Performance for pay? The relationship between CEO incentive compensation and future stock price performance

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Abstract

We find evidence that industry and size adjusted CEO pay is negatively related to future shareholder wealth changes for periods up to five years after sorting on pay. For example, firms that pay their CEOs in the top ten percent of pay earn negative abnormal returns over the next five years of approximately -13%. The effect is stronger for CEOs who receive higher incentive pay relative to their peers. Our results are consistent with high-pay induced CEO overconfidence and investor overreaction towards firms with high paid CEOs.

Keywords: Executive compensation; Pay-performance relationship

JEL Classification: G34; J33

1. Introduction

Over the past two decades, the academic literature on agency theory and executive compensation has argued that CEO compensation should be aligned to firm performance (see for example, Holmstrom, 1979, Grossman and Hart, 1983, and Jensen and Murphy, 1990). Over the last year, politicians and the media have argued that current executive compensation practices push employees to take short-term risks with little regard for the long-term effect on their companies. Consequently, recent regulatory proposals have proposed for example, that more pay be offered through restricted stock or other forms of long-term compensation designed not to reward short-term performance.[1] To the extent that long-term compensation plans offer incentives to CEOs to act in the best interest of shareholders going forward, and to the extent that markets do not fully incorporate pay information when it is made public, this would seem to imply a positive relationship between long-term incentive pay and future firm performance. In this paper, we examine the link between pay and future shareholder wealth changes and test for the causes of any such relation.

Papers that address this link have focused on connections between pay and future accounting performance (see for example, Leonard, 1990 or Hayes and Schaefer, 2000). The link between incentive pay, where incentive pay is defined as payment of restricted stock, options and other forms of long-term compensation, and future *stock* performance has not received much attention.[2] In part, this is due to the implicit assumption that in efficient markets, investors will immediately capitalize the present value of future firm performance increases into the stock price when the incentive pay becomes public information (Fich and Shivdasani, 2005).

However, there are reasons to expect that information in CEO incentive pay may not be immediately impounded into returns. First, CEO compensation contracts may incorporate both observable and unobservable (to outsiders) measures of performance. If the unobservable measures in contracts are correlated with future observable measures of firm performance, then variation in current compensation that is not explained by variation in current observable performance measures should predict future variation in observable performance measures

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[1] See among others, Paletta, Damian and Jon Hilsenrath, "Bankers face sweeping curbs on pay", Wall Street Journal, page A1, September 18, 2009.
[2] A few exceptions, discussed later, include Masson (1971), Abowd (1990), Lewellen, Loderer, Martin, and Blum (1992), Core, Holthausen, Larcker (1999), and Malmendier and Tate (2009).

(Hayes and Schaefer, 2000). So to the extent that firms and managers contract on net-positive unobservable managerial characteristics, this suggests a *positive* relationship between pay and future returns.

Second, incentive pay is potentially less than fully transparent, given the hard to value nature of the non-cash option component of pay. Bebchuk, Fried, and Walker (2002) argue that managers use incentive compensation to "camouflage" or facilitate the extraction of rents from shareholders. For example, the true value of option pay may be distorted by the apparent wide spread practices of option backdating and option repricing (Lie, 2005, Heron and Lie, 2007, or Narayanan and Seyhun, 2008). Pay practices, such as deferred compensation, may not be fully disclosed.[3] If such pay "uncertainty" is correlated with reported pay, this should also imply a relationship between pay and future returns. The direction of this relationship is uncertain. Investors might under-react to non-cash compensation, as they have been shown to under-react to other types of corporate events (see for example, Kadiyala and Rau, 2004) which would also imply a *positive* relationship between incentive pay and future stock price performance. However, firms that pay their CEOs the highest also tend to be firms that have experienced high returns and high operating performance relative to their peer firms (Core, Holthausen, and Larcker, 1999). Lucky CEOs are also likely to be paid more (Bertrand and Mullaiathan, 2001). In addition, CEO pay is typically publicized in the popular press (for example, Fortune magazine has an annual ranking of the highest paid CEOs). Hayes and Schaefer (2009) develop a model where no firm wants to admit to having a CEO who is below average, and so no firm allows its CEO's pay package to lag market expectations. The combination of typical glamour characteristics (high returns and high operating performance) combined with the publicized "allure" of the firms that can afford to pay the best (and the associated star effects that high pay may produce for the firm's CEO), and an inability to distinguish luck from skill, may prompt investors to overreact to these firms, resulting in a *negative* relation between CEO pay and future returns.

Third, highly paid CEOs may become overconfident or overconfident CEOs may seek out high pay. Either way, highly paid overconfident CEOs may engage in sub-optimal behavior from

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[3] See Morgenstern, Gretchen, 1998, "A 'holy cow' moment in Payland", New York Times, February 19, 2006. The article highlighted the case of Analog Devices where deferred CEO compensation was not disclosed for several years.

the standpoint of shareholders, such as wasteful capital expenditures and empire building (Ben-David, Graham, and Harvey, 2008, Malmendier and Tate, 2005, 2008, 2009). Thus, if CEO overconfidence is increasing in pay, and if investors are not fully aware of potential shareholder wealth destroying activities of the overconfident CEO, this suggests a *negative* relation between CEO incentive pay and future firm returns.

Our hypotheses can be summarized as follows. The *efficient market* hypothesis suggests that markets capitalize incentive pay grants into the stock price at the announcement date, resulting in *no relation* between incentive pay and future stock price performance. The *optimal incentives* hypothesis argues that while incentive compensation correctly aligns managerial interests with shareholder value maximization, investors may under-react to this information either because the incentive compensation is conditioned on unobservable measures of performance or because incentive compensation is hard to value. Hence there will be a *positive relation* between incentive pay and future stock price performance. The *investor overreaction and managerial over-confidence* hypotheses suggest a negative relation between incentive pay and future performance, albeit for different reasons. The investor overreaction hypothesis assumes that investors are unable to see through the camouflaging effect of option contracts or that investors over-extrapolate the past performance of high paying firms, and the managerial over-confidence hypothesis assumes that over-confident managers engage in value-destroying activities. Finally, the *managerial risk-shifting* hypothesis argues that option grants to risk-averse CEOs make them willing to take more or less risk (Ross, 2004) resulting in a positive or negative association between incentive pay and future returns. The nature of this relationship will be related to the CEO risk aversion and the option moneyness.

We test these hypotheses in the universe of firms listed on CRSP, Compustat, and Execucomp. We sort these firms annually into industry and size benchmark adjusted CEO compensation deciles. We find a strong negative relation between annual pay and future returns. In the year after the firms are classified into the lowest and highest compensation deciles respectively, firms in the lowest total compensation decile earn insignificant returns. In contrast, the firms in the highest compensation decile earn highly significant abnormal returns of -4.38%. To put this into perspective, the average yearly loss in abnormal shareholder wealth for firms in the top decile of pay is $2.39 billion, after paying out an average of $22.7 million in total CEO compensation. The performance worsens significantly over time. In the five years after the

classification period, firms in the high compensation decile earn a significant negative excess return of -12.27% while firms in the lowest compensation decile earn an insignificant 0.29%. These numbers are not driven by outliers since median excess returns show similar patterns. In addition, the results are robust to alternative methods of benchmark adjusting pay and returns.

These results also carry over to panel regressions of annual abnormal returns on lagged pay and other control variables. Even after controlling for variables that have been shown to explain the cross-section of returns, the level of industry and size adjusted incentive compensation is significantly negatively related to future one-year excess firm returns. In contrast, the level of cash compensation is unrelated to future excess returns. Overall, our results show a strong negative relation between pay and future returns.

To better understand the drivers of the pay effect, we decompose pay into its major components. We find that all pay components are negatively related to future excess returns earned by these firms, with the strongest components being the value of options granted and long-term incentive payouts[4]. However when we add other control variables that have been shown to explain the cross-section of firm returns, most of the components largely lose their significance, with the exception of the value of options granted, which emerges as the main driver of the pay effect. Our results are also robust to alternative measures of computing CEO incentives such as the total fair value of equity holdings by CEOs.

We next test our various hypotheses on the causes of the pay effect. Our main result of a negative relation between pay and future returns appears to reject the *efficient market* and *optimal incentives* hypothesis. Using the proportion of unexercised in-the-money options to incentive compensation as a proxy for managerial over-confidence, we find that performance for the high incentive pay firms steadily declines as we move from the lowest (least confident) to the highest proportion (most over-confident), with high-pay/low-confidence manager firms earning annual abnormal returns of -3.48% and high-pay/high-confidence manager firms earning -18.32%. There is no similar relation for the low incentive pay group. In addition, the difference in excess returns between low and high pay firms is significant only for the most over-confident managers. Similarly, using three year lagged CARs and 3 year sales growth as proxies for

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[4] We define "incentive" pay as the difference between Execucomp's annual total compensation and total cash compensation. Thus, our incentive measure does not include cumulative stock and option grants.

glamour type firms where investors are more likely to overreact to high pay, we find a steady decline in performance as we move from low prior three year abnormal returns (or 3-year sales growth) to high prior performance firms for high pay firms, with an annual abnormal return spread of approximately 8% between high pay/low glamour and high pay/high glamour firms.

We next examine if the level of the industry and size adjusted incentive compensation is significantly related to the forward one-year ROA earned by the firm. Consistent with our results on stock price performance, the level of incentive compensation is significantly negatively related to the forward ROA, while the level of cash compensation is positively related to the level of ROA. These results are consistent with the managerial over-confidence hypothesis: over-confident managers accept high levels of incentive compensation and subsequently underperform both in terms of stock and operating performance.

To test if the evidence of lower returns to the firms with high incentive compensation is due to risk-shifting, we compute various measures of risk and risk adjusted returns to portfolios based on industry and size adjusted incentive compensation sorts. Conditioning on abnormal incentive compensation creates a large and economically significant dispersion in risk adjusted returns across the 10 portfolios in the year after portfolio formation. While total risk, as measured by standard deviation, declines slightly in the year following a high pay period, the reduction in total risk is not high compared to the drop in stock returns. Sharpe ratios for firms in the highest compensation decile drop significantly more than ratios for firms in the lowest compensation deciles from the year the compensation is awarded to the following year. These findings suggest that even though the total risk seems to go down for firms with highest incentive compensation in the year following the grant, the reduction in risk is too low to justify the lower returns earned by firms with the highest abnormal incentive compensation.

Finally, we ask whether a real world investor who can only use publicly available information to make investment decisions can use the information in CEO pay contracts to earn abnormal returns. We find that a portfolio trading strategy going long firms in the lowest 10% of incentive compensation and shorting firms that are in the highest 10% earns an annualized return of 5.27%. The profit to trading strategies conditioning on more extreme pay firms are even higher. A portfolio trading strategy going long on firms in the lowest 5% (2%) of incentive compensation distribution and shorting the firms that are in the highest 5% (2%) earns 8.3%

(16.37%) per year. The trading strategy earns abnormal returns in every year for five years after portfolio formation. These abnormal returns are not explained by the Fama-French three factor model of risk. The monthly Fama-French alpha spread between low and high compensation firms is 0.25%. As with average returns, the alpha spread gets bigger and more significant when we condition on firms that pay more extreme incentive compensation. A portfolio trading strategy going long on firms in the lowest 5% (2%) of incentive compensation distribution and shorting the firms that are in the highest 5% (2%) earns an alpha of 0.5% (1.21%) per month or approximately 6% (14%) per year.

Overall, we conclude that the negative relation between incentive compensation and stock performance we document is inconsistent with both the efficient market and optimal incentives hypotheses, which postulate no or a positive relation, respectively. In addition, our negative relation is not consistent with the risk-shifting hypothesis. Though there is a reduction in total risk for firms with highest incentive compensation in the year following the payment of compensation, the reduction in risk is too low to justify the lower returns earned by firms with the highest abnormal incentive compensation. Our results seem most consistent with the hypothesis that over-confident managers accept large amounts of incentive pay and with the hypothesis that investors over-react to these pay grants and are subsequently disappointed.

The remainder of the paper is organized as follows. In Section 2 we provide a brief overview of the literature on executive compensation. In Section 3, we describe the data used in our analysis and describe how our main compensation metric is formed. In Section 4 we present results that document the relation between components of compensation, specifically incentive compensation, and future returns. Section 5 concludes.

2. Literature review

Our paper is related to three strands of literature on executive compensation. First, it is most directly related to the literature on the pay-performance relationship. Second, it is related to the literature on changing managerial incentives and firm performance. Third, since we examine the effects of aligning managerial and shareholder incentives (through option compensation) on firm performance, it is related to the literature on managerial ownership and firm performance.

The relation between pay and performance is derived from agency theory (see for example, Holmström, 1979, or Grossman and Hart, 1983). According to these models, compensation plans

should be designed to align the interests of risk-averse self-interested executives with those of shareholders. *Ex-post* payouts depend on the likelihood that the desired actions were in fact taken. The performance-pay sensitivity will be weaker for more risk averse executives and will also be weaker, the greater the uncontrollable noise in firm value.

Subsequent empirical research built on these models by examining the relation between performance and ex-post payouts. Jensen and Murphy (1990) define pay-performance sensitivity as the dollar change in CEO wealth (in time $t+1$) associated with a dollar change in shareholder wealth (in time t) and interpret higher sensitivities as indicating a close alignment. Taking into account cash compensation, stock options, and probability of dismissal, they find that a CEOs wealth changes $3.25 per $1,000 change in shareholder wealth. They interpret this as surprisingly low. However, these estimates are controversial. Haubrich (1994) argues that since the key component in models of optimal contracting is the variance of the firm's performance, not managerial ownership per se, these estimates, however low, may well be consistent with the predictions of agency theory for sufficiently risk-averse executives. Hall and Liebman (1998) argue that modest movements in shareholder wealth can lead to large swings in executive wealth even when pay-performance sensitivity is low. Aggarwal and Samwick (1999) test whether the variance of a firm's performance influences the executive's pay-performance sensitivity, i.e. whether a higher variance leads to lower sensitivity. After accounting for firm variance, they document a median sensitivity of $14.52 per $1,000 change in shareholder wealth, a much higher estimate than Jensen and Murphy. In addition, several other stylized facts from the literature are that pay-performance sensitivities are driven primarily by stock options and stock ownership, and not through other forms of compensation. Pay-performance sensitivities vary across industries, and are particularly lower in regulated industries. Pay-performance sensitivities have become larger in the 90s with this increase also being driven by stock option grants.

The question we wish to investigate in this paper is actually the flip side – Do these incentives work? Does paying high incentives to executives actually improve the firm's stock performance? There is surprisingly little research on this important topic, given that current compensation *should* be linked to future performance if the correct incentive contracts are used. For example, Hayes and Schaefer (2000) argue that if compensation contracts optimally incorporate both observable and unobservable (to outsiders) measures of performance and the unobservable measures of performance are correlated with future observable measures of

performance, then variation in current compensation that is not explained by variation in current observable performance measures should predict future variation in observable performance measures. Most of the research that has tried to tackle this question examines accounting based measures of performance while others use Tobin's Q as a measure of value creation.

Gerhart and Milkovich (1990) analyze the pay of 14,000 middle- and top-level managers in the 1980-1985 period. They divide pay into three components—short-term bonus, long-term incentives and base salary and find some evidence that future ROA is positively related to the level of incentive pay, but not to base salary. Over the same period, Leonard (1990) finds that the presence of long-term incentive plans is associated with greater increases in ROE than in those firms without long-term incentive plans. Hayes and Schaefer (2000) investigate the relationship between future accounting performance and compensation. Their main regression equation uses current firm performance variables and current log CEO compensation to predict future returns on shareholder's equity. They find that compensation is positively related to future return on equity.

Only a handful of papers provide direct evidence that higher pay-performance sensitivities lead to higher *stock* price performance. Masson (1971) tests the structure of executive compensation for effects on firm performance for a sample of top executives in 39 firms from 1947-1966. He finds that firms with executives whose financial rewards more closely parallel stockholders' interest perform better in the stock market over the postwar period. Abowd (1990) analyzes the effects that the level of pay-performance sensitivity has on firm performance, in a sample of 16,000 managers in 250 large corporations over the 1981-86 period. He finds that performance, as measured by operating income after taxes, divided by the replacement cost of assets, is significantly and positively related to pay-performance sensitivity. Firms with above-median pay-performance sensitivity had a higher probability of above-median future performance in both accounting and market returns. Lewellen, Loderer, Martin, and Blum (1992) also show a relationship between the levels of compensation and the firms' economic performance. In data drawn from 49 Fortune 500 firms between 1964 and 1973, they find that the total compensation of a firm's three highest-paid officers is positively related to differences in both common stock returns and operating profitability. In a multivariate regression of stock returns on contemporaneous and next year's compensation, value-weighted market and industry returns, firm size, and other variables, compensation (especially future compensation) is

significant. McConaughy and Mishra (1996) find that increasing pay-performance sensitivity increases risk-adjusted excess returns in firms with poor prior performance, where risk-adjusted excess returns are computed using a market model.

Our paper is also related to the strand of literature that examines the effect of changing managerial incentives. Fich and Shivdasani (2005) and Brickley, Bhagat, and Lease (1985) document a positive abnormal return for firms adopting stock-based compensation plans. Tehranian, Travlos, and Waegelein (1987) investigate whether bidding firms with long-term performance plans experience higher abnormal stock returns at acquisition announcements relative to bidding firms without these plans. After controlling for manager's stock ownership in the firm, they find that bidding firms with long-term performance plans in place, experience significantly favorable stock market reaction around the announcement date. Yermack (1997) finds that stock prices increase after (non-publicly announced) grants of executive stock options.

Finally, our paper is related to the literature on the relationship between managerial ownership and company performance. The evidence in this literature is mixed. In a cross-section of 371 Fortune 500 firms in 1980, Morck, Shleifer, and Vishny (1988) find that Q ratios increase with holdings when managers hold from 0-5% of the outstanding stock, decrease as ownership rises to 25% (which they attribute to an "entrenchment effect"), and then begins to rise after 25%. McConnell and Servaes (1990) find a non-linear relationship between Tobin's Q and managerial ownership - Qs increase as share ownership becomes concentrated in the hands of management until it reaches about 50%. Mehran (1995) finds that firm performance is positively related to the percentage of executive compensation that is stock-based and the percentage of equity held by management. However, Himmelberg, Hubbard and Palia (1999) control for the endogeneity of ownership and find little evidence that changes in managerial ownership affect performance.

Overall, there is surprisingly little direct evidence that incentive contracts actually lead to better company returns. Most studies of executive compensation try to identify sensitivity of pay to changes in various factors such as accounting earnings or equity returns. Only a handful try to document the relationship that executive pay might have on subsequent stock returns. To summarize the literature, therefore, most studies do not seem to be too concerned about subsequent firm performance, only that compensation is "properly" tied to it.

3. Data and methodology

Our data consists of all NYSE, AMEX, and NASDAQ firms listed on the Compustat Execucomp Database and the Compustat annual industrial files from 1994 through 2006. CEO compensation figures are obtained from Execucomp. We use three measures of compensation: (i) total compensation (TDC1) which includes salary, bonus, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), and long term incentive payouts, (ii) total cash compensation (TCC) which includes salary and bonus, and (iii) the difference between total compensation and total cash compensation (TDC1-TCC) which is meant to capture the options and incentive components of total compensation. This difference, which we call incentive compensation, is our primary variable of interest, including restricted stock grants, option grants, long term incentive payouts, and other annual noncash compensation. Prior literature has used the pay-performance sensitivity of the CEO - the change in CEO dollar wealth to a dollar or percentage change in the stock price – as a measure of CEO incentives. However, as Cadman (2008) notes, CEOs can and do diversify their firm equity holdings after vesting. Since it is difficult to measure CEO's total wealth outside his firm's shareholdings, we use the incentive compensation measure defined above as our primary measure of CEO incentives.[5]

Bizjak, Lemmon, and Naveen (2008) and Faulkender and Yang (2009) document that firms benchmark pay on peer groups. They show that these benchmarks are used extensively – 96% of the firms in their sample use benchmarking or peer groups to determine levels of executive salary, bonus or option awards. Peer groups are typically based on industry or size. Therefore, in addition to raw compensation levels, we use industry and size adjusted CEO compensation figures for most of our tests. To calculate industry and size adjusted CEO compensation, we use the following procedure. First, firms are allocated into 49 industry portfolios using industry classifications from Ken French's website. Firms in each industry are then allocated into two size groups (High or Low) based on the median December sales (or market capitalization) of the firms in the industry. Industry and size adjusted compensation (total, cash, or the incentive) for each firm is then measured as the difference between the compensation for firm *i* and the median compensation of the firms in the same industry and size portfolio. In the rest of the paper, following Bizjak, Lemmon, and Naveen (2008), we report results based on sales as our proxy for

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[5] In section 4.D we report results using the total fair value of equity holdings by CEOs as an alternate measure of CEO incentives.

firm size, though our results are similar if we use market capitalization. All the compensation figures are adjusted for inflation using the consumer price index. 2006 is used as the base year for inflation adjustment.

Much of our analysis depends on portfolio sorts. For the portfolios formed at the end of calendar year *t*, we form all our accounting and compensation variables using accounting and compensation information from fiscal year ending in calendar year *t* from Compustat. For price- or market value-scaled accounting ratios, such as book-to-market (BM), we use price or market value (MV) from December of year *t*. For firm capitalization, we use the market value of the firm's equity from CRSP at the end of December of year *t*. When our tests include lagged return measures (for example, twelve-month lagged returns), we estimate a holding period return from the beginning of January of year *t* to the end of December of year *t*. Once we form the portfolios in December t using lagged information variables, we track their returns over the following year (January (*t*+1) to December (*t*+1)). All the variables are updated annually, at the end of December each year. Using pay information from calendar year t to explain returns in January of year t+1 may result in the use of pay information for some firms that is not yet public information (for example, firms with fiscal years ending in December may not release pay information until March of the next year). However, our use of contiguous periods to measure pay and future returns is by design, since at least one of our hypotheses posits a relation between non-public pay and future returns (i.e, the managerial overconfidence hypothesis). Nonetheless, later in the paper we also examine returns to sorts where we require at least a three month gap between fiscal year end pay information and future returns. The Appendix contains information on the definition of all the variables used in the paper along with details on the construction of these variables.

4. Results

A. *Descriptive statistics*

Table I reports descriptive statistics on raw levels of CEO compensation and its components for the pooled sample over 1994-2006. Panel A reports the mean, median, standard deviation and maximum values of CEO compensation components, along with the percentage of total compensation each component represents. At the median level, cash compensation (salary and bonus) forms a larger proportion of total compensation (53%) than incentive compensation

(47%), though the numbers are reasonably similar. These two numbers conceal a great deal of variation however. The maximum cash compensation granted to any executive over our time period is on the order of $128 million. In contrast, the maximum incentive compensation is $755 million, over five times larger. The standard deviation for cash compensation is also a fifth of the standard deviation for incentive compensation. Within cash compensation, cash salaries form a larger component than bonuses (33% to 19%). Options are the predominant form of incentive compensation.

These numbers also vary by industry (not reported in tables). The highest proportion of incentive compensation is in the healthcare industry (with 59% of total pay in the form of incentive compensation). Software, hardware, and insurance also have reasonably high levels of incentive compensation (56%, 55%, 52%, respectively). Interestingly, banks have roughly equal amounts of incentive and cash compensation. The textile, agricultural and guns industries offer the most proportions of cash relative to incentive compensation (70%, 64% and 64% respectively). Most of this cash compensation is in the form of cash salaries, not as bonuses.

Panel B reports data on the correlation of these pay components. Consistent with the univariate numbers on the standard deviation of cash vs. incentive compensation, the variation of total compensation seems largely driven by the variation in total incentive compensation. The correlation between total and incentive compensation is 99% while that between total and cash compensation is 37%.

Table II reports median levels of financial and return characteristics of the firms with different levels of industry and size adjusted CEO compensation. We allocate firms into deciles based on annual industry and size adjusted CEO compensation with cutoff s computed annually from industry and size adjusted compensation values. For each firm that is assigned to a portfolio based on its industry and size adjusted pay in December of calendar year *t*, we use various financial and return characteristics of the firm as of fiscal year ending in calendar year *t* to obtain formation year portfolio characteristics. The appendix provides exact formulae for all of the variables used in our tests.

Firms in Decile 10 in Table II are high compensation firms. The median industry adjusted compensation for these firms is substantial, at $10 million for total compensation and a proportion of incentive to total compensation on the order of 83%. The numbers increase sharply

as we progress to even more highly paid executives. For firms in the top 2% of annual total compensation, the median industry-adjusted compensation is $28 million with 90% of this in the form of incentive compensation. In contrast, decile 1 firms are low-compensation firms, with a total compensation $3 million lower than their size and industry adjusted benchmark. High (low) compensation firms also tend to be firms that have also experienced high (low) increases in total pay: Over this period, compensation at the high compensation firms (decile 10) grew at 74%, whereas compensation at low compensation firms (decile 1) shrank by -4%.

Interestingly, the low compensation firms (decile 1) are not the smallest firms in our sample, with a median capitalization of $2.1 billion, though they are typically smaller than the high compensation (decile 10) firms, which have capitalizations of $7.6 billion. The actual relationship between size and compensation is U-shaped. Deciles 3-6 tend to be the firms with the smallest market capitalization. The U-shaped pattern is also observed when we sort firms on the basis of either cash or incentive compensation separately (not reported in tables). Because of this and because our numbers are industry- and size-adjusted, we conclude that it is unlikely that our results are driven by small firms that are unable to pay their executives in cash, and instead pay only in the form of incentive compensation. CEOs at the high-compensation firms own a smaller percentage of stock than the low-compensation firms and because of the U-shaped relationship between firm size and compensation, this relation is not simply driven by market capitalization. High-compensation firms have systematically lower book-to-market-equity ratios (BM) than do the low-compensation firms. Asset growth, ROA, profitability, and capital investment all rise almost monotonically with total compensation, while leverage drops with total compensation.

From a stock performance standpoint, high-compensation firms earn significantly higher prior 1- and 3-year buy-and-hold returns than low-compensation firms and again the relationship is almost monotonic. These results also hold when we sort our sample firms separately on cash- and incentive-compensation. The relation between past stock performance and future pay is almost monotonically increasing.

To summarize our univariate results, firms that pay high compensation tend to be glamour firms, with low share ownership by the CEO, low leverage, high profitability, high levels of capital investment, high asset growth and high levels of prior stock price performance. We find

qualitatively similar results when we sort firms on the basis of either cash or incentive compensation separately. The similar pattern between cash and incentive compensation seems to suggest that incentive pay is largely awarded for similar reasons as cash compensation, though theory would suggest that incentive pay should align managerial incentives with shareholder value in the future, while cash pay is meant to compensate for past performance.

In Table III, we examine whether our results from Table II holds in a multivariate framework where we examine the determinants of benchmark-adjusted compensation in the year the compensation is granted. We report coefficients from separate multivariate panel regressions of cash and incentive compensation for the entire universe of Execucomp firms on the financial and return characteristics of the firms. The dependent variable is the industry and size adjusted CEO (cash and incentive separately) compensation in the fiscal year ending calendar year t. We include firm and year fixed effects in all regressions. In models 1 and 3, we regress compensation against the variables from Table II. In models 3 and 4, we add additional variables that proxy for firm risk and corporate governance. Consistent with Core, Guay, and Larcker (1999), we include average monthly volatility computed over the prior year as our proxy for firm risk. As our proxy for corporate governance, we use the level of institutional holdings in the firm, an indicator variable if the firm has a staggered board (Bebchuk and Cohen, 2005), and the value of the GIM index (Gompers, Ishii and Metrick, 2003), obtained from Riskmetrics.

Across the universe of Execucomp firms, consistent with prior literature (see for example, Gabaix and Landier, 2008), larger firms pay both greater cash and incentive compensation. Glamour firms or firms with high growth opportunities (the inverse of the book-to-market ratio) pay significantly higher levels of cash compensation. Cash compensation is also positively related to lagged returns (though only over the three year horizon) and most notably, to operating performance (ROA). In addition, firms with high institutional holdings and without staggered boards pay higher cash compensation. Oddly, the level of the GIM index, a proxy for poor corporate governance is positively related to the level of cash compensation, which is inconsistent with the signs of the other two measures. In addition to size, incentive compensation is significantly positively related to asset growth and weakly negatively related to operating performance. Idiosyncratic risk (average monthly volatility) is significantly positively related only to the level of incentive compensation, which is reasonable since the value of incentive compensation increases with firm volatility.

Overall, we conclude that firm size and prior stock performance, especially over the past three years, are significant predictors of both cash and incentive compensation for the universe of firms listed on Execucomp. The remaining variables are significant either for cash or for incentive compensation but not consistently across both types of compensation.

B. *Does CEO pay affect future returns?*

Is CEO pay correlated with future firm returns? We address that question in Table IV. We focus on the extreme compensation sample - firms that are in the tails of the industry and size adjusted CEO compensation distribution. As in Table II, for each of the total compensation, total cash compensation, and total incentive compensation measures, we measure abnormal compensation as the excess compensation over control firms matched on industry and sales. We sort firms annually by their abnormal CEO compensation. Excess returns are calculated in excess of the average return of an industry and lagged return matched equity portfolios using the following methodology. For each year, we obtain all other firms with the same industry classification, using Ken French's 49 industry definitions. These industry peer firms are then sorted by their lagged one year returns to form quintile portfolios.[6] Cumulative abnormal returns (CARs) to the event firms are calculated using the returns to these industry and return matched quintile portfolio returns as the benchmark. Table IV reports average cumulative excess returns, in the year before and five years after the pay date. Figure 1 illustrates the evolution of excess returns for these firms over the same period.

The results are striking. In the year after the firms are classified into the lowest and highest compensation deciles respectively (column titled "(+1,+12)"), firms in the lowest total compensation decile earn insignificant industry- and momentum adjusted returns of -0.76%. In contrast, the firms in the highest compensation decile earn a highly significant -4.38%. The performance worsens significantly over time. In the five years after the classification period, firms in the high compensation decile earn a significant negative excess return of -12.27% while firms in the lowest compensation decile earn an insignificant 0.29%. The pattern is similar when we sort on either cash or incentive compensation separately. The results are robust to skipping three months between the portfolio formation date and the date when we start measuring returns ((e.g., see the columns titled "(+4,+N)", where N = 15, 40, and 64 months after sorting on pay),

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[6] The results are robust to using three-year lagged returns to form matching portfolios.

For example, in the first year after sorting on pay, for the (+4 to +15) window, the highest total compensation firms earn a statistically significant -3.49% and the lowest total compensation firms earn an insignificant -0.89% over the April of year t+1 to March of year t+2 period. In addition, the results are not driven by outliers. Median excess returns show similar patterns.

We also estimate the average yearly loss in abnormal shareholder wealth for the firms in the top decile of annual total pay. Each year we multiply the abnormal return for each firm in the top decile of pay by its beginning of the year market capitalization. This gives us an abnormal wealth loss for each firm each year. We then estimate the wealth loss across all firms over time. We find that the average yearly loss in abnormal shareholder wealth for firms in the top decile of pay is $2.39 billion, after paying out an average of $22.7 million in total CEO compensation.

C. *Is the pay/return effect subsumed by other determinants of returns?*

There are two straightforward objections to our results in Table IV. First, these results could be driven by omitted variables that are correlated with incentive and/or cash compensation. Second, these results could be relevant for only the sample of extremely overpaid or underpaid executives. We address both these objections by running a set of cross-sectional time-series regressions, for the entire sample of Execucomp firms and controlling for other variables that have been shown to predict stock price performance.

Specifically, we regress the cumulative abnormal stock returns earned by the firms over January-December of year $t+1$ on lagged compensation (industry and size adjusted incentive and cash compensation separately), and control variables measured as of December of year t over the period 1994-2006. Compensation is the industry and size adjusted CEO compensation in the fiscal year ending calendar year t. The cash and incentive compensation measures are both winsorized at the 1% and 99% points of their distributions (we refer to this as "1 percent winsorization.") The set of control variables include firm book-to-market ratio (as defined in Davis, Fama, and French, 2000), December (t) market value, lagged one-year and three-year cumulative abnormal returns. We also include other recently documented growth-rate related determinants of the cross-section such as asset growth (Cooper, Gulen, and Shill, 2008), accruals (Sloan, 1996), abnormal capital investment (Titman, Wei and Xie, 2004, and Anderson and Garcia-Feijóo, 2006), and a three-year share issuance measure (Daniel and Titman, 2006, Pontiff and Woodgate, 2008). Other control variables include a dummy variable for staggered boards,

the level of the GIM index, and the percentage of total shares owned by CEO as reported by the firm. All the accounting based control variables are measured in fiscal year ending in December of calendar year t. Table V reports the coefficients from these regressions. All the regression specifications include firm and year fixed effects.

The coefficients on the control variables are consistent with those reported in prior literature. For example, the book-to-market ratio is significantly positively related to the next year's excess return earned by the firm while firm size, the lagged 3 year excess returns, asset growth, level of accruals, abnormal capital expenditure are all significantly negatively related to the level of excess returns. Even after controlling for all these control variables however, the level of the industry and size adjusted incentive compensation is significantly negatively related to the forward one-year excess return earned by the firm (t-statistics on incentive compensation range from -2.76 to -4.96). In contrast, the level of cash compensation loses its significance.

We also perform a number of robustness tests. We winsorize total pay at the 5 percent level (instead of 1 percent), use log raw compensation data (instead of industry and sales adjusted), use raw returns as the dependent variable (instead of abnormal returns), use centile sort values of incentive and cash compensation, weight the coefficient estimates in the regression models by the square root of market capitalization, skip three months between when year *t* compensation is measured and when the dependent variable abnormal returns are estimated, and replace the firm fixed effects with CEO fixed effects. Across all these robustness tests, our results are qualitatively similar to those in Table V.

D. *Alternate measures of incentives*

So far, we have measured excess incentive compensation as the dollar value of long-term incentive pay relative to their benchmark peers. However, an alternative explanation for our results is as follows: Suppose firms optimally adjust contracting schemes in response to an executive wealth diversification (Core and Guay, 1999 or Cadman, 2008). In other words, firms choose targeted incentive levels and grant equity towards these levels. Executive granted large number of options in the past would receive low compensation in subsequent years, falling into the low-incentive pay deciles in our annual sorts. Executives with large divestitures or with small past equity grants, would be granted more options and stock incentives payments in subsequent years, falling into the high-incentive pay deciles In our annual sorts, these CEOs will be

classified as low-incentive CEOs. Hence our negative association between *annual* incentive pay and future stock price performance may be a positive relation between *cumulative* incentive pay and future stock price performance.

As in Cadman (2008), we use the total fair value of all the CEO's equity holdings in the firm for each year from 1994-2005 as an alternate measure of the incentives of the firm's CEO.[7] Since this incentive measure increases at a decreasing rate with firm size, we also use the logarithmic transformation of the measure. Our results are qualitatively similar to those in Table V. While the other coefficients on the other variables largely retain their magnitude and significance, the coefficient on the total fair value of equity holdings is significantly negatively related to annual future cumulative abnormal stock returns in every specification.

When we include both our original annual abnormal incentive pay measure and the total fair value of CEO equity holdings in the same regression, the significance of the annual measure drops considerably and even becomes insignificant in some specifications. However, the sample size also reduces considerably, one reason why we use the total value of equity holdings as a supplementary, and not our primary measure of CEO incentives.

Our results are also robust to using an alternative measure of total pay from Execucomp, TDC2. Essentially, TDC2 replaces the estimated value of option *grants* in the measure we use (TDC1) with the value of options *exercised*. It estimates the value of total compensation *realized* by the executive in a given year. Because executives typically exercise options granted in previous years, TDC2 may represent pay from more or less than one year. As Kaplan and Rauh (2009) note, TDC2 also reflects any benefit that an executive may have received from backdating options. The value of options exercised makes up on average, 17% of total pay as measured by TDC2. Since TDC2 uses options exercised in place of option grants, we expect it to be more highly correlated with past stock performance than TDC1. However, to the extent that CEOs immediately sell the stocks received from option exercise, the noncash component using TDC2 might not necessarily be a better proxy for providing incentives than TDC1. To test the relation between this alternative measure of total pay and future returns we re-estimate our panel regression in Table V by using raw and industry and size adjusted total pay (as measure by

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[7] We would like to thank Brian Cadman for providing us with this data. Cadman (2008) describes how the data is constructed.

TDC2) as our main pay measure. Our results are qualitatively similar. Total raw (or abnormal) pay is significantly negatively related to future returns.

Finally, we examine the effects of the Sarbanes-Oxley Act of 2002 (SOX). Cohen, Dey, and Lys (2008) show that after the passage of SOX, overall compensation did not change, but salary and bonus compensation increased and option compensation decreased. In addition, the sensitivity of CEO's wealth to changes in shareholder wealth decreased after SOX. To test if our main findings on the association between abnormal incentive compensation and future returns are affected by SOX, we therefore rerun our panel regressions in Table V for the sub-periods prior to and after SOX. Over the sub-period prior to SOX, the coefficient on the industry and size adjusted incentive compensation is -0.012 (t-statistic = -10.55) for the univariate panel regression specification including firm and time fixed effects. The effect is less strong during the post-SOX period. During this period, the coefficient on industry and size adjusted incentive compensation is -0.0055 (t-statistic = -2.63). In an alternative specification, we rerun the panel regressions by adding a dummy variable for the post SOX period along with a multiplicative dummy where the SOX dummy is interacted with industry and size adjusted incentive compensation variable. The coefficient of the multiplicative dummy is positive (0.0031) and statistically significant (t-stat: 2.09) implying that the association between abnormal pay and future underperformance is weaker after SOX, though it does not entirely disappear.

E. *Are all types of incentive compensation equally bad?*

Total cash compensation and total incentive compensation are aggregate measures of CEO compensation. Total cash compensation includes salary and bonuses whereas total incentive compensation includes restricted stock grants, long term incentive payouts, value of option grants, and other annual non-cash compensation. It is plausible that various subcomponents (industry and sales adjusted) of cash and incentive CEO pay have a differential impact on the future returns than the broader measure of compensation. To investigate this, we regress annual cumulative abnormal stock returns over January-December of year t+1 on lagged CEO compensation and its components in Table VI. All the regression specifications include firm and year fixed effects. We find that all pay components are negatively related to future excess returns earned by these firms. However when we add other control variables that have been shown to explain the cross-section of firm returns, these components largely lose their significance

(models 4-8). The only exception is the value of options granted. This variable is strongly negatively related to the excess returns earned by the firm in every model we use.

F. *What accounts for the negative relation between incentive compensation and stock performance?*

The negative relation between incentive compensation and stock performance we document is inconsistent with both the efficient market and optimal incentives hypotheses. However, our results are consistent with all three hypotheses that postulate a negative relation – investor overreaction, managerial over-confidence, and risk-shifting.

We next ask therefore whether the strong negative relation we document between the level of incentive pay and future stock price performance is consistent with the investor overreaction, managerial over-confidence, and risk-shifting hypotheses. To implement these tests, we compute average year-ahead cumulative abnormal returns to two-way sort portfolios formed on industry and size adjusted incentive compensation and firm/CEO characteristics chosen to capture the salient features of the three hypotheses. The portfolios are formed in December of every year as the intersection of 2 portfolios formed on industry and size adjusted compensation and 5 portfolios formed on firm characteristics as of fiscal year ending in calendar year *t*. The compensation breakpoints are the yearly top and bottom deciles of industry and size adjusted incentive pay distribution. The characteristic portfolios are formed using quintile sorts of the variables measured in fiscal year ending in calendar year t for accounting based information variables and in December of year t for market based information variables. To test the investor overreaction hypothesis (Lakonishok, Shleifer, and Vishny, 1994 (LSV)), we use 3 year growth rate in sales (LSV) and 3 year abnormal returns (De Bondt and Thaler, 1985) in the two-way sorts. If the pay effect is due in part to investor overreaction to high and low pay, we would expect to see lower (higher) future returns for high (low) pay firms that exhibit stronger (weaker) glamour characteristics such as higher (lower) lagged sales growth and higher (lower) lagged 3 year returns. To test the managerial overconfidence hypothesis, we use the proportion of unexercised in-the-money options (Malmendier and Tate, 2005) in the two-way sorts. If the pay effect is due in part to managerial overconfidence, we would expect to see lower future returns for high pay firms with CEOs that exhibit greater levels of overconfidence as captured by higher levels of the proportion of unexercised in-the-money options to total incentive compensation.

The results of the two-way sorts are reported in Table VII. Sorting firms on the proportion of unexercised in-the-money options, performance for the high incentive pay firms steadily declines as we move from the lowest (least confident) to the highest proportion (most over-confident). There is no similar relation for the low incentive pay group. In addition, the difference in excess returns between low and high pay firms is significant only for Q5, the most over-confident managers. The strongest negative return effect is found for the high-pay/highest proportion of unexercised in-the-money options firms. The average annual abnormal returns to the group of firms is -18.32% (t-statistic = -4.25). This is the strongest one-year negative abnormal pay effect we document in the paper.

Similarly, sorts on three year lagged CARs and 3 year sales growth support the investor overreaction hypothesis. Conditioning on pay, across the rows, there is a steady decline as we move from low prior three year abnormal returns (or 3-year sales growth) in Q1 to high prior performance firms in Q5. In these two panels, in both Q1 and Q5, when we condition on sales growth or prior 3-year abnormal returns, overpaid managers earn significantly lower excess returns than underpaid managers. Consistent with investor overreaction to both high and low pay, most of the pay effect is concentrated in low and high glamour firms; the spread between high and low pay firms is statistically significant only for the Q1 and Q5 groups for both lagged returns and sales growth. In fact, the source of the large spread in returns across low and high pay firms in the Q1 portfolios is mostly due to investor overreaction to *low* pay; in the Q1 groups, we see evidence of statistically significant positive returns to the low pay firms. For the high lagged returns and sales growth firm in Q5, returns are much lower to high pay firms than low pay firms. The pay effects in both the Q1 and Q5 groups are consistent with investors overreaction to both high/glamour firms and low pay/value firms. Overall, the results of the two-way sorts are consistent with the pay effect being due in part to managerial overconfidence and investor overreaction.

Next, to help distinguish investor overreaction from managerial over-confidence, we examine the effects of compensation on the future operating performance of the firm. Since operating performance measures do not include any price based measures, the impact of compensation on operating performance cannot be attributed to investor overreaction. Finding no impact on operating performance would make it easier to rule out the managerial over-confidence hypothesis.

Table VIII reports panel regressions where we regress year-ahead ROA (measured as of fiscal year ending in calendar year $t+1$) on lagged compensation, and control variables measured as of December of year t over the period 2004-2006. As usual, compensation is the industry and size adjusted CEO compensation in the fiscal year ending calendar year t. We use a similar set of control variables as in Table VI. We report results for both the one-year forward ROA and the one-year forward industry-adjusted ROA.

We find that the level of the industry and size adjusted incentive compensation is significantly negatively related to the forward one-year ROA (both raw and industry adjusted) earned by the firm, even after controlling for other variables that are likely to affect ROA. We also find that the level of cash compensation is significantly positively related to the forward ROA. These results are consistent with the managerial over-confidence hypothesis. Over-confident managers accept high levels of incentive compensation and subsequently underperform both in terms of stock and operating performance.

Finally, we examine if the lower returns earned by the highest paid CEOs can be explained by the risk-shifting hypothesis. Option grants to risk-averse CEOs with high levels of in the money options may discourage risk taking by these managers especially when they cannot hedge their exposure to their company's stock. In contrast, CEOs with out-of-the money options might be more inclined to take on additional risk. Thus, incentive compensation in the form of option grants to risk-averse CEOs and option moneyness are both likely to impact the risk-taking behavior of CEOs.[8] Our evidence in Table 2 implies differences in risk between high incentive compensation (decile 10) and low incentive compensation firms. Firms in the highest compensation decile are large growth firms with high asset growth and capital investment. To the extent that size and book to market are good proxies for risk, firms with highest incentive compensation are less likely to be risky compared to firms with low incentive compensation. Moreover, higher asset growth and capital investment by these firms also point to a reduction in risk.[9] We conduct two separate tests to see if our results are due to the risk-shifting hypothesis.

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[8] Lewellen (2006) documents evidence on positive association between options and risk-taking for most firms in her sample.

[9] Recent theoretical papers suggest that expected returns should systematically decline in response to increased investment. As firms invest, the importance of growth options relative to existing assets declines, resulting in lower overall risk, as growth options are riskier than assets in place (Berk, Green, and Naik, 1999, Gomes, Kogan, and Zhang, 2003, or Zhang, 2005).

First, we investigate if the negative relation between abnormal incentive compensation and future returns is attributable only to risk-averse CEOs with large amounts of in-the-money options. To do this, we rerun the main regression in Table V for two subsamples: (i) CEOs with only out-of-the money unvested options and (ii) CEOs with only in-the-money unvested options. In both specifications, industry and size adjusted incentive compensation is significantly related to future returns. Interestingly, the effect is stronger for CEOs with only out-of-the money unvested options. This suggests that our findings are not driven by the moneyness of the unvested options held by CEOs. This evidence is not consistent with risk shifting hypothesis.

Second, to test if the evidence of lower returns to the firms with high incentive compensation is due to risk-shifting, we explicitly calculate risk-adjusted returns. In table IX, we report various measures of risk and risk adjusted returns to portfolios based on industry and size adjusted incentive compensation sorts. As before, using the decile cutoff points over the entire sample, we allocate stocks into deciles based on industry and size median-adjusted CEO incentive compensation as of fiscal year ending in calendar year t. Equal-weighted portfolios are formed based on December t compensation decile cutoffs. The portfolios are held for one year, from January of year $t+1$ to December of year $t+1$, and then rebalanced. Portfolio return statistics are calculated for 10 years around the portfolio formation year (t) over the period of January 1994 to December of 2006. The year -1 row reports the portfolio returns, standard deviation, and Sharpe ratio over January (t) - December (t) and year 1 reports the same figures over January ($t+1$)- December ($t+1$). Year [-5,-1] ([1, 5]) is the cumulative portfolio return, standard deviation, and Sharpe ratios over the 5 years prior (after) the portfolio formation period.

Conditioning on abnormal incentive compensation creates a large and economically significant dispersion in risk adjusted returns across the 10 portfolios in the year after portfolio formation. In Panel A, we report Fama-French (1993) three-factor alphas for the compensation decile portfolios. Using pricing errors from the three-factor model to make inferences about compensation is important, since spreads in raw returns from the compensation sorted portfolios are likely to be explained somewhat by the size and book-to-market factors. Our null is based on the initial assumption that the three-factor model does an adequate job of explaining expected returns associated with firm compensation. Thus, statistically significant positive intercepts from

the three-factor model would serve as evidence that high pay leads to high subsequent returns. We do not find this. Over the year after sorting on compensation (the YEAR 1 row in the tables), the high compensation firms earn average EW risk adjusted monthly returns of -0.12% and low compensation firms earns returns of 0.22%, a significantly negative monthly spread of -0.35%.[10] The significant underperformance of high incentive compensation portfolio continues in the five years after portfolio formation. This is a total reversal from the years leading up to the compensation grant year where firms who received highest incentive compensation also had significantly higher risk adjusted returns.

Panels B and C use standard deviation as the risk measure. Consistent with Lewellen (2006), total risk, as measured by standard deviation, declines slightly in the year following high pay period. However, the reduction in total risk is not high compared to the drop in stock returns as the evidence in Panel C shows. The Sharpe ratios for firms in the highest compensation decile drop by more than the ratios for firms in the lowest compensation decile over the year the compensation is awarded to the following year. These findings suggest that even though the total risk seems to go down for firms with highest incentive compensation in the year following the grant, the reduction in risk is too low to justify the lower returns earned by firms with the highest abnormal incentive compensation. We conclude that our results are unlikely to be driven by risk-shifting.

G. *Can we form a trading strategy betting against overpaid CEOs?*

Our findings so far indicate a robust negative association between CEO incentive compensation and future abnormal returns in an event time setting. In this section, we analyze portfolio time returns to a trading strategy based on CEO pay. At the end of March of each year *t*, stocks are allocated into deciles based on industry and size adjusted incentive compensation from fiscal year ending in calendar year *t*-1. After assigning firms to one of ten deciles based on annual industry and size-adjusted incentive compensation we calculate monthly returns for EW portfolios for the next twelve months (from April of year t to March of year *t*+1). The portfolios are held for one year and then rebalanced. After forming the portfolios, we obtain a time series of

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[10] We estimate the t-statistics that compare the alpha estimates of the extreme deciles via the "delta method" (Greene (1997), Theorem 4.16, p. 124). For these extreme decile portfolios, we estimate the three-factor alphas and their covariance matrix jointly using GMM with a robust HAC covariance estimator. The asymptotic distribution of the difference between the alphas of the two series is given in Theorem 4.16 of Greene (1997).

returns to each portfolio from April 1995 to March 2007. To examine the long-run return effects of sorting on compensation, we report the raw returns to the compensation-sorted portfolios in Table X in event time up to five years following the date of portfolio formation. For both types of portfolios, we also compute Fama-French three-factor alphas.

As reported in Panel A of Table X, conditioning on real time sorts on incentive compensation generates large and economically significant dispersion in average returns across the 10 portfolios in the year after portfolio formation. Specifically, high compensation firms (decile 10) earn average equal weighted annual returns of 14% while the low compensation firms earn 19%. The spread between two decile portfolios is economically and statistically significant. A portfolio trading strategy going long on firms in the lowest 10% of incentive compensation distribution and shorting the firms that are in the highest 10% earns an annualized return of 5.27%. The profit to trading strategies conditioning on more extreme pay firms are even higher. A portfolio trading strategy going long on firms in the lowest 5% (2%) of incentive compensation distribution and shorting the firms that are in the highest 5% (2%) earns a 8.3% (16.37%) per year. The trading strategy earns abnormal returns in every year for five years after portfolio formation.

In Panel B of Table X, we present EW portfolio three factor alphas. The abnormal return to the trading strategy is not explained by the Fama-French three factor model of risk. The low compensation firms have a monthly alpha of 0.06%, the high compensation firms have a monthly alpha of -0.19%, and the spread between the two is a marginally significant -0.25%. As with average returns, the alpha spread gets bigger and more significant when we condition on firms that pay more extreme incentive compensation. A portfolio trading strategy going long on firms in the lowest 5% (2%) of incentive compensation distribution and shorting the firms that are in the highest 5% (2%) earns an alpha of 0.5% (1.21%) per month or approximately 6% (14%) risk-adjusted returns per year. Consistent with the evidence in raw returns, the strategy yields positive risk-adjusted returns in years 2 through 5 after portfolio formation; the monthly alpha spread between low and high compensation EW portfolios is 0.16% (t-statistics = 1.68) for decile portfolios, 0.36% (t-statistics= 2.68) for portfolios formed on firms that are in the top and bottom 5% of the pay distribution, and 0.89% (t-statistics= 3.19) for portfolios formed on firms that are in the top and bottom 2% of the pay distribution. Finally, since Execucomp contains relatively larger firms, it is not surprising that forming value-weighted portfolios leads to qualitatively

similar conclusions – firms with overpaid CEOs earn substantially lower raw and risk-adjusted returns than firms with underpaid CEOs.

5. Conclusions

We investigate whether incentive pay, where incentive pay is defined as payment of restricted stock, options and other forms of long-term compensation, is related to the future *stock* performance of the firm.

We find that firms that lie in the extreme compensation deciles exhibit striking differences in performance. In the year after the firms are classified into the lowest and highest compensation deciles respectively, firms in the lowest total compensation decile earn insignificant industry- and momentum adjusted returns. In contrast, the firms in the highest compensation decile earn significant negative excess returns. The performance worsens significantly over time. In a multivariate framework, even after controlling for variables that have been shown to explain the cross-section of returns, the level of the industry and size adjusted incentive compensation is significantly negatively related to the forward one-year excess return earned by the firm. In contrast, the level of cash compensation is unrelated to future excess returns. We find that the worst component of incentive pay for future performance is the value of options granted and long-term incentive payouts to executives. The proportions of these two components in total compensation are significantly negatively related to the excess return earned by the firm. In contrast, the proportion of cash salary is significantly *positively* related to excess returns. The level of incentive compensation is significantly negatively related to the forward ROA, while the level of cash compensation is positively related to the level of ROA. Finally, we find that a portfolio trading strategy going long on firms in the lowest 10% of incentive compensation and shorting the firms that are in the highest 10% earns an annualized return of 5.27%. The profit to trading strategies conditioning on more extreme pay firms are even higher. A portfolio trading strategy going long on firms in the lowest 5% (2%) of incentive compensation distribution and shorting the firms that are in the highest 5% (2%) earns 8.3% (16.37%) per year. The trading strategy earns abnormal returns in every year for five years after portfolio formation.

Overall, we conclude that the negative relation between incentive compensation and stock performance we document is inconsistent with the efficient market, optimal incentives, and risk-shifting hypotheses. Though there is a reduction in total risk for firms with highest incentive

compensation in the year following the payment of compensation, the reduction in risk is too low to justify the lower returns earned by firms with the highest abnormal incentive compensation. Our results seem most consistent with the hypothesis that over-confident managers accept large amounts of incentive pay and with the hypothesis that investors over-react to these pay grants and are subsequently disappointed.

Our results suggest that managerial compensation components such as restricted stock, options and long-term incentive payouts, that are meant to align managerial interests with shareholder value, do not necessarily translate into higher future returns for shareholders. We do not take a stance on whether this means that the incentives are inadequate or whether they do not work. Further research is necessary to answer this question.

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Appendix

The variables used in the paper are listed below (with Compustat data items in parentheses).

Market value (MV) is the price per share times shares outstanding at the end of December of calendar year t.

TDC1 is total compensation (from Execucomp) which includes salary, bonus, total value of restricted stock granted, total value of stock options granted (using Black-Scholes), and long term incentive payouts.

TCC is total current compensation (from Execucomp) which includes salary and bonus.

TDC1-TCC is the difference between total compensation and total current compensation.

ADJTCMV is industry and market value (size) adjusted total compensation (total, current, or the difference). At the end of calendar year t, firms are allocated into 49 industry portfolios using industry classification from Ken French's website. Firms in each industry are then allocated into two size groups (High or Low) based on the median December MV of the firms in the industry. Industry and size adjusted (total, current, or the difference) compensation for each firm is then measured as the difference between the compensation for firm i and the median compensation of the firms in the same industry and size portfolio.

ADJTCS is industry and sales (data12) adjusted total compensation (total, current, or the difference). At the end of calendar year t, firms are allocated into 49 industry portfolios using industry classification from Ken French's website. Firms in each industry are then allocated into two size groups (High or Low) based on the median Sales (as of fiscal year ending in calendar year t) of the firms in the industry. Industry and size adjusted (total, current, or the difference) compensation for each firm is then measured as the difference between the compensation for firm i and the median compensation of the firms in the same industry and size portfolio.

Book-to-market equity (BM), for the fiscal year ending in calendar year *t*, is as defined in Davis, Fama, and French (2000) where book equity (BE) is the stockholders book equity (data60), plus balance sheet deferred taxes and investment tax credit (data35), minus book value of preferred stock (in the following order: data56 or data10 or data130) and ME is the price times shares outstanding at the end of December of calendar year *t*.

ROA is the operating income before depreciation (data13) scaled by total assets (data6)

Leverage is the sum of long-term debt and debt in current liabilities, scaled by total assets [data9 + data34)/data6]

BHRET12 is the twelve-month buy-and-hold return over January (t) to June (t) $[(1+r_1) \times ... \times (1+r_6)-1]$ where r_i is the return in month i

BHRET36 is the 3-year buy-and-hold return over January (t-2) to December (t) $[(1+r_1) \times ... \times (1+r_{36}) -1]$ where r_i is the return in month i

Asset growth (ASSETG) is the one year percentage change in total firm assets $[(assets_t - assets_{t-1})/ assets_{t-1}]$ where assets are Compustat data item 6

CI is the abnormal capital investment measure used in Titman, Wei, and Xie (2004). $[CE_t / (CE_{t-1} + CE_{t-2} + CE_{t-3})/3 -1]$ where CE_t is capital expenditures (data128) in fiscal year *t* and each capital expenditure term is scaled by that year's net sales (data12)

Cash Flow, as used in Titman, Wei, and Xie (2004). It is defined as Cash Flow =(Operating income before depreciation - interest expenses - taxes - preferred dividends - common dividends)/total assets [data13-(data15+data16+data19+data21)]/data6

Leverage, as used in Titman, Wei, and Xie (2004). It is defined as Leverage = long-term debt/(long-term debt+market value of equity) [data9/(data9+data199*data25)]

Accruals= [(change in current assets – change in cash) – (change in current liabilities - change in short-term debt – change in taxes payable) – depreciation expense] / average total assets).
[(Δdata4 - Δdata1) – (Δdata5 – Δdata34 – Δdata71) – data14] / [(data6$_t$+ data6$_{t-1}$)/2]

Profitability (Profit margin) is operating income before depreciation (OIBD) scaled by sales. [data13/data12]

SHROWNPC is the percentage of the company's shares owned by the CEO (Execucomp)

TDC1PCT is the year to year percentage change in total CEO compensation, TDC1 (Execucomp)

INST. HOLDINGS is the institutional holdings of a given firm calculated using data from Thompson Institutional Holdings database (S34).

Table I
Descriptive statistics on CEO compensation
This table reports descriptive statistics on CEO Compensation for firms listed in the S&P Execucomp database over 1994-2006. Panel A reports mean, median, and other statistics for components of raw pay while Panel B reports correlations between components of raw pay. Total compensation (Execucomp data item TDC1) includes salary, bonus, restricted stock grants, option grants, and long term incentive payouts while cash compensation (Execucomp data item TCC) includes salary and bonus. Incentive compensation is computed as the difference between TDC1 and TCC.

Panel A

	Percentage of total compensation	Dollar values of compensation (in $000s)			
		Mean	Median	Standard Deviation	Maximum
Total compensation	100.0%	4,995	2,360	12,364	760,153
Total cash compensation	52.7%	1,516	1,060	2,040	128,176
Total incentive compensation	47.3%	3,476	1,118	11,770	754,818
Salary	33.3%	704	642	382	5,807
Bonus	19.4%	812	408	1,886	127,633
Other annual compensation	1.4%	62	0	396	36,782
Restricted stock grants	6.0%	517	0	5,794	754,777
Long-term incentive payouts	3.1%	213	0	1,143	37,840
All other compensation	3.9%	184	24	1,310	117,217
Value of options granted	32.9%	2,501	638	9,724	685,534

Panel B

	Total compensation	Total cash compensation	Total incentive compensation	Salary	Bonus	Other annual compensation	Restricted stock grants	Long-term incentive payouts	All other compensation	Value of options granted
Total compensation	1.000									
Total cash compensation	0.366	1.000								
Total incentive compensation	0.987	0.211	1.000							
Salary	0.251	0.482	0.180	1.000						
Bonus	0.345	0.984	0.192	0.319	1.000					
Other annual compensation	0.125	0.120	0.110	0.128	0.104	1.000				
Restricted stock grants	0.518	0.095	0.528	0.083	0.086	0.051	1.000			
Long-term incentive payouts	0.168	0.170	0.147	0.214	0.141	0.044	0.019	1.000		
All other compensation	0.176	0.136	0.161	0.095	0.128	0.115	0.027	0.042	1.000	
Value of options granted	0.836	0.155	0.852	0.125	0.143	0.042	0.033	0.041	0.034	1.000

Table II
CEO compensation deciles: Financial and return characteristics

The table reports median financial and return characteristics for firms in the merged Execucomp, COMPUSTAT, and CRSP databases over 1994-2006. Using annual decile cutoff points, stocks are allocated into deciles based on industry and size median-adjusted total CEO compensation (in thousands of dollars) as of fiscal year ending in calendar year t. Total compensation (Execucomp data item TDC1) includes salary, bonus, restricted stock grants, option grants, and long term incentive payouts. Both the percentage of company stock held by CEO and the year-on-year percentage change in total CEO compensation as of fiscal year ending in calendar year t are from the Execucomp database. Market value, in millions of $, is calculated using the price and the number of shares outstanding at the end of December of year t. All accounting variables (book-to-market ratio), growth rate in total assets, leverage, return on assets (ROA), cash flow, profitability, capital investment and accruals are calculated using Compustat data in the fiscal year ending in calendar year t. The lagged one-year buy-and-hold return is computed over January (t) to December (t) where t is the portfolio formation year. The lagged 3-year buy and hold return is computed over January (t-2) to December (t). The numbers in each cell are cross-sectional time series averages. Details on the construction of these variables are provided in the Appendix. Spreads significant at the 1% level are bolded.

Decile	Comp	Incentive comp/ total comp	Percentage change in raw total pay year to year (in %)	Percentage of total shares owned	Size (market value)	Book-to-market	Asset growth	Leverage	ROA	Cash Flow	Profit	Capital Invest-ment	Accruals	Lagged 1 year buy and hold return	Lagged 3-year buy and hold return
2%	-5,999	28%	-4.0	2.7	3,271	0.50	0.08	0.17	3.12	0.07	0.16	-0.11	-0.04	0.11	0.33
5%	-3,950	32%	-3.9	2.7	2,810	0.48	0.08	0.18	3.26	0.08	0.16	-0.12	-0.04	0.11	0.33
1	-2,886	28%	-4.2	2.7	2,076	0.49	0.08	0.18	3.70	0.08	0.15	-0.10	-0.04	0.08	0.30
2	-1,398	33%	-0.4	2.1	1,175	0.49	0.07	0.19	3.80	0.08	0.13	-0.11	-0.04	0.07	0.29
3	-817	23%	-0.3	2.3	612	0.51	0.08	0.16	3.80	0.08	0.14	-0.09	-0.04	0.08	0.25
4	-444	31%	1.7	1.9	563	0.54	0.07	0.21	3.72	0.07	0.14	-0.10	-0.04	0.09	0.24
5	-79	43%	5.4	1.8	754	0.51	0.07	0.20	4.16	0.08	0.15	-0.08	-0.04	0.10	0.31
6	129	50%	10.9	1.3	885	0.49	0.08	0.21	4.31	0.08	0.15	-0.07	-0.04	0.10	0.35
7	600	57%	18.1	1.2	1,088	0.45	0.09	0.19	4.62	0.08	0.15	-0.07	-0.04	0.12	0.43
8	1,505	64%	22.9	1.2	1,656	0.40	0.10	0.19	5.34	0.09	0.16	-0.05	-0.04	0.14	0.48
9	3,404	73%	38.9	1.2	3,389	0.36	0.10	0.19	5.05	0.09	0.18	-0.06	-0.04	0.13	0.53
10	10,266	83%	73.9	1.5	7,585	0.35	0.13	0.16	4.33	0.08	0.20	-0.05	-0.04	0.17	0.62
95%	16,785	86%	97.9	1.6	9,712	0.35	0.15	0.16	3.74	0.08	0.20	-0.03	-0.04	0.19	0.70
98%	28,085	90%	125.7	2.0	10,371	0.35	0.17	0.15	3.45	0.08	0.21	-0.03	-0.04	0.20	0.81
Spread (10-1)	13,152	**55%**	**78.1**	**-1.2**	**5,509**	**-0.13**	**0.05**	-0.02	**0.63**	0.00	**0.05**	**0.06**	0.00	**0.09**	**0.33**
Spread (95-5)	20,735	**54%**	**101.8**	**-1.1**	**6,902**	**-0.14**	**0.06**	-0.02	**0.49**	0.00	**0.04**	**0.09**	0.00	**0.08**	**0.37**
Spread (98-2)	34,084	**62%**	**129.7**	-0.7	**7,100**	**-0.16**	**0.09**	-0.02	0.33	0.00	**0.05**	0.08	0.00	0.09	**0.49**

Table III
Determinants of CEO cash and incentive compensation

This table reports panel regressions on the determinants of industry and size adjusted CEO compensation. The dependent variable is the industry and size adjusted CEO (cash and incentive) compensation in the fiscal year ending calendar year *t*. Cash compensation includes salary and bonus and the incentive compensation includes restricted stock grants, option grants, and long term incentive payouts. Explanatory variables include B/M ratio (book-to-market ratio, as defined in Davis, Fama, and French (2000)), December (*t*) market value, lagged 12-month return (cumulative abnormal return over January(*t*)-December(*t*)), lagged 36-month return (cumulative abnormal return over January(*t-2*)-December(*t*)), growth rate in total assets, accruals, abnormal capital expenditures, return on assets, average monthly volatility, the level of institutional holdings, staggered board dummy, and GIM index. All accounting based variables are measured in the fiscal year ending in calendar year t and all market based variables are as of December of year t. Regressions include firm and year fixed effects. More details on the construction of these variables are provided in the Appendix. Robust t-statistics adjusting for clustering within firms are reported in parentheses.

	Cash compensation				Incentive compensation			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Firm market capitalization	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05
	(16.58)	(12.95)	(16.51)	(12.82)	(16.05)	(13.90)	(15.81)	(13.60)
Book-to-market ratio	-0.07	-0.07	-0.05	-0.06	-0.10	-0.09	-0.02	-0.01
	(-4.06)	(-3.52)	(-3.06)	(-2.95)	(-1.49)	(-1.07)	(-0.32)	(-0.13)
Lagged 1 year CAR	0.00	-0.04			0.00	-0.14		
	(0.07)	(-0.81)			(0.02)	(-0.72)		
Lagged 3 year CAR			0.08	0.08			0.39	0.57
			(5.66)	(4.60)			(6.83)	(7.91)
Asset growth	0.05	0.04	0.03	0.03	0.66	0.62	0.54	0.54
	(2.62)	(1.64)	(1.44)	(1.14)	(7.75)	(5.67)	(6.32)	(4.98)
Accruals	0.10	0.14	0.05	0.10	-0.38	-0.88	-0.66	-1.19
	(0.78)	(0.93)	(0.37)	(0.64)	(-0.71)	(-1.35)	(-1.22)	(-1.81)
Abnormal capital expenditure	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	(0.91)	(0.70)	(0.92)	(0.72)	(0.32)	(0.39)	(0.35)	(0.45)
ROA	0.00	0.01	0.00	0.01	-0.01	0.00	-0.01	-0.01
	(4.77)	(5.52)	(3.98)	(4.82)	(-2.77)	(-1.03)	(-3.59)	(-2.13)
Volatility		0.66		0.73		7.44		7.72
		(1.29)		(1.44)		(3.35)		(3.49)
Institutional holdings		0.36		0.29		-0.04		-0.49
		(3.56)		(2.89)		(-0.08)		(-1.11)
Staggered board dummy		-0.18		-0.19		0.09		0.16
		(-2.41)		(-2.44)		(0.28)		(0.48)
GIM corporate governance index		0.03		0.03		-0.11		-0.10
		(2.22)		(2.15)		(-2.02)		(-1.83)

Table IV
CEO compensation excess returns in event time
This table reports cumulative excess returns, in the year before (-12,0) and up to five years (+1,+60) after, to the firms that are in the top and bottom deciles of annually ranked abnormal CEO compensation distribution over 1994-2006. For each of the total compensation, total cash compensation, and total incentive compensation measures, abnormal compensation is measured as the excess compensation over control firms matched on industry and sales. Firms are first sorted annually by their abnormal CEO compensation. An event is then defined as a firm-year a firm falls into either the bottom or top decile of the abnormal CEO compensation distribution in that year. Returns are calculated in excess of the average return of an industry and lagged-return matched equity portfolios using the following methodology: For every firm that falls into the top or bottom decile of abnormal CEO compensation in a given year, we obtain all other firms with the same industry classification, using Ken French's 49 industry definitions. These industry peer firms are then sorted by their lagged one year returns to form quintile portfolios. Return windows starting with +1 are for returns computed starting in January. Return windows starting with +4 are for returns computed starting in April. Cumulative abnormal returns (CARs) to the event firms are calculated using the returns to these industry and return matched quintile portfolio returns as the benchmark. T-statistics are reported in parentheses for the null hypothesis that the event window abnormal return is zero.

Panel A: Lowest compensation decile

Event windows	N	(-12,0)	(+1,+12)	(+1,+36)	(+1,+60)	(+4,+15)	(+4,+40)	(+4,+64)
Total pay	1885	-1.91%	-0.76%	-0.51%	0.29%	-0.89%	-0.36%	0.27%
		(-2.13)	(-0.81)	(-0.30)	(0.12)	(-0.94)	(-0.21)	(0.12)
Cash Pay	1885	-1.61%	-2.47%	-2.09%	-1.15%	-1.59%	-0.96%	-0.01%
		(-1.82)	(-2.57)	(-1.21)	(-0.47)	(-1.60)	(-0.55)	(0.00)
Incentive pay	1885	-1.67%	-0.59%	0.71%	-0.35%	-0.59%	0.087%	-0.20%
		(-1.87)	(-0.62)	(0.42)	(-0.15)	(-0.62)	(0.51)	(-0.08)

Panel B: Highest compensation decile

Event windows	N	(-12,0)	(+1,+12)	(+1,+36)	(+1,+60)	(+4,+15)	(+4,+40)	(+4,+64)
Total pay	1885	-1.43%	-4.38%	-7.89%	-12.27%	-3.49%	-6.73%	-11.56%
		(-1.54)	(-4.67)	(-4.49)	(-5.05)	(-3.65)	(-3.76)	(-4.85)
Cash Pay	1885	-1.68%	-2.40%	-6.21%	-12.45%	-2.05%	-6.20%	-12.21%
		(-2.17)	(-3.02)	(-4.20)	(-5.95)	(-2.54)	(-4.10)	(-5.95)
Incentive pay	1885	-0.84%	-4.53%	-9.51%	-12.92%	-3.59%	-8.18%	-11.93%
		(-0.88)	(-4.70)	(-5.23)	(-5.18)	(-3.64)	(-4.42)	(-4.87)

Table V
Cross sectional time series regressions of annual stock returns on CEO compensation

Annual cumulative abnormal stock returns over January-December of year $t+1$ are regressed on lagged compensation, and other variables measured as of December of year t over the period 1994-2006. Compensation is the industry and size adjusted CEO compensation in the fiscal year ending calendar year t. B/M ratio (book-to-market ratio, as defined in Davis, Fama, and French (2000)), is calculated using the Compustat data in the fiscal year ending in calendar year t. Market value is the December (t) market value, lagged 12-month return is the cumulative abnormal return lagged one year (over January(t)-December(t)). Total cash compensation is obtained from Execucomp (data item TCC), and total incentive compensation is computed as the difference between total compensation and total cash compensation (TDC1-TCC). The cash and incentive compensation measures are both winsorized at the 1% and 99% points of their distributions. More details on the construction of these variables are provided in the appendix. Regressions include firm and year fixed effects. More details on the construction of these variables are provided in the Appendix. Robust t-statistics adjusting for clustering within firms are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
Industry and size adjusted incentive	-0.01		-0.01	-0.01	-0.01	-0.01
compensation	(-10.1)		(-9.04)	(-4.96)	(-4.78)	(-2.76)
Industry and size adjusted cash		-0.03	-0.02	-0.01	-0.01	-0.01
compensation		(-6.57)	(-4.78)	(-0.86)	(-0.86)	(-0.47)
Firm market capitalization				0.00	0.00	0.00
				(-8.57)	(-8.62)	(-5.05)
Book-to-market ratio				0.04	0.06	0.07
				(4.86)	(6.35)	(4.33)
Lagged 1 year CAR				-0.03	-0.02	-0.01
				(-1.44)	(-1.22)	(-0.45)
Lagged 3 year CAR				-0.08	-0.10	-0.10
				(-11.68)	(-12.28)	(-8.1)
Asset growth				-0.09	-0.08	-0.15
				(-7.85)	(-6.37)	(-6.69)
Accruals				-0.24	-0.29	-0.27
				(-3.79)	(-4.24)	(-2.51)
Abnormal capital expenditure				-0.02	-0.03	-0.03
				(-2.78)	(-3.28)	(-2.13)
3 year share issuance measure				-0.02	-0.01	-0.01
				(-0.89)	(-0.31)	(-0.27)
Staggered board dummy					-0.06	-0.06
					(-1.6)	(-0.8)
GIM corporate governance index					-0.01	0.00
					(-1.1)	(-0.46)
Percentage of shares owned						0.00
						(2.04)
N	18,725	18,725	18,725	11,920	10,152	4,728

Table VI
Cross sectional time series regressions of annual stock returns on components of CEO compensation

Annual cumulative abnormal stock returns over January-December of year t+1 are regressed on lagged CEO compensation and its components over 1994 -2006. Total compensation (Execucomp data item TDC1) includes salary, bonus, restricted stock grants, option grants, and long term incentive payouts while cash compensation (Execucomp data item TCC) includes salary and bonus. Incentive compensation is computed as the difference between TDC1 and TCC). All the overall compensation measures and the components are industry and size adjusted and winsorized at the 1% and 99% points of their distributions. Control variables include B/M ratio, December (*t*) market value, lagged 12-month return, lagged 36-month return, growth rate in total assets, accruals, abnormal capital expenditures. All accounting based variables are measured in the fiscal year ending in calendar year t and all market based variables are as of December of year t. Regressions include firm and year fixed effects. More details on the construction of these variables are provided in the Appendix. Robust t-statistics adjusting for clustering within firms are reported in parentheses.

	Regression on levels of pay components							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Salary	-0.06		-0.04	-0.05				-0.04
	(-2.55)		(-1.84)	(-2.04)				(-1.57)
Bonus	-0.03		-0.02	-0.01				-0.01
	(-5.30)		(-3.70)	(-1.70)				(-0.83)
Other annual compensation		-0.09	-0.07					-0.08
		(-2.39)	(-1.99)					(-1.98)
Restricted stock grants		-0.01	0.00		0.00			0.00
		(-1.96)	(-1.54)		(-0.97)			(-0.12)
Long-term incentive payouts		-0.02	-0.02			-0.02		-0.01
		(-2.60)	(-2.19)			(-1.74)		(-1.44)
All other total compensation		-0.01	0.00					-0.01
		(-0.66)	(-0.51)					(-0.48)
BS value of options granted		-0.01	-0.01				-0.01	-0.01
		(-9.86)	(-9.15)				(-6.68)	(-6.26)
Firm market capitalization				-3.38	-3.52	-3.49	-3.27	-3.13
				(-9.40)	(-9.91)	(-9.82)	(-9.17)	(-8.64)
Book-to-market ratio				0.04	0.05	0.04	0.04	0.04
				(5.83)	(5.87)	(5.85)	(5.74)	(5.70)
Lagged 1 year CAR				-0.03	-0.03	-0.03	-0.03	-0.03
				(-3.95)	(-4.00)	(-4.01)	(-4.38)	(-4.32)
Lagged 3 year CAR				-0.01	-0.01	-0.01	-0.01	-0.01
				(-7.71)	(-7.74)	(-7.70)	(-7.59)	(-7.59)
Asset growth				-0.07	-0.07	-0.07	-0.07	-0.07
				(-7.44)	(-7.46)	(-7.47)	(-6.97)	(-6.97)
Accruals				-0.39	-0.39	-0.39	-0.40	-0.40
				(-6.79)	(-6.82)	(-6.79)	(-6.93)	(-6.91)
Abnormal capital expenditure				0.00	0.00	0.00	0.00	0.00
				(-0.25)	(-0.28)	(-0.28)	(-0.31)	(-0.29)

Table VII
Two-way independent sorts on abnormal incentive compensation and information variables

The table reports average year-ahead cumulative abnormal returns to 10 portfolios formed on industry and size adjusted incentive compensation and firm and CEO characteristics. The portfolios are formed in December of every year as the intersection of 2 portfolios formed on industry and size adjusted compensation and 5 portfolios formed on firm characteristics as of fiscal year ending in calendar year t. The compensation breakpoints are the yearly 10th (low) and 90th (high) percentile of the industry and size adjusted incentive pay distribution. The characteristic portfolios are formed using quintile sorts of the variables measured in fiscal year ending in calendar year t for accounting based information variables and in December of year t for market based information variables. Information variables used in the sorts include: lagged 3-year abnormal returns, lagged 3-year sales growth, and the lagged unexercised in-the-money options as the percentage of total incentive compensation. Incentive compensation is measured as total compensation (Execucomp data item TDC1 which includes salary, bonus, restricted stock grants, option grants, and long term incentive payouts), less total cash compensation (Execucomp data item TCC which includes salary and bonus).

	Unexercised in-the-money options as a percentage of total incentive compensation					
	Q1	Q2	Q3	Q4	Q5	Q5-Q1
Low Pay	0.97%	-4.69%	-0.25%	0.11%	-0.54%	-1.50%
	(0.24)	(-1.51)	(-0.10)	(0.05)	(-0.34)	(-0.34)
High Pay	-3.48%	-5.41%	-1.60%	-3.03%	-18.32%	-14.84%
	(-1.66)	(-2.68)	(-0.80)	(-1.22)	(-4.25)	(-3.10)
High-Low	-4.45%	-0.72%	-1.35%	-3.13%	-17.79%	.
	(-0.97)	(-0.19)	(-0.43)	(-0.96)	(-3.88)	
	3-year abnormal returns					
	Q1	Q2	Q3	Q4	Q5	Q5-Q1
Low Pay	4.45%	-1.81%	-0.24%	-1.98%	-2.20%	-6.64%
	(1.98)	(-0.93)	(-0.14)	(-1.03)	(-0.80)	(-1.87)
High Pay	-3.44%	-2.07%	-2.66%	-2.53%	-10.28%	-6.83%
	(-1.44)	(-1.00)	(-1.40)	(-1.33)	(-4.29)	(-2.02)
High-Low	-7.89%	-0.26%	-2.42%	-0.56%	-8.08%	.
	(-2.41)	(-0.09)	(-0.94)	(-0.21)	(-2.21)	
	3-year sales growth (LSV)					
	Q1	Q2	Q3	Q4	Q5	Q5-Q1
Low Pay	6.67%	-0.44%	-1.65%	-4.69%	-5.40%	-12.07%
	(2.19)	(-0.19)	(-0.75)	(-1.94)	(-1.95)	(-2.93)
High Pay	-0.65%	-3.49%	-2.81%	-4.82%	-12.77%	-12.13%
	(-0.22)	(-1.48)	(-1.24)	(-1.97)	(-4.73)	(-3.05)
High-Low	-7.32%	-3.05%	-1.15%	-0.13%	-7.37%	.
	(-1.74)	(-0.93)	(-0.36)	(-0.04)	(-1.91)	.

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Table VIII
Cross sectional time series regressions of compensation on ROA

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Year-on-year growth rate in ROA (measured as of fiscal year ending in calendar year t+1) is regressed on lagged cash and incentive compensation, and other variables measured as of December of year *t* over the period 1994-2006. Compensation is the industry and size adjusted CEO compensation in the fiscal year ending calendar year t. Explanatory variables include B/M ratio (book-to-market ratio, as defined in Davis, Fama, and French (2000)), December (*t*) market value, lagged 12-month return (cumulative abnormal return over January(*t*)-December(*t*)), lagged 36-month return (cumulative abnormal return over January(*t-2*)-December(*t*)), growth rate in total assets, accruals, abnormal capital expenditures, return on assets, average monthly volatility, 3 year composite share issuance variable of Daniel and Titman, scattered board dummy, and GIM index and percentage of shares owned by the CEO. Regressions include firm and year fixed effects. More details on the construction of these variables are provided in the Appendix. Robust t-statistics adjusting for clustering within firms are reported in parentheses.

	One-year forward ROA				One-year forward industry-adjusted ROA			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Cash compensation	0.25		0.31	0.48	0.24		0.29	0.53
	(2.69)		(3.37)	(4.11)	(2.71)		(3.23)	(4.61)
Incentive compensation		-0.11	-0.12	-0.10		-0.08	-0.09	-0.09
		(-4.34)	(-4.78)	(-3.92)		(-3.33)	(-3.76)	(-3.42)
Firm market capitalization	0.44	1.35	0.84	0.79	0.21	1.00	0.51	0.21
	(0.53)	(1.64)	(1.00)	(0.95)	(0.25)	(1.23)	(0.62)	(0.25)
Book-to-market ratio	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
	(-15.29)	(-15.48)	(-15.35)	(-14.47)	(-13.22)	(-13.39)	(-13.27)	(-12.95)
Lagged 1 year CAR	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02
	(2.63)	(2.53)	(2.58)	(3.11)	(2.41)	(2.32)	(2.38)	(3.28)
Lagged 3 year CAR	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	(1.98)	(2.46)	(2.30)	(2.70)	(0.80)	(1.20)	(1.05)	(1.81)
Asset growth				-0.01				0.00
				(-1.92)				(-1.79)
Accruals				0.04				0.04
				(2.34)				(2.47)
Abnormal capital expenditure				0.00				0.00
				(-2.59)				(-2.47)
Institutional holdings				0.08				0.07
				(6.74)				(5.61)
Staggered board dummy				0.00				0.00
				(0.07)				(0.46)
GIM corporate governance index				0.00				0.00
				(-0.98)				(-0.25)
3 year share issuance measure				-0.01				-0.01
				(-2.41)				(-1.28)
Percentage of shares owned				0.16				0.09
				(2.77)				(1.54)

Table IX
CEO incentive compensation decile portfolio returns in event time

Using the decile cutoff points over the entire sample, stocks are allocated into deciles based on industry and size median-adjusted CEO incentive compensation (tdc1-tcc) as of fiscal year ending in calendar year *t*. Equal-weighted portfolios are formed based on December *t* compensation decile cutoffs. The portfolios are held for one year, from January of year *t+1* to December of year *t+1*, and then rebalanced. Portfolio return statistics are reported every year for 10 years around the portfolio formation year (t) over the period of January 1994 to December of 2006. The year -1 row reports the portfolio returns, volatility, and Sharpe ratio over January (*t*) - December (*t*) and year 1 reports the same figures over January (*t+1*)-December (*t+1*). Year [-5,-1] ([1, 5]) is the cumulative portfolio return, volatility, and Sharpe ratios over the 5 years prior (after) the portfolio formation period. Numbers are in percentages. The Fama_french alphas and standard deviations, in percent, are monthly averages and the Sharpe ratio, in decimal form, is annual.

YEAR	1	2	3	4	5	6	7	8	9	10	Spread 10-1	t(10-1)
A. Fama-French alphas												
-1	0.08	0.56	0.29	0.12	0.11	0.35	0.27	0.41	0.62	0.76	0.68	3.21
1	0.22	0.23	-0.03	0.02	-0.08	0.00	0.03	-0.07	-0.01	-0.12	-0.35	-2.03
[-5,-1]	0.44	0.63	0.46	0.36	0.36	0.55	0.52	0.76	0.88	1.43	0.99	9.93
[+1,+5]	0.37	0.14	0.03	0.10	0.11	0.07	0.08	0.10	0.07	-0.02	-0.4	-2.97
B. St. Deviation												
-1	4.8	5.6	5.2	5	5	5.1	4.9	5.1	5.3	6.3		
1	4.8	5.5	4.9	4.8	4.9	4.7	4.8	5	5.1	6		
[-5,-1]	5.3	6	5.5	5.5	5.5	5.6	5.7	5.7	5.9	6.5		
[+1,+5]	5.4	5.8	5.5	5.1	5	4.9	5.1	5.3	5.7	6.4		
C. Sharpe Ratio												
-1	0.854	1.044	1.052	0.920	0.799	1.084	0.944	0.989	1.107	0.888		
1	0.887	0.845	0.854	0.903	0.774	0.778	0.908	0.745	0.803	0.470		
[-5,-1]	2.312	2.484	4.155	3.785	2.826	3.910	3.261	2.914	2.455	1.622		
[+1,+5]	0.906	2.395	3.244	2.692	3.329	2.830	3.467	2.852	1.516	1.254		

Table X
CEO incentive compensation decile portfolio returns

At the end of March of each year *t* over 1995-2006, stocks are allocated into deciles based on industry and size adjusted total incentive CEO compensation (tdc1-tcc) as of fiscal year ending in calendar year *t-1*. Equal-weighted portfolios are formed based on December(*t*) compensation decile cutoffs. The portfolios are held for one year, from April of year *t* to March of year *t+1*, and then rebalanced. Portfolio return statistics are reported every year for 10 years around the portfolio formation year (t) over the period of April 1995 to March of 2007. The year -1 row reports the portfolio returns over April (*t-1*)-March (*t*) and year 1 reports the portfolio returns over April (*t*)-March (*t+1*). Year [1, 5] is the cumulative portfolio return over the 5 years after the portfolio formation period. Panel A reports annual raw returns and Panel B reports monthly Fama-French alphas. Numbers are in percentages.

Panel A. Equally-weighted raw returns

YEAR	2%	5%	1	2	3	4	5	6	7	8	9	10	95%	98%	Spread 10-1	t(10-1)	Spread 95-5	t(95-5)
1	27.60	21.16	19.29	19.95	18.91	18.38	17.60	17.61	18.86	17.35	16.65	14.01	12.86	11.23	-5.27	-1.95	-8.30	-2.35
2	15.77	20.10	18.90	20.03	19.66	19.02	21.07	18.22	19.50	19.92	17.69	17.67	19.40	19.14	-1.22	-0.50	-0.70	-0.20
3	24.76	18.34	18.65	18.88	19.22	18.70	21.35	17.64	16.78	16.23	15.66	16.47	14.36	20.85	-2.18	-0.78	-3.98	-1.21
4	24.72	21.50	19.10	18.60	21.84	18.52	19.57	22.31	17.72	18.15	16.22	14.78	14.10	14.34	-4.31	-2.04	-7.40	-2.79
5	19.92	14.57	13.55	17.17	14.24	18.11	17.55	17.08	12.55	17.48	15.12	13.15	9.17	2.02	-0.41	-0.14	-5.40	-1.19
[1,5]	203.73	126.74	112.58	100.20	110.43	109.55	121.01	112.10	99.23	105.49	92.05	87.37	73.76	62.82	-25.2	-2.23	-52.99	-3.93

Panel B. Fama-French alphas

YEAR	2%	5%	1	2	3	4	5	6	7	8	9	10	95%	98%	Spread 10-1	t(10-1)	Spread 95-5	t(95-5)
1	0.89	0.16	0.06	0.06	-0.02	-0.08	-0.12	-0.09	0.01	-0.04	-0.09	-0.19	-0.33	-0.32	-0.25	-1.58	-0.50	-2.21
2	0.02	0.08	-0.02	-0.05	-0.06	-0.09	0.05	-0.07	0.01	-0.01	-0.10	-0.04	0.09	0.06	-0.03	-0.18	0.00	0.00
3	0.59	0.04	0.09	-0.08	-0.03	-0.08	0.22	-0.05	-0.19	-0.16	-0.14	-0.09	-0.23	0.54	-0.17	-0.91	-0.27	-1.13
4	1.05	0.50	0.25	-0.10	0.31	-0.04	0.09	0.16	-0.04	-0.05	-0.19	-0.12	-0.09	-0.12	-0.37	-1.92	-0.59	-2.11
5	1.00	0.36	0.07	0.15	-0.03	0.23	0.16	0.12	-0.12	0.29	0.04	0.06	-0.10	-0.62	-0.01	-0.06	-0.46	-1.55
[1,5]	0.83	0.30	0.16	0.00	0.10	0.05	0.16	0.07	0.01	0.09	-0.02	0.00	-0.06	-0.06	-0.16	-1.68	-0.36	-2.68

Figure 1.

Cumulative excess returns to the firms that are in the top and bottom deciles of annually ranked abnormal CEO incentive compensation distribution over 1994-2006 are plotted in event time. Abnormal compensation is measured as the excess compensation over control firms matched on industry and sales. Firms are first sorted annually by their abnormal CEO incentive compensation. An event is then defined as a firm-year a firm falls into either the bottom or top decile of the abnormal CEO incentive compensation distribution in that year. Returns are calculated in excess of the average return of an industry and lagged-return matched equity portfolios using the following methodology: For every firm that falls into the top or bottom decile of abnormal CEO compensation in a given year, we obtain all other firms with the same industry classification, using Ken French's 49 industry definitions. These industry peer firms are then sorted by their lagged one year returns to form quintile portfolios. Cumulative abnormal returns (CARs) to the event firms are calculated using the returns to these industry and return matched quintile portfolio returns as the benchmark.