Institutional Investors and Executive Compensation

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ABSTRACT

We find that institutional ownership concentration is positively related to the pay-for-performance sensitivity of executive compensation and negatively related to the level of compensation, even after controlling for firm size, industry, investment opportunities, and performance. These results suggest that the institutions serve a monitoring role in mitigating the agency problem between shareholders and managers. Additionally, we find that clientele effects exist among institutions for firms with certain compensation structures, suggesting that institutions also influence compensation structures through their preferences.

WHILE INSTITUTIONS' OWNERSHIP OF CORPORATIONS has grown over the last few decades, their importance in monitoring corporate behavior is still unknown. In this study, we examine whether institutional investors influence corporate governance by studying the relation between institutional ownership and the compensation of firms' executives. Both practitioners and theoreticians have suggested a relation between institutional ownership and executive compensation. Incentive effects vary with different forms of compensation (e.g., Holmstrom (1979) and Shavell (1979)), and public fund managers have often voiced their opinions that managerial compensation should be linked to corporate performance (e.g., Smith (1996) and Gillan and Starks (2000)). Public institutions are not the only entities expressing an interest in corporate governance—there are indications that other types of institutional investors are also becoming involved.[1]

[1] See, for example, Sullivan (1995) or Useem (1996).

We measure the influence of institutional investors through their ownership concentration in firms: either the share of institutional ownership due to the five largest holders or a Herfindahl index of institutional fractional holdings. We find a strong positive relation between each of these measures of institutional concentration and the pay-for-performance sensitivity of managerial compensation. The positive relation is robust to a wide variety of alternate specifications, including varying measures of incentive compensation. For an average executive, an increase of one standard deviation in the percentage of institutional shareholdings by the top five institutional investors is associated with (1) an estimated 20% increase in option-grant sensitivity to stock price changes, and (2) a greater than 20% increase in the sensitivity of changes in total compensation to changes in shareholder wealth.

We also find that institutional-investor concentration has a negative relation to the level of executive compensation. That is, firms with a higher concentration of institutional investors have lower managerial compensation after controlling for firm size, industry, investment opportunities, and recent performance. Again, our estimates imply that an increase of one standard deviation in the percentage of institutional shareholdings by the top five institutional investors is associated with a drop in salary equal to 12% of the sample mean, and a drop in total compensation equal to 19% of the sample mean.

These results provide support for the hypothesis that institutional investors influence executive compensation structures. A potential alternative interpretation of these findings, however, is that both monitoring by institutional investors and managerial incentive compensation arise simultaneously and endogenously. Theoretical research suggests that the two could coexist because of a needed interaction between the monitoring of managers and incentive compensation. Holmstrom and Tirole (1993), Burkart, Gromb, and Panunzi (1997), and Chidambaran and John (1999) show such interrelations, where the monitoring is by the stock market, outside equity holders, and institutional investors, respectively. For a given firm, the relation between the two mechanisms (monitoring and incentive pay) should depend on their benefits and costs. While monitoring by outside shareholders such as institutional investors can be beneficial (Shleifer and Vishny (1986) and Huddart (1993)), it is also costly. Such monitoring requires independent sources of information concerning managerial actions; there are also potential liquidity costs (Coffee (1991), Bhide (1994), Kahn and Winton (1998), Maug (1998), and Noe (2002)) and free-rider problems with other shareholders (Grossman and Hart (1980)).[2] Similarly, while incentive compensation better aligns managers' and stockholders' interests, the incentive structure imposes a cost on shareholders. Incentive compensation typically imposes excessive risk on managers, requiring that they be paid more than would otherwise be

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[2] Activist blockholders differ from institutional investors in that they purchase large positions in firms with the clear intent of influencing the decision making. Gorton and Kahl (1999) point out differences between the monitoring incentives and abilities of large blockholders (that are not institutions) and institutional investors with large positions in a firm. Bethel, Liebiskind, and Opler (1998) provide empirical evidence on the effects of these blockholders.

optimal. These cost–benefit considerations imply that the two mechanisms, monitoring by institutional investors and incentive compensation, would be employed in concert by many firms.

To disentangle these two explanations for our findings, we examine the timing of both the institutional influence and the incentive compensation. We find that changes in institutional concentration are related to subsequent changes in incentive compensation, but that the reverse relation is not true; that is, we do not find that changes in pay-for-performance sensitivity predict long-run changes in institutional concentration. These results show that the relation is not simply driven by concurrent increases in both measures, providing support for the hypothesis that institutional investors influence the structure of executive compensation in a firm.

While we find a positive relation between institutional ownership and incentive compensation (on average), we expect some heterogeneity in the strength (and possibly direction) of the correlation across firms. Because the costs and benefits of each mechanism can differ across firms, firms will vary in their use of these mechanisms. To examine these variations, we document differences in characteristics for firms that use one of the mechanisms extensively and the other hardly at all. That is, we focus on firms with high institutional presence and low pay-for-performance sensitivity versus firms with low institutional presence and high pay-for-performance sensitivity. We find large differences between these two groups of firms, suggesting the existence of cases in which the cost-benefit trade-off is such that only one of the mechanisms is employed.

Institutional investors could also influence firms indirectly through their preferences and trading. That is, firms may adopt compensation structures preferred by some investors, for example, structures with greater pay-for-performance sensitivity, in order to attract them as shareholders. Consistent with this hypothesis, we find a significantly positive relation between the percentage of shares held by all institutional owners of the firm and the pay-for-performance sensitivity of the executive compensation. To determine whether these apparent clientele results could be due to simultaneous increasing trends in institutional ownership and incentive compensation rather than institutional preferences, we employ an instrumental variable approach.[3] Using turnover as the instrumental variable for institutional ownership provides equivalent results, suggesting that endogeneity is not driving the clientele effects. Further, we find similar results when we conduct annual, cross-sectional tests that do not depend on time series data. (Clay (2000) provides an alternate approach to examining clientele effects between compensation and institutional ownership.)

In the next section we describe our data. We examine the relation between institutional ownership concentration and the pay-for-performance sensitivity of

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[3] Although simultaneous increasing trends in institutional ownership and incentive compensation trends could affect the relation between compensation and total institutional ownership, they should not pose a potential problem for our results on the relation between compensation and concentration of institutional ownership. With concentration of ownership, any increasing trends would have an inverse effect, thus, dampening results.

compensation in Section II and the relation between the concentration and level of compensation in Section III. We consider the effects of firm characteristics in Section IV and clientele effects in Section V. Our conclusions are provided in Section VI.

I. Data

We form our sample by selecting the 1,914 firms included on the Standard & Poor's ExecuComp database from 1992 through 1997. The database covers roughly 1,500 firms per year, including the 500 firms in the S&P 500 Index, the 400 firms in the S&P Midcap Index, and the 600 firms in the S&P Smallcap Index. We retrieve compensation package details for up to five top executives in each firm, including each one's salary, bonus, long-term incentive plan payouts, stock and option grants, and other compensation reported by the firms in their proxy statements.[4] Although option grant data is available in 1992 from firms that voluntarily provided it, it is only available for all firms in the database after 1992 due to an SEC change in proxy disclosure rules.

A. Measures of Compensation

We employ several different measures of the structure of managerial compensation. First, we use the level of pay, where pay is alternatively defined as salary and total direct compensation. (Total direct compensation consists of the sum of salary, bonus, option and stock grants, long-term incentive plan payouts, and other compensation.) Second, we assess pay-for-performance sensitivity through three measures. We employ a measure of sensitivity of pay to performance by focusing solely on the options granted to managers: The sensitivity of the value of option grants to changes in stock price. We also use two measures of changes in compensation: (1) the change in cash compensation (salary plus bonus) and (2) the change in total direct compensation.[5]

None of these measures considers the change in compensation that managers derive from an increase or decrease in the value of the stocks and options they already hold. Whether the consequence of this exclusion is an underestimation of the managers' true pay-for-performance sensitivity depends upon the managers' activities with respect to their personal portfolios. Recent evidence suggests that these activities may substantially alter the pay-for-performance sensitivity of managers' current holdings. For example, Ofek and Yermack (2000) report evidence that managers alter their portfolios in response to the composition of their pay packages. Similarly, Bettis, Bizjak, and Lemmon (2001) provide evidence that managers counteract the effects of existing holdings through hedging transactions. For their sample of corporate insiders, zero-cost collars and equity swaps cover over a third of the insiders' equity holdings.

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[4] The determination of the number of executives is based on the number of executives that the firm lists in their proxy statement. Some firms list less than five.

[5] We use several measures of compensation in the tests because of the differences across them. In particular, total direct compensation is not simply a monotonic increase over salary plus bonus. There is a 55% correlation between the two measures.

Given the difficulty of controlling for managers' activities, using current compensation has the advantage of measuring only the compensation components over which the board of directors has direct control. Our interest is in the potential influence institutional investors have on executive compensation, rather than an analysis of the optimal managerial ownership dynamics. Since any institutional investor influence, whether direct or indirect, would presumably come through the board's decisions, current compensation measures are more appropriate for our tests. The board has limited control (e.g., through vesting and trading restrictions) over the amount of stock and options executives choose to retain in their portfolios, control that may be only partially effective as evidenced by the Ofek and Yermack (2000) and Bettis et al. (2001) results. The use of current compensation is further justified by Core and Guay (1999), who conclude that firms use flow of equity incentives to reward past performance and to reoptimize incentives for future performance.

B. Measures of Institutional Influence

For every firm on the ExecuComp database, we obtain institutional equity holdings for each year between December 1991 and December 1996 from the CDA Spectrum database. CDA Spectrum derives these holdings from institutional investors' 13-f filings. (Institutional investors with more than $100 million in equities must report their equity ownership to the SEC in quarterly 13-f filings.) Institutions file their holdings as the aggregate for their firm, regardless of how many individual fund portfolios they have. USAA mutual funds, for example, files one report even though it has over 30 different mutual funds under management.

Since institutional investors would be expected to have more influence when they are larger shareholders (e.g., Shleifer and Vishny (1986)) and when they have allies in the form of other shareholders (e.g., Black (1992)), we measure institutional investor influence through the concentration of institutional ownership. Our primary measure is the proportion of the institutional investor ownership accounted for by the top five institutional investors in the firm. Our second measure is a Herfindahl Index of institutional investor ownership concentration. For every year in our sample, we calculate each firm's Herfindahl Index of institutional ownership concentration. Because of large outliers in the distribution of this statistic across firms, we divide the calculated indices into quartiles.[6]

In addition to the data on executive compensation and institutional investor ownership, we employ stock returns, stock-return volatilities, and dividend yields from the Center for Research in Securities Prices (CRSP), and details on assets and liabilities from COMPUSTAT. To be included in the final sample, a firm must have data available from all four sources for a given year. This requirement results in a sample of 36,352 firm-executive-year observations.

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[6] Our results are robust to alternative categorizations of the institutional Herfindahl index—we also divided by the median and by deciles.

Descriptive statistics on the principal variables of interest are given in Table I. Panel A provides information on firm characteristics and Panel B on institutional holdings. As can be seen from the table, the sample consists of a range of firms with an average market capitalization of $3.5 billion, but a median of $869 million. The average executive's total direct compensation is $1.25 million. Of this amount, salary plus bonus averages $525,970. Reflecting the high stock market returns during the 1990s sample period, the average annual return is 21.8% and the average annual change in total shareholder wealth is $571 million, although there were also firms that performed very poorly. The 10th-percentile return is -23.1%.

Panel B shows that institutional investors have large interests in the sample firms. Average aggregate institutional holdings are 53.1% of shares outstanding. In fact, the firm at the 10th percentile has institutional holdings of 25.4%, indicating that our sample in general has substantial institutional interest. There is also significant concentration of institutional investors; the average holdings of the

Table I

Summary Statistics

This table reports the sample statistics for the principal variables. Panel A shows the firm characteristics over the 1992 to 1997 time period and Panel B shows the institutional investor holdings over the 1991 to 1996 time period (in the empirical tests, institutional holdings are lagged by one year). We define *Market capitalization* as the number of shares outstanding times the price at the beginning of the year, *Cash compensation* as the manager's salary plus bonus for the year, and *Total direct compensation* as the sum of the manager's salary, bonus, stock and option grants, and other compensation. We define Δ*(Shareholder wealth$_t$)* as the change in value of the shares outstanding times stock price from period $t-1$ to period t. Both *Total institutional holdings* and the *Holdings of the top five institutions* are calculated as the shares held by 13-f institutional investors (all or the five largest, respectively) divided by the total number of shares outstanding. The *Herfindahl Index of institutional concentration* is calculated based on the percentages of institutional holdings by all 13-f institutions.

Variable	Mean	Median	Std. Dev.	10%	90%
Panel A: Firm Characteristics					
Market capitalization ($MM)	3,476.93	869.91	9,477.30	155.78	7,469.07
Cash compensation (Salary + bonus, $K)	525.97	361.85	813.66	155.17	1,000.00
Total direct compensation ($K)	1,250.16	645.03	2,910.64	215.97	2,540.77
Return	21.8%	15.7%	49.3%	-23.1%	69.2%
Δ*(Shareholder wealth)* ($MM)	570.74	99.11	2,762.85	-186.32	1,363.37
Panel B: Institutional Investor Holdings					
Holdings as a % of shares outstanding					
Total institutional holdings	53.1%	54.8%	19.4%	25.4%	77.3%
Holdings of top five institutions	22.3	21.5	9.7	10.6	34.3
Holdings of top five institutions *(as % of institutional holdings)*	44.0	42.1	14.6	26.5	64.4
Herfindahl Index of institutional holdings	.0193	.0145	.0292	.0038	.0351

top five institutional investors in a firm is 22% of the outstanding shares and 44% of the aggregate institutional holdings. Panel B also shows the descriptive statistics for the raw Herfindahl Index of institutional holdings.[7]

II. Institutional Investor Influence and Pay-for-Performance Sensitivity

In this section, we examine the relation between institutional investor influence and the pay-for-performance sensitivity of executive compensation. We first examine this relation using the sensitivity reflected in option grants and then by using the sensitivity reflected in salary and bonus, and in total direct compensation.

Previous research has found systematic differences in institutional investment across characteristics of the firm such as size (Sias and Starks (1997) and Gompers and Metrick (2001)) and performance (Nofsinger and Sias (1999)). Similarly, there is evidence of a relation between managerial compensation and these variables. For example, Baker, Jensen, and Murphy (1988) document that larger firms (in terms of net sales) have higher paid executives, although Murphy (1998) shows that the explanatory power of firm sales has declined over time. Smith and Watts (1992) find systematic differences in managerial compensation across size, performance, and a firm's growth opportunities (among other variables). They hypothesize that because it is more difficult to observe managers' actions in firms with more growth options, those firms will be more likely to employ incentive plans. Using recent data, Harvey and Shrieves (2001) also document a strong relation between growth opportunities and the presence of incentive compensation.

Given the evidence of systematic relations between various firm characteristics and executive compensation or institutional investor ownership, we control for these characteristics in our regressions. Our reported measure of firm size is market capitalization, but we also employed net sales and total assets in our tests with no change in results. Using Tobin's q ratio, we control for the presence of growth opportunities, and to the extent that Tobin's q captures expected performance of the firm, we control for that as well.[8] We use industry dummy variables not only to control for pay similarities within industries, but also for any preferences institutional investors have for particular industries. (The industry dummies can be thought of as fixed effects at the industry level.) Year dummy variables allow both pay-for-performance sensitivity and changes in pay to vary year by year. Finally, we employ a CEO dummy variable, equal to one if the executive is the CEO, and zero otherwise, to control for differences in the effects of pay-for-performance sensitivity for CEOs versus the other top executives of the firm.[9]

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[7] The Herfindahl quartile breakdowns are as follows: The top quartile runs from a Herfindahl of 0.02394 to the sample max of 0.714878. Quartile 3 is [0.01452, 0.023926]. Quartile 2 is [0.007675, 0.014517]. Quartile 1 is [1.68e-07, 0.007673].

[8] Using COMPUSTAT as our data source, we calculate Tobin's q as the sum of the market value of equity and the book value of debt (defined as the difference between the book value of assets and the book value of equity), divided by book value of assets.

[9] In some cases, ExecuComp does not designate which of the executives is the CEO. In this case, we assume the executive with the highest base salary is the CEO.

A. Option-Grant Sensitivity

We focus on stock option grants in isolation for several reasons. First, they have become an increasingly important component of executive pay. In fact, Murphy (1998) states that in the 1990s, stock options replaced base salaries as the single largest component of compensation. Second, analyzing the option grants independently is important because of the increasing interest by institutional investors in firms' option compensation. Thus, if institutional investor influence exists, one would expect it to be most prominent in this component of pay. A third reason to examine option grants separately is that option-grant sensitivity is an ex ante measure, in contrast to ex post pay-for-performance sensitivity regressions based on other forms of compensation. Option-grant sensitivity can be directly calculated using observed option-grant data and is not subject to the noise inherent in using slope coefficients as sensitivity estimates.

To calculate each executive's option-grant sensitivity, we use the methodology suggested by Yermack (1995). First, we calculate the delta of every option grant, $\partial C/\partial P$ (where C is the value of the call option and P is the price of the stock), by using the Black–Scholes model modified for dividends. We then multiply the delta of the options by the number of options granted and divide by the number of shares outstanding at the beginning of the year. Since this number is the sensitivity of the option grant per dollar change in share value, we then multiply it by 1,000, which gives the familiar dollar change in managerial wealth per $1,000 change in shareholder wealth. For years in which executives receive multiple option grants, the sensitivities are aggregated within each year for each manager. We find that the average option-grant sensitivity for our sample is $0.977 per $1,000, with a median of $0.170 and a standard deviation of $3.147. While these are much higher than Yermack's mean and median of $0.59 and $0.07, the difference is consistent with the increasing role of options in compensation throughout the 1990s.[10]

To analyze the relation between option-grant sensitivity and institutional investor influence, we employ a Tobit model. Such a model is necessary because many firms do not pay their managers with stock options, and even those firms that do use options do not necessarily grant them every year. The model we test is as follows:

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\begin{aligned}
\Delta(\text{value of options granted per \$1000 in shareholder} \\
\text{wealth})_{it} = {} & \beta_1 \Delta(\text{shareholder wealth})_{it-1} \\
& + \beta_2 \Delta(\text{shareholder wealth})_{it} \\
& + \beta_3 (\text{institutional ownership concentration}_{it-1}) \\
& + \Sigma \beta_k (\text{control variables}_{it}) \\
& + \Sigma \beta_y \text{ year dummy variables}_t,
\end{aligned}
\tag{1}
$$

where the concentration of institutional ownership is measured by either the percentage of institutional ownership owned by the five largest holders or the

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[10] Yermack's sample ends in 1991.

Herfindahl Index of institutional ownership. The control variables are total institutional ownership, Tobin's q ratio, market capitalization, a dummy variable equal to one for each firm's CEO, industry-level dummy variables equal to one for the two-digit SIC in which the firm operates, and year dummies equal to one if the observation was for the given year. We use the level and concentration of institutional ownership for the *prior* period because of our interest in the institutions' influence. Tobin's q ratio and market capitalization are similarly lagged.

Our primary coefficient of interest in equation (1) is the coefficient on institutional ownership concentration, β_3. If institutions prefer a steeper relation between pay and shareholder wealth and if concentrated institutional ownership affects the sensitivity of option grants to stock price, then we would expect a positive sign for this coefficient. This then is our alternative hypothesis, with a null hypothesis that institutions do not influence option compensation or do not prefer stronger incentives (i.e., $\beta_3 = 0$). Another possible interpretation of this null hypothesis is that firms do not simultaneously have in place both strong institutional monitoring and incentive-laden compensation (e.g., they are substitute mechanisms).[11]

The results of the Tobit regressions, provided in Table II, show the concentration of institutional holdings is important in explaining option-grant pay-for-performance sensitivity. Models (1) and (2) show the results hold whether concentration is measured from the top five institutions' holdings or from the institutional Herfindahl quartile. Model (3) shows the result holds when aggregating across executives in a firm, which prevents potential problems due to correlations across executives within a firm. The consistency of our results across the three models demonstrates that our results are not driven by standard errors that are too small. The evidence of the significant relation between compensation structure and institutional concentration supports the hypothesis that institutional ownership can serve as a monitoring device that affects the structure of executive compensation.

The results of Table II provide evidence that the effects of institutional investor influence are relatively large compared to the average option-grant sensitivity in our sample. Model (1) implies that a one-standard-deviation increase in the percentage of institutional shareholdings by the top five institutional investors is associated with an increase in option sensitivity of $0.198 per $1,000 ($= 1.358 \times 0.146$). This is a 20% increase in sensitivity for an executive with the average option-grant sensitivity.

Table II also shows that option-grant sensitivity is positively related to Tobin's q ratio. Smith and Watts (1992) argue that firms with greater growth opportunities should have more incentive pay. In support of this argument, they find that industries with higher average Tobin's q ratios have greater proportions of firms with

[11] Prior research has found evidence or argued that these types of monitoring mechanisms are substitutes. For example, Pound (1992) suggests that different monitoring mechanisms change to substitute for each other when one mechanism, such as the takeover market, begins to wane. Providing an example of substitutes for incentive compensation, Hartzell (2002) shows that the threat of termination and career concerns act as substitutes for the incentives provided by pay for performance.

Tobit Analysis of Pay-for-Performance Sensitivity of Option Grants as a Function of Institutional Influence

This table shows the coefficients from a regression of the change in the value of options granted a manager per a \$1,000 change in shareholder wealth against the lagged change and change in shareholder's wealth, and percentage holdings of institutions filing 13-f reports, holdings of top five institutions as a percent of institutional holdings and controls for firm size (market capitalization), and Tobin's q ratio. Further control variables are a CEO dummy that equals one if the executive is CEO, and zero otherwise, and a series of control dummies for the firm's two-digit SIC industry and for time. (The coefficients for the latter variables are not shown in the table.) Models (1) and (2) employ separate observations for each executive. Model (3) sums across the executives for a single firm and Model (4) shows the averages of the coefficients from annual regressions. For each model, t-statistics are provided in parentheses. One, two, and three asterisks denote significance at the 0.10, 0.05, and 0.01 levels, respectively. Dependent variable: Δ *in Value of Options Granted per \$1,000 Δ in Shareholder Wealth.*

Independent Variable	(1)	(2)	(3)	(4)
$\Delta(Shareholder\ wealth_t)$	7.210	9.420	22.300	−2.290
	(0.85)	(1.10)	(0.36)	(0.27)
$\Delta(Shareholder\ wealth_{t-1})$	1.410	9.350	18.900	3.700
	(0.12)	(0.76)	(0.22)	(0.13)
Top Five/Total Institutional Ownership$_{t-1}$	1.358***		10.672***	1.329
	(8.42)		(9.57)	(3.70)
Institutional Herfindahl Quartile$_{t-1}$		0.161***		
		(5.98)		
Total Institutional Ownership$_{t-1}$	0.799***	−0.268*	2.524***	0.832
	(6.53)	(−1.73)	(2.97)	(3.07)
Tobin's q$_{t-1}$	0.066***	0.057***	0.430***	0.060
	(4.05)	(3.38)	(3.86)	(1.59)
Market Capitalization$_{t-1}$	−10.600***	−15.500***	−76.100***	−11.690
	(−2.65)	(3.80)	(−2.61)	(−1.20)
CEO Dummy$_t$	1.380***	1.355***		1.386
	(28.75)	(27.23)		(13.23)
Number of observations	33,928	31,299	6,934	6,786

option plans. However, inconsistent with our results and those of Smith and Watts, Yermack (1995) finds a significantly *negative* relation between CEO option-grant sensitivity and Tobin's q ratio.

To test the robustness of our results, we estimate annual cross-sectional regressions. For four out of the five annual cross-sectional regressions, we find that the pay-for-performance sensitivity of the option grants is significantly related to the concentration of institutional ownership, indicating that our results are not driven by common trends.[12] Model (4) of Table II shows the averages of the

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[12] Assuming a two-tailed test of the hypothesis, the relation between option-grant sensitivity and institutional ownership concentration is significant for 4 of the 5 years: At least at the 5% level for 3 years and at least at the 10% level for 1 year. Assuming a one-tailed test of the hypothesis, the relation is significant for all 5 years: At least at the 5% level for 4 years and at least at the 10% level for 1 year.

coefficients and *t*-statistics from these annual regressions. In addition, we estimated a random effects panel Tobit model (with effects at the firm level) to check the robustness of the model specification.[13] There was no substantial change in results indicating that our results do not appear to be driven by unobservable firm heterogeneity.

B. Institutional Investor Monitoring and Changes in Compensation Structures

If institutional investors have a significant influence on executive compensation structures as our results imply, then as institutional ownership concentration increases over time, we would expect to see corresponding increases in incentive compensation. That is, we would expect to see changes in ownership in the early part of the sample associated with long-run changes in compensation over the entire sample. To test this hypothesis, we calculated the change in ownership concentration across the early part of our sample period, that is, 1994 institutional concentration less 1991 concentration (using each of our concentration measures). We estimate the change in option-grant sensitivity across the two periods in the following manner.[14] First, we calculate the average sensitivity over the base period by summing the option deltas for the top executives of each firm in each year and taking an average. We then calculate the average option-grant sensitivity over the later period in an analogous manner and measure the change in sensitivity by subtracting the earlier average from the later average.

We regress the change in option-grant sensitivity on the earlier change in institutional concentration, controlling for potential confounding variables (Tobin's *q*, firm size, industry, and change in total institutional ownership). Table III provides the results of this regression. Models (1) and (2) use the percentage of institutional holdings held by the top five institutions as the measure of institutional ownership concentration, and Models (3) and (4) use the Herfindal Index of institutional ownership. For both measures of concentration, we find a strong positive relation between the long-run change in option-grant sensitivity and the early change in institutional concentration.[15] Running the opposite regression (long-run changes in institutional concentration vs. early changes in option sensitivity) provides no significant relation. That is, early-sample changes in pay-for-performance sensitivity do not predict long-run changes in institutional concentration.

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[13] We employed random effects here rather than fixed effects due to the use of maximum likelihood in estimating the model.

[14] The average is calculated over 1992 to 1994 because there was not sufficient option disclosure in 1991.

[15] These results are robust to alternative specifications of the variables. To ensure no bias from requiring a firm to be present in 1992 and 1994, we also run the regressions using all firms in the sample and defining the change in concentration as the difference between the concentration in 1994 and the earliest year in the sample period for which data is available for the firm. There was no change in results. In addition, we average the Tobin's *q* across the 3 years, rather than just employing the 1994 observation. We found no change in results.

Table III

Long-run Change in Institutional Investor Concentration and Subsequent Change in Option-Grant Sensitivity

This table shows the coefficients from a regression of the change in option-grant sensitivity against changes in institutional ownership controlling for changes in total institutional ownership, changes in shareholder wealth, and the levels of Tobin's q ratio in 1994, market capitalization in 1994 and dummy variables for each two-digit SIC code. The *Change in option-grant sensitivity* is measured as the difference between the firm's average option-grant sensitivity over the years 1995 to 1997 and the average sensitivity over the years 1992 to 1994. Option-grant sensitivity in year t is the estimated change in the value of options granted to the top-five managers in year t per \$1,000 change in shareholder wealth. The change in concentration is defined as the change in (*Top five institutional ownership/Total institutional ownership*) from 1991 to 1994 in Models (1) and (2) and as the change in the Herfindahl Index over the same period in Models (3) and (4). For each model, t-statistics are provided in parentheses. One, two, and three asterisks denote significance at the 0.10, 0.05, and 0.01 levels, respectively. Dependent Variable: *Change in Option-Grant Sensitivity* (1995 to 1997 versus 1992 to 1994).

Independent Variable	(1)	(2)	(3)	(4)
$Concentration_{1994} - Concentration_{1991}$	3.933***	4.313***		
	(2.72)	(2.77)		
$Herfindahl_{1994} - Herfindahl_{1991}$			22.241*	31.154**
			(1.75)	(2.24)
$Total_{1994} - Total_{1991}$		1.044		-2.785
		(0.67)		(-1.60)
$Tobin's\ q_{1994}$	$-0.463**$	$-0.471**$	$-0.511**$	$-0.558***$
	(-2.36)	(-2.44)	(-2.54)	(-2.74)
$Market\ Cap_{1994}$	11.028	13.048	21.210	13.330
	(0.31)	(0.37)	(0.58)	(0.36)
$\Delta Shareholder\ wealth_{1994}$	-139.985	-153.154	-213.780	-129.040
	(-0.62)	(-0.67)	(-0.91)	(-0.55)
$\Delta Shareholder\ wealth_{1993}$	6.543	4.052	-17.100	-4.080
	(0.04)	(0.03)	(-0.11)	(-0.03)
$\Delta Shareholder\ wealth_{1992}$	43.058	37.472	-18.820	24.960
	(0.25)	(0.22)	(-0.10)	(0.14)
Number of observations	1,221	1,221	1,077	1,069

The results of Table III further support the hypothesis that institutional investors influence executive compensation. Following an increase in the concentration of institutional ownership concentration, executive compensation has more pay-for-performance sensitivity.

C. Pay-for-Performance Sensitivity of Cash Compensation and Total Direct Compensation

In this section, we use an alternate measure of the executive pay-for-performance sensitivity, the sensitivity reflected in the executive's cash and total direct compensation (Jensen and Murphy (1990)). Our tests on the relation between institutional investor influence and this sensitivity are based on the following

equation:

$$\Delta(\text{manager's compensation})_{it}$$
$$= \beta_1 \Delta(\text{shareholder wealth})_{it-1}$$
$$+ \Delta(\text{shareholder wealth})_{it}$$
$$* [\beta_2 (\text{institutional ownership concentration}_{it-1})$$
$$+ \Sigma \beta_k (\text{control variables}_{it})]$$
$$+ \Sigma \beta_y \text{ year dummy variables}_t, \tag{2}$$

where managerial compensation is measured by either salary plus bonus or by total direct compensation (the sum of salary, bonus, option and stock grants, long-term incentive plan payouts, and other compensation) and the control variables are total institutional ownership, Tobin's q ratio, market capitalization, a dummy variable equal to one for each firm's CEO, industry-level dummy variables equal to one for the two-digit SIC in which the firm operates, and year dummies equal to one if the observation was for the given year.[16]

The first two columns of Table IV provide the regression results when the manager's compensation is defined as salary plus bonus. The two models use the two different specifications for institutional investor concentration. Columns 3 through 6 expand the definition of managerial compensation to include forms of compensation other than cash compensation from salary and bonus payments. Models (1) through (4) allow for differences in executives within a firm, Model (5) uses firm-level fixed effects, and Model (6) sums across the executives within a firm.

Consistent with Table II, the results in Table IV show that a firm's pay-for-performance sensitivity tends to be significantly positively related to the concentration of institutional ownership. (Only Model (2) does not show a significant coefficient for the institutional Herfindahl quartile.) As the regression results show, pay-for-performance sensitivity is associated with institutional ownership concentration, even after controlling for growth opportunities, size, industry fixed effects, and whether the executive is CEO.[17]

In terms of the economic significance of these results, again the effects of institutional investor influence are relatively large compared to the average pay-for-performance sensitivity in our sample. While executives' pay-for-performance sensitivity of salary plus bonus averages $0.032 per $1,000 change in shareholder wealth, the estimates from Model (1) imply that a one-standard-deviation increase in institutional ownership concentration is associated with a $0.005 increase in sensitivity, an increase of 16%. Similarly, executives' pay-for-performance sensitivity of total direct compensation averages $0.18 per $1,000 change in shareholder wealth, and a one-standard-deviation increase in institutional ownership concentration implies a $0.04 increase in sensitivity (using Model (3)).

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[16] The year dummies enter the regression twice: once as intercept terms and once interacted with the change in shareholder wealth. Thus, they control for time-specific variation in both changes in pay and changes in pay-for-performance sensitivity. Hall and Liebman (1998) show that pay-for-performance sensitivity has increased since the 1980s.

[17] The results are also robust to various controls for a nonlinear size effect, such as the inclusion of the square of market capitalization as a determinant of sensitivity.

Table IV

Pay-for-Performance Sensitivity as a Function of Institutional Influence

This table shows the coefficients from a regression of the change in the manager's compensation on the lagged change in shareholder's wealth and the change in shareholder's wealth interacted with percentage holdings of institutions filing 13-f reports, holdings of top five institutions as a percent of institutional holdings and controls for firm size (market capitalization), and Tobin's q ratio. Further control variables are a CEO dummy that equals one if the executive is CEO, and zero otherwise, and a series of control dummies for the firm's two-digit SIC industry and for time. (The coefficients for the latter variables are not shown in the table.) Models (1) and (2) have Δ(*Salary plus bonus*) as the dependent variable and Models (3) to (6) have Δ(*Total Direct Compensation*) as the dependent variable. Model (5) includes firm fixed effects and Model (6) sums across the executives for a single firm. For each model, t-statistics are provided in parentheses. One, two, and three asterisks denote significance at the 0.10, 0.05, and 0.01 levels, respectively.)

| | Dependent Variable | | | | | |
| | Δ (*Salary + Bonus$_t$*) | | Δ (*Total Direct Compensation$_t$*) | | | |
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Δ (*Shareholder wealth$_{t-1}$*)	0.001	0.001	0.091 ***	0.093 ***	0.079 ***	0.338 ***
	(0.51)	(0.56)	(9.01)	(8.88)	(6.09)	(7.08)
Δ (*Shareholder wealth$_t$*) ×						
Top 5/Total Instl. Ownership$_{t-1}$	0.035 **		0.251 **		0.252 ***	0.865 **
	(2.18)		(3.47)		(2.56)	(2.51)
Institutional Herfindahl Quartile$_{t-1}$		0.001		0.030 ***		
		(0.27)		(3.13)		
Total Institutional Ownership$_{t-1}$	0.050 ***	0.045 ***	0.099 *	−0.008	0.416 ***	0.385
	(4.00)	(2.93)	(1.79)	(−0.13)	(4.84)	(1.46)
Tobin's q$_{t-1}$	−0.003 ***	−0.003 *	−0.002	0.0002	0.009 *	−0.022
	(−3.84)	(−3.48)	(−0.48)	(0.04)	(1.70)	(−1.26)
Market Capitalization$_{t-1}$	−0.172 ***	−0.187	−1.380 ***	−1.390 ***	−0.766 ***	−5.810 ***
	(−4.14)	(−4.38)	(−7.51)	(−7.45)	(−2.91)	(−6.32)
CEO Dummy$_t$	0.023 ***	0.022 ***	0.084 ***	0.082 ***	0.085 **	
	(8.12)	(7.49)	(7.43)	(7.03)	(7.47)	
Number of observations	36,342	33,458	27,610	25,587	27,610	6,933
Adjusted R^2	0.01	0.01	0.03	0.03	0.03	0.09

The regressions also show that pay-for-performance sensitivity is stronger for the CEO than for the other top managers of the firm. Pay-for-performance sensitivity is negatively related to size, consistent with previous studies that have found smaller firms use more incentive pay than do larger firms (e.g., Murphy (1998)).

The consistency in results with the firm fixed effects in Model (5) implies that our results are not driven by cross-sectional variation across firms alone, or by unobservable firm-specific variables. Thus, our findings are not being driven by certain "types" of firms (subject to firm types remaining constant over our sample period). Finally, Model (6) shows that the results are robust to summing across executives in a single firm.

The results in Tables II through IV show that more concentrated institutional ownership is associated with greater pay-for-performance sensitivity and that changes in institutional concentration are associated with subsequent changes in managerial compensation. Black (1992) argues that institutions should take on a stronger monitoring role by holding larger stakes in companies and teaming up with other institutional investors to have more influence. Our results suggest that such an activity may be occurring.

The positive relation we find between pay-for-performance sensitivity and concentration of institutional investor ownership is also consistent with the hypothesis that institutional investors serve as a complementary monitoring device to incentive compensation. If one assumes that institutional investors can represent the stock market or outside equity holders, the coexistence of these two devices would be consistent with theoretical arguments that managerial monitoring and incentive compensation play interrelated roles (Holmstrom and Tirole (1993), Burkart et al. (1997), and Chidambaran and John (1999)).

III. Institutional Investor Influence and the Level of Executive Compensation

Another aspect of the compensation structure in which institutional investors could provide monitoring is on the magnitude of the compensation. If institutional investors provide such monitoring, then we would expect firms with greater concentrations of institutional ownership to have managerial compensation no greater than what would be expected given their industry, size, investment opportunities, and performance. In this section, we test the relation between the concentration of institutional ownership and the level of executive compensation, controlling for variables that can explain the level of compensation:

Level of manager's compensation$_{it}$

$$
\begin{aligned}
= & \beta_1 \Delta(\text{shareholder wealth})_{it} \\
& + \beta_2 \Delta(\text{shareholder wealth})_{it-1} \\
& + \beta_3 (\text{institutional ownership concentration}_{it-1}) \\
& + \Sigma \beta_k (\text{control variables}_{it}),
\end{aligned}
\tag{3}
$$

where the level of compensation is measured by either salary or by total direct compensation (the sum of salary, bonus, option and stock grants, long-term

incentive plan payouts, and other compensation), the additional control variables are total institutional ownership, Tobin's q ratio, market capitalization, a dummy variable equal to one for each firm's CEO, industry-level dummy variables equal to one for the two-digit SIC in which the firm operates, and year dummies equal to one if the observation is for the given year. We use several different regression models to test our hypothesis. The results of the regressions are provided in Table V.

The models in Table V show that the level of the top executives' salaries (in Models (1) and (2)) and total direct compensation (in Models (3), (4), and (5)) are significantly negatively related to institutional ownership concentration, whether concentration is measured by the top five institutional holdings or the institutional Herfindahl quartile. Using the top-five-institutions concentration variable, we find that a one-standard-deviation increase in institutional investor concentration is associated with a drop in salary of $36,000, or a 12% (15%) drop for a person with a salary equal to the sample mean (median) of $299,000 ($244,000). Similarly, that change in concentration is associated with a $236,000 drop in total compensation ($-1{,}620.658 \cdot 0.146$), which is 19% (37%) of the mean (median) total direct compensation.

To further examine the robustness of our results to our specifications, we employ several alternative specifications. In addition to aggregating the compensation measures across the top executives of each firm as we did in Model (5), we estimated the models using only CEOs, rather than the full management team. The results in both cases are basically unchanged from the other models shown— CEO compensation is decreasing in institutional ownership concentration. Our results are robust to the inclusion of net sales and total assets as additional size proxies, as well as to the square of market capitalization as a control for possible nonlinearities in the data. The results are qualitatively very similar if we estimate the regressions using the natural logarithm of compensation (salary or total direct pay) as the dependent variable. These alternative specifications are not reported for the sake of brevity.

An important facet of this result is the difference in outcomes from what one might expect given a standard principal—agent model. Such a model would imply that when faced with steeper pay-for-performance sensitivity incentives, risk-averse managers require a higher level of expected pay. In contrast, we find that concentrated institutional ownership is associated with stronger incentives, but lower salary and lower total compensation. This relation is consistent with the notion that institutions act as a check on the pay level. Where ownership is more concentrated, institutions should have an easier time coordinating their efforts and exerting pressure on management, ensuring that management does not expropriate rents from shareholders in the form of greater compensation. Most importantly, this result suggests that institutions do monitor managers, and the magnitudes imply that monitoring has real wealth effects on the managers.

IV. Firm Characteristics and Monitoring Mechanisms

The evidence we have presented supports the hypothesis that institutional investor monitoring and incentive compensation, in general, work in concert.

Table V
Level of Executive Compensation as a Function of Institutional Influence

This table shows the coefficients from a regression of the manager's compensation against the change and lagged change in shareholder's wealth, holdings of top five institutions as a percent of institutional holdings and controls for firm size (market capitalization), Tobin's q ratio, whether the executive is CEO, and the firm's two-digit SIC industry and year. (The coefficients for industry and year are not shown in the table.) Models (1) to (4) employ separate observations for each executive. Model (5) sums across the executives for a single firm. For each model, t-statistics are provided in parentheses. One, two, and three asterisks denote significance at the 0.10, 0.05, and 0.01 levels, respectively.

	Dependent Variable				
Independent Variable	$Salary_t$ (1)	$Salary_t$ (2)	Total Direct Compensation$_t$ (3)	Total Direct Compensation$_t$ (4)	Total Direct Compensation$_t$ (5)
$\Delta(Shareholder\ wealth_t)$	0.001	0.0006	0.058***	0.053*	0.258***
	(1.63)	(1.61)	(10.25)	(9.11)	(6.22)
$\Delta(Shareholder\ wealth_{t-1})$	−0.006***	−0.007***	0.032***	0.028***	0.051
	(−11.75)	(−12.66)	(3.87)	(3.26)	(0.85)
$Top\ 5\,/Total\ Institutional\ Ownership_{t-1}$	−247.967***		−1,620.658***		−8,321.096***
	(−36.35)		(−15.25)		(−11.18)
$Institutional\ Herfindahl\ Quartile_{t-1}$		−36.692***		−258.429***	
		(−32.00)		(−14.16)	
$Total\ Institutional\ Ownership_{t-1}$	101.685***	316.691***	1,035.152***	2,518.839***	5,428.972***
	(19.57)	(48.07)	(12.74)	(23.96)	(9.55)
$Tobin's\ q_{t-1}$	−19.552***	−19.288***	−48.492***	−49.931***	−251.611***
	(−28.11)	(−26.93)	(−4.48)	(−4.41)	(−3.36)
$Market\ Capitalization_{t-1}$	0.008***	0.009***	0.049***	0.052***	0.309***
	(49.24)	(50.04)	(18.09)	(18.64)	(15.58)
$CEO\ Dummy_t$	268.43***	267.56***	1,502.33***	1,503.44***	
	(127.37)	(122.63)	(46.78)	(44.39)	
Number of observations	36,346	33,462	33,278	30,721	6,934
Adjusted R^2	0.46	0.46	0.18	0.18	0.31

However, given the diversity in firms' informational and competitive environments, combined with the fact that both mechanisms have costs, there may be cases in which one mechanism is more prevalent than the other. That is, given the monitoring capabilities of institutions, along with the incentive effects of managerial compensation structures, the issue is whether there are firm characteristics that would suggest that one monitoring device play a more prominent role than the other.

To investigate this issue, we divide our firms into different groups based on the existence of the two different monitoring devices. We first average total ownership and institutional concentration for each firm across the sample period. We divide the firms by their institutional presence into groups and define high (low) institutional presence firms as those with both average total institutional ownership and average institutional concentration in the highest (lowest) quartile. We next divide the firms into quartiles according to their average option-grant sensitivity across the sample period and define high (low) option-grant sensitivity as those firms with average option-grant sensitivity in the highest (lowest) quartile. Given these divisions by each of the monitoring devices, we then define four combination groups that are composed of the highest and lowest quartiles of each device: (1) high institutional presence/low option-grant sensitivity, (2) low institutional presence/high option-grant sensitivity, (3) high institutional presence/high option-grant sensitivity, and (4) low institutional presence/low option-grant sensitivity. The first two groups consist of firms with heavy use of one mechanism but not the other. The second two groups consist of firms with either heavy use of both mechanisms or little use of either.

According to these definitions, we have 26 firms in the high institutional presence/low option-grant sensitivity, 59 in the low institutional presence/high option-grant sensitivity, 109 firms in the high institutional presence/high option-grant sensitivity, and 72 firms in the low institutional presence/low option-grant sensitivity (the remaining firms in the sample are not in the combined set of extreme groups). Since our regression results show evidence toward more use of both mechanisms in concert, one would expect to observe fewer firms in the two extreme negative association groups (85) than in the two extreme positive association groups (181), as we do.

Table VI reports the characteristics of firms in the extreme groups, along with t statistics and Wilcoxon Z statistics for tests of differences between the two groups. In general, the firms in the high institutional presence/low option-grant sensitivity group tend to be larger, have lower volatility, and lower Tobin's q's than their counterparts in the low institutional presence/high option-grant sensitivity group. These executives' level of compensation is higher, and they have lower pay-for-performance sensitivities. The differences in firm size, volatility, and Tobin's q suggest that the firms with low institutional presence and high option-grant sensitivity may be more costly and difficult to discern managerial actions. Thus, institutions will be less able to discipline management directly and will rely more on incentive compensation as a mechanism. On the other hand, managerial actions in firms with greater institutional presence and low option-grant sensitivity may be more transparent, thus, lessening the need for expensive incentive pay.

Table VI
Extremes in the Interaction Effects between Institutional Investor Influence and Incentive Compensation

This table presents summary statistics for a group of 26 (59) firms with high (low) institutional-owner presence and low (high) option-grant sensitivity. High institutional presence/low option sensitivity firms are defined as firms whose average institutional ownership and Herfindahl concentration are in the highest respective quartiles among all firms, with option-grant sensitivity in the lowest quartile. Low institutional presence/high option sensitivity firms are defined analogously (lowest quartile of both ownership and concentration, highest option-sensitivity quartile). The table also presents the estimated pay-for-performance sensitivity of total direct compensation, which is defined as the sum of slope coefficients for a regression of changes in total direct compensation on current and lagged changes in shareholder wealth. This measure and option-grant sensitivity are defined as the estimated change in managerial wealth per $1,000 change in shareholder wealth.

	High Institutional Presence/Low Option Sensitivity ($n = 26$)		Low Institutional Presence/High Option Sensitivity ($n = 59$)		Tests for Differences Between the Groups	
	Mean	Median	Mean	Median	t-statistic	Wilcoxon Z
Sorting characteristics						
Option-Grant Sensitivity ($ change per $1,000)	0.087	0.077	3.138	2.397	− 12.40 ***	− 7.31 ***
Total Inst'l Ownership	75.1%	73.6%	21.2%	21.0%	28.31 ***	7.31 ***
Herfindahl Index	0.097	0.049	0.005	0.005	3.23 ***	7.31 ***
Other characteristics						
Salary ($K)	300.47	267.26	191.02	180.95	4.86 ***	4.71 ***
Total Direct Compensation ($K)	917.81	800.71	749.58	502.39	1.08	2.07 **
Market Capitalization ($MM)	1,858.39	808.01	282.13	179.12	2.93 ***	5.52 ***
Tobin's q	1.73	1.31	2.66	2.35	− 3.18 ***	− 3.25 ***
Return	18.2%	18.0%	27.5%	16.6%	− 0.01	− 0.16
Δ(*Shareholder Wealth*) ($MM)	382.66	100.72	20.10	0.81	2.04 *	4.14 ***
Stock-Market Volatility	28.5%	26.9%	55.9%	55.9%	− 10.29 ***	− 6.61 ***
Estimated pay-for-performance sensitivity of total direct comp. ($ change per $1,000)	0.07		2.73			

V. Clientele Effects and Institutional Monitoring

The influence of institutional investors could occur indirectly through their trading behavior as well as through direct pressure. For some institutional investors, high turnover may imply that monitoring is not a central focus of their strategies. However, portfolio managers' investment decision algorithms often consider quality of management, and in turn, executive compensation practices.[18] In these cases, an outcome of even actively traded managers' decisions is an association between greater institutional investment and preferred compensation structures (e.g., greater pay for performance).

Gompers and Metrick (2001) argue that institutional investor preference for large firms, along with the increasing institutional presence in equity markets, has affected relative stock prices between large and small firms. Studies by Badrinath, Gay, and Kale (1989), Del Guercio (1996), Falkenstein (1996), Bennett, Sias, and Starks (2003), and Binay (2002) find relations between institutional investors and preferences for certain stock characteristics.[19] The effects of these preferences may be important to directors if the type of institution holding the stock affects share value and/or management of the company. In particular, the directors may want to attract a particular type of institution as a shareholder (Brickley, Lease, and Smith (1988), Allen, Bernardo, and Welch (2000), Bushee and Noe (2000), and Hotchkiss and Strickland (2002)). Indirect influence also arises when institutions choose to sell their shares rather than attempt to instigate change in the firm. Such selling can have an impact on the corporation's governance through several potential effects: downward price pressure, information signals to other investors, and changes in shareholder composition (Brown and Brooke (1993) and Sias, Starks, and Titman (2002)).

The clientele effects from institutional preferences could encourage firms to adopt certain compensation structures viewed as preferred by investors. To test for potential clientele effects, we examine the relation between the pay-for-performance sensitivity of managerial compensation and the total institutional ownership (proportion of the firm's shares owned by institutions). As shown in Tables III and IV, pay-for-performance sensitivity tends to be positively related to the level of total institutional ownership, although this does not hold for all model specifications.[20]

Increasing trends in institutional ownership and option compensation could cause a spurious relation between the two. In addition, the adoption of certain compensation structures by firms to attract institutions could cause an endogeneity in the relation between institutional investor ownership and executive compensation. To examine these possibilities, we conducted two additional tests.

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[18] In support of this hypothesis, a survey of mutual fund managers has found that executive compensation is a factor in a majority of these managers' investment decisions (Maxey and ten Wolde (1998)).

[19] In addition, see Almazan et al. (2002) for research on the effects of constraints on portfolio manager decisions.

[20] For an alternative examination of the relation between compensation and institutional ownership see Clay (2000).

First, we ran a regression to see if lagged sensitivity of option grants would predict subsequent institutional ownership. The results were insignificant. Second, to determine whether our results for total institutional ownership hold in the face of an endogeneity, we used an instrumental variable approach in which we ran a two-stage least squares analysis. Bennett et al. (2003) find a correlation of 22% between total institutional ownership and share turnover in a firm, indicating turnover as a reasonable instrumental variable for the total institutional ownership. Accordingly, in the first stage, we regressed total institutional ownership on share turnover and on industry, time, and firm size as controls. In the second stage, we ran a Tobit analysis of the pay-for-performance sensitivity of option grants using the fitted values from the first stage regression as our instrument for total institutional ownership. The results, provided in Table VII, are consistent with the earlier results, suggesting that pay-for-performance sensitivity is positively related to institutional ownership. These results are also consis-

Table VII
Tobit Analysis of Pay-for-Performance Sensitivity of Option Grants as a Function of Total Institutional Ownership Using an Instrumental Variables Approach

This table shows the coefficients from a regression of the change in the value of options granted a manager per $1,000 change in shareholder wealth against the lagged change and change in shareholder's wealth, and the fitted value from a regression of institutional holdings on industry, time, size, and turnover. Further controls are for the holdings of the top five institutions as a percent of institutional holdings, firm size (market capitalization), and Tobin's q ratio. Further control variables are a CEO dummy that equals one if the executive is CEO, and zero otherwise, and a series of control dummies for the firm's two-digit SIC industry and for time. (The coefficients for the latter variables are not shown in the table.) For both models, t-statistics are provided in parentheses. One, two, and three asterisks denote significance at the 0.10, 0.05, and 0.01 levels, respectively. Dependent variable: Δ *in Value of Options Granted per $1,000 Δ in Shareholder Wealth*.

Independent Variable	(1)	(2)
$\Delta(Shareholder\ wealth_t)$	0.727	11.000
	(0.85)	(1.27)
$\Delta(Shareholder\ wealth_{t-1})$	5.870	10.600
	(0.48)	(0.85)
Top 5 / Total Institutional Ownership$_{t-1}$	0.925***	
	(6.28)	
Institutional Herfindahl Quartile$_{t-1}$		0.081***
		(4.01)
Instrument for Total Institutional Ownership$_{t-1}$	17.754***	16.848***
	(19.63)	(18.23)
Tobin's q_{t-1}	0.146***	0.136***
	(8.59)	(7.79)
Market Capitalization$_{t-1}$	-38.400**	-42.700***
	(−8.94)	(−9.76)
CEO Dummy$_t$	1.386**	1.361***
	(28.69)	(27.18)
Number of observations	33,381	30,803

tent with those of Garvey and Swan (2003), who show a relation between compensation and turnover directly rather than through our instrumental variable approach.

VI. Conclusions

In this paper, we find that concentration of institutional investor ownership is positively related to the performance sensitivity of managerial compensation and negatively related to the level of that compensation. Further we determine that changes in institutional concentration are related to subsequent changes in incentive compensation, but not vice versa. These results support the hypothesis that institutional investors influence executive compensation. The results are also consistent with previous studies that suggest institutional investors play a monitoring role. For example, Bushee (1998) and Wahal and McConnell (2000) provide evidence of apparent institutional monitoring in R&D expenses and capital expenditures. Brickley et al. (1988), Jarrell and Poulsen (1988), Agrawal and Mandelker (1992), and Borokhovich, Brunarski, and Parrino (2000) provide evidence of apparent institutional investor monitoring in antitakeover amendments. Parrino, Sias, and Starks (2002) provide evidence of such monitoring in CEO turnover.

Our results imply that institutional investor monitoring, on average, tends to be used in concert with incentive compensation in mitigating the agency problems between shareholders and managers. We examine the conditions under which the two monitoring mechanisms are used together versus those conditions under which one acts alone. We find that firm characteristics differ across institutional presence and pay-for-performance sensitivities. While these results are suggestive of heterogeneity in the costs and benefits of various monitoring devices, more research is needed to provide a better understanding of how these mechanisms interact, and their relation to characteristics of the firm and the industry.

With regard to the clientele effects of incentive compensation, we provide evidence that institutions in general are attracted to firms with greater pay-for-performance sensitivity. We conduct additional tests to ensure that our results are robust to potential endogeneities in the relation between total institutional equity ownership and pay-for-performance sensitivity. These tests are consistent with our simpler specifications. These results suggest that institutional preferences may play an important role in stock valuations, as argued by Gompers and Metrick (2001).

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