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Stock-Based versus Cash Compensation: Does the Correlation between Earnings and Stock Returns Matter?

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Abstract

I empirically examine the role of the correlation between earnings and stock returns in determining the structure of compensation packages for top executives. I develop two competing hypotheses on the relation between the returns-earnings correlation and the structure of executive compensation and empirically test the association between the returns-earnings correlation and use of stock-based pay. The results show that the returns-earnings correlation is positively associated with the use of stock-based compensation, after controlling for other determinants of stock-based compensation such as firm size and firm's growth opportunities.

Keywords: returns-earnings correlation, executive compensation, stock-based pay

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INTRODUCTION

Using CEO compensation data before the 1990s, prior literature in accounting on the use of performance measures in optimal incentive contracts has examined the relative weights placed on performance measures such as accounting earnings and stock returns in determining executive cash compensation, which is only part of a total executive compensation package (e.g., Lambert and Larcker 1987; Sloan 1993). The literature provides two insights on the role of accounting earnings in determining the annual cash bonus: 1) measurement noise affects the way firms use performance measures to compensate executives, and 2) accounting earnings play a role in removing the 'noise' in stock price and macroeconomic factors from stock price incentives.

However, unlike the 1980s when cash compensation constituted the largest proportion of executive compensation, the most pronounced trend in executive compensation practice in the 1990s was increased use of stock option grants.[1] As of the mid-1990s, one third of total CEO compensation was in the form of stock option awards, up from one-fifth during the 1980s (Bryan, Hwang, and Lilien 2000a), and the enormous growth in CEO compensation during the last decade resulted largely from stock-based compensation (Hall and Liebman 1998). Stock-based compensation, on the basis of Black-Scholes value, is currently the largest component in executive compensation in U.S. firms (Murphy 1999). Considering the sizable proportion of stock-based compensation in total executive pay, insight into managerial incentives requires a good understanding of stock-based compensation. However, the underlying causes of the relatively recent large shift towards stock option awards in firms' executive incentive contracts are still unknown (Bushman and Smith 2001).

The objective of this study is to examine the role of the correlation between earnings and stock returns (i.e., value-

1) For example, Lambert and Larcker (1987) cite the results of compensation consulting survey by Booz, Allen, and Hamilton and Hay Associates reporting that salary plus bonus represented between 80% and 90% of executives' total compensation to validate the use of cash compensation for their analysis.

relevance of earnings) in explaining cross-sectional variation in firms' use of stock-based compensation. Given the recent large shift towards stock option awards in firms' executive incentive contracts, it is important to understand how the compensation committee of the board of directors uses their perception of the relationship between reported earnings and stock returns in structuring an executive's compensation package. Several recent studies attempt to investigate the determinants of CEO stock-based compensation (Anderson, Banker, and Ravindran 2000; Baber, Janakiraman, and Kang 1996; Bryan, Hwang, and Lilien 2000a; Core and Guay 1999; Ittner, Larcker, and Lambert 2003; Yermack 1995) but there is little research that explicitly considers the correlation between earnings and stock returns as one of the factors explaining cross-sectional differences in stock option granting strategies across the firms.

In this paper, I empirically examine the association between the returns-earnings correlation and the structure of compensation packages for top executives. I develop two competing hypotheses on the relation between the returns-earnings correlation and firms' use of stock-based pay. One prediction stems from the literature documenting a positive association between the returns-earnings correlation and the informativeness of accounting measures in optimal contracts. Based on the notion that earnings are a highly informative accounting measure, hypothesis one predicts that firms with higher returns-earnings correlations are likely to use a larger proportion of earnings-based cash compensation and a smaller proportion of stock-based compensation.

The competing hypothesis comes from the heuristic-systematic model in the psychology literature. Applying this model in the compensation setting leads to a prediction that in the compensation committee's decision-making process, if the correlation between two information cues — *earnings and stock returns* — is high ("congruent condition") the committee will place more weight on stock returns that it prefers to use as performance measures (because they are less easily manipulated than are earnings). I also examine the possibility that high volatility in cues may attenuate the impact of cue congruence on judgments.

The main results show that firms with high returns-earnings

correlations rely more on stock-based compensation, after controlling for hypothesized determinants of use of stock-based compensation, such as firm size and firms' growth opportunities, consistent with the psychology-based hypothesis.[2] Further analysis reveals that high returns-earnings correlations are positively correlated with the level of stock-based pay, but I do not find evidence that firms decrease the level of cash compensation in response to an increase in returns-earnings correlation. This suggests that the positive relation between returns-earnings correlations and the relative proportion of stock-based pay to total compensation is driven mostly by the increase in equity grants rather than the decrease in cash compensation. I also find weak evidence that the association between the returns-earnings correlation and executive compensation mix is mitigated by variability in stock returns or earnings.

Evidence from supplemental analyses suggests that firms may decompose returns-earnings correlation and use the correlation between firm-specific components in returns and earnings in compensation decision-making. Overall, my findings from using total compensation of executives are consistent with prior literature documenting that the correlation between earnings and stock returns are positively associated with the relative weights placed on stock returns in determining cash compensation (Lambert and Larcker 1987).

My study makes several contributions to the executive compensation literature. First, prior research has focused on the role of returns-earnings correlation in executive cash compensation (Lambert and Larcker 1987; Sloan 1993). My study extends this literature by explicitly considering the

2) Prior research documents that the value-relevance of earnings has declined over time (Collins, Maydew, and Weiss 1997; Francis and Schipper 1999). Decline in the value-relevance of earnings and a huge escalation of stock-based pay in 1990s may appear to be inconsistent with my findings. Prior studies on temporal change in value relevance of earnings, however, make statistical inferences using the comparison of yearly pooled cross-sectional data. In contrast to these studies, I construct returns-earnings correlation from estimating firm-specific regressions. When I compute the mean firm-specific correlation between returns and earnings in my sample by year, it increases up until 1998 and dampens after 1998, suggesting that cross-sectional and firm-specific value-relevance measures are not directly comparable.

returns-earnings correlation as one of the factors explaining cross-sectional differences in stock option granting strategies across the firms. I provide conflicting results to Bushman et al. (2004), who document a negative association between the use of long-term compensation including stock-based pay and their earnings timeliness metrics using 1994 proprietary data from a consulting firm. However, their results are fragile and vary across specifications.[3] My study differs from their study in that 1) I develop an alternative hypothesis based on psychology theory predicting the opposite relationship; 2) I use ten-year panel data from a public database in a longitudinal research design to attenuate the effect of omitted variables that could arise in cross-sectional studies.

Second, unlike most prior research that has focused on testing the economic agency model, I develop and test a psychology-based hypothesis that considers returns-earnings correlation as one of the psychological factors that influence the use of stock options and stock grants. I draw on psychology theory to investigate how the firms' compensation committees, which became more "independent" after the 1992 SEC compensation disclosure rule, use and process returns-earnings correlations in making compensation decisions. Furthermore, by documenting that earnings-based cash compensation is replaced by stock-based compensation, conditional on returns-earnings correlation, this study provides evidence that firms prefer to increase the pay for performance relation by granting stock-based compensation such as stock option awards after the 1992 regulation reform (Lo 2003; Vafeas 2003; Vafeas and Afxentiou 1998).

Third, this paper also contributes to the growing body of literature investigating potential linkages between the contracting and valuation roles of accounting information by providing further evidence that valuing the firm is not the same as evaluating the manager's contribution to the value of the firm (Gjesdal 1981; Lambert and Larcker 1987; Paul 1992).

The remainder of the paper is organized as follows. I review

3) For example, the coefficient on the earnings timeliness metric becomes insignificant after addressing simultaneity issues. However, as seen in table 7, my results are robust to two-stage least square (2SLS) estimation for correcting potential simultaneity bias.

prior literature and develop my hypotheses in Section 2. Section 3 describes sample selection and my research design. Section 4 presents empirical results and Section 5 presents the results of additional analyses. Concluding remarks are offered in Section 6.

PRIOR LITERATURE AND HYPOTHESES DEVELOPMENT

Accounting Earnings and Executive Cash Compensation

Typically, the total compensation paid to executives at publicly traded firms in the U.S. primarily consists of fixed cash payments (salary), variable cash payments usually tied to accounting performance (annual bonus), long-term incentive plan pay-outs, stock options, and restricted stock grants. Prior research shows that accounting measures are extensively used in determining bonus plans. For example, Murphy (1999) reports that 161 of his 177 sample firms explicitly use at least one measure of accounting profits in their annual bonus plans.

Given the explicit role of accounting earnings in annual bonus plans, the literature has examined factors that influence the relative weights placed on earnings in determining cash compensation (Bushman et al. 2001, Lambert and Larcker 1987; Sloan 1993). This literature mainly draws on the agency-theoretic prediction that the signal-to noise ratio of candidate performance measures is the key determinant of their value in incentive contracting (Banker and Datar 1989). Empirically, the "noise" in accounting earnings relative to the "noise" in other performance measures (e.g., stock returns) has been operationalized using the ratio of the time-series variance of a firm's earnings to the time-series variance of its stock returns, and the results are generally consistent with the theory (Bryan, Hwang, and Lilien 2000a; Lambert and Larcker 1987; Sloan 1993; Yermack 1995).

Unlike the empirical findings of the extant literature that are generally consistent with the theory that measurement noise affects the way firms use performance measures to compensate executives, researchers provide mixed evidence about the role of correlation between accounting earnings and stock returns in determining the relative weights placed on earnings in the

compensation function. The correlation between earnings and stock returns can be viewed as a measure of valuation weight placed on earnings. Lambert and Larcker (1987) find that firms place more relative weight on stock returns and less relative weight on ROE in the compensation function when correlation between stock returns and ROE is high. They argue that this provides evidence consistent with the result from analytical research (e.g., Gjesdal 1981) that the way a particular set of signals is used for valuation purposes is generally different from the way it is used in contracts.[4)]

On the other hand, Bushman et al. (2001) find that the incentive weight on earnings is positively associated with the valuation weight. Garvey and Milbourn (2000) argue that the relative ability of each measure to explain stock returns (i.e., its R2) is more desirable than the relative variances between measures as a judge of their value and show that the simple correlation between accounting performance measures and stock returns is a reasonably reliable guide to its value as an incentive contracting tool.

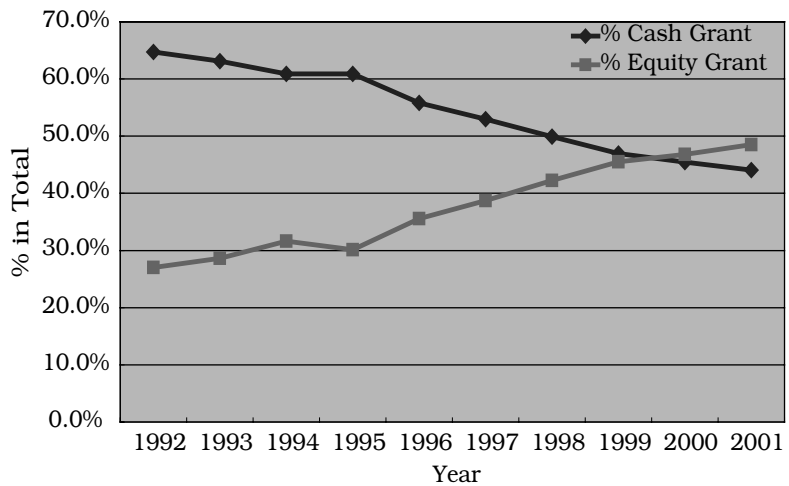

Figure 1. Temporal Change in Executive Compensation Mix during 1992-2001.

4) Sloan (1993) also finds that the correlation between accounting-based metrics and stock returns is negatively associated with the relative weights placed on accounting metrics in the cash compensation function, but the coefficient is not significant at conventional levels.

Taken together, most of the existing literature on the relation between the valuation and contracting role of accounting information has solely used executive cash compensation, which is only a part of the total executive compensation package and provides mixed results. Using all firm data in Standard & Poor's (S&P) ExecuComp database during the period 1992-2001, Figure 1 shows that stock-based compensation is currently the largest component in executive compensation in public U.S. firms.

In the following subsections, I develop two competing predictions on the role of correlation between earnings and stock returns in determining the structure of executive compensation packages.

Earnings Informativeness Hypothesis

Recent literature on the relation between properties of accounting information and corporate governance decisions argues that accounting earnings become more useful in executive contracts when earnings are more associated with stock returns (e.g., Bushman et al. 2001, 2004; Engel, Hayes, and Wang 2003). These studies provide empirical evidence that higher association between earnings and returns implies greater weights on earnings in determining CEO compensation or CEO turnover decisions.

For example, using earnings' timeliness as a proxy for the strength of earnings as a signal managerial actions, Engel, Hayes, and Wang (2003) develop a model showing that correlation between earnings and returns could positively influence the informativeness of earnings measure in optimal contracts and empirically find that accounting earnings receive greater weight in CEO turnover decisions when current earnings captures current value-relevant information in a more timely manner. Bushman et al. (2004) find weak evidence that firms with untimely earnings use a higher proportion of equity-based incentives to total executive compensation.

Main argument underlying these studies is motivated by theoretical work on incentive contracts from an agency perspective that indicates additional performance measures should be included in an incentive contract if they provide incremental information content about an agent's effort.

Performance measures that are more predictive of future performance (therefore more highly correlated with stock price) are arguably also more informative about the manager's action choice, and therefore should receive heavier weights in incentive contracts (Lambert 2001). Consistent with this view, Bushman et al. (2001) document a significantly positive relation between the valuation coefficient of earnings and the compensation coefficient of earnings.

Combined, the results of these studies suggest that the association between earnings and returns are positively correlated with the informativeness of accounting measure in the contracts.

If this is the case, firms with higher correlations between earnings and stock returns are likely to use larger proportions of earnings-based cash compensation and smaller proportions of stock-based compensation.[5)]

Psychology-based Hypothesis

Stock-based vs. Cash Compensation: Which Does the Board Prefer? A fundamental reason for the use of performance-contingent incentives in executive compensation contracts is to motivate executives to take actions that are in the best interests of the shareholders. In that respect, one might expect that the best way to minimize the firm's incentive problem would be to pay the manager with the firm's securities since stock-based compensation provides the executive with a more direct incentive alignment mechanism compared to cash compensation. Hall and Liebman (1998) conjecture that the increasing use of stock options may reflect a desire by boards to increase the relationship between pay and performance and to find a less visible way to increase CEO pay. This is consistent with the findings of prior literature that principals exhibit a preference for market-based measures because they are less susceptible to manipulation and are more closely aligned with principals'

5) However, in discussing Engel, Hayes, and Wang (2003), Brickley (2003) comments, "The argument for why accounting measures should be weighted more heavily, when they are highly correlated with stock returns is not immediately obvious to most readers. For example, if accounting returns were perfectly correlated with stock returns why would the board focus on accounting returns and ignore stock returns?"

personal wealth (David, Kochhar, and Levitas 1998; Wiseman and Gomez-Mejia 1998).

However, stock price is not an optimal aggregator of information for the firm's principal-agent problem and accordingly firms have an incentive to create non-stock based incentives such as earnings-based annual bonuses to offset the deficiencies of stock-based pay (Paul 1992). Thus, it suggests that earnings can play a role in removing the 'noise' in stock price and macroeconomic factors from stock price (Bushman and Indjejikian 1993; Kim and Suh 1993; Sloan 1993) and that firms improve managerial contracts by supplementing stock-based compensation with earnings-based cash components (e.g., annual bonus).

In most public companies, ultimate decisions over executive compensation are made by a compensation committee of the board of directors who are supposed to represent shareholders' interests. Prior research suggests that outside directors better represent the interests of shareholders in compensation decision. For example, Mehran (1995) shows that outsider-dominated boards make greater use of equity-based compensation. Hanlon, Rajgopal, and Shevlin (2003) also find a positive association between executive stock option (ESO) grants and the quality of corporate governance. After the 1992 SEC compensation disclosure rules, the number of committees with insider participation steadily declined over time, partly motivated by public concerns over board independence (Vafeas and Afxentiou 1998).

More recent studies on the composition of firms' compensation committees show that on average, insider committee membership declined from 6.05% of the total in 1991 to 1.42% of the total in 1997 (Vafeas 2003). Furthermore, Perry and Zenner (2001) and Vafeas (2003) show that for firms with committee insiders, the pay for performance relation is lower and the mix of cash-based to stock-based pay is higher than that for firms without committee insiders. Combined, these findings suggest that after the 1992 regulatory reform, possible opportunistic behavior by insiders in the compensation committee has been limited and that firms with more 'independent' compensation committees are likely to rely on stock-based compensation that is more effective in improving the pay for performance relation and

thereby protecting shareholder interests.[6)]

Decision-Making Process of Compensation Committee: Heuristic-Systematic Model. Assessing executives' performance and determining appropriate compensation packages is the central monitoring function of a firm's compensation committee (Daily et al .1998). Each committee member uses and evaluates the importance of available information cues that may influence the decision (Larcker and Lessig 1983; Mear and Firth 1987; Slovic 1972).

The heuristic-systematic model in psychology (Chaiken 1980) provides a useful theoretical framework to investigate the decision-making process of compensation committees. The model posits two concurrent modes of information processing. Systematic processing is effortful and involves a comprehensive scrutiny of all relevant information to form a judgment. Heuristic processing is more limited and less cognitively demanding, and involves simple decision rules to form judgments.

As noted earlier, a compensation committee is likely to prefer granting stock-based compensation to the executives but cannot replace all cash compensation by stock-based pay due to the role of earnings-based annual bonuses in offsetting the deficiencies of stock-based pay. The rationale is that theoretical work on incentive contracts from an agency perspective indicates additional performance measures should be included in an incentive contract as long as they provide incremental information content about an agent's effort (Holmstrom 1979).

Sloan (1993) also argues that unlike stock price accounting earnings are not affected by factors that are uncontrollable from a manager's viewpoint such as macroeconomic shocks (i.e., changes in interest rates). Thus, contracting on earnings will still be valuable in contracting because accounting earnings are more controllable than stock price-based measures. Thus, it will be suboptimal for the board to replace earnings-based cash compensation completely with stock-based pay (Bushman et al. 2004). Combined, this suggests that the committee may form initial expectations towards rewarding executive with stock-

6) Lo (2003) shows that the 1992 revision of executive compensation disclosure rules has benefited shareholders by improving corporate governance practices rather than just increasing disclosure costs.

based compensation based on the extrinsic cue, "stock returns," a direct performance measure that better reflects change in shareholder value than earnings.

The model suggests the way in which the inferences based on initial heuristic processing affect subsequent judgment. A committee's expectations based on initial processing of the stock return cue may be confirmed (disconfirmed) by subsequent systematic processing of earnings information. The model predicts that under these circumstances, a committee will use both the stock returns and earnings information in making judgments about executive compensation packages (Chaiken, Liberman, and Eagly 1989).

In systematic processing of earnings information, the correlation between earnings and stock returns provides the board with a useful gauge measuring "cue similarity" or "cue congruency" (Mitra 1995). That is, in a compensation committee's decision-making process, if the correlation between two information cues — *earnings and stock returns* — is high ("congruent condition") the board will place more weight on stock returns that they prefer to use as performance measures and this will lead to the board's decision to use a greater proportion of stock-based compensation. If the correlation between earnings and stock returns is low ("incongruent condition"), the board will place less weight on stock returns, leading to a greater proportion of earnings-based cash compensation. This is consistent with prior literature indicating that cues correlated with other cues are removed in information processing process, thereby retaining the cue that is deemed most important (Lewis, Patton, and Green 1988; Zacharakis and Meyer 1996). In sum, the psychology theory predicts that firms with high correlation between earnings and stock returns are likely to use a larger proportion of stock-based compensation and a smaller proportion of earnings-based cash compensation.

Because of the opposite predictions from the competing theoretical arguments and mixed empirical evidence, I test the following non-directional hypothesis, stated in null form:

> **H1:** The correlation between earnings and stock returns is not associated with executive compensation mix.

In addition, prior research demonstrates that when evaluating cues, individuals attend to the underlying time-series properties of the data (e.g., variance) when making judgments (e.g. Andreassen and Kraus 1990). It is likely that in evaluating the returns-earnings relation, the committee will take time-series variation of the cues into account. Intuitively, high volatility in cues may attenuate the impact of cue congruence on judgments. I also test the following non-directional hypothesis, stated in null form:

> **H2:** The association between returns-earnings correlation and executive compensation mix is not mitigated by the volatility in earnings and returns.

RESEARCH DESIGN

Sample Selection

To compile my sample, I started with all firm-year observations with a complete set of 10-year returns and earnings data in each year during 1992-2001 to estimate firms' earnings-returns regression over rolling 10-year windows.[7] Stock returns and accounting variables were drawn from CRSP and COMPUSTAT, respectively.

The final sample was formed by taking the intersection of the above sample with the executive compensation data available from Standard & Poor's (S&P) ExecuComp database for the years 1992-2001. ExecuComp covers companies from the S&P 500, S&P 400 mid-cap, and S&P 600 small-cap indices and includes information for all executives reported in the proxy statements. SEC rules require companies to include compensation data for the CEO and the four other highest-paid executives. Following prior literature, I exclude financial institutions (SIC codes 6000-6999). In an attempt to prevent extreme observations from affecting my results, I winsorize the variables at the 1 percent and 99 percent levels. The final sample consists of 4,337 firm-year observations from 923 firms over the period 1992-2001.

7) For example, the returns-earnings correlation of a firm at 1992 was computed using returns and earnings data from 1983 to 1992.

Table 1. Distribution of Sample Firm-Years

Panel A. Distribution of Sample Firm-Years by Year

Year	N	Percent
1992	244	5.63%
1993	391	9.02%
1994	428	9.87%
1995	417	9.61%
1996	455	10.49%
1997	497	11.46%
1998	483	11.14%
1999	493	11.37%
2000	487	11.23%
2001	442	10.19%
Total	4,337	100.00%

Panel B. Distribution of Sample Firm-Years by Industry

Industry	N	Percent
Agriculture (0100-0999)	19	.4%
Mining and Construction (1000-1999, excluding 1300-1399)	103	2.4%
Food (2000-2111)	163	3.8%
Textiles and printing/publishing (2200-2799)	449	10.4%
Chemicals (2800-2824, 2840-2899)	142	3.3%
Pharmaceuticals (2830-2836)	165	3.8%
Extractive (1300-1399, 2900-2999)	177	4.1%
Durable manufactures (3000-3999, excluding Computers)	1228	28.3%
Transportation (4000-4899)	256	5.9%
Utilities (4900-4999)	115	2.7%
Retail (5000-5999)	693	16.0%
Services (7000-8999, excluding 7370-7379)	309	7.1%
Computers (3570-3579, 3670-3679, 7370-7379)	491	11.3%
Others or missing	27	.6%
Total	4,337	100.0%

Table 1 describes the distribution of sample firm-years by year and by industry.

Regression Specification

To test my research hypotheses, I estimate the following pooled cross-sectional time-series regression equation.

$$\begin{aligned}\%EQUITY\_GRANT_{i,t} = {} & \alpha_0 + \alpha_1 CORR_{i,t} + \alpha_2 CORR{*}NOISE\_ROA_{i,t} \\ & + \alpha_3 CORR{*}NOISE\_RET_{i,t} + \alpha_4 BONSHR_{i,t} \\ & + \alpha_5 HIGH\_TAX_{i,t} + \alpha_6 LOW\_TAX_{i,t} + \alpha_7 ROA_{i,t} \\ & + \alpha_8 RET_{i,t} + \alpha_9 LEV_{i,t} + \alpha_{10} MTB_{i,t} \\ & + \alpha_{11} OWNERSHIP_{i,t} + \alpha_{12} NOISE\_ROA_{i,t} \\ & + \alpha_{13} NOISE\_RET_{i,t} + \alpha_{14} TENURE_{i,t} + \alpha_{15} SIZE_{i,t} \\ & + \alpha_{16} NEW\_ECON_{i,t} + \alpha_{17} CASHFLOW_{i,t} \\ & \sum_{t=1}^{9} YEARDUMMY + \sum_{t=1}^{13} INDUSTRYDUMMY + \varepsilon_{i,t} \quad (1) \\ & (t = 1992\text{-}2001)\end{aligned}$$

Where:

%EQUITY_GRANT = firm *i*'s ratio of the sum of average Black-Scholes value of stock options and average restricted stock to average total compensation across the firm's executives at year *t*

CORR = firm *i*'s Fisher *Z* transformed R^2 of the firm-specific regression of annual stock return on the change in annual core earnings deflated by market value of equity at the beginning of the period at year *t*

BONSHR = firm *i*'s ratio of average annual cash bonus to average total compensation across the firm's executives at year *t*

HIGH_TAX = 1 if the firm has a positive pretax book income and no net operating loss carry-forwards, and 0 otherwise

LOW_TAX = 1 if the firm has a negative pretax book income and net operating loss carry-forwards, and 0 otherwise

ROA = firm *i*'s return on asset ratio at year *t* calculated

as net income before extraordinary items (Compustat data item 18) divided by total assets at fiscal year end (Compustat data item 6)

RET = firm *i*'s raw annual stock return at year *t*

LEV = firm *i*'s book value of liabilities divided by its market value of equity at year *t*

MTB = firm *i*'s market to book ratio defined as its market value of equity divided by book value of equity at year *t*

OWNERSHIP = firm i's percentage of common shares owned by its executives at year *t*

NOISE_ROA = firm *i*'s time-series standard deviation of the firm's return on asset ratio over the prior 10 years at year *t*

NOISE_RET = firm *i*'s time-series standard deviation of the firm's annual stock return over the prior 10 years at year *t*

TENURE = the average number of years the firm's executives have held office at year *t*

SIZE = the natural log of firm *i*'s market value of equity defined as the firm's price per share at year *t*'s fiscal year end (Compustat data item 199) multiplied by the number of shares outstanding (Compustat data item 25)

NEW_ECON = 1 if the firm is a new-economy firm (new-economy firms are firms with SIC codes 3570, 3571, 3572, 3576, 3577, 3661,3674, 4812, 4813, 5045, 5961, 7370, 7371, 7372, 7373), and 0 otherwise

CASHFLOW = sum of the firm i's net operating cash flow (Compustat data item 308) and net investing cash flow (Compustat data item 311) scaled by market value of equity

To examine the possibility that firms' compensation committees will consider the level of earnings in addition to the change in earnings, I also estimate equation (1) using earning's value-relevance (Bushman et al. 2004; Francis et al. 2004; Lev and Zarowin 1999).[8)]

Additional Test of Hypotheses

To more directly test whether the correlation between earnings and stock returns is associated with executive compensation mix, I estimate the following equation that regresses the level of stock-based compensation and cash compensation on the correlation between earnings and stock returns and control variables.

$$\begin{aligned}\ln COMP_{i,t} = {} & \beta_0 + \beta_1 CORR_{i,t} + \beta_2 CORR{*}NOISE\_ROA_{i,t} \\ & + \beta_3 CORR{*}NOISE\_RET_{i,t} + \beta_4 HIGH\_TAX_{i,t} \\ & + \beta_5 LOW\_TAX_{i,t} + \beta_6 ROA_{i,t} + \beta_7 RET_{i,t} + \beta_8 LEV_{i,t} \\ & + \beta_9 MTB_{i,t} + \beta_{10} OWNERSHIP_{i,t} + \beta_{11} NOISE\_ROA_{i,t} \\ & + \beta_{12} NOISE\_RET_{i,t} + \beta_{13} TENURE_{i,t} + \beta_{14} SIZE_{i,t} \\ & + \beta_{15} NEW\_ECON_{i,t} + \beta_{16} CASHFLOW_{i,t} \\ & \sum_{t=1}^{9} YEARDUMMY + \sum_{t=1}^{13} INDUSTRYDUMMY + \varepsilon_{i,t} \qquad (2)\end{aligned}$$

(t = 1992-2001)

Where:

COMP is EQUITY_COMP or CASH_COMP,

EQUITY_COMP = one plus the average of Black-Scholes value of stock options and restricted stock across the firm's executives (thousands of dollars) at year t

CASH_COMP = the average of salary, bonus, and long term incentive pay (LTIP) across the firm's executives (thousands of dollars) at year t

Estimation Method

Since stock options and/or stock grants are not granted every year to executives, %*EQUITY_GRANT* has a preponderance of left-censored (at zero) values. Bryan, Hwang, and Lilien (2000a) and

8) Bushman et al. (2004) use this adjusted R-squared as one of three metrics for earnings-timeliness. However, most financial archival research labels it as "value-relevance of earnings" (e.g., Lev and Zarowin (1999).

Yermack (1995) use a Tobit model to analyze CEO stock option awards, because the main dependent variable has a mass point of observations at zero when firms award no CEO stock options. In my sample, this 'censored dependent variable' problem is not severe since the main dependent variable, %*EQUITY_GRANT*, is calculated based on the average value of each component of compensation across executives for each firm-year. However, 560 observations out of 4,337 firm-years indicate zero, suggesting that these firms did not award stock-based compensation to any of their executives.[9] Accordingly, for robustness checks, I estimate equation (1) using both OLS and a Tobit model.

Measurement of Key Variables

Relative proportion of stock-based compensation (%*EQUITY_GRANT*). I divide total compensation into three parts: salary (including salary, other current and all other compensation), bonus (including annual bonus and long-term incentive plan payments), and stock-based pay (including option and restricted stock-awards). The firm's relative proportion of stock-based compensation to total executive compensation is calculated by dividing the sum of (executives' stock option compensation and restricted stock grant) by total compensation. This "flow" measure is the ex ante proportion of executive compensation related to their firm's share price, which captures a firm's explicit policy choice to link managers' compensation to share price (Ittner, Larcker, and Lambert 2003; Nagar, Nanda, Wysocki 2003). The value of options granted in each year is computed using the Standard and Poor's modified Black-Scholes options valuation methodology. The value of restricted stock equals the number of restricted stock granted multiplied by the year-end

9) To examine whether there is any systematic difference between firm-years granting stock-based compensation and those granting no stock-based pay, I compare firm-specific characteristics between two groups. The results suggest that firms granting no stock-based compensation are generally smaller, cash-constrained firms than those granting stock-based compensations and that they exhibit worse stock price performance, lower marginal tax rate, and higher stock ownership held by their CEOs. To ensure that my results are unaffected by a potentially endogenous decision to use stock-based pay, I repeat all analyses after I exclude firm-years granting no stock-based compensation. The results are similar to those reported in the table 4 through 7.

stock price. To avoid cross-sectional correlation and to reduce the impact of observations for executives who are employed for the part of the year and included in the proxy disclosure, I average across executives for each firm-year.

Correlation between earnings and stock returns (ERC_CORR). I measure the returns-earnings correlation by Fisher *Z* transformed R-squared at year t obtained from estimating the following firm-specific returns-earnings regression equation based on the most recent 10 time-series observations.[10)]

$$RET_{i,t} = \beta_0 + \beta_1 \Delta EARN_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where:

RET = the stock return for firm *i* over the 12 month period of the firm's fiscal year *t*

ΔEARN = the change in earnings before extraordinary items and discontinued operations for firm *i* between year *t* and year *t* – 1, deflated by the market value of equity at the beginning of year *t*

Value-Relevance of Earnings (RELEV). I measure value-relevance of earnings by Fisher Z transformed R-squared at year t obtained from estimating the following firm-specific returns-earnings regression equation based on the most recent 10 time-series observations.[11)]

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10) The requirement of 10 years of complete returns and earnings data to estimate firms' earnings-returns regression biases the sample towards larger firms. This is one caveat of my sampling scheme that makes the results likely applicable to large US public firms.

11) One may argue that the simple assumption of a linear relation of stock returns and earnings does not consider asymmetric sensitivity of accounting earnings to unrealized gains and losses. To address this concern, I additionally construct the timeliness of earnings metric as R-squared from the reverse regression following Ball, Kothari, and Robin (2000). This timeliness of earnings metric will decrease in the lag with which earnings capture the news reflected in stock returns (Ball, Kothari, and Robin 2000). The correlation between the timeliness metric and value-relevance of earnings is close to 0.7 and when I replace *CORR* and *RELEV* with timeliness of earnings metric, my results reported in table 4 remain unchanged.

$$RET_{i,t} = \beta_0 + \beta_1 EARN_{i,t} + \beta_2 DEARN_{i,t} + \varepsilon_{i,t} \quad (4)$$

Where:

RET = the stock return for firm *i* over the 12 month period of the firm's fiscal year *t*
EARN = earnings before extraordinary items for firm *i* in year *t*, deflated by the market value of equity at the beginning of year *t*
ΔEARN = the change in earnings before extraordinary items and discontinued operations for firm *i* between year *t* and year *t* – 1, deflated by the market value of equity at the beginning of year *t*

Control Variables

Growth opportunities. I predict that firms with growth opportunities are likely to rely heavily on stock-based compensation. High growth firms should provide managers with a market-based pay mechanism because of the potential information asymmetry due to managers' privy information about the value of the investment. In these firms, earnings-based cash compensation is unlikely to provide desired incentives to executives (Bryan, Hwang, and Lilien 2000a; Ittner, Lambert, and Larcker 2003; Lambert and Larcker 1987; Smith and Watts 1992; Yermack 1995). I capture firms' growth opportunities using the market to book ratio.

Noise in performance measures. Agency theory suggests that the relative weight on a given performance measure in a linear contract is a decreasing function of the noise in the performance measure (Banker and Datar 1989). Therefore, the more 'noise' a performance measure contains, the less weight firms will place on that measure in executive compensation packages. Following prior literature, I measure the noise in earnings and stock returns as the time-series standard deviation of earnings and annual stock returns, respectively (Bryan, Hwang, and Lilien 2000a; Ittner, Lambert, and Larcker 2003; Lambert and Larcker 1987; Yermack 1995). I predict that the noise in earnings is positively associated with the use of stock-based compensation. Similarly, the noise in stock returns is expected to be negatively associated with the use of stock-based compensation. However,

the convex nature of stock option mechanisms may make stock return volatility positively correlated with use of stock-based pay (Ittner, Lambert, and Larcker 2003; Core, Guay, and Larcker 2003a).

Managerial ownership. I expect executive ownership to be negatively related to the use of stock-based compensation because when executives hold a large fraction of their firm's equity, the demand for further stock-based compensation is likely to be reduced, since the interests of executives and shareholders are relatively aligned already (Anderson, Banker, and Ravindran 2000; Bryan, Hwang, and Lilien 2000a; Jensen and Meckling 1976; Yermack 1995; Zajac and Westphal 1994).

Firm leverage. A firm's leverage is included as a control variable since debtholders are likely to demand a premium for the potential increase in firm risk due to pursuing "too risky projects" if incentive plans align the interests of managers and stockholders at the expense of debtholders (Bryan, Hwang, and Lilien 2000a; Yermack 1995). In this case, leverage will be negatively associated with the use of stock-based pay. On the other hand, almost all firms apply measurement provisions of APB 25 under which they do not expense stock options for most fixed option grants and disclose pro forma net income under SFAS123 that requires firms' stock-based compensation expense to be calculated based on the fair value of options (Aboody, Barth, and Kaznik 2004). Therefore, the leverage variable also will capture the firms' incentive to prefer to use options when there is a need to boost accounting income to avoid violating debt covenants (Anderson, Banker, and Ravindran 2000; Matsunaga 1995) and it is likely that highly-levered firms heavily rely on stock-based compensation.

Liquidity constraints. Firms with short cash supply may prefer to grant stock-based compensation (Anderson, Banker, and Ravindran 2000; Core and Guay 1999; Ittner, Lambert, and Larcker 2003). Thus, I predict a negative relation between the mix of stock-based compensation to cash compensation and free cash flow. I capture firms' cash availability using net operating cash flow minus net investing cash flow, scaled by market value of equity.

Tax rates. Stock option awards provide either no tax deduction (for "incentive" stock options) or a tax deduction that is deferred

until the options are exercised (for "non-qualified" stock options). Cash compensation, by contrast, is immediately deductible.[12] Consequently, I expect that firms with higher marginal tax rates are likely to shift the compensation mix from stock-based to cash compensation. Following Core and Guay (2001) and Ittner, Lambert, and Larcker (2003), I measure marginal tax rate using two indicator variables, *HIGH_TAX* and *LOW_TAX*.

Firm size. Larger firms are generally more difficult to monitor and thus there may be more need to provide executives with a more "direct" incentive mechanism such as stock-based compensation (Ittner, Lambert, and Larcker 2003). This is also consistent with Bushman et al. (2004) documenting that firms' use of equity-based compensation is positively related to organizational complexity. I use the natural logarithm of market value of the firm as a proxy for firm size.

Firm performance. I include *ROA* and RET to control for a possible confounding effect of firm performance on the compensation mix since it is likely that firms that perform better may have high value relevance of earnings and firms that perform well also use stock-based compensation more intensively.

Other considerations. The bonus share (BONSHR) variable is included in the equation to examine whether stock-based pay is a substitute for cash bonus (Anderson, Banker, and Ravindran 2000). I expect the coefficient on BONSHR to be negative. "New economy" firms are known to rely more heavily on the use of equity grants as a key component of their executive compensation packages (Anderson, Banker, and Ravindran 2000; Ittner, Lambert, and Larcker 2003; Murphy 2003). I use Murphy (2003)'s classification to create a "new economy firm" indicator variable, *NEW_ECON*. Finally, I include executives' tenure to control for its possible impact on compensation mix (Bushman, Indjejikian, and Smith 1996).

Year and Industry Dummies. In order to address cross-sectional correlation in regression residuals from using a pooled

12) Starting January 1, 1994, the Internal Revenue Code §162(m) disallows tax deductibility of compensation expense exceeding $1,000,000 for the CEO and the other four highest compensated employees, unless compensation is performance-based and the board has a compensation committee comprising two or more outside directors.

sample, I include nine year-dummy variables and thirteen industry-dummy variables. These variables are intended to capture unspecified time- and industry-differences in firms' compensation practices.

EMPIRICAL RESULTS

Descriptive Statistics

Table 2 presents descriptive statistics for the variables I use to test my hypotheses. The mean and median proportions of stock-based compensation to total compensation (%*EQUITY_GRANT*) are 34.5% and 32.0%, respectively. The mean stock-based pay is $880,000, which far exceeds the mean cash compensation, $572,000, whereas median cash compensation, $427,000, is much larger than median equity grants, $231,000, suggesting that there is huge cross-sectional variation in granting stock options. Note that compensation variables are averaged across executives for each firm-year. The mean and median returns-earnings correlations (*CORR*) measured with R^2 are .258 and .156, respectively. Earning's value relevance measures (*RELEV*) that additionally consider the level of earnings as well as change in earnings (adjusted R^2) are .254 and .172, respectively. The mean *RELEV* is smaller than *CORR* because there are firm-year observations with negative adjusted R^2.

Table 3 presents correlations among the variables used to test hypotheses. Returns-earnings correlation is significantly positively correlated with %*EQUITY_GRANT*, managerial stock ownership, standard deviation of accounting and stock price-based performance measures, and negatively correlated with the level of cash compensation and firm size. These findings provide preliminary univariate support for my hypotheses.

The Association between Returns-Earnings Correlation and the Mix of Executive Pay

I begin by presenting the results for the regressions on the mix of executive compensation. Table 4 reports the estimated coefficients and corresponding p-values of each variable in

Table 2. Sample Descriptive Statistics

Variable	N	Mean	Median	Q1	Q3	Std.
%*EQUITY_GRANT*	4337	.345	.320	.133	.538	.253
EQUITY_GRANT	4337	879.837	23.641	64.465	632.616	357.139
CASH_COMP	4337	571.705	427.232	299.870	648.063	541.797
CORR	4337	.258	.156	.039	.371	.294
RELEV	4337	.254	.172	-.054	.485	.396
SYS_CORR	4337	.121	.070	.017	.180	.136
UNSYS_CORR	4337	.246	.163	.039	.358	.265
HIGH_TAX	4337	.393	.000	.000	1.000	.489
LOW_TAX	4337	.062	.000	.000	.000	.242
ROA	4337	.052	.056	.023	.092	.077
RET	4337	.090	.020	-.209	.286	.476
LEV	4337	.840	.468	.205	1.006	1.186
MTB	4337	2.975	2.221	1.499	3.406	2.619
OWNERSHIP	4337	.051	.019	.007	.062	.074
NOISE_ROA	4337	.049	.035	.021	.056	.049
NOISE_RET	4337	.572	.393	.291	.568	.718
TENURE	4337	5.971	.000	.000	12.000	9.126
SIZE	4337	6.616	6.496	5.710	7.469	1.318
NEW_ECON	4337	.109	.000	.000	.000	.311
CASHFLOW	4337	.006	.012	-.042	.058	.176

Variable definitions:

%EQUITY_GRANT = the ratio of the sum of average Black-Scholes value of stock options and average restricted stock to average total compensation across the firm's executives

EQUITY_COMP = the average of Black-Scholes value of stock options and restricted stock across the firm's executives (thousands of dollars)

CASH_COMP = the average of salary, bonus, and long term incentive pay (LTIP) across the firm's executives (thousands of dollars)

CORR = Fisher Z transformed R-Squared of the firm-specific regression of annual stock return on the change in annual core earnings deflated by market value of equity at the beginning of the period

RELEV = Fisher Z transformed adjusted R-Squared of the firm-specific regression of annual stock return on the level of annual core earnings and change in annual core earnings deflated by market value of equity at the beginning of the period

SYS_CORR = Fisher Z transformed R-Squared of the firm-specific regression of the annual CRSP value-weighted return on the change in annual core earnings deflated by market value of equity at the beginning of the period

UNSYS_CORR = Fisher Z transformed R-Squared of the firm-specific regression of the firm's annual market model residual on the change in annual core earnings deflated by market value of equity at the beginning of the period

HIGH_TAX = 1 if the firm has a positive pretax book income and no net operating loss carry-forwards and 0 otherwise

LOW_TAX = 1 if the firm has negative pretax book income and net operating loss carry-forwards and 0 otherwise

ROA = the firm's return on asset ratio calculated as net income before extraordinary items (Compustat data item 18) divided by total assets at fiscal year-end (Compustat data item 6)

RET = the firm's annual stock returns

LEV = the firm's book value of liabilities divided by its market value of equity

MTB = the firm's market to book ratio defined as its market value of equity divided by book value of equity

OWNERSHIP =the firm's percentage of common shares owned by its executives

NOISE_ROA = standard deviation of the firm's annual return on asset ratio over prior 10 years

NOISE_RET = standard deviation of the firm's annual stock returns over prior 10 years

TENURE = the average number of years the firm's executives have held office

SIZE = the natural log of the firm's market value of equity defined as the firm's price per share at fiscal year-end (Compustat data item 199) multiplied by the number of shares outstanding (Compustat data item 25)

NEW_ECON = 1 if the firm is new economy firm (new economy firms are firms with SIC codes 3570,3571,3572,3576, 3577,3661,3674,4812,4813,5045,5961,7370,7371,7372, and 7373) and 0 otherwise

CASHFLOW = sum of the firm's net operating cashflow (Compustat data item 308)and net investing cashflow (Compustat data item 311) scaled by market value of equity

Table 3. Pearson Correlations between Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1. % *EQUITY_GRANT*	**1.00**																		
2. *EQUITY_COMP*	.36**	**1.00**																	
3. *CASH_COMP*	.09**	.24**	**1.00**																
4. *CORR*	.04**	-.01	-.08**	**1.00**															
5. *SYS_CORR*	-.01	.00	-.02	.04**	**1.00**														
6. *UNSYS_CORR*	.02	-.02	-.09**	.89**	-.17**	**1.00**													
7. *HIGH_TAX*	-.08**	-.01	.02	-.02	.00	.00	**1.00**												
8. *LOW_TAX*	.05**	-.01	-.08**	.00	.04**	-.01	-.21**	**1.00**											
9. *ROA*	-.07**	.03	.09**	.03*	-.02	.03*	.30**	-.37**	**1.00**										
10. *RET*	.00	.00	.04**	.04*	.01	.03*	-.02	-.03*	.12**	**1.00**									
11. *LEV*	-.09**	-.04**	.01	.00	.06**	-.02	-.18**	.13**	-.35**	-.16**	**1.00**								
12. *MTB*	.20**	.19**	.11**	.01	-.01	.00	.05**	-.01	.23**	.19**	-.26**	**1.00**							
13. *OWNERSHIP*	-.21**	-.03*	.00	.04**	.01	.04*	.12**	-.03*	.12**	-.01	-.02	.01	**1.00**						
14. *NOISE_ROA*	.16**	.04*	-.12**	.06**	.01	.04**	-.19**	.19**	-.28**	.09**	-.06**	.18**	-.11**	**1.00**					
15. *NOISE_RET*	.15**	.06**	.02	.24**	.01	.21**	-.11**	.08**	-.07**	.12**	.01	.07**	-.06**	.42**	**1.00**				
16. *TENURE*	-.09**	-.04**	.10**	-.12**	-.02	-.09**	-.02	-.04*	-.01	-.07**	.11**	-.09**	-.03	-.20**	-.18**	**1.00**			
17. *SIZE*	.33**	.30**	.47**	-.12**	-.05**	-.12**	.11**	-.10	.28**	.07**	-.27**	.43**	-.01	-.19**	-.05**	.16**	**1.00**		
18. *NEW_ECON*	.23**	.15**	-.02	.10**	.02	.08**	-.07**	.09	-.03*	.03*	-.12**	.18**	-.06**	.18**	.15**	-.20**	.08**	**1.00**	
19. *CASHFLOW*	-.08**	-.01	.00	-.03*	.02	-.04**	.03	-.01	.09**	.07**	.05**	-.01	.04**	-.02	-.04*	.04**	-.03*	-.03	**1.00**

See Table 2 for definitions of variables.

*,** Significant at $p < .05$ and $p < .01$ respectively.

equation (1). Columns (1)-(2) report the results from OLS estimation and columns (3)-(4) report results from TOBIT estimation. Because the results from OLS estimation are very similar to those from TOBIT estimation, I provide the results based on OLS estimation in subsequent analyses.

The coefficients on returns-earnings correlation are statistically positive for all four regressions.[13] In column (1), the coefficient on the correlation between stock returns and earnings is significantly positive ($p < .0001$), consistent with the hypothesis that returns-earnings correlation is positively associated with the firm's greater use of stock-based pay. This result also holds when I use *RELEV*, a more sophisticated measure of earnings' value-relevance obtained by firm-specific estimation of equation (4) (see column (2)). In contrast, the coefficients on the interaction terms between returns-earnings correlation and time-series standard deviation of performance measures are significantly negative for stock returns and marginally significant for *ROA*. This result remains unchanged when *RELEV* is used in lieu of *CORR*. Taken together, these findings support the prediction that firms with high returns-earnings correlation will use stock-based compensation more intensively rather than cash compensation and that this relation is mitigated when returns and earnings are highly volatile, consistent with the prediction from psychology-based theory.

For all four regressions, the coefficients on the percentages of annual cash bonus in total compensation are significantly negative. These results are consistent with the substitution hypothesis, that is, stock-based compensation and cash bonus

13) Prior research also documents that firms' governance plays a role in determining executive pay mix (Hanlon, Rajgopal, and Shevlin 2003; Mehran 1995). Drawing on this literature, I use detailed governance variables drawn from the IRRC database[13] during 1998-2001 to control for the effect of firms' governance on the use of stock-base compensation. Specifically, I include board size, the fraction of independent directors on board, the fraction of independent directors on compensation committee and CEO duality (i.e., the CEO also serves as chairman of the board of directors). The coefficients on returns-earnings correlation continue to be significant for all four regressions. In doing so, however, I lose significant number of observations since IRRC board database does not cover the period 1992-1997 in my sample (the number of usable observations for regressions has been reduced to 1,506). Thus, I report the results without controlling for governance variables only.

are substitutes in compensation committees' decisions on compensation mix (Anderson, Banker, and Ravindran 2000).

The coefficients on the *HIGH_TAX* indicator variable are all significantly negative, suggesting that firms with higher marginal tax rates are likely to shift the compensation mix from stock-based to cash compensation for tax purposes (Bryan, Hwang, and Lilien 2000a; Ittner, Lambert, and Larcker 2003; Yermack 1995).

Firm performance variables are generally not associated with compensation mix, except for weak negative coefficients on *ROA* in Columns (1)-(2). One possible explanation is that the board may rely more on stock option awards as a less visible way to increase executive compensation under low accounting performance, but an unequivocal explanation is not readily available.

Firms' growth opportunities proxied by the market-to-book ratio are not significantly correlated with firms' use of stock-based pay, inconsistent with prior literature (Baber, Janakiraman, and Kang 1996; Smith and Watts 1992). However, this result is consistent with some prior literature documenting no significantly positive relationship between firms' growth opportunities and greater use of stock options (e.g., Yermack 1995). Alternatively, the insignificant result may arise because the market to book metric captures growth opportunities with severe measurement error.

The coefficients on managerial ownership are all statistically negative. These results are consistent with the prediction that high managerial stock ownership aligns the interests of executives with those of shareholders, reducing the demand for other stock-based incentive mechanisms such as options (Jensen and Meckling 1976).

Consistent with agency theory, firms with noisy accounting metrics are more likely to use stock-based pay. However, the positive coefficient on *NOISE_RET* suggests that the convexity of the option payoff function makes stock return volatility positively correlated with use of stock-based pay for incentive purposes (Core, Guay, and Larcker 2003; Ittner, Lambert, and Larcker 2003).

The results also indicate that large firms use stock-based compensation more heavily, consistent with the view that as the

Table 4. Regression of Percentage of Equity-based Compensation on Returns-Earnings Correlation and Control Variables

(*p*-values in parentheses)

Variable	Predicted Sign	Estimated Coefficient			
		OLS ESTIMATION		TOBIT ESTIMATION	
Intercept	+/−	-.121**	-.114**	-.211**	-.205**
		(.01)	(.01)	(.00)	(.00)
CORR	+	.067**	-	.067**	
	-	(.00)		(.00)	
RELEV	+	-	.036**	-	.037**
			(.00)		(.00)
*CORR*NOISE_ROA*		-.353	-	-.321	-
		(.09)		(.17)	
*CORR*NOISE_RET*		-.018*	-	-.018	-
		(.05)		(.08)	
*RELEV*NOISE_ROA*		-	-.149	-	-.161
			(.33)		(.34)
*RELEV*NOISE_RET*		-	-.016*	-	-.016
			(.04)		(.06)
BONSHR		-.756**	-.756**	-.874**	-.875**
		(.00)	(.00)	(.00)	(.00)
HIGH_TAX		-.016**	-.017**	-.014	-.015*
		(.01)	(.01)	(.06)	(.05)
LOW_TAX	+	-.015	-.016	-.019	-.019
		(.24)	(.23)	(.20)	(.19)
ROA	+/−	-.085	-.085	-.078	-.079
		(.08)	(.08)	(.15)	(.14)
RET	+/−	.004	.004	.010	.010
		(.57)	(.57)	(.18)	(.18)
LEV	+/−	-.003	-.003	-.004	-.004
		(.28)	(.27)	(.28)	(.27)
MTB	+	.0004	.0004	-.0002	-.0001
		(.76)	(.75)	(.91)	(.93)
OWNERSHIP		-.484**	-.483**	-.603**	-.599**
		(.00)	(.00)	(.00)	(.00)
NOISE_ROA	+	.455**	.385**	.475**	.417**
		(.00)	(.00)	(.00)	(.00)
NOISE_RET	+/	.033**	.035**	.032**	.034**
		(.00)	(.00)	(.00)	(.00)
TENURE	+/	-.002**	-.002**	-.002**	-.002**
		(.00)	(.00)	(.00)	(.00)
SIZE	+	.074**	.073**	.080**	.079**
		(.00)	(.00)	(.00)	(.00)
NEW_ECON	+	.040**	.043**	.038*	.041**
		(.01)	(.00)	(.02)	(.01)
CASHFLOW		-.038*	-.038*	-.050**	-.050**
		(.02)	(.02)	(.01)	(.01)
N		4337	4337	4337	4337
Adjusted R^2		44.7%	44.4%	-	-
F value of the regression		9.7	89.5	-	-
% of noncensored obs		-	-	87%	87%

*,** Significant at p < .05 and p < .01 respectively (two-tailed test)

BONSHR = the ratio of average annual cash bonus to average total compensation

For parsimony, intercept, coefficients on control variables, year-dummies, and industry-dummies are not reported.

See Table 2 for other variable definitions.

complexity of the firm's operations increases, the equilibrium level of equity-based compensation increases (e.g., Bushman et al. 2004). The new economy firm indicator variable is significantly positively associated with the use of stock-based pay (Anderson, Banker, and Ravindran 2000; Ittner, Lambert, and Larcker 2003; Murphy 2003).

Finally, the coefficient on free cash flows is significantly negative for the mix of stock option awards and stock grants, suggesting that liquidity constraints lead to heavy reliance on stock option awards relative to cash compensation (Bryan, Hwang, and Lilien 2000a; Core and Guay 1999; Ittner, Lambert, and Larcker 2003). Consistent with the findings of prior literature, the coefficient on tenure is significantly negative (Bushman, Indjejikian, and Smith 1996; David Kochhar, and Levitas 1998).

The Association between Returns-Earnings Correlation and the Magnitude of Compensation

To further investigate the relation between returns-earnings correlation and executive compensation packages, Table 5 presents the results of OLS regression of the magnitude of both equity grants and cash compensation on returns-earnings correlation during sample periods. Columns (1) and (2) show the results for stock-based pay and cash pay, respectively. To adjust for the highly skewed distributions in compensation variables, I log-transform both stock-based and cash pay. Given that stock options and stock grants are not granted every year to executives, I add the value of one to stock option compensation and stock grant values before log-transformation, an approach similar to Bryan, Hwang, and Lilien (2000b).

In column (1), as expected, the coefficient on the correlation between stock returns and earnings is significantly positive ($p = .0076$), consistent with the hypothesis that returns-earnings correlation is positively associated with the level of stock-based compensation. The coefficient on the interaction term between returns-earnings correlation and *NOISE_ROA* is significantly negative at the .07 level, but returns-earnings correlation interacted with *NOISE_RET* is not significantly different from zero.

Table 5. OLS Regression of the Level of Executive Compensation on Returns-Earnings Correlation and Control Variables

(*p*-values in parentheses)

Variable	Estimated Coefficients	
	Equity_Comp	*Cash_Comp*
Intercept	-2.706**	3.953**
	(.00)	(.00)
CORR	.434**	-.016
	(.01)	(.66)
CORR*NOISE_ROA	-4.026	-.819
	(.07)	(.10)
CORR*NOISE_RET	-.060	-.001
	(.55)	(.97)
HIGH_TAX	-.171**	-.051**
	(.01)	(.00)
LOW_TAX	-.194	-.100**
	(.16)	(.00)
ROA	-2.425**	.167
	(.00)	(.13)
RET	-.035	.071**
	(.61)	(.00)
LEV	.050	.089**
	(.10)	(.00)
MTB	-.024	-.031**
	(.10)	(.00)
OWNERSHIP	-5.527**	-.063
	(.00)	(.50)
NOISE_ROA	4.549**	-.209
	(.00)	(.34)
NOISE_RET	.139*	.014
	(.04)	(.33)
TENURE	-.007	.001
	(.06)	(.11)
SIZE	.809**	.321**
	(.00)	(.00)
NEW_ECON	.276	.002
	(.07)	(.96)
CASHFLOW	-.636*	.039
	(.00)	(.32)
N	4337	4337
Adjusted R^2	27.4%	47.4%
F value of the regression	44.05	103.81

*,** Significant at $p < .05$ and $p < .01$ respectively (two-tailed test)

For parsimony, intercept, coefficients on control variables, year-dummies, and industry-dummies are not reported.

See Table 2 for other variable definitions.

The coefficients on the marginal tax indicator, firm performance, leverage, market-to-book ratio, managerial ownership, noise in performance measure, tenure, size, new economy indicator, and liquidity constraint are generally consistent with those reported in Table 5.

In column (2), the coefficient on the correlation between stock returns and earnings is negative but not significantly different from zero. In addition, the coefficient on the interaction term between returns-earnings correlation and *NOISE_ROA* is marginally significantly negative and the coefficient on returns-earnings correlation interacted with *NOISE_RET* is not significantly different from zero.

The level of cash compensation is positively associated with stock returns, leverage, and firm size and negatively associated with tax indicator and market to book ratio.

Overall, further analysis reveals that high returns-earnings correlations are positively correlated with the level of stock-based pay, but it does not provide evidence that firms decrease the level of cash compensation in response to high returns-earnings correlation. This suggests that the positive relation between returns-earnings correlation and relative proportion of stock-based pay to total compensation is driven mostly by increases in equity grants rather than by decreases in cash compensation.[14)]

SENSITIVITY ANALYSES

Taken together, Table 4 and 5 provide strong evidence supporting the psychology-based hypothesis that firms with high returns-earnings correlation are likely to use more stock-based pay and provide weak evidence supporting that this relationship is conditional on variability of stock returns and earnings. To investigate alternative interpretations for my results, I conduct additional analyses.

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14) This finding is consistent with Hall and Murphy (2003)'s argument that since risk-averse executives place low values on options, recent escalation of stock option grants came without reductions in any other form of pay.

Does the Compensation Committee Decompose Returns-Earnings Correlation?

Sloan (1993) argues that the correlation between earnings and stock returns consists of two components that provide different implications for executive performance measurement. The first component is the correlation between earnings and market-wide movements in stock returns and the second component is the correlation between earnings and firm-specific movements in stock returns. He argues that the former captures the extent to which earnings reflect the noise present in stock price and makes earnings less useful in the contract and the latter indicates the extent to which earnings capture the firm-specific signal in stock returns. He finds that the first (second) component of correlation is negatively (positively) associated with the relative weights placed on earnings in determining cash compensation.

Given Sloan's implicit assumption that the firm-specific component in stock returns is a more informative signal in evaluating manager's contribution to firm value, the compensation committee may decompose the correlation between earnings and stock returns into Sloan's two components and take their different implications for stock option granting strategy into account. If that is the case, the hypothesized association between the return-earnings correlation and greater use of stock based pay, if any, might be an artifact reflecting the extent to which the return-earnings correlation is driven by the first or the second component.

Furthermore, whether Sloan's finding based on executive cash compensation will be generalized to the structure of total compensation for executives is an empirical question. To investigate these alternative explanations for my previous results, I estimate equations (1) and (2) using Sloan's two components of returns-earnings correlation.

Panel A of table 6 shows the results for regression of compensation mix on two components of returns-earnings correlation. In column (1), the coefficient on *SYS_CORR* is positive, but is not significantly different from zero at conventional levels (p = .11), suggesting that *SYS_CORR* is not

Table 5. Regression of Compensation Mix and Level on Components of Returns-Earnings Correlation and Control Variables for 1992-2001

(*p*-values in parentheses)

Panel A. Dependent Variable- Percentage of Equity-based Compensation

Variable	*SYS CORR*	*UNSYS_CORR*
SYS_CORR	.051	-
	(.11)	
UNSYS_CORR	-	.052**
		(.00)
SYS_CORR*NOISE_ROA	-.285	-
	(.55)	
SYS_CORR*NOISE_RET		
	.008	-
	(.82)	
UNSYS_CORR*NOISE_ROA	-	-.336
		(.14)
UNSYS_CORR*NOISE_RET	-	-.015
		(.18)
N	4,337	4,337
Adjusted R^2	44.4%	44.5%
F value of the regression	89.91	9.20

*,** Significant at p < .05 and p < .01 respectively (two-tailed test)
For parsimony, intercept, coefficients on control variables, year-dummies, and industry-dummies are not reported.

Panel B. Dependent Variable- Level of Executive Compensation

Variable	*SSYS_CORR Model*		*UNSYS_CORR Model*	
	EquityComp	*CashComp*	*EquityComp*	*CashComp*
SYS_CORR	.458	.115	-	-
			(.18)	(.13)
UNSYS_CORR	-	-	.378*	-.074*
	(.03)	(.05)		
SYS_CORR*NOISE_ROA	-5.044	-1.168	-	-
	(.33)	(.30)		
SYS_CORR*NOISE_RET	-.165	-.080	-	-
	(.66)	(.33)		
UNSYS_CORR*NOISE_ROA	-	-	-3.869	-.615
		(.11)	(.25)	
UNSYS_CORR*NOISE_RET	-	-	-.035	.016
			(.76)	(.54)
N	4337	4337	4337	4337
Adjusted R^2	27.3%	47.3%	27.4%	47.4%
F value of the regression	43.85	103.44	43.95	103.98

*,** Significant at p < .05 and p < .01 respectively (two-tailed test)
For parsimony, intercept, coefficients on control variables, year-dummies, and industry-dummies are not reported.

the metric used by compensation committees for mix decisions. However, column (2) shows that the coefficient on *UNSYS_CORR* is positive and significant at the 1% level, suggesting that firms' compensation committees may implicitly decompose returns-earnings correlation and use the correlation between firm-specific components in returns and earnings in decision-making.

To provide more insights into this result, I report the results for regression of the level of both equity and cash compensation on two components of returns-earnings correlation in Panel B. Again, the coefficient on *SYS_CORR* is not significantly positive, suggesting that the board does not rely on the correlation between market returns and earnings. The coefficient on *UNSYS_CORR* is significantly positively correlated with the level of stock-based pay and negatively correlated with the level of cash compensation. This finding is noteworthy in the sense that the results obtained by using firm-specific stock returns-earnings correlation are more consistent with the hypothesis than those by using returns-earnings correlation, suggesting that firms may decompose returns-earnings correlation.

Averaging Observations across Years

My research design assumes that the change in correlation between earnings and stock returns will be reflected in the compensation committee's decision process annually. However, long-term grants such as stock options may not be given every year, leading to measurement error in my dependent variables. To mitigate this issue, I average all the observations available for a given firm across the sample period and then use the average of the observations in the regression and drop year-dummy variables. Averaging yearly observations for a given firm is consistent with specifications from some of the prior literature (e.g., Bushman, Indjejikian, and Smith 1996; Core, Holthausen, and Larcker 1999; Indjejikian and Nanda 2002). The results, not tabulated, show that averaging yearly observations for a given firm does not change my previous results.

Simultaneity Bias

My hypothesis assumes that a firm's compensation committee

will adjust the compensation mix according to a change in returns-earnings correlation. However, there is prior literature documenting that managerial ownership or stock-based compensation is positively associated with the usefulness of earnings (Behn, Nagy, and Riley 2002; Warfield, Wild, and Wild 1995). Recent studies argue that managers with higher stock-based compensation are more likely to manage earnings and therefore, the quality of earnings decreases with the magnitude of stock-based compensation (e.g., Cheng and Warfield 2005; Erickson, Hanlon, and Maydew 2003).[15] To address this issue, I use a simultaneous equations model wherein the compensation mix and returns-earnings correlation are jointly determined. Specifically, I consider the following system of two equations:

$$\begin{aligned}\ln CORR_{i,t} = {} & \delta_0 + \delta_1 \%EQUITY\_GRANT_{i,t} + \delta_2 OWNERSHIP_{i,t} \\ & + \delta_3 REG_{i,t} + \delta_4 SIZE_{i,t} + \delta_5 RISK_{i,t} + \delta_6 LEV_{i,t} \\ & + \delta_7 MTB_{i,t} + \delta_8 NOISE\_ROA_{i,t} + \delta_9 NOISE\_RET_{i,t} \\ & + \delta_{10} PERS_{i,t} + \delta_{11} PPE\_TA + \upsilon_1 \end{aligned} \tag{5a}$$

$$\begin{aligned}\%EQUITY\_GRANT_{i,t} = {} & \alpha_0 + \alpha_1 CORR_{i,t} + \alpha_2 CORR{*}NOISE\_ROA_{i,t} \\ & + \alpha_3 CORR{*}NOISE\_RET_{i,t} + \alpha_4 BONSHR_{i,t} \\ & + \alpha_5 HIGH\_TAX_{i,t} + \alpha_6 LOW\_TAX_{i,t} + \alpha_7 ROA_{i,t} \\ & + \alpha_8 RET_{i,t} + \alpha_9 LEV_{i,t} + \alpha_{10} MTB_{i,t} \\ & + \alpha_{11} OWNERSHIP_{i,t} + \alpha_{12} NOISE\_ROA_{i,t} \\ & + \alpha_{13} NOISE\_RET_{i,t} + \alpha_{14} TENURE_{i,t} + \alpha_{15} SIZE_{i,t} \\ & + \alpha_{16} NEW\_ECON_{i,t} + \alpha_{17} CASHFLOW_{i,t} \\ & + \sum_{t=1}^{9} YEARDUMMY + \upsilon_2 \end{aligned}$$

The endogenous variables are *CORR* and %*EQUITY_GRANT*. If *CORR* and %*EQUITY_GRANT* are jointly determined, the errors υ_1 and υ_2 are correlated, resulting in a correlation between *CORR* and υ_2, potentially causing OLS estimates of (5b) to be biased

15) However, it is not certain how higher stock-based compensation influences the association between returns and earnings for long return intervals in this study (Bushman et al. 2004). A study by Nagar, Nanda, and Wysocki (2003) finds that firms' disclosures, measured both by management earnings forecast frequency and analysts' subjective ratings of disclosure practice, are positively related to the proportion of CEO compensation affected by stock price and the value of shares held by the CEO.

Table 7. Two-Stage Least Squares(2SLS) Regression of Percentage of Equity-based Compensation on Returns-Earnings Correlation and Control Variables for 1992-2001

(*p*-values in parentheses)

Variable	Estimated Coefficient
Intercept	-.391**
	(.00)
CORR	.843**
	(.00)
*CORR*NOISE_ROA*	.147
	(.60)
*CORR*NOISE_RET*	-.008
	(.58)
BONSHR	-.767**
	(.00)
HIGH_TAX	-.018
	(.07)
LOW_TAX	-.015
	(.46)
ROA	-.110
	(.15)
RET	.009
	(.36)
LEV	-.001
	(.84)
MTB	-.006*
	(.03)
OWNERSHIP	-.642**
	(.00)
NOISE_ROA	.811**
	(.00)
NOISE_RET	-.074*
	(.03)
TENURE	-.002**
	(.00)
SIZE	.102**
	(.00)
NEW_ECON	.067**
	(.00)
CASHFLOW	-.046**
	(.09)
N	4291
Adjusted R^2	24.1%
F value of the regression	53.32

*,** Significant at $p < .05$ and $p < .01$ respectively (two-tailed test)
For parsimony, intercept, coefficients on year-dummies are not reported.
See Table 2 for other variable definitions.

and inconsistent. I select a vector of exogenous variables associated with *CORR* in equation (5a) from prior literature such as Warfield, Wild, and Wild (1995). The identifying exogenous variables are as follows: *REG* equals one if the firm operates in a regulated industry (SIC code 4900-4999). *RISK* is a firm's systematic risk, beta. *PERS* is the persistence of earnings as measured by the slope coefficient estimate from an autoregressive model of order one (AR1) for annual earnings over prior 10 years (Francis et al. 2004). *PPE_TA* is the ratio of property, plant, and equipment to total assets. All other variables are as previously defined.

I estimate (5b) using two-stage least squares (2SLS). Table 7 shows the results of the 2SLS estimation of equation (5b). The Hausman endogeneity test shows significant endogeneity at the 1% level, thus justifying *CORR* as an endogenous variable. The first-stage adjusted R^2 is 14 percent, raising a concern that low explanatory power in first-stage estimation may cause second-stage coefficient estimates to have large sampling variance. As seen in the table, the inferences from 2SLS analyses are qualitatively similar to those derived from the multiple regressions reported in Table 5. Thus, simultaneity does not affect the primary inference drawn from Table 4, suggesting empirical results are robust to both procedures.

CONCLUSION

In this paper, I empirically examine the association between the returns-earnings correlation and the structure of compensation packages for top executives. I document that firms with high returns-earnings correlation rely more heavily on stock-based compensation, after controlling for hypothesized determinants of use of stock-based compensation such as firm size and firm's growth opportunity. The positive relation between returns-earnings correlation and relative proportion of stock-based pay to total compensation seems to be driven mostly by increases in equity grants rather than by decreases in cash compensation. Overall, my findings are consistent with the psychology-based hypothesis predicting that compensation committees that prefer stock-based compensation for rewarding

executives use the correlation between stock returns and earnings as a useful gauge measuring "cue similarity" in compensation mix decisions. Evidence from supplemental analyses suggests that firm may decompose returns-earnings correlation and use the correlation between firm-specific components in returns and earnings in compensation decisions. I also find weak evidence that the impact of returns-earnings correlation on executive compensation packages is mitigated by variability in stock returns or earnings.

My study sheds light on the role of returns-earnings correlation in determining executive compensation packages from a perspective different from prior literature. Traditionally, accounting literature has interpreted the size of the correlation between earnings and stock price performance as an indicator of the usefulness of earnings from a valuation perspective (e.g., Salamon and Smith 1979). However, whether or not more value-relevant earnings should receive larger weights in the compensation function has been a controversial issue among accounting academics. Drawing on psychology theory, I provide new evidence on the role of returns-earnings correlation as a useful "heuristic" in decision-making processes of the firms' compensation committees, which became more "independent" after the 1992 SEC compensation disclosure rule. My study suggests that the compensation committee may interpret returns-earnings correlation as a useful gauge measuring "cue congruence", helping them determine the appropriate mix between stock and cash compensation.

This study is subject to several important caveats, the most important of which is that the association documented in the paper may indeed be driven by important correlated omitted firm characteristics, not by the correlation between returns and earnings. While I include a comprehensive set of economic determinants of firms' use of stock-based compensation to rule out any potential alternative explanations, it is still possible that the results may be driven by unspecified firm characteristics. A caution should be exercised in interpreting the empirical findings of this study since the research design precludes me from identifying the exact mechanisms by compensation committee makes compensation decisions.

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