive pay (base plus bonus) changes are unrelated to contemporaneous changes in company performance. The base and bonus pay of managers responds hardly at all to changes in

corporate sales or profits, or to unit sales. The elasticity of pay with respect to corporate sales is only .122. Bonuses are smoothed over time, but they are far more variable over time than is base pay.

Higher-level executives are more likely to be motivated by contingent pay than by promotion. Because higher-level executives are also more directly responsible for corporate success, and less affected by free-rider problems, their pay is more heavily contingent upon corporate performance. The relationship of pay to corporate performance is U-shaped: executive pay is higher in successful than in failing companies, but among failing companies it is higher in those with heavy losses than in those with small losses. This pattern, which may reflect the difficulty of retaining skilled managers in a firm with poor prospects, is not compatible with the usual description of pay as an incentive device that rewards superior corporate performance.

As for whether long-term incentive plans are in the shareholders' best interests, the evidence of this study suggests that firms with such plans enjoyed significantly greater increases in ROE during the 1980s than did other firms. By 1985, such plans had been nearly universally adopted by large corporations, along with bonus pay plans.

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