Consequences of Underpaying CEOs

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ABSTRACT

This study examines the effects of relative underpayment of CEOs on the performance of 1500 U.S companies between 1992 and 2011. Our study attempts to explain how CEO underpayment, determined by yearly regressions of pay, affect firm performance and CEO turnover the subsequent year. We find no negative incentive effect for underpaying CEOs as extreme underpayment is associated with positive future firm performance. Conditional on poor past performance, relative CEO underpayment is associated with positive future firm performance, which is consistent with increased pressure to perform. Additionally, we find that relative underpayment of CEOs with good past performance is also associated with positive future firm performance. Our results suggest that underpaying CEOs is value creating for the company. Such a finding underscores the viability of underpayment as an incentive in CEO compensation plans.

I.   INTRODUCTION

Due to a huge increase in CEO pay for several decades, the justification of exorbitant compensation of CEOs has been debated. However, little to no attention is paid to the consequences of relative CEO undercompensation. Are all CEOs overcompensated? Given the range of CEO total compensation from $ 3,077,000 to $ 655,447,998 over 1992 to 2011, we can safely say that some CEOs are underpaid relative to their industry peers. For instance, Bloomberg Markets employed the notion of relative underpayment and compared the awards and performance of each of the 20 CEOs of North American banks to determine who was the most undercompensated (See Bloomberg Markets, Bloomberg, July 2013). Little is known and studied about the relative underpayment of CEOs but it is of practical importance to understand the reasons for such relative underpayment of CEOs and how it is related to future firm performance and CEO turnover. This paper attempts to draw more attention to relatively underpaid CEOs and determine the relationships among CEO relative underpayment, future firm performance, and CEO turnover.

Our study is the first study to examine why some firms choose to pay their CEOs below the market rate and how it affects firm performance and CEO turnover the subsequent year. We posit that relative underpayment of a CEO could be due to poor past performance. If underpayment is a result of poor past performance, underpayment may serve a role as a punishment for poor performance as well as a warning for plausible dismissal for continuous poor performance. We also consider various reasons for CEO underpayment. What if a CEO is getting underpaid despite his/her good past performance? In this case, CEOs are considered to be underappreciated by the firm despite CEO's good performance. Are underappreciated CEOs have less incentives to deliver performance or are they more likely to leave for a better placement? The purpose of this article is to examine these questions. These questions are of practical significance. If a firm's performance does not suffer, then it may be possible to reverse the trend in growth in CEO pay. There may be a good rationale for underpaying CEOs temporarily to provide motivation for better future firm performance. Firms could consider the implications of our findings and devise a strategy to relatively underpay their CEOs without sacrificing firm performance. We study the effect of such relative underpayment of CEOs on future firm performance to shed light on this issue. Previous studies on underpayment of CEOs relative to the CEO labor market rate do not focus on different reasons for underpayment and how they affect the relationship between underpayment and future firm performance as well as the relationship between underpayment and CEO departure.

In sum, we do not find negative motivational effects of underpaying CEOs. We find that both relative underpayment of CEOs with poor past performance and relative underpayment of CEOs with good past performance are associated with better future firm performance. This paper is the first study to consider all three sources of underpaying CEO and how they are related to future firm performance. We have shown that lower pay due to low CEO talent is associated with worse future firm performance whereas lower pay due to good agency is associated with positive future firm performance. More importantly, incentive effects of underpaying CEO is never studied before and we have shown that there is no negative incentive effects of underpaying CEO on future firm performance. Additionally, underpaid CEOs with good past performance did not show a

high probability of voluntary departure. Our results imply that relatively underpaid CEOs with good past performance deliver a better future performance and they do not necessarily leave the firm despite unjustified underpayment. There may be other limitations such as job availability or social ties that prevent CEOs to leave the firm for a better placement. Results indicate that firms could take advantage of CEOs with good past performance who are willing to stay despite relatively low payment. We also find that both the underpayment of CEOs with poor past performance and the threat of dismissal are effective tools in delivering better future firm performance. When underpayment of CEOs is due to poor past performance, it can be justified since relative underpayment is associated with positive future firm performance. Such a relationship is intuitive in the sense that CEOs know that they may be dismissed after poor performance. We also find that CEOs with poor performance who could not deliver a better firm performance face high likelihood of dismissal. Our results suggest that underpaying CEOs is value creating for the company. Such a finding underscores the importance of an uninflated compensation plan for CEOs that will provide motivation for future firm performance. In a world filled with extremely overpaid CEOs and a society that is starting to speak out about surging executive compensation levels, this is a noteworthy finding.

In an attempt to explain how CEO relative underpayment based on past performance affects future firm performance in the subsequent year, our study sheds light on different factors affecting underpayment of CEOs and provides plausible explanations for the relationship between relative underpayment and future firm performance in each case. This paper contributes to CEO compensation literature by providing the examination to analyze the relationship between relative CEO underpayment and future firm performance. This paper is also one of the first paper to examine reasons for CEO underpayment and to document the link between relative CEO undercompensation and turnover, thus contributing to CEO turnover literature. This study also contributes to the study of CEO compensation relative to the CEO labor market literature and presents empirical evidence on the relationship between relative CEO undercompensation and future firm performance as well as the relationship between relative CEO undercompensation and CEO turnover by exploring different reasons for underpayment. The remainder of this paper is organized as follows: Section II presents the motivation and hypotheses of this study. Section III discusses the data and Section IV discusses methodology and variable descriptions. In Section V, we develop the empirical results. Also in section 5, we provide more tests to check the robustness of our findings. Finally, we provide our concluding remarks in Section VI.

II.   MOTIVATION

CEO compensation has long been the subject of heated debate for several decades among media, academia (Bebchuck and Fried, 2004), and public alike. People have been questioning the fairness of CEO compensation as the rise in pay continues to outpace increases in firm performance as well as increases in average worker's pay. For instance, CNN Money reports that Apple's CEO, Tim Cook with compensation of $378 million in total, takes home more pay than 6,258 Apple workers' compensation. What's more, CNN Money notes that most fortune 50 CEOs took home an average 379 staffers' equivalent base pay. These are prolific examples that address core issues related executive compensation. Main topics currently studied in executive compensation include the

overall rise in pay due to an increase in equity-based compensation, the pay sensitivity to performance, and the relationship between CEO pay and firm performance. Empirical evidence on the relationship between CEO pay and firm performance is not conclusive. Many researchers such as Bebchuk and Fried (2004), Bebchuk et al. (2006), Bertrand and Mullainathan (2001), and Crystal (1991) have long argued that executive compensation contracts are excessive since overcompensation is a byproduct of the CEO's influence within pay setting process. However, Murphy (1985) and Jensen and Murphy (1990b) find a statistically significant relationship between the level of pay and the performance of the firm. Other researchers such as Gabaix and Landier (2008), Himmelberg and Hubbard (2000), Kaplan and Rauh (2007), Kaplan and Minton (2006), and Rajgopal et al. (2006) argue that executive compensation contracts are fair and market-based as pay for performance sensitivity is high. These researchers attempt to address whether CEOs are overpaid based on how CEO compensation has been contracted to reflect past performance.

As argued by Weill (2009) such literature only provides indirect information on the incentives generated by compensation for performance. Habib and Ljungqvist (2005) directly investigate whether stock components of CEO compensation contribute by exerting a positive impact on firm value by reducing agency costs. They provide evidence of the incentive effects of stock components of CEO pay on the ability to reach the optimal Tobin's Q. Leonard (1990) and Hayes and Schaefer (2000) also address this link between pay and future performance by examining how compensation policy is related to firm's accounting performance. These studies show how CEO compensation influences firm performance without examining how negative excess CEO compensation may influence future firm performance. This paper is unique in that it examines *ex ante* motivational effects (a portion not captured by compensation) of CEO undercompensation on future firm performance. Although many studies investigate the relationship between the level of compensation and performance, the relationship between the relative negative excess compensation and future performance of the firm has not yet been studied extensively. Our study is one of the first studies to focus on underpayment of CEOs and employ negative residual values of appropriate pay in each year as the underpayment of CEOs to determine motivational effects of underpaying CEOs on future firm performance. As a result, our measure of underpayment is more inclusive and, thus, more useful to determine the incentive effects of CEO underpay on future firm performance.

As Fong et al. (2010) summarize, some scholars recently have argued that "relative evaluation within an industry" (Miller, 1995:1381) and the role of "executive labor market" (Ezzamel and Watson, 1998: 221) should be more considered to determine appropriate levels of CEO compensation. For instance, O'Reilly, Main, and Crystal (1988) and Porac, Wade, and Pollock (1999) show how the compensation of board of director members is related to the pay of CEOs in the focal firm. In addition, Ezzamel and Watson (1998) show that CEO under and overpayment ('relative to the going rate of executive labor market') has effects on future levels of CEO compensation. Wade, O'Reilly, and Pollock (2006) also show that relative CEO under- and overpayment has effects on the compensation and turnover of lower-level managerial employees. These studies emphasize the importance of considering relative CEO under- and overpayment and its potential consequences. Building upon this body of literature on relative CEO compensation, Fong et al (2010) show how the underpayment of CEOs relative to the

CEO labor market rate is associated with the increase in size of the firm as well as voluntary withdrawing from the firm. They also find that an overpaid CEO would seek to improve firm profitability instead (Fong et al., 2010).

This study presents empirical evidence on relationship between CEO's relative undercompensation and the future performance but differs from previous work on compensation in two ways. First, it focuses on relative undercompensation rather than the level of compensation. Undercompensation data is obtained from the residual values of first regression of appropriate pay and reflects the unexplained negative portion of pay relative to peers in the same industry, thus providing effects of relative undercompensation. Although Fong et al. (2010) also employ wage equation (Wade et al., 2006; Watson et al., 1996) to determine underpayment relative to the labor market rate, their method of how to calculate the effects of deviations in CEO pay from labor markets is different than ours. Additionally, they examine how overcompensation or undercompensation is related to changes in firm size, firm profitability, and CEO withdrawal whereas we investigate if relative underpayment of CEOs has motivational effects on future firm performance by examining different reasons for underpayment. Second, it investigates the motivational effects of underpayment on future firm performance rather than the motivational effects of CEO compensation structure on future firm performance. Most research currently focuses on explaining whether compensation influences future firm performance and how it does so. For instance, both Murphy (1998) and Hall and Liebman (1998) examine the sensitivity of CEO compensation to variations of the stock price.

Additionally, this study contributes to CEO turnover literature. Previous studies on CEO turnover focus on finding determinants of CEO dismissal. Many studies (Coughlan and Schmidt, 1985; Warner, Watts, and Wruck, 1988; Weisbach, 1988) have analyzed CEO turnover and it is well known fact that there is an increased likelihood of CEO dismissal following poor performance (e.g., Coughlan and Schmidt, 1985; Warner, Watts, and Wruck, 1988; Weisbach, 1988; Parrino, 1997). Specifically, Weisbach (1988) and Murphy and Zimmerman (1993) provide evidence that earnings are a significant predictor of CEO turnover. Hemalin and Weisbach (1988) find out that share prices reflect the market's expectations regarding the CEO's continued employment.

Some studies focus on relative peer performance and its impact on CEO dismissal. Warner, Watts, and Wruck (1988), for example, examine CEO turnover and find that stock returns relative to the overall market are a better predictor of CEO turnover than absolute performance. Mock, Shleifer, and Vishny (1989) examine turnovers of entire top management teams and find that industry shocks are filtered from the dismissal decision. Barro and Barro (1990) also find evidence that supports complete filtering of peer performance in CEO turnovers. Building on previous research in agency theory by Holmstrom (1982), and Antle and Smith (1986), Gibbons and Murphy (1990) find that both market-wide shocks and industry shocks are filtered from stock price performance for the CEO dismissal decision. Defond and Park (1999) show that industry-adjusted earnings factor more strongly into turnover decisions for firms in less concentrated industries. Building on these previous studies on CEOs, we also examine how underpayment of CEO conditional on good or bad performance is related to CEO turnover.

This study examines CEO undercompensation, provides reasons for CEO underpayment and analyzes the relationship of CEO undercompensation to future firm performance and CEO dismissal. Stated formally, this becomes:

H1: CEO undercompensation lowers the value of a firm since appropriate executive compensation is determined by balancing an executive's marginal contribution to firm value with related marginal cost of compensation.

For underpayment, we consider two different cases of CEO underpayment: (1) underpayment due to poor past performance, and (2) underpayment despite good past performance. Gao, Harford, and Li (2009) find that a large CEO pay cut is triggered by poor stock performance. Although we are using relative CEO underpayment, we could infer that relative underpayment is triggered by poor past performance. Thus, we hypothesize that underpayment is a result of poor past performance. Some firms with poor performance may choose to dismiss an executive if they could attribute poor performance to CEO's low ability. However, given the high costs associated with replacement, firms may be more careful. They may provide one or two more periods for CEOs to turn around firm performance before dismissal. In this setting, underpayment serves as a warning before dismissal. We measure bad performance as two consecutively negative industry-adjusted buy and hold returns among underpaid CEOs. Given strong support for relative peer performance as a determinant of CEO dismiss in many studies (e.g., Holmstrom, 1982; Antle and Smith, 1986; and Gibbons and Murphy, 1990), we employ two consecutively negative industry-adjusted buy and hold return. If underpayment is a part of an appropriate compensation scheme, underpayment should be effective in producing improved performance. Gao, Harford, and Li (2009) find that pay cuts lead to greater performance improvements due to its incentive effects. Thus, we hypothesize the following:

H2: Conditional on poor performance, CEO underpayment is positively associated with future firm performance.

Gao, Harford, and Li (2009) further find that improved performance by a CEO that had received a pay cut was rewarded with an increase in pay, whereas continued poor performance resulted in CEO dismissal. We therefore also examine pay increases and dismissal rates for CEOs. We hypothesize that underpaid CEOs who deliver better future performance despite poor past performance may be positively associated with an increase in pay as CEOs who are relatively underpaid can reduce dissonance by increasing their outcomes such as rewards (Greenberg, 1990). How about CEOs who could not deliver a better future performance? As Gao, Harford, and Li (2009) find that continued poor performance after a pay cut result in CEO dismissal, we hypothesize that underpaid CEOs who couldn't deliver better future performance after poor past performance may face a higher probability of dismissal. Formally stated, this becomes:

H3a: Better subsequent firm performance of underpaid CEOs is positively associated with a pay increase.
H3b: Unimproved subsequent firm performance of underpaid CEOs is positively associated with the probability of dismissal.

Second, we consider another reason for underpayment and hypothesize that underpayment conditional on good past performance is a result of inadequate pay setting practice. Firms may realize that they do not need to pay an incumbent executive the market pay of a new external hire. Firms may be over-estimating the CEO's cost of relocation thus justifying underpayment of CEOs. According to researchers such as Simon (1947), Marris (1964), McCleland and Boyatzis (1982), and Davis, Schoorman, and Donaldson (1997), CEOs tend to have high levels of achievement motivation. Thus, we hypothesize the following:

H4: Under-paid CEOs with good past performance which is defined as two consecutively positive industry-adjusted buy and hold return are expected to deliver superior performance.

Additionally, for those who stay with the firm, we expect to see an increase in pay the following year, which provides an incentive for relatively underpaid CEOs with good past performance to perform again and stay with the firm. Other factors, such as the limited availability of better jobs, CEO's loyalty to the company, CEO's age, CEO's tenure and a high perceived cost of relocation may also determine the choice of underpaid CEOs with good past performance to remain with their firm. Meanwhile, CEOs who are underpaid despite their good past performance may leave for desirable external alternatives. According to Ezzamel and Watson (1998) and Fama (1980), significant underpayment of a CEO to the market rate would lead to that executive being hired by other firms that are willing to pay the market rate. Wade et al. (2006) and Zenger (1992) show that inequity in pay does lead to voluntary turnover among lower level employees. Moreover, Fong et al. (2010) find that CEO underpayment is associated with voluntary CEO departures. Thus, we hypothesize the following;

H5: Underpaid CEOs with good past performance face high probability of voluntary departure.

In an attempt to explain how CEO underpayment based on one year performance affects subsequent firm performance, our study shed lights on different factors affecting underpayment of CEOs and provide plausible explanations for the relation between underpayment and future firm performance in each case. In addition, our tests provide evidence how underpayment conditional on good or bad performance relate to CEO dismissal or voluntary departure.

III.   DATA

The sample of firms used in this paper is comprised of the largest 1,500 firms in the United States, as found in the Standard and Poor's Super-Composite 1500. All available information on CEOs is obtained from Compustat's "Execucomp" database, which covers CEOs in the S&P 500, the S&P Mid-Cap 400, and the S&P small -Cap 600 from 1992 to 2011. The data on CEO turnover is obtained from Execucomp, and a turnover event is identified as a change in CEO from one year to the next. Other performance measures such as net income, return on assets, and sales are obtained from the Compustat database. Buy and hold return data is obtained from the Center for Research in Security

Prices (CRSP) database. Data on CEO compensation is merged with firm financial data from Compustat and the stock market performance data from Center for Research in Security Prices (CRSP). A total of 17,240 observations are employed and analyzed for this study.

We identify all instances of CEO turnover in Execucomp and find an overall CEO turnover rate of 12.09% for sample from 1992 to 2009. Using Lexis Nexis we identify the CEOs with involuntary or forced departure using a keyword search in news articles. We classify the CEOs who were fired as "dismissal" and all other CEO departures as "voluntary departure." This is admittedly conservative since many CEOs are given the opportunity to leave "for personal reasons" or some other explanation. Any bias that this decision might cause works against finding evidence consistent with our hypotheses. For our overall sample, we find a CEO dismissal rate of 1.54% and a voluntary departure rate of 10.55%. Dismissals comprise 12.7% of all turnovers.

IV.   METHODLOGY

To test the effects of CEO undercompensation on future firm performance, two stages of regression are employed. Residuals from the first regression of the pay model represent any unexplained portion of CEO pay in each year. First, we examine the mean pay of the year using the entire sample in the first stage regression; which we define as appropriate pay. Assuming proper control of factors that determine CEO compensation, the positive (negative) residual should reflect the unexplained overcompensation (under-compensation) of CEOs. Controls used on the first stage regression include firm attributes such as the buy and hold return, current year's sale, prior year's return on asset, standard deviation of ROA over five years, and standard deviation of BHR over five years. CEO compensation is the dependent variable. We perform the following first stage ordinary least squares (OLS) regression year by year:

$$CEOPay_{it} = \beta_0 + \beta_1 BHR_{it} + \beta_2 Sale_{it} + \beta_3 ROA_{it} + \beta_4 StdDevBHR_{it-1,t-4}$$
$$+ \beta_5 StdDevROA_{it,t-4} + \beta_6 InvestOpp_{it,t-4} + \varepsilon_{it} \qquad (1)$$

The definition of variables are presented in the appendix. Accounting performance variables including accounting performance and the stock market performance variable are used to control for the effects of performance on CEO compensation. Return on assets for accounting performance and buy and hold returns for stock performance are used. As surveyed by Murphy (1998), many studies of executive compensation have examined these measures of firm performance.

To control for the effects of firm size on CEO compensation, size variables such as reported sale are included. To control for industry effects on CEO compensation, we include industry fixed effects using 49 industry classifications. The firm's year-end adjusted book-to-market ratio is averaged over the past five years, ending the year prior to the year in which CEO compensation was awarded and capturing the investment opportunities of the firm. Motivated by other empirical research on compensation such as Smith and Watts (1992) and Core (1997), we include measures of firm risk as a determinant of the level of compensation. Evidence observed by Banker and Datar (1989) suggests that compensation risk may either increase or decrease with firm risk. Cyert et al. (1997) also report higher CEO compensation with greater stock return volatility. The

standard deviation of the annual stock market return for the past five years and the standard deviation of the annual corporate return on assets for the past five years are controlled for the firm's risk.

All control variables and performance variables included on the first regression are motivated by the pay model of Core, Holthausen, and Larcker (1999) although their governance variables are not included since we are focusing rather on the appropriate process of pay with the economic determinants of pay. A table with a brief definition of all the variables used in first stage OLS regression is included in Appendix.

Negative residual values obtained from the first stage yearly regression are then stacked together over a sample period, from 1992 to 2011. To test how undercompensating CEOs can affect firm performance, a second stage OLS regression is employed. Firm performance variables including buy and hold return and Return on Assets (ROA) are included to control for both stock market and accounting performance, respectively. Both variables are industry mean-adjusted using the Fama French 49 industry classifications in each year. Using industry mean-adjusted ROA as the dependent variable, the second stage regression attempts to ascertain the relationship between undercompensation at year t and accounting performance at year $t+1$. Standard deviation of ROA over the past five years and sales at year t are controlled.

We perform the following second stage ordinary least squares (OLS) regression:

$$AdjustedROA_{it+1} = \delta_0 + \delta_1 Underpayment_{it} + \delta_2 Underpay * Underpay_{it}$$
$$+\delta_3 StdDevROA_{it,t-4} + \delta_4 Sale_{it} + \delta_5 EquityRatio_{it} + \varepsilon_{it} \quad (2)$$

The definition of variables are presented in the appendix. A total of 20 OLS regression results from 1992 to 2011 are compiled to create a panel of data with the positive or negative residual value of the CEO compensation for that year. Joint F testing shows that all the variables used in first stage of the OLS regression are jointly significant at both the 5% and the 1% level across all the sample years. Using the residual values of compensation, we created the over- and undercompensation variables for the year t. These two main over- and undercompensation variables are main interest variables used in a second stage regression to test how CEO over- and undercompensation affect the future firm performance. Since the factors that lead to under and overcompensation of CEOs are different, this paper focuses on how undercompensation of CEOs affects future firm performance. Negative significant coefficients on the undercompensation variable indicate that undercompensation leads to worse firm performance. Additionally, a squared term of underpayment is included in order to capture the non-linear relationship between undercompensation of CEOs and firm performance during the subsequent year.

Return on assets is employed as a dependent variable[1]. Our future accounting performance variable is industry mean-adjusted using the Fama/French 49 industry classifications in each year. We control for the standard deviation of ROA over the past five years and sales in year t. Allowing for a nonlinear relationship between CEO undercompensation and future firm performance, we include squared terms of underpayment.

Following Core, Holthausen, and Larcker (1999), we include the reported sales of each firm, ROA, and the standard deviations of ROA over the past five years. Since Hall and Liebman (1998) report that the vast majority of variation in executive wealth associated with changes in firm value stems from executives' holdings of stock and stock

options, we need to control for incentive effects of pay structure on future firm performance[2]. The equity ratio is defined as a ratio of equity payment over total compensation and is included to control the incentive effects of equity payment on performance due to pay structure. Equity payment includes the total value of the restricted stock granted, the total value of stock options granted using the Black-Sholes model, and the fair value of all stock awards during the year. We control for all economic determinants of accounting performance so that we can ensure that any relationship between underpay and future performance could not be attributed to these other determinants of accounting performance. Included in Appendix is a table that shows a brief description of all variables employed on second stage regression on accounting performance variable.

V.   RESULTS

A.   Descriptive Statistics

Table 1 Panel A reports descriptive statistics on all employed variables from 1st and 2nd stage regression for the sample over 1992–2011. We employ total compensation from Execucomp, and is in thousands. Panel A of Table 1 lists samples that are actually used in the 2nd stage regression. We winsorized CEO undercompensation at the 1% level. Refer back to Appendix for detailed variable descriptions. Table 1 Panel B shows a correlation matrix for all employed independent variables of the second stage regression. None of the independent variables on our second regression shows highly significant correlation with each other.

Table 1
Sample overview

Panel A: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
AdjROA	17,240	0.005	0.068	-0.502	0.217
AdjBHR	17,033	-0.003	0.043	-0.155	0.395
Underpayment	17,240	2.968	2.264	0.000	10.121
Underpayment^2	17,240	0.014	0.020	4.27E-11	0.102
StdDevROA	17,240	0.040	0.069	0.001	2.753
StdDevBHR	17,240	0.030	0.025	0.000	0.253
Sale	17,240	14.332	1.361	6.216	19.813
EquityRatio	17,240	0.295	0.262	0.000	1.000
BTM	17,206	1.825	1.287	0.475	36.189

Panel B: Correlation

	AdjROA	Underpay-ment	Underpay-ment^2	StdDev ROA	Sale	Equity Ratio
AdjROA	1					
Underpayment	0.035*	1				
Underpayment^2	0.037*	0.943*	1			
StdDevROA	-0.171*	0.003	0.014	1		
Sale	0.116*	0.497*	0.467*	-0.307*	1	
EquityRatio	-0.004	-0.126*	-0.116*	0.038*	0.133*	1

B.   Empirical Analyses

Our basic results are found in Table 2. We first winsorized our underpayment (in millions) at 1%. We use return on total assets as our dependent variable for accounting performance and we adjust ROA with industry mean using 49 industry classifications. The results are reported in the first five columns of Table 2 and they suggest that CEO underpayment has a U-shaped relationship with future accounting performance, as proxied by firm's return on asset. We find a positive significant coefficient on underpayment and a negative significant coefficient on squared term of underpayment. Such a finding implies that underpaying the CEOs is negatively related to future accounting performance up to certain point and underpayment beyond that point leads to better future accounting performance. Our finding is not consistent with our hypothesis that undercompensation of CEOs lower firm value as we find that moderate underpayment is value destroying whereas extreme underpayment is value creating for the firm. Note that significance of coefficients on both underpayment and squared term of underpayment disappears once we cluster by Gvkey in column 5.

Given no negative incentive effects of underpayment, we consider the possibility that underpaid CEOs may manipulate earnings in order to achieve a better future performance. Thus, we suspect that the U-shaped relationship between underpayment and future accounting performance could be due to earnings management so we adjust for accrual. According to a basic accounting equation, earnings are composed of an accrual component and a cash component. Many studies to date have utilized a balance sheet approach to determine the accrual component of earnings. Balance-sheet-based accrual is estimated as follows:

$$ACCR\_ BS = [(\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD) - Dep]/\ Avass \qquad (3)$$

where ACCR_BS is accruals computed using consecutive changes in the balance sheet data items; ΔCA is changes in total current assets (Compustat ACT); $\Delta Cash$ is changes in cash and short-term investments (Compustat CHE); ΔCL is changes in total current liabilities (Compustat LCT); ΔSTD is changes in debt in current liabilities (Compustat DLC); Dep is depreciation and amortization expenses from the income statement (Compustat DP); and Avass is average total assets (Compustat AT).

Underpaid CEOs may also be under a lot of pressure to deliver better performance thus leading to earnings management. To account for earnings management, we subtract accruals from return on asset (both figures are scaled by total asset). Results after controlling for accruals are reported on last five columns of Table 2. Once we control for accruals in the second stage, we observe a consistent U-shaped relationship between overpayment and future accounting performance. After controlling for firm fixed effects with clustering by Gvkey, we find that only extreme underpayment is positively related to future firm performance. Coefficient on squared term of underpayment is statistically significant at 99% confidence level. Results indicate that one standard deviation increase in squared term of underpayment is associated with 0.03122 increase in industry-adjusted return on asset. Resulted change in industry adjusted ROA of 0.03122 is economically significant when we compare it to mean of industry adjusted ROA of 0.005.

Table 2
Underpayment and future performance

	Adjusted ROA					Accrual-Adjusted ROA				
	1	2	3	4	5	6	7	8	9	10
Underpay-ment	0.000	-0.001*	-0.001*	-0.001**	-0.001	0.007***	-0.008***	-0.007***	-0.004***	-0.004
	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]	[0.004]
Underpayment^2		0.146*	0.146*	0.152**	0.152		1.607***	1.578***	1.561***	1.561***
		[0.076]	[0.076]	[0.076]	[0.144]		[0.199]	[0.199]	[0.198]	[0.401]
StdDevROA	-0.146***	-0.148***	-0.147***	-0.145***	-0.145***	0.111***	0.132***	0.107***	0.068***	0.068
	[0.008]	[0.008]	[0.008]	[0.008]	[0.030]	[0.021]	[0.020]	[0.020]	[0.021]	[0.076]
Sale	0.004***	0.003***	0.004***	0.004***	0.004***	0.009***	0.012***	0.009***	0.005***	0.005*
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.003]
EquityRatio	-0.002		-0.002	-0.003	-0.003	0.048***		0.047***	0.055***	0.055***
	[0.002]		[0.002]	[0.002]	[0.003]	[0.005]		[0.005]	[0.005]	[0.009]
Fyear				Yes	Yes				Yes	Yes
Gvkey					Yes					Yes
Constant	-0.040***	-0.037***	-0.038***	-0.044***	-0.044**	-0.210***	-0.216***	-0.193***	-0.148***	-0.148***
	[0.006]	[0.006]	[0.007]	[0.012]	[0.018]	[0.017]	[0.017]	[0.017]	[0.030]	[0.051]
Observations	17,240	17,240	17,240	17,240	17,240	14,927	14,927	14,927	14,927	14,927
R-squared	0.034	0.034	0.034	0.035	0.035	0.026	0.025	0.030	0.044	0.044

Notes: Regressions of subsequent industry-adjusted accounting performance on measured CEO undercompensation from the first stage yearly regression, squared term of underpayment, the standard deviation of ROA, log of sales, equity ratio, year controls, and cluster by Gvkey. The sample consists of all samples for which all measured overpayment, and subsequent performance data is available.

$AdjustedROA_{it+1} = \delta_0 + \delta_1 Underpayment_{it} + \delta_2 Underpayment^2_{it} + \delta_3 StdDevROA_{it,t-4} + \delta_4 Sale_{it} + \delta_5 Equity_{it} + \varepsilon_{it}$

Accounting performance variable is Return on Assets on subsequent year. Adjusted ROA is industry mean adjusted ROA using 49 industry classifications. Underpayment is undercompensation amount measured from first stage yearly pay regression. Underpayment^2 is squared term of undercompensation amount. StdDevROA is standard deviation of annual percentage corporate return on assets for the past five years. Sale is log of sales for the prior year to the year in which compensation is awarded. EquityRatio is a ratio of equity payment over total compensation. Equity payment includes total value of restricted stock granted, total value of stock option granted using a Black-Sholes model, and fair value of all stock awards during the year. Regressions of subsequent industry and accrual-adjusted accounting performance on measured CEO undercompensation, squared term of underpayment, the standard deviation of ROA, log of sales, equity ratio, year controls, and cluster by Gvkey. Accounting performance variable is Return on Assets on subsequent year. Adjusted ROA is industry mean adjusted ROA using 49 industry classifications and the accrual is subtracted.

$AccrualAdjustedROA_{it+1} = \delta_0 + \delta_1 Underpayment_{it} + \delta_2 Underpayment^2_{it} + \delta_3 StdDevROA_{it,t-4} + \delta_4 Sale_{it} + \delta_5 Equity_{it} + \varepsilon_{it}$

*, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

The observed linear relationship between relatively extreme underpayment and future accounting performance implies that earnings management did not change the relationship between underpayment and future firm performance and underpaying CEOs is value creating for the company. The estimated coefficients for the squared term of relative underpayment variable should indicate the existence of a significant relationship between the extreme relative underpayment of CEOs and future firm performance. Although we do not interpret this relationship as causal, but read it as a conditional correlation between these variables. Our results are different from the results of Fong et al. (2010) as they find no significant relationship between underpayment and change in firm performance. Difference in results could be due to different analytic technic as they employ hierarchical linear modeling (Raudenbush and Bryk, 2002) instead of two-stage regression (Core et al. 1999). Based on our finding, we reject our hypothesis that CEO undercompensation lowers firm value since appropriate executive compensation is determined by balancing an executive's marginal contribution to firm value with his marginal cost of compensation. (H1)

It is possible that CEO underpayment despite good past firm performance is an inadequate pay setting practice as firms may realize that they do not need to pay an incumbent executive the market pay of a new external hire. Firms may be over-estimating the CEO's cost of relocation thus justifying CEO underpayment. Despite the fact that underpayment of these CEOs with good past performance is unjustified, CEOs still have incentives to perform as good performance may lead to a better job (externally) or better pay within the firm. Thus we hypothesize that conditional on good past performance, CEO relative underpayment is positively associated with future firm performance (H4). First, we only include the subsample with good past performance under the same CEO, thus selecting observations with consistent CEO for at least three years. We then use industry-adjusted accounting performance as a measure of good performance and select the subsample with two consecutively positive industry-adjusted accounting performance. Finally, we only include the subsample that has above-median underpayment. We wanted to highlight the relationship between relative underpayment and future firm performance by including the subsample that is more underpaid as the moderately underpaid subsample is more clustered around zero underpayment thus capturing truly underpaid samples. In unreported results, we also test the same hypothesis employing the whole sample of underpaid CEOs with good performance and results are qualitatively similar.

The results are reported in the first five columns of Table 3 and they suggest that relative CEO underpayment has a linear relationship with future accounting performance. We observe a positive significant coefficient on underpayment and this is different from U-shaped relationship we find it in Table 2. Results imply that better job opportunities or an increase in salary may be incentivizing even moderately underpaid CEOs to perform despite unjustified underpayment. Note that we do not observe a linear relationship between underpayment and future firm performance after controlling for firm fixed effects.

The last five columns of Table 3 report results after controlling for accrual, and we find a positive significant coefficient on the squared term of underpayment. Once we control for accrual, we find a stronger linear relationship between extreme underpayment and future firm performance. The magnitude of coefficient on the squared term of underpayment is stronger for our restricted subsample with good past performance and

above-median underpayment. It is statistically significant at 95% confidence level and is economically significant. We conclude that extreme underpayment of CEOs despite a good past performance (industry-adjusted ROA) is more strongly associated with better future firm performance. Our finding is consistent with our H4, which states that conditional on good past performance, CEO underpayment is positively associated with better future firm performance. (H4)

Next, we proxy performance as the change in ROA instead of industry-adjusted ROA. Our subsample includes firms if the change in ROA from last year to current year is positive and all other procedures to limit sample remain the same as above. We want to ensure that the results found in Table 3 are not spurious based on how we define good performance. In unreported results, using the change in ROA we find a consistent U-shaped relationship between underpayment and future firm performance after controlling for accrual. Results imply that moderate underpayment is value destroying whereas extreme underpayment is value creating for the firm. This may indicate that extremely underpaid CEOs with good past performance may have a more incentive to improve their performance. These results are consistent with extremely underpaid CEOs with good performance deliver a better performance for better paying job in the future. Results are robust to using a different measure of performance.

CEOs may be underpaid because of poor past performance. CEOs who are underpaid as a result of poor past performance face high pressure to deliver better performance since continued poor performance may lead to dismissal. In this setting, underpayment serves as a warning before dismissal. We first proxy bad performance as two consecutively negative industry-adjusted ROA. If underpayment is both a result of poor past performance and a warning before dismissal, underpayment should be effective in producing improved performance. Thus, we hypothesize the following that an underpayment conditional on poor performance, CEOs will deliver better performance in an effort to avoid future dismissal. (H2)
We follow same procedures as specified above to limit our sample but use two consecutively negative industry-adjusted accounting performance to capture CEOs with poor past performance. The results in Table 4 suggest that CEO underpayment has no relationship with future accounting performance before controlling for accrual.

A U-shaped relationship between underpayment and future firm performance only appears after controlling for accrual and the finding implies earnings management. Coefficient on underpayment is negative significant at 90% confidence level whereas coefficient on squared term of underpayment is positive significant at 99% confidence level. Economic significance is also maintained. For CEOs with poor past firm performance, only extreme underpayment is value creating for the company whereas moderate underpayment is value destroying. Results may suggest that CEOs with extreme underpayment are under more pressure to perform as they face dismissal due to poor past performance. Our finding is consistent with our hypothesis that CEO's underpayment conditional on bad past performance is associated with better future firm performance. (H2)

Table 3
Underpayment and future performance among good performance (industry-adjusted) and more underpaid samples.

	Adjusted ROA					Accrual-Adjusted ROA				
	1	2	3	4	5	6	7	8	9	10
Underpayment	0.003***	0.004**	0.004**	0.004**	0.004	0.012***	-0.015**	-0.014**	-0.010	-0.010
	[0.000]	[0.002]	[0.002]	[0.002]	[0.004]	[0.001]	[0.007]	[0.007]	[0.007]	[0.011]
Underpayment^2		-0.115	-0.116	-0.124	-0.124		2.192***	2.224***	2.156***	2.156**
		[0.176]	[0.176]	[0.176]	[0.315]		[0.563]	[0.562]	[0.557]	[0.960]
StdDevROA	0.019	0.019	0.019	0.019	0.019	0.410***	0.418***	0.402***	0.318***	0.318**
	[0.015]	[0.015]	[0.016]	[0.016]	[0.037]	[0.055]	[0.054]	[0.055]	[0.055]	[0.138]
Sale	-0.002***	-0.002***	-0.002***	-0.002***	-0.002*	0.010***	0.012***	0.010***	0.006**	0.006
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.005]
EquityRatio	-0.002		-0.002	0.001	0.001	0.032***		0.033***	0.054***	0.054***
	[0.003]		[0.003]	[0.003]	[0.005]	[0.011]		[0.010]	[0.011]	[0.018]
Fyear				Yes	Yes				Yes	Yes
Gvkey					Yes					Yes
Constant	0.064***	0.061***	0.060***	0.063***	0.063***	-0.235***	-0.181***	-0.164***	-0.147***	-0.147**
	[0.010]	[0.012]	[0.012]	[0.013]	[0.020]	[0.034]	[0.038]	[0.038]	[0.040]	[0.074]
Observations	3,730	3,730	3,730	3,730	3,730	3,469	3,469	3,469	3,469	3,469
R-squared	0.014	0.014	0.014	0.021	0.021	0.056	0.057	0.06	0.086	0.086

Notes: Samples were selected if CEO is underpaid below median and past two consecutive year industry-adjusted performance is positive.
Regressions of subsequent industry-adjusted accounting performance on measured CEO undercompensation from the first stage yearly regression, squared term of underpayment, the standard deviation of ROA, log of sales, equity ratio, year controls, and cluster by Gvkey. The sample consists of all samples for which all measured overpayment, and subsequent performance data is available.
$AdjustedROA_{it+1}=\delta_0 +\delta_1 Underpayment_{it} +\delta_2 Underpayment^2_{it} + \delta_3 StdDevROA_{it,t-4} + \delta_4 Sale_{it} + \delta_5 Equity_{it}+\varepsilon_{it}$
Accounting performance variable is Return on Assets on subsequent year. Adjusted ROA is industry mean adjusted ROA using 49 industry classifications. Underpayment is undercompensation amount measured from first stage yearly pay regression. Underpayment^2 is squared term of undercompensation amount. StdDevROA is standard deviation of annual percentage corporate return on assets for the past five years. Sale is log of sales for the prior year to the year in which compensation is awarded. EquityRatio is a ratio of equity payment over total compensation. Equity payment includes total value of restricted stock granted, total value of stock option granted using a Black-Sholes model, and fair value of all stock awards during the year.
Regressions of subsequent industry and accrual-adjusted accounting performance on measured CEO undercompensation, squared term of underpayment, the standard deviation of ROA, log of sales, equity ratio, year controls, and cluster by Gvkey. Accounting performance variable is Return on Assets on subsequent year. Adjusted ROA is industry mean adjusted ROA using 49 industry classifications and the accrual is subtracted.
$AccrualAdjustedROA_{it+1}=\delta_0 +\delta_1 Underpayment_{it} +\delta_2 Underpayment^2_{it}+ \delta_3 StdDevROA_{it,t-4} + \delta_4 Sale_{it} + \delta_5 Equity_{it}+\varepsilon_{it}$
*, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 4
Underpayment and future performance among bad performed (industry-adjusted and more underpaid samples).

	Adjusted ROA					Accrual-Adjusted ROA				
	1	2	3	4	5	6	7	8	9	10
Underpayment	-0.001**	-0.001	0.000	-0.002	-0.002	0.015***	-0.031***	-0.026***	-0.027***	-0.027*
	[0.001]	[0.003]	[0.003]	[0.003]	[0.003]	[0.002]	[0.009]	[0.009]	[0.010]	[0.016]
Underpayment^2		-0.078	-0.09	-0.012	-0.012		3.771***	3.544***	3.572***	3.572***
		[0.247]	[0.247]	[0.247]	[0.274]		[0.807]	[0.803]	[0.805]	[1.237]
StdDevROA	-0.233***	-0.230***	-0.233***	-0.234***	-0.234***	-0.055	-0.014	-0.054	-0.056	-0.056
	[0.013]	[0.013]	[0.013]	[0.013]	[0.061]	[0.041]	[0.040]	[0.040]	[0.041]	[0.137]
Sale	0.006***	0.006***	0.006***	0.006***	0.006***	-0.003	0.003	-0.002	-0.001	-0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]	[0.004]	[0.003]	[0.004]	[0.004]	[0.008]
EquityRatio	0.007		0.007	0.006	0.006	0.082***		0.079***	0.073***	0.073***
	[0.004]		[0.004]	[0.004]	[0.005]	[0.014]		[0.014]	[0.014]	[0.020]
Fyear				Yes	Yes				Yes	Yes
Gvkey					Yes					Yes
Constant	-0.107***	-0.113***	-0.109***	-0.101***	-0.101***	-0.122**	-0.078	-0.033	-0.138	-0.138
	[0.015]	[0.016]	[0.016]	[0.017]	[0.029]	[0.050]	[0.054]	[0.054]	[0.102]	[0.148]
Observations	2,993	2,993	2,993	2,993	2,993	2,284	2,284	2,284	2,284	2,284
R-squared	0.155	0.154	0.155	0.166	0.166	0.036	0.031	0.044	0.057	0.057

Notes: Samples were selected if CEO is underpaid below median and past two consecutive year industry-adjusted performance is negative.

Regressions of subsequent industry-adjusted accounting performance on measured CEO undercompensation from the first stage yearly regression, squared term of underpayment, the standard deviation of ROA, log of sales, equity ratio, year controls, and cluster by Gvkey. The sample consists of all samples for which all measured overpayment, and subsequent performance data is available.

*, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Next, we measure performance with the change in ROA instead of industry-adjusted ROA. Samples are selected if the change in ROA from last year to current year is negative and we limited our samples to the ones with consistent CEOs over a three-year period. Finally, we excluded samples with underpayment below median value. We wanted to ensure that our results found in Table 4 are not spurious to how we define bad performance.

In unreported results, using change in ROA as our measure for bad performance, we find a stronger U-shaped relationship between underpayment and future firm performance once we control for accrual. Our results imply that moderate underpayment is value destroying where as extreme underpayment is value creating for the firm. This may indicate that extreme underpaid CEOs with a bad past performance may have more incentives to perform as they face dismissal. Our results with different measures of bad performance provide consistent results that support our hypothesis that Underpayment of CEOs conditional on bad performance is associated with better future firm performance. (H2) Our results indicate that moderate underpayment is associated with negative future firm performance. This finding may suggest that only extreme underpaid CEOs are under pressure to deliver a better performance in order to avoid dismissal.

Table 5A shows simple t stat difference between overpaid samples and underpaid samples. Rate of turnovers and voluntary departures for underpaid CEOs were higher than the rate of turnovers and voluntary departures for overpaid CEOs. Underpaid samples deliver better accounting performance and they receive higher pay increase.

If CEOs are underpaid despite a good past performance, they are more likely to leave for a better job thus leading to higher voluntary departure rate. (H5) For those CEOs who choose to stay may also see an increase of pay thus explaining the reason for staying. We select samples based on past good or poor performance. In Table 5B, 5C, and 5D, we select underpaid samples with a poor past performance and compare them to underpaid samples with a good past performance. First, we use two consecutively positive or negative industry-adjusted ROA to limit the sample in 7B, and then use two consecutively positive and negative ROA in 7C. Lastly, we use a positive and negative change in ROA to compare sample.

Using three different measures of performance, we have relatively consistent findings. Underpaid CEOs with a good past performance does not face high probability of voluntary departure. Our finding is inconsistent with our hypothesis (H5) since we expect for CEOs who are underpaid unjustly leave for a better job. Our finding is also different from the result of Fong et al. (2010) as they find that CEO underpayment is associated with voluntary CEO withdrawals. Difference in results could be due to how Fong et al. (2010) are defining voluntary CEO withdrawal since only the cases where CEO left position and either became a director or retained a previously held directorship are considered as voluntary CEO withdrawal. Meanwhile, we use keyword search to define voluntary departure. Using Lexis Nexis we identified the CEOs with involuntary or forced departure using a keyword search in news articles. We classified the CEOs who were fired as "dismissal" and all other CEO departures as "voluntary departure." Since we are defining all other CEO departures as voluntary departure, there may be some samples that are classified as voluntary departure even if CEOs are indeed fired, which supports our finding more strongly.

Table 5
Underpayment and CEO turnover

Obs	Ind. Adj. ROA	Obs	Ind. Adj. Accr ROA	Obs	ROA	Obs	Accr ROA	Obs	PayIncrease	Obs	Fired	Obs	Voluntary Departure	Obs	Turnover
Panel A: Under vs. Over															
Under (0) 11,555	0.008	9,994	-0.047	11,555	0.082	9,994	0.041	11,525	0.459	13,221	0.016	13,221	0.108	13,221	0.124
Over (1) 8,543	-0.003	7,263	-0.037	8,543	0.067	7,263	0.035	8,669	0.196	10,123	0.019	10,123	0.096	10,123	0.115
Combined 20,098	0.003	17,257	-0.043	20,098	0.075	17,257	0.038	20,194	0.346	23,344	0.018	23,344	0.103	23,344	0.120
Diff (0-1) T stat	9.596		-2.847		12.633		1.472		15.921		-1.547		2.873		2.046
Panel B. Under Good Performance vs. Under Bad Performance (Industry-adjusted ROA)															
Underbad (0) 3,172	-0.035	2,380	-0.087	3,172	0.038	2,380	-0.006	3,168	0.451	3,674	0.022	3,674	0.112	3,674	0.133
Undergood (1) 4,418	0.044	4,163	-0.016	4,418	0.118	4,163	0.078	4,406	0.469	5,049	0.014	5,049	0.109	5,049	0.123
Combined 7,590	0.011	6,543	-0.042	7,590	0.085	6,543	0.047	7,574	0.462	8,723	0.017	8,723	0.110	8,723	0.127
Diff (0-1) T stat	-62.898		-16.724		57.678		19.005		-0.622		2.64		0.334		1.342
Panel C. Under Good Performance vs. Under Bad Performance (ROA)															
Underbad (0) 297	-0.112	285	-0.052	297	-0.067	285	-0.021	292	0.665	349	0.032	349	0.117	349	0.149
Undergood (1) 8,339	0.016	7,193	-0.045	8,339	0.092	7,193	0.046	8,329	0.448	9,581	0.016	9,581	0.111	9,581	0.127
Combined 8,636	0.012	7,478	-0.045	8,636	0.086	7,478	0.044	8,621	0.455	9,930	0.017	9,930	0.111	9,930	0.128
Diff (0-1) T stat	-37.523		-0.735		-45.486		-6.485		3.072		2.196		0.381		1.202
Table D. Under Good Performance vs. Under Bad Performance (Change in ROA)															
Underbad (0) 1,917	-0.027	1,594	-0.087	1,917	0.04	1,594	-0.016	1,909	0.343	2,272	0.03	2,272	0.126	2,272	0.156
Undergood (1) 2,935	0.041	2,646	-0.007	2,935	0.121	2,646	0.106	2,932	0.553	3,338	0.01	3,338	0.106	3,338	0.116
Combined 4,852	0.014	4,240	-0.037	4,852	0.089	4,240	0.060	4,841	0.470	5,610	0.019	5,610	0.114	5,610	0.132
Diff (0-1) T stat	-36.749		-14.783		-42.337		-21.222		-5.754		5.433		2.33		4.347

We select samples based on past good or poor performance. In Table 5B, 5C, and 5D, we select underpaid samples with a poor past performance and compare them to underpaid samples with a good past performance. First we use two consecutively positive or negative industry-adjusted ROA to limit the sample in 7B, then use two consecutively positive and negative ROA in 7C. Lastly, we use a positive and negative change in ROA to compare sample. Industry Adjusted ROA is industry mean adjusted ROA using 49 industry classifications. Industry Adjusted ROA Accrual is industry mean adjusted ROA using 49 industry classifications and the accrual is subtracted. ROA is Return on Assets. ROA Accrual is Return on Assets and the accrual is subtracted from ROA. Accrual is measured using balance sheet approach. Refer back to Appendix for detailed variable descriptions for Accrual. Chgroa is measured as change in Return on Assets from current year to next year. Pay Increase is measured as a change in total pay from current year to next year. We identify all instances of CEO turnover in Execucomp and we find an overall CEO turnover rate of 8.89% for samples from 1992 to 2009. Using Lexis Nexis we identified the CEOs with involuntary or forced departure using a keyword search in news articles. We classified the CEOs who were fired as "dismissal" and all other CEO departures as "voluntary departure.

More importantly, there may be other reasons for a CEO with a good past performance to stay. We first consider a pay increase as a reason to stay for CEOs with good past performance. Pay increase is measured as change in total pay from current to next year. We do not observe consistent results for pay increase in Table 5. In unreported results, we also compared pay increase of underpaid CEOs with good past performance to pay increase of all underpaid sample but we do not find any significant difference either. However, increase in pay for underpaid CEOs with good performance was significantly higher than the overpaid CEOs and this finding suggests an increase of pay as another factor in determining the rate of voluntary departure. There may be some other reasons such as social ties, CEO age, CEO tenure, or job availability why CEOs with good past performance to stay. Additionally, prior literature shows that inside hires tend to be underpaid and inside hires may also explain low voluntary departure rate for underpaid CEOs with good performance. In unreported results, we compare the rate of inside hire of underpaid CEOs with good past performance to the rate of inside hire of underpaid CEOs with bad past performance. We find a significantly higher rate of inside hires among underpaid CEOs with good past performance than underpaid CEOs with bad past performance. Higher rate of inside hires among underpaid CEOs with good past performance may partially explain why CEOs with good past performance do not leave despite lower compensation. When we compare pay increase and voluntary departure rate of underpaid CEOs with good past performance to overpaid CEOs, results are more intuitive. Pay increase for underpaid CEOs with a good past performance is much bigger than pay increase of overpaid CEOs. When we compare our voluntary departure rate of underpaid CEOs with good performance to voluntary departure rate of our overpaid CEOs, we find that CEOs who are getting underpaid unjustly face higher rate of voluntary departure than overpaid CEOs.

Consistent with our hypothesis we do find that underpaid CEOs with poor past performance face high probability of dismissal for all Table 5B, 5C, and 5D regardless of how we define performance (H5). CEOs who was not dismissed also face high increase in pay due to their improved current performance. Pay increase for underpaid CEOs with a bad past performance is also much bigger than pay increase of overpaid CEOs. Overall, underpaid CEOs with a good past performance tend to deliver better future accounting performance than underpaid CEOs with a poor past performance.

VI.   ROBUSTNESS

Gao, Harford, and Li (2009) find that improved performance of a firm with a pay cut was rewarded with increase in pay. To ensure our result are not due to samples with a pay cut, we first exclude samples with 30% or more pay cut thus eliminating samples with a pay cut. In unreported results, consistent with the results found in Table 2, we observe a linear relationship between underpayment and future firm performance after controlling for accrual. We find a significant positive coefficient on the squared term of underpayment after controlling for accrual and the magnitude of a coefficient on squared term of underpayment is bigger than the coefficient found in Table 2. Thus, we conclude that the result without 30% or more pay cut shows a consistent finding that extreme underpayment is associated with positive future firm performance.

We also select the samples with 30% or more pay cut and find a consistent linear relationship between squared term of underpayment and future firm performance thus reinforcing our main finding that more underpayment of CEOs is associated with better future firm performance. In unreported results, our finding is consistent with the finding of Gao, Harford, and Li (2009) and results are robust to different sample selections. Our results may indicate that relative underpayment may be a signal for a good management of the firm and there are no negative incentive effects of underpaying CEOs. In unreported results, we also tested the same hypothesis employing all underpaid samples with bad performance and results are qualitatively similar.

To ensure that results are not spurious based on certain assumptions, we employ a battery of tests including: (1) using components of pay and its residual values to determine our underpayment, and (2) employing underpaid samples above the median and find a qualitatively similar results. Without fail, we find a consistent U-shaped relationship between underpayment and future firm performance. Results are qualitatively identical. Specifics of each test as well as the results are available upon request.

Finally, we try to disentangle incentive components of underpay from low ability components of underpay. To distinguish the underlying source of CEO underpayment, we decompose our negative residual pay into low CEO ability, good agency, and incentive components. Albuquerque et al. (2012) decomposed the peer pay effect into talent and self-serving components by regressing peer pay effect on the full set of proxies for CEO talent and self-serving. Formally stated, this becomes:

$$Residual\ pay_{it} = \gamma_0 + \Sigma\gamma_m Ability_{it} + \gamma_1 Agency_{it} + \varepsilon_{it,} \qquad (4)$$

where CEO ability is a set of proxies for CEO ability and Agency is a CEOpower variable. Following Albuquerque et al. (2012), we employ three proxies of CEO ability. CEO Abn ROA (t-1, t-3) is average of the firm's ROA measured relative to the industry ROA over the past three years. CEO Abn Ret (t-3, t-1) is average of the firm's stock return measured relative to the industry over the past three years. CEO Log Market Cap (t-3, t-1) is natural logarithm of the average market capitalization of the companies the CEO worked for over the last three years. Instead using proxies employed in Albuquerque et al. (2012) for self-serving components, we employ CEOpower variable as an agency proxy. We construct our CEOpower variable by dividing CEO pay by the average pay of other non-CEO executives' pays that are listed on ExecuComp. This approach estimates Eq. (4) with the full set of proxies for CEO ability and agency. This

measure of low CEO ability is the negatively predicted component of residual calculated using estimated negative coefficients on the CEO ability variables and we label this low ability. Similarly, this measure of agency is the predicted component of unexplained negative pay calculated using the estimated negative coefficient on CEOpower variable and we label this good agency. Remaining negative residual value of Eq. (4) represents incentive components of underpayment and we label this underpayment. We then estimate the following:

$$AdjustedROA_{it+1} = \delta_0 + \delta_1 Underpayment_{it} + \delta_2 Underpayment^2_{it} + \delta_3 LowAbility_{it}$$
$$+ \delta4 GoodAgency + \delta_6 StdDevROA_{it,t-4} + \delta_7 EquityRatio_{it} + \varepsilon_{it} \quad (5)$$

Underpayment is the negative residual value of Eq. (4) and captures incentive effects of underpaying a CEO. Low ability is the negatively predicted value of pay using proxies for CEO low ability and good agency is negatively predicted value of pay using CEOpower variable. To capture non-linearity of the relationship, we include a squared term for underpayment. Results are reported in Table 6. For ease of understanding, we take absolute values of all negative decomposed values of underpayment.

First five columns of Table 6 shows the results with negatively predicted pay of low ability, negatively predicted pay of good agency, and incentive effects of underpayment in the second stage regression. To test this empirically, we eliminate samples with CEO turnovers in the prior three years to ensure our proxies for low CEO ability capture periods that include the same CEO. Consistent with our previous findings, we find a U-shaped relationship between underpayment and future accounting performance. We also find a linear relationship between good agency and future accounting performance, which implies that pay decrease due to good agency is associated with better future accounting performance. Consistent with our expectation, predicted value of pay for low CEO ability is associated with negative future accounting performance. We then control for accrual and results are reported in last five columns of Table 6.

Last five columns of Table 6 show the regression results of future accounting performance on predicted pay of low ability, predicted pay of good agency, and incentive effects of underpayment after controlling for accrual. We find a stronger negative relationship between low ability and future accounting performance after accrual adjustment. This finding highlights the fact that underpaying CEOs for their low ability not only leads to better future accounting performance, but also such a relationship is strengthened after accrual adjustment. After controlling for accrual, we find a stronger linear relationship between good agency and future accounting performance. Results imply that underpayment due to good agency leads to stronger future performance after controlling for accrual. In addition, once we control for balance-sheet-based accrual in the second stage regression, we observe a stronger U-shaped relationship between underpayment and future accrual-adjusted accounting performance. This finding provides evidence that there is no negative incentive effect of underpaying CEOs. Even after we control for low ability and good agency, which lower CEO pay, underpayment of CEOs leads to better future accounting performance. Thus, we conclude that once we separate out low ability measure and good agency measure from unexplained lower pay, underpayment of CEOs is still associated with better future firm performance. Our results are robust to decomposition of underpayment.

Table 6
Decomposing underpayment into incentive, low ability, and good agency

	Adjusted ROA					Accrual-Adjusted ROA				
	1	2	3	4	5	6	7	8	9	10
Underpayment	0.001	-0.004*	-0.004*	-0.004*	-0.004	0.008***	-0.015***	-0.014**	-0.012**	-0.012
	[0.001]	[0.002]	[0.002]	[0.002]	[0.003]	[0.002]	[0.006]	[0.006]	[0.006]	[0.009]
Underpayment^2		0.000**	0.000**	0.000**	0.000*		0.000***	0.000***	0.000***	0.000***
		[0.000]	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]	[0.000]
Low_Ability	-0.013***	-0.013***	-0.013***	-0.016***	-0.016***	-0.097***	-0.101***	-0.097***	-0.102***	-0.102***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.005]	[0.009]	[0.009]	[0.009]	[0.009]	[0.016]
Good_Agency	0.004**	0.003**	0.004**	0.003*	0.003	0.020***	0.014***	0.019***	0.019***	0.019***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.005]	[0.005]	[0.005]	[0.005]	[0.007]
StdDevROA	-0.203***	-0.201***	-0.201***	-0.206***	-0.206**	0.076	0.111	0.089	0.061	0.061
	[0.029]	[0.029]	[0.029]	[0.029]	[0.080]	[0.083]	[0.083]	[0.083]	[0.084]	[0.206]
Sale	-0.006***	-0.006***	-0.006***	-0.007***	-0.007***	-0.032***	-0.028***	-0.030***	-0.031***	-0.031***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.005]	[0.005]	[0.005]	[0.005]	[0.008]
EquityRatio	0.004		0.004	-0.003	-0.003	0.062***		0.060***	0.058***	0.058***
	[0.005]		[0.005]	[0.005]	[0.007]	[0.015]		[0.015]	[0.016]	[0.021]
Constant	0.100***	0.101***	0.101***	0.126***	0.126***	0.401***	0.389***	0.396***	0.411***	0.411***
	[0.022]	[0.022]	[0.022]	[0.023]	[0.035]	[0.066]	[0.066]	[0.066]	[0.069]	[0.121]
Observations	2,528	2,528	2,528	2,528	2,528	2,166	2,166	2,166	2,166	2,166
R-squared	0.027	0.029	0.029	0.043	0.043	0.091	0.092	0.098	0.109	0.109

*, **, and *** indicate significance at the 90%, 95%, and 99% confidence levels, respectively.

Table 7
CEOs with low ability and the future performance

	Obs	Industry Adjusted ROA	Obs	Industry Adjusted ROA_Accrual	Obs	ROA	Obs	ROA_Accrual	Obs	Accrual	Obs	Pay_Increase	Obs	CEOpower
Under (0)	5,648	0.010	4,849	-0.032	5,648	0.083	4,849	0.057	4,848	0.045	5,635	0.532	5,661	2.389
Under BadAbility (1)	3,470	0.006	3,063	-0.066	3,470	0.081	3,063	0.019	3,064	0.074	3,467	0.354	3,481	2.463
Combined	9,118	0.008	7,912	-0.045	9,118	0.082	7,912	0.042	7,912	0.056	9,102	0.465	9,142	2.417
Diff (0-1) T stat		2.698		8.968		1.019		9.252		-8.039		6.865		-3.231

We estimate the following:

Residual pay it = $\gamma_0 + \Sigma\gamma_m$ LowAbility,it + γ_1 GoodAgency,it + εit

Where CEO ability is a set of proxies for CEO ability and Agency is a CEOpower variable. We employ three proxies of CEO ability. CEO Abn ROA (t-1, t-3) is average of the firm's ROA measured relative to the industry ROA over the past three years. CEO Abn Ret (t-3, t-1) is average of the firm's stock return measured relative to the industry over the past three years. CEO Log Market Cap (t-3, t-1) is natural logarithm of the average market capitalization of the companies the CEO worked for over the last three years. Negative predicted values of these proxies of CEO ability represent low CEO ability that lowers CEO pay. We employ CEOpower variable as an agency proxy. Negative predicted value of CEOpower variable represents good agency that lowers CEO pay. This approach estimates Eq. above with the full set of proxies for CEO low ability and good agency. We then select samples based on low CEO ability only and compare them to underpaid samples.

Industry Adjusted ROA is industry mean adjusted ROA using 49 industry classifications. Industry Adjusted ROA Accrual is industry mean adjusted ROA using 49 industry classifications and the accrual is subtracted. ROA is Return on Assets. ROA Accrual is Return on Assets and the accrual is subtracted from ROA. Accrual is measured using balance sheet approach. Refer back to Appendix for detailed variable descriptions for Accrual. Pay Increase is measured as a change in total pay from current year to next year. CEOpower variable is constructed by dividing CEO pay by the average pay of other non-CEO executives' pays that are listed on ExecuComp.

Additionally, we performed simple t stat difference between underpaid samples with low ability and underpaid samples and reported in Table 7. After estimating Eq (4) above with the full set of proxies for CEO low ability and good agency, we then select samples based on underpaid due to low CEO ability and compare them to underpaid samples. We find that underpaid samples due to low CEO ability deliver lower future firm performance than underpaid samples on average. Difference in future firm performances is stronger and statistically more significant once we control for accrual using both ROA and industry adjusted ROA as a performance measure. We also find that underpaid samples with low CEO ability use more accruals than underpaid samples. Underpaid samples with low CEO ability also show a significantly higher CEO power, which implies a poor agency. Consistent with our expectation, underpaid samples with low CEO ability experience a significantly lower increase in pay than underpaid samples. Results in Table 7 confirms how the sample selected using decomposed underpayment due to low CEO ability are well behaving as expected.

VII.   CONCLUSION

This study presents how CEO underpayment affects both firm performance and CEO turnover the subsequent year. This is the first study to examine why some firms choose to pay their CEOs below the market rate and how it affects future firm performance and CEO turnover.

We find that extreme CEO underpayment is associated with better future firm performance after controlling for accrual thus we reject our hypothesis that CEO underpayment lowers firm value. With our basic results, we conclude that there is no such a thing as a negative incentive effect of underpaying CEOs.

We consider relative underpayment of a CEO because of poor past performance. We find that moderate underpayment conditional on poor performance is associated with negative future firm performance whereas extreme underpayment conditional on poor performance is associated with positive future firm performance. We use both industry adjusted accounting performance and change in accounting performance as a measure of performance and find a consistent U-shaped relationship between underpayment and future firm performance after controlling for accrual.

Additionally, we find that underpayment conditional on poor performance face a higher CEO dismissal rate. Thus, we conclude that underpaid CEOs who could not deliver better future firm performance after a poor past performance face higher dismissal rate.

When a CEO is getting underpaid despite his/her good past performance, only extreme CEO underpayment conditional on good past performance is associated with better future firm performance. We have consistent results using both industry adjusted ROA and change in ROA as our performance measure. We note a stronger U-shaped relationship between extreme underpayment and future firm performance with change in ROA as a measure of performance.

Moreover, we find that underpaid CEOs with good performance does not face high probability of voluntary departure. Our finding is inconsistent with our hypothesis since we expect for CEOs who are underpaid unjustly leave for a better job. Other factors, such as the limited availability of better jobs, CEO age, CEO tenure, and a high perceived cost of relocation may also determine the choices of underpaid CEOs with good past

performance to stay with their current firm. In unreported results, increase in pay for underpaid CEOs with good performance was significantly higher than the overpaid CEOs and this finding suggests an increase of pay as another factor in determining the rate of voluntary departure. When we compare our voluntary departure rate of underpaid CEOs with good performance to voluntary departure rate of our overpaid CEOs, we find that CEOs who are getting underpaid unjustly face higher rate of voluntary departure than overpaid CEOs.

Finally, we decompose our negative residual pay into CEO low ability, good agency, and incentive components. Consistent with our expectations, we find that lower pay for low ability is indeed negatively related to future performance, and lower pay due to good agency is positively related to future performance. Once we decompose source of undercompensation due to CEO low ability from incentive effects of underpayment and good agency effects of underpayment, we find consistent positive effects of underpaying CEOs once we control for accrual. Thus, we conclude that once we separate out low ability measure and good agency measure from unexplained lower CEO pay, underpayment of CEO is still associated with better future accounting performance.

This paper is the first study to consider all three sources of underpaying CEO and how they are related to future firm performance. We have shown that lower pay due to low CEO talent is associated with worse future firm performance whereas lower pay due to good agency is associated with positive future firm performance. More importantly, incentive effects of underpaying CEO is never studied before and we have shown that there is no negative incentive effects of underpaying CEO on future firm performance.

Overall, we find that there are no negative motivational effects of underpaying CEOs. We find that underpayment of CEOs with poor past performance as well as underpayment of CEOs with good past performance is associated with better future firm performance. Our results are robust to decomposition of underpayment. Moreover, underpaid CEOs with good performance did not show high probability of voluntary departure when compared to underpaid CEOs with bad performance. Does this mean firms can justify underpaying CEOs without facing high cost of replacement? The results should be taken with caution as underpaid CEOs with good performance do have significantly higher voluntary departure rate than overpaid CEOs though. We also find that underpayment of CEOs with poor past performance along with threat of dismissal are effective tools in delivering better future firm performance. Our results suggest that underpaying CEOs is value creating in general for the company and such a finding underscores the importance of reasonable compensation for CEOs and its positive impact on firm's value. In a world filled with extremely overpaid CEOs and a society that is starting to speak out about executive compensation levels, this is a noteworthy finding.

Appendix
Variable definitions

Variable	Definition	Source
TDC1	Total pay TDC1: The sum of bonus, salary, the total value of restricted stock granted, the total value of stock options granted using a Black–Scholes model, long-term incentive payouts, and all other payments provided by ExecuComp. (000s).	ExecuComp

ROA	Earnings before interest and taxes scaled by Total asset at year t. ROA = EBIT /TA (both are in thousands) ROA is winsorized at 1%.	Compustat
BHR	Buy and hold Stock market return with monthly returns from CRSP annual Buy and hold return is calculated by using fiscal year end month. BHR (December) = (1+January return) * (1+February return)....*(1+December return) BHR is winsorized at 1%.	CRSP
StdDevROA	For the prior five years of the standard deviation of annual percentage corporate return on assets for the prior five years. STD_ROA is winsorized at 1%.	Compustat
StdDevBHR	For the prior five years of standard deviation of annual percentage stock market return. Refer to BHR for detailed BHR calculation. Std_BHR is winsorized at top 1%.	CRSP
InvestOpp	The firm's year -end market-to-book ratio is averaged over the five years ended the year prior to the year in which CEO compensation is paid. Refer back to MTB for detailed MTB calculation. Invest is winsorized at 1%.	CRSP/ Compustat
Sale	Log of sales for the prior year to the year in which compensation is awarded.	Compustat
Underpayment Underpayment^2	Undercompensation measured from yearly pay regression. Unexplained negative TDC1 value. Scaled by 1000 thus in millions. Winsorized at 1% of undercompensation measured from yearly regression. Squared term of Underpayment. Scaled by 1,000,000.	ExecuComp ExecuComp
BTM	Book to market ratio is calculated on the market value and book value of the firm's equity at the end of year prior to which compensation is paid. BTM = [BE+(AT-BE)]/[ME+(AT-BE)] BTM is adjusted book to market ratio to correct a large negative values of Market to book ratio. ME = csho*prcc_f = number of shares outstanding * price of share BE = (total asset - deferred taxes + common share reserved for conversion to debt)-(liabilities + common shares reserved for preferred stock) BTM is winsorized at 1%	CRSP/ Compustat

EquityRatio	A ratio of equity payment over total compensation. Equity payment includes total value of restricted stock granted, total value of stock option granted using a Black-Sholes model, and Fair value of all stock awards during the year.	ExecuComp
AdjROA	Earnings Before Interests and Taxes scaled by total asset at year t+1 and winsorized at 1%. Winsorized ROA has been industry mean adjusted using 49 industry classifications.	Compustat
Accrual	Balance sheet based accrual is estimated as following and is subtracted from winsorized Industry mean adjusted return on asset. $ACCR\_ BS = [(\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD) - Dep]/ Avass$ where ACCR_BS is accruals computed using consecutive changes in the balance sheet data items; ΔCA is changes in total current assets (Compustat ACT); $\Delta Cash$ is changes in cash and short-term investments (Compustat CHE); ΔCL is changes in total current liabilities (Compustat LCT); ΔSTD is changes in debt in current liabilities (Compustat DLC); Dep is depreciation and amortization expenses from the income statement (Compustat DP); Avass is average total assets (Compustat AT)	Compustat
Performance	Performance is a dummy variable that is defined to equal to 1 if industry-adjusted ROA is positive for both year t-1 and year t. Performance is equal to 0 otherwise. Other measures of Performance are also used for robustness.	CRSP
AdjBHR	Industry-adjusted BHR using 49 industry classifications at year t+1. Industry-adjusted BHR is winsorized at 1%. Refer back to BHR for detailed BHR calculation.	CRSP

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