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THE GOOD, THE BAD AND THE LUCKY:
CEO PAY AND SKILL

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Abstract

CEO compensation varies widely, even within industries. In this paper, we investigate whether differences in skill explain these differences in CEO pay. Using the notion that skilled CEOs are more likely to continue prior good performance and to reverse prior poor performance, we develop a new methodology to detect if skill is related to pay. We find that highly paid CEOs are more skilled than their industry counterparts when firms are small or face few environmental constraints, especially when there is a large shareholder and the CEO has high incentives. By contrast, pay is negatively related to skill in large firms constrained by environmental conditions, especially when there is no large shareholder to monitor management. We also examine CEO turnovers and show that the firm's post-turnover performance is related to differences between the two CEO's pay levels. Finally, we find that a portfolio that invests in firms managed by highly paid CEOs and sells firms managed by poorly paid CEOs generates an annualized abnormal return of 8% between 1994 and 2001, but only in conditions when pay and skill are related.

> One of the great, as-yet-unsolved problems in the country today is executive compensation and how it is determined.
>> Securities and Exchange Commission chairman, William H. Donaldson[1]

> Is it a problem of bad apples, or is it the barrel?
>> Harvard Business School Dean, Kim Clark[2]

PART I. INTRODUCTION

Very few business topics are as hotly contested as the salaries of CEOs of public firms. The amount that CEOs are paid and the structure of their pay is frequently debated in the popular press, television programs, proposed legislation, political campaigns, magazine cover stories and academic research. Outrage over CEO pay has forced important changes at major firms; Jack Welch of GE was forced to give back part of his pay when investors complained it was excessive and Richard Grasso of the NYSE was forced to resign altogether. Shareholder suits to recover an executive's salary are now front page news (Disney).

One obvious reason for the interest in CEO pay is its striking increase. In 1992, the average CEO of an S&P 500 firm earned $2.7 million. By its peak in 2000, average pay for these CEOs had increased to over $14 million – an increase of more than 400%. The increase in CEO pay is even more striking in relative terms. 12 years ago, CEOs at major U.S. corporations were paid 82 times the average earnings of a blue collar worker; last year they were paid more than 400 times the average blue collar worker. This huge increase in executive compensation is has been especially controversial because CEOs are sometimes paid large sums even as the firm's results deteriorate; CEOs at WorldCom, Tyco, and Enron, collected an average of $53 million in the year prior to the collapse of their firms.

These facts and spectacular governance failures at important firms have caused many to conclude that the process for setting CEO pay is badly broken. Critics such as Bebchuk and Fried (2004) conclude

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[1] National Press Club speech, August 2003
[2] National Press Club speech, February 2003

that CEOs are overpaid because they have too much influence over the board that should be monitoring them on shareholders' behalf and too much influence over the committee that sets their pay. Independent directors and consultants hired to advise the board have relatively little interest in safeguarding shareholder interests. Thus, CEOs are effectively able set their own pay and the CEO's compensation contract is badly distorted. In this view, CEO pay is the product of badly functioning corporate governance. Such arguments also suggest that cases of excessive CEO pay reflect a systematic social problem of "fat-cat" CEOs skimming money at shareholders' expense.

Others are more sanguine, arguing that the process for determining CEO pay is not systematically broken. Holmstrom and Kaplan (2003) argue that US corporate governance works relatively well and that any problems with CEO pay have not erased the comparative advantages of the U.S. system.[3] Murphy (2002) argues that CEO pay levels and practices are generally consistent with good governance and that distortions from optimal contracting reflect the perceived impact of accounting and tax rules. In this view, compensation problems reflect breakdowns in particular firms, but do not indicate a general problem.

Previous research seeking to distinguish between these competing views of CEO pay typically examines whether CEO pay changes with contemporaneous changes in firm performance. Agency theory suggests that the CEO pay should be linked to changes in firm value in order to align managers' interests with shareholders.[4] Most prior research examines whether CEO pay changes in this way and, to the degree it doesn't, deviations are taken as evidence of CEO skimming excessive compensation.

Surprisingly, however, there is little evidence on the basic question: is CEO pay related to CEO skill? The question is important in evaluating the governance of public firms and executive compensation.[5] If pay and skill are unrelated, the process for setting CEO pay is likely to be badly broken and highly paid

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[3]Reasons other than governance failures may explain the increase in pay unrelated to performance. For example, Murphy and Zabojnik (2004), Oyer (2004), and Himmelberg and Hubbard (2002) argue that CEO pay reflects changes in labor market for CEOs. Bolton et al. (2003) argue that it may even be in shareholders' interest to avoid incentive pay if capital markets are speculative.

[4] There are several papers that investigate factors, such as risk, that affect the optimal amount of incentive pay. See Murphy (1999) and Core, Guay and Larcker (2001) for a survey of this literature.

[5]Studies that examine firm performance and contemporaneous CEO compensation do not shed light on whether skill and pay are correlated because both the level of the firm's current performance and CEO compensation are functions of things other than skill.

CEOs may be over-paid, regardless of which model describes executive compensation. If pay and skill are related, high salaries will not necessarily be evidence that "fat cat" CEOs capture the board. Just as sports teams may decide to pay high salaries to attract or retain valuable players, boards may also decide to pay a lot for an especially talented manager.

To examine the link between pay and skill, we introduce a new measure of skill and then ask whether highly-paid CEOs are in fact more skilled. The intuition behind our measure of skill is straightforward: firms run by good CEOs should consistently do better than firms run by bad CEOs. If a firm is performing poorly relative to its peers, a skilled CEO will consistently be more likely to reverse or turnaround the firm's fortunes, while a bad CEO will be more likely to continue the poor performance. If, on the other hand, a firm performs well relative to its peers, a good CEO will be consistently more likely to continue the good performance, while a bad CEO will increase the chance of a bad outcome. Our measure for CEO skill is thus the persistence of good performance (positive persistence) and the reversal of poor performance (turnarounds). Our measure is related to the performance persistence measure used to evaluate skill among mutual fund managers (Brown and Goetzman, 1995), hedge fund managers (Brown, et al, 1999) and investment analysts (Mikhail, Walter and Willis, 2004), but has several advantages for studying industrial firms and CEOs. First, by conditioning on past performance, we compare all CEOs who are in the same position, rather than comparing a CEO who is in charge of a firm that performed well in the past with another CEO who is in charge of a firm that performed poorly in the past.

Second, while general persistence measures reveal whether there is managerial skill overall, separately measuring reversals and persistence allows us to distinguish between "good," "bad" and "lucky" CEOS. "Good" CEOs reverse poor performance and continue positive performance. "Bad" CEOs are highly paid CEOs that continue poor performance and reverse positive performance. "Lucky" CEOs are highly paid, but perform no differently from their lower-paid peers. This distinction allows us to make some initial conclusions about overall pay levels. For example, we can conclude that highly paid CEOs are overpaid if their performance is consistently worse than their lower-paid peers.

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The third advantage of separately examining the persistence of superior performance and the reversals of poor performance is that any observed link between pay and skill is now more likely to arise from the CEO's attributes rather than the firm's attributes. The difficulty of separating CEO effects from firm effects is perhaps one reason for the lack of evidence about CEO skill. Bertrand and Schoar (2004) deal with this by examining CEOs who move from one firm to another. This methodology helps them to distinguish the styles of particular CEOs, but for much of the analysis restricts the sample to roughly 117 CEOs (out of around 500 top executives) that switched firms, and these CEOs who switch firms may be different from CEOs who do not change firms. While our methodology does not explicitly separate the effects of individual CEOs, it does reduce such concerns, as discussed in Part 2. Moreover, given that the design of CEO pay is said to be systematically broken, and to be worse in firms when the CEO is entrenched, it is valuable to examine a large, systematic sample that includes CEOs that have not moved and who are therefore more likely to have become entrenched.

We begin by examining overall CEO pay levels. In a functioning labor market, a CEO's reservation wages and pay level might be increasing with a CEO's outside opportunities and skill. This variation in skill may explain some of the variation in CEO pay. If pay is linked to skill, the high salaries will not of themselves be evidence that "fat cat" CEOs capture the board (just as no one alleges that superstar athletes are well paid because they control the management of the teams they play for). We use the pay levels in the year prior to the realized performance year to see if the pay captures the expectations of CEO skill. We then look at subsequent realized performance to see if the pattern is consistent with the idea that highly paid CEOs are more skilled.

We find evidence that highly paid CEOs are more skilled when firms are small or when there are fewer environmental constraints on managerial discretion. This link between pay and skill is strengthened in the presence of a blockholder and high incentive pay. By contrast, we find that highly paid CEOs who operate in large firms and subject to environmental constraints are actually more likely to continue poor

performance and surprisingly, even to reverse good performance. This negative relation between pay and skill is exacerbated in the absence of an external blockholder.

We also investigate the importance of incentive pay in the link between pay and skill. We find that in firms where there is a link between pay levels and skill, the link is stronger when incentive pay is higher, especially if the higher incentive pay is accompanied with the presence of an external blockholder. We also find some evidence that the level of pay may itself be an important incentive. When CEO's can be dismissed for poor performance, relatively well-paid CEOs will find dismissal more costly than those CEOs that are relatively poorly paid.

In addition, we find that a new CEO who gets a higher pay than the departing CEO is more likely to reverse prior poor performance, relative to CEOs who are paid similarly or lower than the departing CEO, if the pay package has high incentive pay. Strikingly, if the highly paid new CEO's pay lacks incentive pay, the CEO is more likely to continue prior poor performance.

Finally, we create equal-weighted portfolios that hold firms with highly paid CEOs and shorts firms with low paid CEOs.[6] When pay and skill are related, we find that such a portfolio generates an annualized abnormal return of 8% between 1994 and 2001. When pay and skill are unrelated, there is no such abnormal return.

Part II describes our data and methodology. Part III describes our findings on the connection between pay and skill and examines how this connection varies with industry specific constraints on the CEO's discretion. Part IV examines the affect of incentive pay on the link between pay and skill. Part V computes the returns to the portfolio that holds firms with "good" CEOs. Part VI concludes.

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[6] We focus on equal-weighted portfolios since we find that CEOs are more important in smaller firms.
[8] An important exception, discussed in Part 5, is Hayes and Schaefer (2000). If boards observe and reward a CEO's contribution before the market does, then regressing current pay on future performance will not capture CEO skill: current high pay and future good performance might just reflect good current firm performance and good current performance may not be related to CEO skill, but luck.

In this section, we present the methodology we use to detect whether CEO skill and pay are related. We assume that CEO skill will manifest itself in firm performance and that highly skilled CEOs will lead to better results. A talented CEO who either does not exert effort or is unable to affect firm performance would not be classified as skilled. Our approach then follows: if pay and skill are related, current compensation will be related to future performance. If CEO pay levels are unrelated to CEO skill, then current compensation will be unrelated to future performance.

It is worth noting at the outset that our approach differs from the vast majority of research on CEO pay. Most prior research examines the structure and design of CEO pay or, in other words, the relationship between pay and contemporaneous performance.[8] By contrast, we examine total pay and its relation to future firm performance. Thus, while the prior literature typically uses firm performance as the independent variable and the CEO's pay as the dependent variable, we use prior CEO pay as an independent variable and future firm performance as the dependent variable.

Since we are interested in detecting if pay levels are related to CEO skill, we estimate the following regression:

$$\text{Performance}_{it} = \alpha + b\,\text{HighPay}_{t-1} + c\,\text{HighPay}\,(\text{Performance}_{i\,t-1} * \text{Good}) + d\,\text{HighPay}\,(\text{Performance}_{i\,t-1} * \text{Bad}) + e\,(\text{Performance}_{i\,t-1} * \text{Good}) + f\,(\text{Performance}_{i\,t-1} * \text{Bad}) + \varepsilon$$

where Performance_{it} is the measure of the firm's performance, α is a constant, HighPay is a dummy variable set equal to 1 if the CEO pay was in the top 40% of the industry the prior year, equal to 0 if the CEO pay was in the bottom 40% of the industry, and otherwise set to missing, and good is a dummy variable set equal to one if the firm's performance that year was better than the industry median.

Since two firms that have performed differently in the past might have very different possibilities

in the future, we condition the persistence on prior performance being above industry median or below industry median levels. This insures that we compare CEOs managing firms with similar prior results.

Conditioning on prior performance has another advantage. It is possible (and likely) that there are firm specific factors that increase both pay and persistence in prior performance. For instance, it might be the case that large firms have both a higher pay and, due to inertia, have greater overall performance persistence. We mitigate – but do not completely remove - such concerns by focusing on both the persistence of superior performance and the reversal of poor performance (or turnarounds) for the highly paid CEOs.[10] In terms of the regression, we therefore will look for both a significant positive coefficient for highly paid CEOs given prior good performance (c) and a significant negative coefficient for highly paid CEOs given prior bad performance (d). This pattern would indicate that, compared with poorly paid CEOs, highly paid CEOs are both more likely to continue good performance and more likely reverse prior bad performance and we would interpret that as evidence that skill and pay are linked. The alternative interpretation would be that some firm factor (unrelated to the CEO's actions and skill) is correlated with high pay, reversals of bad performance *and* persistence of good performance. We are unable to think of a plausible such factor.[11]

We also examine how the relationship between pay and skill varies in different settings. For instance, we would expect a stronger link between CEO pay and skill when CEO's are likely to have a greater impact on the firm (recall that our notion of skill combines impact on firm performance and the CEO's innate ability or talent). It has been argued that environmental constraints, such as regulation, can

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[10] For instance, momentum in stock prices will not explain any observed skill. It is true that stock price momentum might lead to performance persistence for CEOs whose compensation were related to the firm's stock price, however we define skill as performance persistence when the firm's prior performance was good, and reversals (rather than momentum) if the prior performance was bad. This pattern of reversals will be inconsistent with explanations based on momentum. Also note that any survivorship bias will only explain observed skill if the most highly paid CEOs are more likely to fail and thus disappear from the sample, thus exaggerating the good performance the next year. This seems unlikely.

[11] One potential objection is that, by conditioning on prior poor performance, we might identify some as skilled who has only done well relative to poor performers, which is too low a standard for calling someone skilled. However, because we condition both on good and bad performance, highly paid CEOs will need to do well consistently (following good years and following bad years) to be identified as skilled. Moreover, a CEO who does consistently better other poor performing CEOs will eventually emerge out of the poor performing category.

reduce the impact of the CEO (see, e.g., Hambrick (1995), Adams et. al. (2004)). So we also estimate the regressions separately based on environmental constraints. It is also argued that CEO's with a greater incentive pay are more likely to impact firm value. Consequently, we estimate the above regression based on the incentive component in pay.

We first compute CEO pay, defined as the sum of the cash, bonus payments, option grants and stock grants. We then compute industry adjusted pay-levels for all CEOs by subtracting the median CEO pay in the same industry, using the 48 industry classification provided by Fama-French (1997). We then sort the CEOs in pay-quintiles based on industry adjusted overall pay and classify CEOs as highly paid if they are in the top 2 pay quintiles for their industry (the top 40%).

As a measure of firm performance, we first use return on assets. Since accounting measures might be subject to manipulation by the CEO, we also measure the firm's stock price performance because stock prices are less likely to be affected by cosmetic earnings changes that do not affect the firm's cash flow. For stock price performance, we compute the yearly abnormal return for each firm in the sample using daily data. The abnormal return is computed for the Fama-French four factor model that includes the market factor, size factor, book to market factor and the momentum factor. Both of these measures of performance are computed relative to the firm's industry, where industry adjustments are done using both the 2-digit SIC classifications as well as the 48 industries classified by Fama and French. To reduce the noise in these yearly abnormal returns we (1) use daily returns and (2) form quintiles based on a firm's measure of abnormal returns, making it less likely that our results are driven solely by noise in measures of return.[12] If investors accurately assess and anticipate the CEO's skill level, there will be no measurable link between skill level and stock return.

We include in our sample all firms for which we can find data on stock return data on CRSP, accounting data on Compustat, and compensation data on Execucomp for the years 1992-2001. This produces a sample of 12,569 firm years, in which there are 2,373 unique firms and 3,579 unique CEOs. In

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[12] Our results are qualitatively similar when we use the abnormal returns directly instead of quintiles and are omitted here.

regressions reported below, we exclude firms if there is a turnover either that year or in the previous year. This insures that we focus on the same CEO and do not use the performance of one CEO to estimate the performance of another. In the resulting no turnover sample, we examine 2,284 firms and 2,880 CEOs (10,043 firm years). The turnover sample, used as described below, contains 980 firms.

Table 1 below provides summary data for our sample. Panel A lists descriptive statistics. Mean CEO pay in our sample is 4.39 million, of which 46% is characterized as incentive pay.[13] The top five spots are occupied by Charles Wang of Computer Associates ($1.3 billion in 1998), Steve Jobs of Apple ($600 million in 2000), Gregory Reyes of Brocade ($370 million in 2001) and Thomas Siebel of Siebel ($293 million in 2000, and $244 million in 2001). On the other end of the scale were 18 CEOs who received no pay.

Variation in CEO pay is large, with a standard deviation in our sample of roughly $18 million. Figure 1a provides detailed information by industry. The difference between CEOs paid at the 80th percentile and those paid at the 20th percentile ranges from $682,000 in coal and $1.8 million in utilities (on the low side) to $16 million in Telecom and nearly $29 million in Fabricated Products and Machinery (on the high side). As evident in Figure 1b, the standard deviation in CEO pay is closely connected to the industry average pay. Note that there is very little between industry variation in the fraction of CEO pay that is incentive pay – even as average pay increases, the incentive fraction remains relatively flat at between 35% to 50% of total CEO pay.

Panel B of Table 1 reports correlation coefficients between the main variables of interest. CEO pay is positively correlated with incentive pay and firm size, as expected. Our proxy for shareholder monitoring of CEO performance, the existence of a 5% blockholder, is negatively correlated with total CEO pay, and positively correlated with the fraction of incentive pay. In addition, firms operating in environments with environmental constraints have both more blockholders and greater incentive pay.

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[13] For a measure of incentive pay, we use ((total pay– salary–bonus)/total pay).

[Insert Table 1 and Figure 1 about here]

PART III THE LINK BETWEEN CEO PAY AND SKILL

We first estimate a cross-sectional regression estimating performance persistence and reversals for all firms in our sample. The estimated regression coefficients are reported in Table 2. We find that, when compared to poorly paid CEOs, highly paid CEOs are significantly more likely to exhibit consistently good performance. However, we find no difference with regard to reversals and high CEO pay. Not surprisingly, we also find performance persistence generally.

Since we only find a link between pay levels and positive persistence, we cannot say whether CEO pay and skill are in general linked. The association between a higher CEO pay and greater positive persistence could be due to firm factors associated with both high pay and persistence generally. One such firm characteristic could be firm size. Large firms might have both more inertia in performance and higher CEO pay; large firms, like large ships, may take time to turn around. So we examine the link between pay and skill for large and small firms. Firms are classified as large if their asset size is greater than the median asset size of the sample. Such a classification also sheds light on whether the impact of a CEO might vary with firm size.

We find evidence that among small firms highly paid CEOs are more skilled than their more poorly paid peers. See Table 2 below. In small firms, highly paid CEOs are significantly more likely to continue positive performance *and* to reverse poor performance than poorly paid CEOs, using both accounting and stock market measures of performance. The effects are large; a highly paid CEO is more likely continue positive ROA (estimated coefficient 0.11) and to reverse poor performance (estimated coefficient is -0.17).[14] The persistence of abnormal returns associated with highly paid CEOs in small firms is significant as well (0.17 higher following a good year, and 0.35 higher following a bad year.) As discussed earlier, this pattern of positive persistence and reversals of poor performance suggests a link between high pay and managerial skill and mitigates concerns that firm specific factors driving persistence. By contrast, in large

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[14] See Part VI for an estimate of the economic impact of a highly paid CEO.

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firms, there is no evidence that highly paid CEOs produce predictably better results; the estimated coefficients for highly-paid CEOS are all insignificant.

These results suggest two possibilities: (1) consistent with Jensen and Murphy (199), CEOs have a greater impact in smaller firms or (2) the design of compensation is faulty in large firms. We now investigate if the link between pay and skill varies with factors that affect the CEO's impact on the firm.

[Insert Table 2 about here]

A. ENVIRONMENTAL CONSTRAINTS

Our ability to detect CEO skill may depend on the environment in which the firm operates. If regulatory or environmental constraints limit a CEO's discretion and alternatives, it may be difficult for the CEO to affect firm performance (Finkelstein and Hambrick, 1996; Hannan and Freeman, 1977). Hambrick and Finkelstein (1987) argue that managerial discretion can be limited by a variety of environmental factors such as regulation, competition, the degree to which the firms' products are differentiatiable from its competitors, and the existence of large concentrated suppliers or customers. Hambrick and Abrahamson (1995) use a panel of industry analyst and academics to rank managerial discretion and industry level-data to produce a proxy for managerial discretion. Industries classified as high constraint with this measure include natural gas transmission, electric services, oil, utilities, textiles, books, transportation, paper, and ships, while industries characterized as low environmental constraint include electrical equipment, health, chips, computers, drugs, banks, beer, insurance, medical equipment and personal services. Using this proxy for managerial discretion, Adams et. al. (2004) show that environmental constraints indeed limit a manager's ability to affect firm performance.

We use this variable to examine how the link between pay and skill varies with constraints on managerial discretion. Where environmental factors limit discretion, CEOs are more likely to perform similarly even if they have different innate talents and therefore CEO skill will be less correlated with pay.

By contrast, when the CEO faces fewer environmental constraints the link between pay and skill should be stronger because skilled CEOs will be able to induce a greater variation in firm performance and, to the degree skill and pay are linked, we will more easily observe the correlation.

Since the data are likely to be noisy, we use an indicator variable set equal to one for firms in industries ranked in the top 50% of the distribution (high constraint industries), and equal to zero for industries in the bottom 50% of the distribution (low constraint industries).

We separately estimate the regression for firms in high and low constraint environments. As reported in Table 3 below, we find that high CEO pay is clearly associated with better performance in industries characterized by low constraint on managerial discretion. In measures of both accounting performance and abnormal returns, firms managed by highly paid CEOs were significantly more likely to continue good performance (the estimated effect on ROA is an additional 0.24, significant at 1%) and less likely to continue bad performance (the estimated coefficient is – 0.17, significant at 5%). Results using abnormal returns are similar; estimated persistence for abnormal returns for highly paid CEOs is 0.24 higher following a good year (significant at 1%) and - 0.17 following poor performance (significant at 5%).

By contrast, in low discretion industries, there is little evidence of high skill among highly paid CEOs. Highly paid CEOs in industries where managers have little discretion perform no differently from their lower-paid peers following a bad year. The evidence is mixed for performance following a good year: firms managed by highly paid CEOs in these industries underperform the market in years following good years, even though they turn in superior accounting results. Given the lack of reversals and the inconsistent evidence of positive performance, we conclude that there is no evidence that CEO skill and pay are linked in firms where environmental constraints limit managerial action.

[Insert Table 3 and Figure 2 about here]

This relationship between pay and the quality of the performance persistence can be seen across pay categories. Figure 2 separately reports estimated performance persistence coefficients CEOs in each pay quintile. We divide the sample into quintiles and run the regression on each quintile. In low constraint industries, the correlation between good performance last year and performance this year generally increases with CEO pay. The slope of the line is positive and increasing in pay quintile. When the prior year's performance was bad, there is less and less performance persistence as pay quintiles increase, and the slope of the line is negative indicating that more highly paid CEOs were better able to reverse poor performance persistence following bad years. When we consider only firms in high constraint industries, this pattern is reversed. As we move up the pay scale in these firms, bad years are more likely to predict future performance and good years less likely. By contrast, there is no particular pattern for firms in firms where industry factors constrain managerial discretion. Given that we earlier found differences based on firm size, we separately examine the impact of environmental constraints for big and small firms (again characterized by median industry adjusted size). We separately estimate the regression for each subgroup. Table 4 reports only the estimated coefficients we look to for evidence that skill and pay are connected - for positive persistence for the highly paid CEOs and reversals for highly paid CEOs. For the balance of the paper, we report only these estimated coefficients and omit the estimated coefficients for the constant, the highly paid CEO dummy and the interaction terms from the basic model described in Part II.

As reported in Table 4 below, there is little evidence of high skill among big firms and if anything there is some evidence that pay and skill are negatively related in the accounting performance big firms where the CEOs actions are constrained by environmental factors. Highly paid CEO in these environments are significantly more likely to reverse positive accounting performance (the estimated coefficient is -0.38) and to continue poor performance (the estimated coefficient is .21). The differences are economically meaningful and statistically significant at the 1% and 5% level respectively. As before, we observe reversals in firms facing few environmental constraints, but do not observe the persistence of positive performance. Abnormal returns show no evidence of skill for big firms.

By contrast, pay is more closely connected with skill in small firms. Using abnormal returns as the performance measure, highly paid CEOs in low constraint environments show both significantly more positive persistence and significantly more reversals when the firm is small (the estimated coefficients are 0.18 for positive performance persistence and -0.27 for reversals of poor performance). In small firms in high constraint environments, highly paid CEOs are no more likely to exhibit positive persistence, but reversals continue to be significantly more common (the estimated coefficient is -0.28). Using ROA as the performance measures, the estimated positive persistence is 0.41, while big firms in the same industry saw reversals following positive performance (estimated coefficient -0.38) and the persistence of bad results. Thus, there is no consistent pattern in high constraint environments, though there is some evidence that pay and skill are negatively related in big firms in constrained environments. We interpret these results as consistent with the idea that CEO skill is more tightly linked with pay in industries in which CEOs are likely to have a greater impact on firm performance. Moreover, when industry factors constrain CEO discretion, there is some evidence that small firms exhibit a tighter link between pay and skill than do big firms.

[Insert Table 4 about here]

B. THE IMPORTANCE OF EXTERNAL FACTORS

We next examine the connection between pay and skill in environments where firm specific factors are important for firm performance. To compute the relative importance of external factors vis-à-vis firm factors in performance, we compute within industry variations of analyst forecasts from IBES. To do this, we use the average earnings forecast for each firm and then compute the variation in the average earnings forecast for different industries. In industries where all firms have similar forecasts, firm specific factors are likely to be less important for performance. In contrast, when there is a large variation among firms within the same industry there is the potential for firms to perform very differently.

We then examine the link between pay and skill for different levels of the computed firm-specific dispersion. We find that the results are largely consistent with the results on skill and pay by environmental constraints.[15] Highly paid CEOs are significantly more likely to both perform consistently well and to reverse poor performance in environments where external factors are less important.

[Insert Table 5 about here]

C. SUMMARY

We examine variation in CEO pay and find that pay is linked to skill in firms that are small or when firms are subject to few environmental constraints. In these firms, highly paid CEOs are significantly more likely to continue good performance and to reverse negative performance. The estimated effects are economically significant and robust to alternative measures. By contrast, among big firms and firms where the CEO is constrained by environmental or external factors, CEO skill is actually *negatively* related to pay. In these firms, highly paid CEOs are more likely than their poorly paid peers to continue poor performance and to reverse positive performance. These are our primary empirical findings. The balance of the paper examines the role of incentive pay, monitoring shareholders and provides some robustness checks.

PART IV THE ROLE OF INCENTIVE PAY

So far we have examined the relationship between total pay and CEO skill and now turn to the effect of incentive pay. As discussed in Part II, CEO skill can be viewed as a combination of the executive's innate ability (or talent) and of his effort. Two CEOs with different talent endowments but who exert no effort are more likely to perform similarly than are CEOs who exert different amounts of effort. Thus, since higher performance based pay should induce higher effort, we would expect to find a stronger link between pay and skill when the CEO has greater incentives to exert effort.

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[15] The correlation between the proxy for environmental constraints and uncertainty is significant, but a relatively low 0.16.

We examine two measures that affect managerial incentives. First, we examine the link between pay and skill when incentive pay (stock and option-based compensation) constitutes an important part of the CEO's total pay package. Second, since the threat of termination can provide incentives to exert effort as well, we then investigate if the link between pay and skill is stronger when the threat of dismissal for poor performance is higher. We use the existence of a strong shareholder as a proxy for a greater likelihood of dismissal for poor performance.[17]

A. STOCK AND OPTION BASED PAY

In this section, we examine the connection between skill and pay among CEOs whose pay is relatively more dependent on stock price performance. We first divide the sample into CEOs with high incentive pay (defined as those whose fraction of stock-based compensation is above the median level in the same industry) and CEOs with low incentive pay (stock-based compensation is below industry median). We then run the same regression for firms in each category of incentive pay.[18]

Consistent with the prediction that pay and skill are more closely linked in the presence of high-powered incentives, we find greater evidence of skill for highly paid CEOs. As reported in Panel A of Table 5 below, among highly incentivized CEOs, highly paid CEOs were more likely to continue superior performance and also more likely to reverse inferior performance than their less richly compensated peers. The effect is statistically significant at 1% (for ROA measures) and economically meaningful. By contrast, absent high-powered incentives, we find no evidence of differential skill for highly paid CEOs – we find no significant difference in persistence of positive performance and reversals of poor performance. This is

[17] See Huson, Parrino and Starks (2000) for evidence that the presence of strong shareholders is associated with greater CEO dismissals. This threat may be less important if severance pay is high.
[18] Analyzing incentive pay also sheds light on a potential interpretation that all agents have same reservation wages but different contracts are offered. More skilled agents choose pay structures with greater incentive pay and hence also get a higher pay level. We think this is unlikely to be the complete story, since there are many CEOs with high pay but not high incentive pay. Moreover, even within an industry, where firms are similar, there are differences in incentive pay and pay levels.

consistent with the idea that high incentive pay increases the connection between pay and skill. Stock returns show no such effect of incentive pay.

Since we have seen that the link between pay and skill is stronger in small firms, we further partition the high and low incentive pay categories along dimensions of firm size. As reported in Panel B of Table 5, higher incentive pay strengthens the link between pay and skill especially in smaller firms. Using ROA as the measure of performance, CEOs in small firms who are highly paid and have a high incentive component show evidence of skill – they are significantly more likely to continue good performance (estimated coefficient .51) and to reverse bad performance (estimated coefficient -.54) when they have high-powered incentives. In small firms, the same pattern of highly paid CEOs doing better in the presence of high power incentives holds when we examine firm's stock returns.

Thus, we find that highly paid CEOs with high powered incentives and in small firms are significantly more likely to reverse bad performance and to continue good performance than their more poorly paid peers. By contrast, for CEOs with low powered incentives and for big firms, there is no evidence of skill.

[Insert Table 6 about here]

Before we proceed to investigate the link between pay and skill in the presence of a threat of CEO dismissal, we present one refinement of these results. Bertrand and Mullainathan (2001) have shown that stock and option based pay are not likely to be related to CEO effort in the absence of monitoring shareholders. Thus incentive pay should perhaps be characterized not simply as high stock and option based pay but as a combination of high stock and option based pay and the presence of an external blockholder. We therefore redo our results on incentive pay for firms with and without a blockholder.

Generally consistent with Bertrand and Mullainathan (2001), the results suggest that incentives work better in the presence of a blockholder. As reported in Panel C of Table 5, highly paid CEOs with a

blockholder and high stock and option-based pay are both more likely to reverse poor performance and to continue good performance than are their less well-paid counterparts (the estimates are significant for the accounting measures and of the right sign but insignificant for stock return measures.) However, highly paid CEOs with high incentives are not likely to continue prior good performance if there is not also a blockholder. However, CEOs with high incentives but no blockholder do appear to reverse prior bad performance.

B. MONITORING SHAREHOLDERS

The threat of termination can act as an incentive device as well. To proxy for a higher threat of dismissal, we use the existence of an external institutional blockholder.   To see if such monitoring shareholders increase the link between pay and skill, we check the association between pay levels and CEO skill in firms with and without a blockholder. Table 6 presents the coefficients estimating positive persistence and reversals for highly paid CEOs, broken down by the existence of a blockholder (which we define as the existence of an institutional shareholder with greater than 5% of the firm's equity) and by firm size. Consistent with the idea that monitoring shareholders improve the connection between pay and skill, we find that in the presence of a blockholder, highly paid CEOs are significantly more likely to reverse prior ROA in both large firms and small firms.

[Insert Table 7 about here]

This is consistent with the idea that, given a monitoring shareholder, total pay (and not just incentive pay) serves as performance incentive and that pay and skill are linked. An alternative interpretation, however, is simply that the design of CEO pay is more likely to be faulty in the absence of monitoring shareholders. If this were indeed the case, one would expect corrupt CEOs to pay themselves the most in the absence of a monitoring shareholder. If these corrupt CEOs also perform poorly, one would

then, in the absence of a blockholder, expect a negative relation between CEO skill and pay.[19] If, on the other hand, they perform no differently from other CEOs, we would not expect to find, in the absence of a blockholder, any relation between pay and skill. To investigate if there is any such negative relation between pay and skill in the absence of monitoring shareholders, we estimate the regression without and without blockholders and with and without environmental constraints.

The effect of a blockholder appears to be strongest in firms where CEOs face environmental constraints. As reported in Table 6, pay appears to be negatively related to skill in firms without blockholders and in industries with high environmental constraints. Highly paid CEOs in such environments are more likely to reverse positive performance (estimated coefficient is -.21) and to continue bad performance (the estimated coefficient is .35). This pattern of performance appears to most consistent with negative skill and clearly indicates that these CEOs are excessively paid. Further, the negative link between CEO pay and skill also highlights the more general governance role of the blockholder, who likely does more than simply posing a threat of dismissal.[20]

By contrast, firms in industries with high environmental constraints show some evidence that higher pay is connected with better positive persistence if there also a blockholder. The estimated coefficient for continuing positive ROA performance is significant and economically meaningful (the estimated coefficient is 0.21). However, absent environmental constraints, it does not appear that blockholders are associated with any differing relation between pay and skill. Thus the governance role of a monitoring shareholder appears more important in industries that face environmental constraints.[21] A more detailed investigation of how all the various aspects of corporate governance affect the link between CEO pay and skill is left for future research.

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[19] Note that if the role of the monitoring shareholder is to only incentivize the CEO by a threat of dismissal, there is no reason to expect a negative relation between pay and skill in the absence of such monitoring shareholders.
[20] Alternatively, severance pay is high enough to offset the incentive that arises from dismissal and the pay design role of strong shareholders is more important.
[21] The effects of firm size and the existence of a large shareholder to monitor management reported below are largely similar when we substitute uncertainty for managerial discretion, though the significance levels are reduced in some circumstances.

We have seen that pay and skill are correlated in small firms and in firms where managerial

discretion is likely to affect firm performance, while pay and skill are negatively correlated in large firms

operating in environments that constrain managerial discretion (especially if the firm lacks a blockholder).

In this section we use an alternative sample to test if skill and pay are related by examining a firm's

performance persistence associated with CEO turnover. Changes in CEOs could be associated with

changes in CEO skill. If pay is indeed related to skill, pay levels should then also be different.

Consequently, we would expect that a new CEO who is paid differently from the old CEO would perform

differently as well.

We begin by testing whether changes in CEO pay are associated with changes in performance

persistence, without conditioning on prior performance. If CEO pay and skill are connected, CEOs with

similar wages should be similarly skilled and perform similarly. Greater differences in pay suggest greater

differences in skill and therefore less correlation between the firm's performance under the old CEO and its

performance under the new CEO. In each year t, we select firms that witnessed a turnover the previous

year (t-1). We then relate the firm's performance in year prior to the old CEO's departure (t-2) to the

firm's performance after the new CEO has had a year on the job (t).

As before, each CEO's pay is categorized into 5 categories, ranging from 1 to 5, based on quintiles

formed using industry pay levels. The difference between the two CEO's pay is the measured simply as the

difference between their quintiles. We compute the absolute value of these changes, so the change in

compensation varies from 0 to 4.[22] All observations with compensation change greater than 2 are lumped

together to form three categories of compensation change of 0, 1, and >2. We then estimate the firm's

performance persistence for each of these three categories.

As reported in Table 8 below, we find that firm's post-turnover performance is less similar to its

pre-turnover performance if the new CEO's pay is not similar to the former CEOs pay.   This is consistent

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[22] Therefore the new CEO's compensation information is from year t-1 and the old CEOs compensation information is from date t-3.

with the idea that changes in pay are connected to changes in skill, but is only suggestive. Ideally we would examine this subsample in greater detail to see whether pay increases are associated with performance improvements, and how incentive pay and environmental constraints affect pay and skill.[23] However, we have only around 200 observations with pay increases and pay reductions and further partitions reduce our chances of finding statistical significance. There is also a potential bias with the CEO turnover sample that makes it difficult to detect positive persistence. CEO turnovers are often associated with poor performance and there are fewer instances of CEO turnover following good performance. Thus it difficult to observe any statistically significant positive persistence following good performance, but we have a better chance in detecting patterns among reversals of poor performance.

Nevertheless, we perform these regressions based on incentive pay, environmental constraints, persistence and reversals and unsurprisingly find that most of our estimated coefficients are statistically insignificant.[25] The only significant findings exist when using only incentive pay. See Table 9 below. We find that an increase in CEO pay is associated with a greater likelihood of reversing poor performance only when incentive pay is high. Surprisingly, when incentive pay is low, an increase in CEO pay is associated with a greater likelihood of continuing poor performance. These findings confirm our earlier findings on the importance of incentive pay in the link between pay and skill.

[Insert Table 8 and 9 about here]

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[23] Note that by considering positive persistence and reversals we are already partitioning the sample into two categories based on prior performance. Any further partitioning (e.g., on incentive pay) generates four categories he problem is exacerbated when using environmental constraints. Since the measure for environmental constraints is not available for all the firms, we also lose firms by partitioning by this attribute.

[25] The results, in the interests of space, are not reported.

[27] Note that higher unexplained variation is not always related to higher pay. For example, a CEO who gets a high pay concurrently with high firm performance has little unexplained variation in CEO pay but a CEO who gets a high pay when firm performance is poor has a high unexplained variation. Thus, the interpretation that pay reflects realized performance not yet reflected in public performance measures is more applicable for reversals, where both pay is high and unexplained variation is high too. Encouragingly, it is exactly here too that the turnover results suggest that pay and skill are related.

These findings are also of interest because they address an alternative interpretation of these results. Hayes and Schaeffer (2000) show that the portion of CEO pay that is unexplained by current performance might reflect the fact that boards observe performance that public markets will only observe in the future. That is, boards might pay CEOs today for their good performance that will yield improved results tomorrow. If higher unexplained variation in pay is also related to higher CEO pay levels, then it might be the case that high pay is correlated with future good performance because boards observe and pay for CEO effort not yet reflected in public measures of performance.[27] Note that this interpretation depends on a link between pay and skill, consistent with our findings. However, in a sample where there is a CEO change, there is no history for the new CEO and therefore any link between pay and skill is unlikely to be driven by realized good performance that is not yet reflected in public measures of performance. The fact that performance changes across CEOs depends on their pay changes is not likely to be due to driven by the fact that boards may pay CEOs for performance that is not yet reflected in public measures of performance. More importantly, this alternative interpretation cannot explain the negative association between pay and skill that we observe in large firms operating in high environmental constraints and no monitoring shareholders.[28]

Nevertheless, if boards do pay CEOs in advance of firm performance, this might produce a pattern of high pay and subsequently better performance even if firm performance varies randomly from year to year. To rule out the possibility that CEO skill is simply an artifact of this sort of process, we first examine the frequency of pay changes. If CEO skill is not constant over time, as this interpretation suggests, then CEO pay will vary a lot over time as well. We examine compensation changes from year to year (in terms of industry adjusted quintile) and find that in fact more than 80% of the time there is either no change in CEO pay or a change of 1 quintile. Thus, it appears that pay is relatively stable over time and does not

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[28] It is also useful to address a concern that Hayes and Schaefer (2000) acknowledge in the interpretation of their results. They discuss the possibility that the link between higher unexplained compensation and high future performance might be due to earnings manipulation by the CEO. If managers indeed smooth earnings between time periods and are paid for the 'true' current earnings, it should be difficult to detect reversals because managers would "borrow" from future good times to boost current bad times. Thus, smoothing would mask rather than explain any reversals.

change a lot from year to year as this alternative would suggest. We also re-run our regressions using only

CEOs that were consistently identified as highly-paid in consecutive years, with largely similar results.

PART VI. THE IMPACT OF A GOOD CEO

Using patterns of firm performance as our measure of CEO skill, we have shown that highly paid

CEOs are more skilled when firms are small, have an external monitor, or operate with few environmental

constraints. We now attempt to estimate the economic impact of a good CEO, first by estimating the long

run returns for a portfolio of firms run by good CEOs in industries where pay and skill are linked. We also

make rough estimates of the impact of a skilled CEO using ROA as our measure of performance.

A. ABNORMAL RETURNS

We apply several screens to detect the "good" CEOs.   In each year, we select firms that are small

(below median size of 1.2 billion dollars), face few environmental constraints and have an institutional

blockholder. From our earlier results, we know that CEO pay is related to CEO skill in these firms.

Therefore, we next identify the highly paid (highly skilled) CEOs in these firms as those whose pay falls in

quintiles 4 or 5 based on industry pay distribution. Since incentive pay also strengthens the link between

pay and skill, among these CEOs we also examine those that have high incentive pay as well, which we

define as greater than industry median level of incentive pay. Both these compensation characteristics are

measured in year before we measure their performance.

After using these screens, we are left with 341 firm years, 187 unique firms and an average of 38

stocks per month. At the beginning of each year we use this list of good CEOs to create equally weighted

and value-weighted portfolios of these CEOs/firms. Each selected CEO/firm is held to the end of the year,

and a new portfolio is formed at the beginning of the next year based on the new list of "good" CEOs.

Returns to this portfolio series is computed using monthly observations, giving us 96 observations from

1994 to 2001. We then analyze the equity returns for a portfolio that consists of these "good" CEOs.

To ensure that differences in risk or style do not drive our results, we calculate abnormal returns using the four-factor model (Fama and French, 1993) augmented by the momentum factor (see Jegadeesh and Titman, 1993) and Carhart (1997). The estimated abnormal return is the constant or alpha in the model:

$$R_t = \alpha_t + bMkT_t + cSMB_t + dHML_t + eUMD_t + \varepsilon_t$$

where R_t is the excess return over the riskless rate to the good CEO portfolio in month t. MKT_t, SMB_t, HML_t and UMD_t are the returns on the market portfolio and the three portfolios that capture the size, book-to-market and momentum effects.

We find that the portfolio of "good" CEOs earns an annualized abnormal return of 11.76% (6.6%) for the equally weighted (value-weighted) portfolio. See Panel A of Table 10 below.[29] The abnormal returns for the equal-weighted portfolio are significant at the 1% level with t-statistics of 3.22 (the t-statistic for the value-weighted portfolio is 1.53).[30] However, it is difficult to interpret these results as the returns to managerial skill if all small firms with few environmental constraints and blockholders share a systematic factor which the asset-pricing model does not correct for.[31]

To isolate the returns attributable specifically to differences in CEO pay, we next construct a portfolio that buys firms managed by highly-paid CEOs and sells firms managed by low-pay CEOs in conditions (a) where we expect pay and skill to be matched and (b) where we expect no link between pay and skill. In this way, common factors affecting firm returns should wash out, and we should better identify returns associated with differences in skill. As reported in Panel B of Table 10, this portfolio of high pay CEOs minus low pay CEOs generates a mean annual return of 3.7% in industries where pay and

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[29] We focus on equally weighted portfolio as we find CEOs pay and skill to be linked in smaller firms. While we have chosen small firm based on a size screen using asset values (consistent with our earlier results), they might include some big firms with few assets. Thus market capitalization might have further information on firm size.

[30] Since Cremers and Nair (2004) show that firms with both blockholders and low takeover defense have high abnormal returns we check to see the distribution of takeover defense measures in the "good CEO" firms to see whether this is driving our results. We find that there is sufficient variation in the governance of these firms that it is unlikely that the alphas are driven by this effect. The mean value of the governance index constructed by Gompers, Ishii and Metrick (2003) is 8.11 and the standard deviation is 2.38 with the minimum value being 3 and the maximum being 14.

[31] We find in unreported regressions that an equally weighted portfolio of small firms with a blockholder in industries with few environmental constraints earn abnormal returns regardless of CEO characteristics.

skill are linked, but -4.0% in industries in which there is not a link. While the mean returns are statistically insignificant, the equally weighted portfolio of high pay CEOs minus low pay CEOs earned statistically significant (at the 10% level) abnormal annual returns of 8.3% when pay and skill are linked and statistically insignificant returns of 1.3% when pay and skill are not linked. The magnitude of this is economically significant. Consistent with our findings that the link between pay and skill is observed more in smaller firms, we find no such abnormal returns for the value-weighted portfolios. Thus, we find that a portfolio that buys high pay CEOs and sells low pay CEOs earns abnormal returns conditional on the firms operating in conditions where pay and skill are likely to be linked.

[Insert Table 10 about here]

B. ACCOUNTING PERFORMANCE

We now characterize the impact of a highly paid CEO on firm performance using accounting measures, partitioned by firm size and environmental constraints (we obtain similar estimates when we instead partition by the dispersion of analyst forecasts). As reviewed in Part III, if current firm performance is poor, a highly paid CEO in a small firm with few environmental constraints is more likely to reverse this poor performance than his lower paid counterpart. The difference between the likelihood of reversals between the high paid and the low paid CEOs is 0.16 (see Table 3, small firms facing low constraints). For an average firm in this category (median firm size=457 m), the increase in ROA on moving from poor performance to good performance is 4.93%. Thus the increase in earnings associated with a highly paid CEO is $3.5 million (0.16 x 4.93% x 457m). Similarly, for a large firm with few environmental constraints the likelihood of reversals is higher under the highly paid CEO than under the low paid CEO by 0.5. For an average firm in this category (median firm size is roughly $5 million with an average increase in ROA = 2.85%), this translates into expected incremental earnings of $72 million.

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For a large firm operating with high environmental constraints, the highly paid CEO is more, and not less, likely to continue poor performance. Highly paid CEOs of these firms were earlier classified as 'bad'. The losses associated with such CEOs can be computed similarly. For an average large firm with high environmental constraints (median firm size is 3,650 m with an average increase in ROA = 4.93), a highly paid CEO in these firm is associated with a loss of 0.21 x 4.93% x 3650 = 37.78 million.

PART VII. CONCLUSION

Using a new measure of skill, we find evidence that CEO pay and skill are linked in small firms, when there are few constraints on managerial discretion and when CEOs have greater incentives in the presence of large monitoring shareholders. Highly paid CEOs in these firms appear to be good CEOs; they earn more and produce better results. In such firms, problems of CEO compensation appear to be outliers rather than to reflect a systematic problem, consistent with the view of those who claim that there are only "a few bad apples." However, in large firms where managerial discretion is constrained by environmental factors or when boards are not subject to monitoring from a large shareholder, there appears to be little justification for high pay. In these cases, high pay and skill are actually negatively related and the highest paid CEOs are the least skilled. These appear to be bad CEOs. In such firms, CEOs problems may be more widespread rather than just a few bad apples. Highly paid CEOs in other circumstances may just be lucky given that we find no evidence that their performance is superior to their lowly-paid peers.

These findings shed light on a highly debated question - 'are CEOs overpaid?" Since "Bad" CEOs earn more and do worse, it appears that are actually overpaid. Highly paid CEOs in conditions where pay and skill are negatively related are associated with annual average losses of up to 38 million. On the other hand, "good" CEOs appear to be getting paid for superior skill and to produce more value than they are paid for. The marginal difference in managerial skill appears to make a significant difference. In situations where skill and pay are linked, a portfolio that buys firms managed by highly paid CEOs and shorts firms managed by poorly paid CEOs earns annual abnormal returns of approximately 8% a year. A separate but related question on which these findings shed light is whether individual CEOs can make an impact on a

firm. Some suggest that the impact of an individual CEO is limited, other research suggests that CEOs differ in style (Bertrand and Schoar, 2003). These results suggest that, in some situations, CEO skill does vary in a way generally captured by differences in CEO pay.

Regardless of which model captures the process of setting CEO compensation, this evidence suggests that the process for setting pay generally aligns skill with pay in small firms and when managers are able to affect firm performance and does not when firms are large and either subject to high environmental constraints or lack a blockholder. This difference suggests where executive compensation reform would be most profitably directed.

Finally, these results suggest that executive compensation can be a window to understanding firm performance and governance generally. Executive compensation data predicts firms that will generate significant abnormal returns and that will be associated with large accounting losses. The magnitude of these numbers appears to be larger than the amount of pay itself, suggesting that the level of executive compensation may provide information about the firm's governance and performance generally.

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TABLE 1
DESCRIPTIVE STATISTICS

This table reports descriptive statistics of a sample of 2,280 firms (10,0043 firm years) between 1992-2001. Blockholder is a dummy variable indicating whether there is a shareholder holding at least 5% of the firm's stock. The variable measuring environmental constraint is taken from Finkelstein and Hambrick (1996). The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP. Panel A gives summary statistics and Panel B lists correlation coefficients, significant at 5% (**) and 1% (***) levels.

		INCENTIVE	ENVIRONMENTAL		
Panel A	PAY	PAY	CONSTRAINTS	ASSETS	BLOCK
	(1,000)			(1,000,000)	
Mean	4,386	0.46	0.15	8,378	0.75
Stand. Dev.	17,951	0.28	0.99	35,029	0.42
Min	0	0	-1	3.43	0
Max	1,306,260	1.00	1.00	1,051,450	1.00
N	10,007	9,988	7,112	10,023	7,979

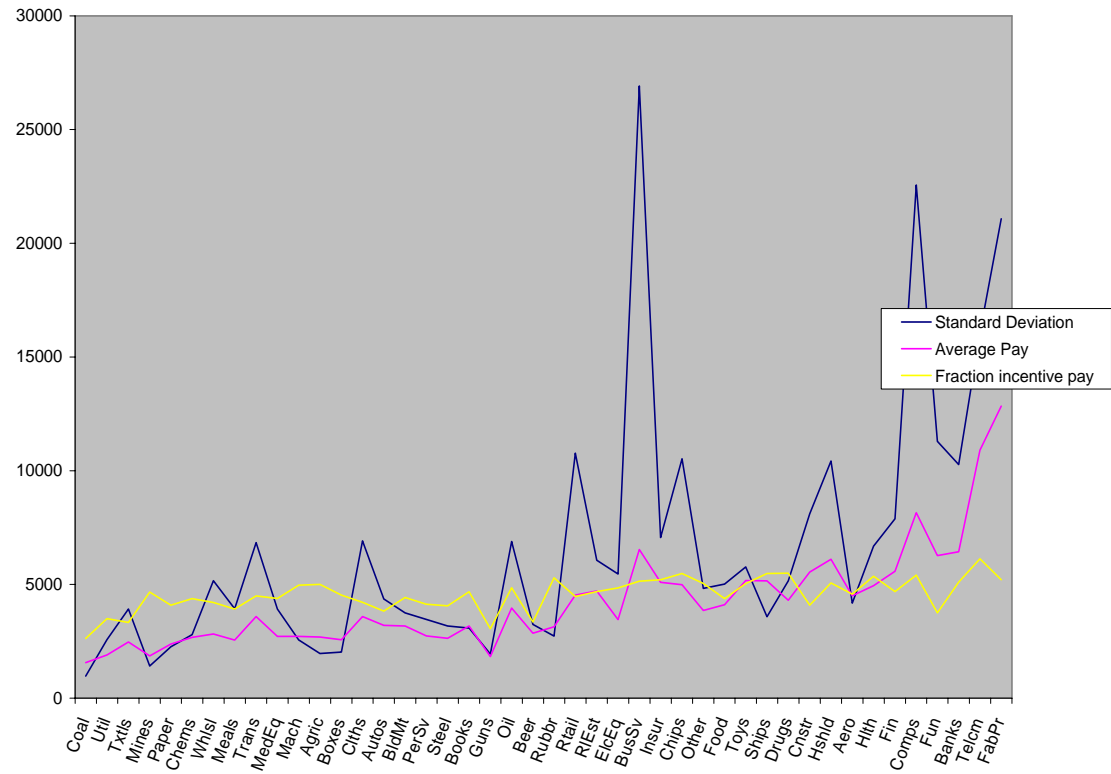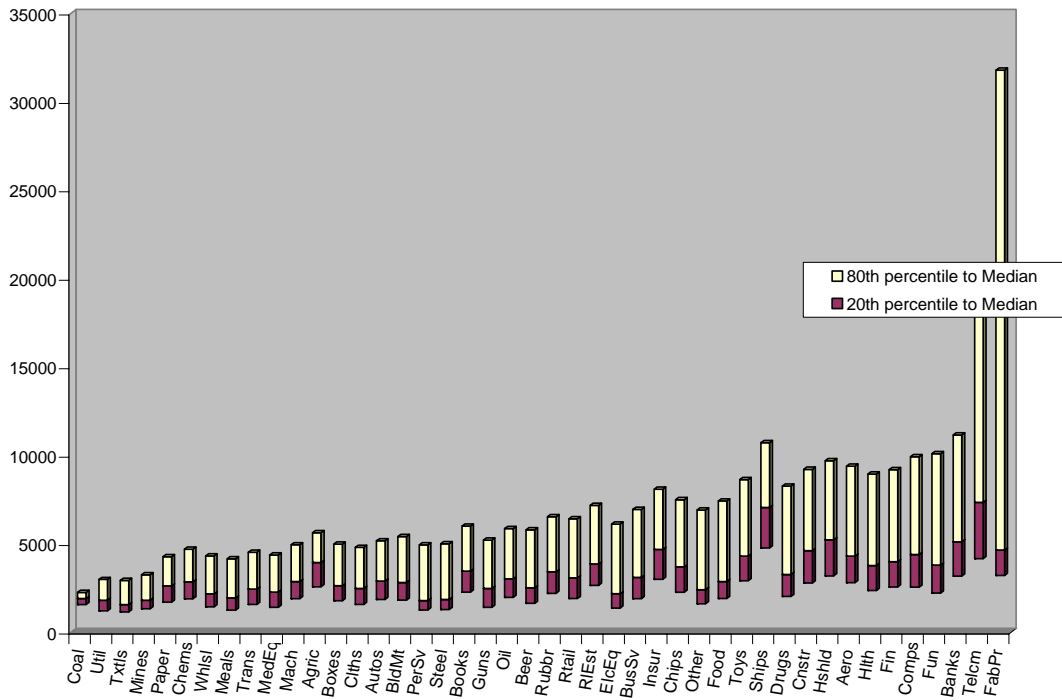| *Panel B* | | | | | |
Incentive Pay	0.23***				
Environmental Constraints	0.03**	0.10***			
Assets	0.02***	0.11***	- 0.15***		
Block	- 0.02**	0.04**	0.13***	- 0.11***	

FIGURE 1

CEO pay by industry

Table 2
CEO PAY AND SKILL

This table reports regression estimates of the performance of public firms between 1990 and 2001. The dependent variable is the firm's industry-adjusted accounting performance and abnormal returns. Independent variables include a dummy for a highly paid CEOs (defined as those in top 2 quintiles of industry adjusted pay in the prior year) that estimates the effect of highly paid CEOs relative to poorly paid CEOs (defined as those in bottom two quintiles). Other variables control for the prior year's performance and an interaction term. The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP. Standard errors are in parentheses. Estimated coefficients are significant at 1(***), 5(**), and 10 (*) percent.

	All firms		Small firms		Big Firms	
	Abnormal return (quintiles)	ROA	Abnormal return (quintiles)	ROA	Abnormal return (quintiles)	ROA
Prior good performance for highly paid CEOs	0.09* (0.05)	0.20*** (0.03)	0.17** (0.09)	0.11* (0.07)	0.06 (0.09)	-0.01 (0.09)
Prior bad performance for highly paid CEOs	-0.03 (0.04)	0.04 (0.03)	-0.35*** (0.07)	-0.17** (0.07)	0.03 (0.04)	-0.18 (0.13)
Highly paid CEO dummy	-0.21*** (0.05)	-0.64 (0.30)	- 0.43*** (0.08)	-0.33* (0.28)	0.00 (0.08)	-0.12 (0.46)
Prior good performance	0.08*** (0.30)	0.69*** (0.02)	0.04 (0.05)	0.74*** (0.03)	0.11 (0.09)	0.94*** (0.09)
Prior bad performance	0.14*** (0.03)	0.39*** (0.02)	0.13 (0.04)***	0.41*** (0.3)	0.22 (0.06)***	0.56*** (0.13)
R-squared	.02	.31	0.01	0.33	0.05	0.38
N			2,985	2,670	2,942	2,540

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TABLE 3
ENVIRONMENTAL CONSTRAINTS, CEO PAY AND SKILL

This table reports regression estimates of firm industry-adjusted accounting performance and abnormal returns, after partitioning firms based on the regulatory and environmental constraints placed on managerial discretion. Independent variables include a dummy for a highly paid CEOs (defined as those in top 40% of industry adjusted pay) in the prior year and estimates the effect of highly paid CEOs relative to poorly paid CEOs (defined as those in bottom two quintiles). Other variables control for the, as well as they prior year's performance and an interaction term. The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP. Standard errors are in parentheses. Estimated coefficients are significant at 1(***), 5(**), and 10 (*) percent.

	Low Environmental Constraints		High Environmental Constraints	
	Abnormal return Quintiles	ROA	Abnormal return Quintiles	ROA
Prior good performance for highly paid CEOs	0.24***	0.17***	-0.14***	0.16***
	(0.08)	(0.05)	(0.10)	(0.06)
Prior bad performance for highly paid CEOs	-0.17**	-0.17**	-0.06	0.09
	(0.07)	(0.08)	(0.07)	(0.08)
CEO Pay	-0.22***	-1.06**	-0.22	-0.12
	(0.08)	(0.55)	(0.08)	(0.23)
Prior good performance	0.03	0.76***	0.15***	0.43***
	(0.05)	(0.03)	(0.06)	(0.03)
Prior bad performance	0.03	0.39***	0.20***	0.35***
	(0.05)	(0.02)	(0.05)	(0.03)
R-square	0.01	.33	0.03	.19

FIGURE 2
CEO PAY AND PERFORMANCE PERSISTENCE

High Discretion Industries

- Prior Good Performance
- Prior Bad Performance

Estimated persistence (y-axis)

Pay Quintiles (x-axis)

Low Discretion Industries

- Prior Good Performance
- Prior Bad Performance

Estimated Persistence (y-axis)
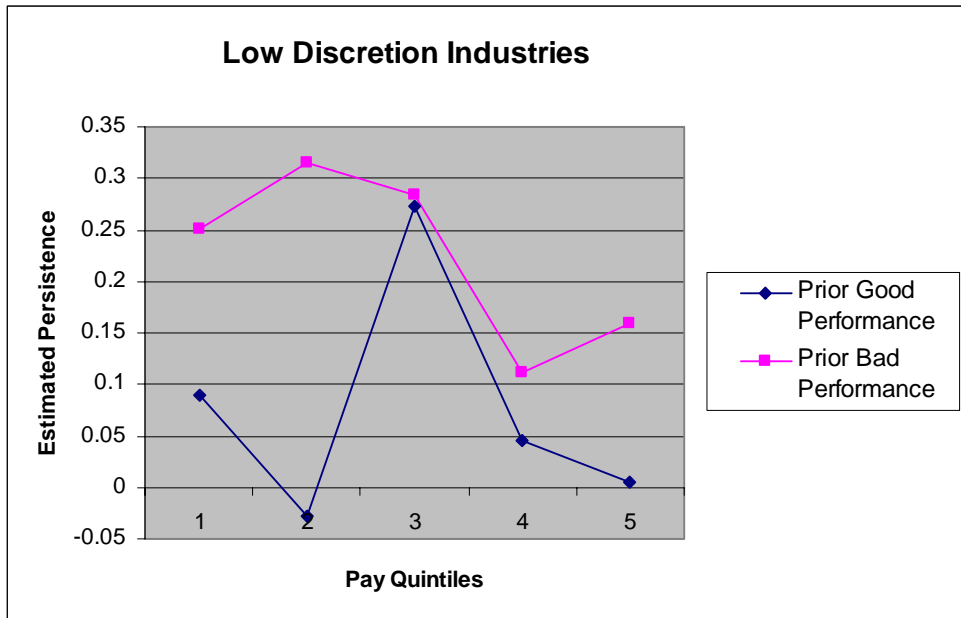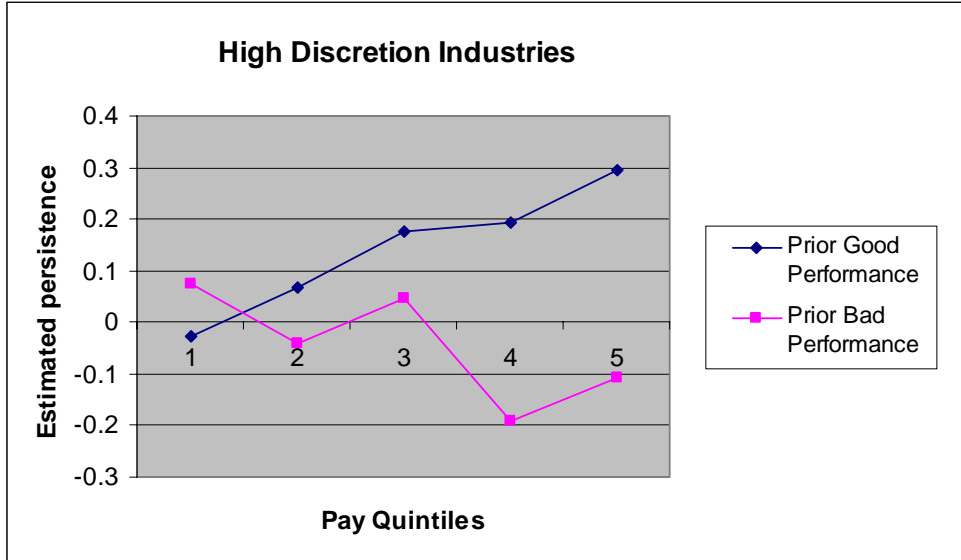
Pay Quintiles (x-axis)

TABLE 4

MANAGERIAL SKILL BY FIRM SIZE AND ENVIRONMENTAL CONSTRAINT

We report the marginal impact of a highly paid CEO on firm performance. Firms are first partitioned into big (above median) and small (below median) firms, and then further partitions firms by the severity of environmental constraints on managerial discretion The table reports results from a regression estimating the firm's industry-adjusted accounting performance and abnormal returns. We report only the estimated coefficients for firms lead by highly paid CEOs conditional on positive prior performance (above industry median) and prior bad (below industry median) performance (or "reversals"), that estimates the effect of highly paid CEOs relative to poorly paid CEOs. The regression model includes other unreported independent variables, including a constant, a dummy for highly paid CEOs, and controls for prior year performance. The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP.   Estimated coefficients are significant at 1(***), 5(**), and 10 (*) percent.

	Big firms		Small Firms	
	Abnormal Returns (quintiles)	ROA	Abnormal Returns (quintiles)	ROA
Low constraints				
Prior good performance	- 0.2	0.00	0.18*	- 0.08
Prior bad performance	0.0	- 0.50*	- 0.27***	- 0.17*
High constraints				
Prior good performance	12	- 0.38***	0	0.41**
Prior bad performance	.06	0.21**	-0.28*	- 0.01

TABLE 5

ROBUSTNESS: IMPORTANCE OF FIRM SPECIFIC FACTORS, CEO PAY AND SKILL

Firms are portioned based on the importance of firm specific factors, as measured by the within industry dispersion in analysts forecasts (see description in Part 5). This table reports regression estimates of firm industry-adjusted accounting performance and abnormal returns. Independent variables include a dummy for a highly paid CEOs (defined as those in top 40% of industry adjusted pay) in the prior year, as well as the prior year's performance and an interaction term. The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP. Standard errors are in parentheses. Estimated coefficients are significant at 1(***), 5(**), and 10 (*) percent.

	Low Importance		High Importance	
	Abnormal return Quintiles	ROA	Abnormal return Quintiles	ROA
Prior good performance for highly paid CEOs	0.02 (0.09)	0.29*** (0.05)	0.12* (0.07)	0.17*** (0.04)
Prior bad performance for highly paid CEOs	0.05 (0.05)	0.06 (0.06)	-0.11* (0.06)	-0.16** (0.07)
CEO Pay	-0.20*** (0.06)	-0.82** (0.29)	-0.19** (0.08)	-0.61 (0.42)
Prior good performance	0.09* (0.05)	0.57*** (0.03)	0.09** (0.05)	0.74*** (0.03)
Prior bad performance	0.24*** (0.04)	0.32*** (0.05)	0.06 (0.04)	0.40*** (0.02)
R-square	0.01	.33	0.03	.34

TABLE 6
INCENTIVE PAY AND CEO SKILL

We report the marginal impact of a highly paid CEO on firm performance. Panel A reports results for all firms. Panel B partitions firms by size, dividing the sample into two subgroups, big (above median) and small (below median) firms. Panel C partitions firms by the existence of a monitoring shareholder (defined as an institutional shareholder holding at least a 5% block of shares.) The table reports results from a regression estimating the firm's industry-adjusted accounting performance and abnormal returns. We report only the estimated coefficients for firms lead by highly paid CEOs, conditional on positive prior performance (above industry median) and prior bad (below industry median) performance (or "reversals"). The regression model includes other unreported independent variables, including a constant, a dummy for highly paid CEOs, and controls for prior year performance. The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP. Estimated coefficients are significant at 1(***), 5(**), and 10 (*) percent.

	Quintiles		ROA	
	Low incentive pay	High incentive pay	Low incentive pay	High incentive pay
Panel A				
All firms				
Prior good performance	0.21*	0.17	0.07	0.58***
Prior bad performance	0.01	-0.09	0.06	- 0.62***
N	2,869	2,937	2,471	2,628
Panel B				
Big Firms				
Prior good performance	0.18	0.09	-0.03	0.06
Prior bad performance	0.08	-0.10	-0.13	-0.37
Small Firms				
Prior good performance	0.23	0.24 *	0.12	0.51***
Prior bad performance	- 0.46***	- 0.37***	- 0.20	- 0.54***
Panel C				
No blockholder				
Prior good performance	0.23	0.10	0.01*	- 0.02
Prior bad performance	0.02	0.28	- 0.34	- 0.43***
Blockholder				
Prior good performance	0.16	0.11	0.10	0.20**
Prior bad performance	- 0.04	- 0.11	0.01	- 0.79***

TABLE 7
CEO SKILL, ENVIRONMENTAL DISCRETION AND BLOCKHOLDERS

We report the marginal impact of a highly paid CEO on firm performance. Firms are first partitioned by the existence of a monitoring shareholder (defined as an institutional shareholder holding at least a 5% block of shares.) Panel A then further partitions firms by the severity of environmental constraints on managerial discretion. Panel B partitions firms by firm size. The table reports results from a regression estimating the firm's industry-adjusted accounting performance and abnormal returns. We report only the estimated coefficients for firms lead by highly paid CEOs conditional on positive prior performance (above industry median) and prior bad (below industry median) performance (or "reversals"). The regression model includes other unreported independent variables, including a constant, a dummy for highly paid CEOs, and controls for prior year performance. The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP. Estimated coefficients are significant at 1(***), 5(**), and 10 (*) percent.

Panel A	No blockholder	Blockholder
Low environmental constraints		
Prior good performance	- 0.12	0.01
Prior bad performance	- 0.36**	- 0.40***
High environmental constraints		
Prior good performance	- 0.21*	0.21**
Prior bad performance	0.35***	-0.12
Panel B		
Small firms		
Prior good performance	- 0.33	0.08
Prior bad performance	- 0.27	- 0.31***
Big firms		
Prior good performance	0.04	0.03
Prior bad performance	0.12	- 0.28*

TABLE 8
CEO PAY, SKILL AND TURNOVER

This table examines firm performance in a two year window surrounding CEO turnover and reports the correlation between performance under one CEO and the performance under the successor. Panel A reports the overall performance persistence, conditional on the change in pay between the old CEO and the new CEO, for firm ROA and abnormal return quintiles. Panel B breaks these numbers down to reflect performance persistence for those changes associated with pay increases and those associated with pay decreases. The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP. T-statistics are in parentheses.

	No pay change	1 quintile pay change	2 quintile pay change
Panel A:	0.18	0.15	0.06
Abnormal returns	(2.91)	(2.36)	(0.65)
ROA	0.58	0.41	0.35
	(9.95)	(11.03)	(4.41)

		1 quintile pay change		2 quintile pay change	
Panel B		Pay decrease	Pay increase	Pay decrease	Pay increase
Abnormal returns		0.10	0.18	0.01	0.10
		(1.14)	(2.11)	(0.05)	(0.8)
ROA		0.31	0.46	0.41	0.32
		(5.38)	(9.80)	(2.08)	(4.46)
N	307	135	145	66	113

TABLE 9
CEO PAY, SKILL AND TURNOVER

This table examines firm performance in a two year window surrounding CEO turnover and reports the correlation between performance under one CEO and the performance under the successor. Panel A reports the overall performance persistence, conditional on the change in pay between the old CEO and the new CEO. Panel B breaks these numbers down to reflect performance persistence for those changes associated with pay increases and those associated with pay decreases. The sample includes all firms for which executive compensation, accounting and stock price data is available on Execucomp, Compustat and CRSP. The t-statistics are in parentheses.

	HIGH INCENTIVE COMPONENT		LOW INCENTIVE COMPONENT	
	Abnormal return Quintiles	ROA	Abnormal return Quintiles	ROA
Prior good performance * increase in CEO pay	0.11 (0.69)	-0.02 (-0.19)	-0.03 (0.13)	0.26 (1.60)
Prior bad performance * increase in CEO pay	-0.04 (0.31)	-0.35*** (-3.38)	0.14 (0.54)	0.74* (1.86)
Prior good performance	0.00 (0.01)	0.55*** (8.23)	0.06 (0.63)	0.67*** (9.16)
Prior bad performance	0.11 (1.47)	0.64*** (8.38)	0.15 (1.96)	0.11*** (2.36)
R-square	0.02	.30	0.01	.34

TABLE 10
ABNORMAL RETURNS FOR GOOD CEOS

This table presents the abnormal returns (alphas) to a value-weighted portfolio of highly paid CEOs in firms where pay and skill are related (See text for conditions where pay and skill are related). The alphas are computed relative to a Fama-French (1993) four factor model that includes the market, size, book to market and momentum factors. We identify good CEOs at the beginning of the year and hold the portfolios for either one or two years. All abnormal returns are annualized and presented with the respective t-statistics in parentheses.

	Mean return	Abnormal return
Panel A: CEO Pay in top 40%		
Where pay and skill are linked	13.44%	11.76%***
	(1.51)	(3.22)
Where pay and skill are NOT linked	3.00%	- 2.00%
	(0.12)	(0.79)
Panel B: High Pay CEOs – Low Pay CEOs		
Where pay and skill are linked	3.72%	8.28% *
	(0.21)	(1.71)
Where pay and skill are NOT linked	- 3.96%	1.32%
	(0.17)	(0.18)