EXECUTIVE COMPENSATION AND FIRM PERFORMANCE: BIG CARROT, SMALL STICK

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Abstract

The statistical link between executive compensation and firm performance is well established. I explore two features of the relationship that have not yet been addressed empirically. First, does the relationship itself change depending on firm performance? I find that, on average, executives are rewarded in good years but are not punished in bad years. This result is consistent with a model that attempts to induce risk-taking behavior by rewarding good performance and limiting downside punishment. Second, does the relationship change with the executive's rank in the company? I find that the top executive's compensation is most strongly linked with performance, the second-highest ranking executive less so, and the third-highest even less. This result is consistent with linking compensation to performance only to the extent that the employee has some direct influence on it.

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Introduction

The compensation of top executives seems to receive no end of attention, both in the popular press—best illustrated by *Business Week*'s annual survey of CEO pay, and in the academic literature—with Jensen and Murphy (1990) as the most-frequently cited work. The academic literature tends to focus not on whether the *level* of CEO pay is appropriate,[1] but whether compensation contracts appear to be structured to provide the CEO with proper incentives. Since the actual contracts between the CEOs and their firms are almost never directly observable, the economics literature focuses on observable outcomes—how does CEO compensation vary with firm performance?

The statistical link between pay and performance is well-established, both by Jensen and Murphy and many others who have built upon their work. In this paper I ask two questions that do not appear to have yet been adequately addressed empirically. First, does executive pay remain linked to performance in both good times and bad? In other words, what is the relationship between compensation and performance when the firm has a bad year compared to when the firm has a good year? Second, how does the relationship between pay and performance among the top executives change as one moves down the corporate ladder—does the second-in-command, for example, see a weaker compensation/firm performance link than does the top executive?

I. Creating the Proper Incentives for the Firm's Top Managers

The basic issue a CEO compensation contract must address is that of the separation of firm ownership (by its shareholders) from control (by its top managers). CEOs are entrusted with control of vast resources and assets—the top 365 publicly-traded firms in 1990 were valued at

almost $3 trillion. Clearly, it is important to structure compensation contracts such that the CEO has proper incentives to work in the shareholders' interests, which presumably are to maximize firm value.

Without proper incentives, CEOs may not be inclined to act in the best interests of the shareholders. A CEO paid a flat salary, for example, may pursue goals other than maximizing firm value—at potentially enormous cost to the shareholders. Shareholders, meanwhile, whose wealth can be diversified across a large portfolio, are likely to be less risk-averse than the CEO, whose wealth is more heavily concentrated in the one firm. Shareholders should want the CEO heading their firm to be willing to take large risks for potentially large profits, and contracts should be structured this way. An efficient compensation scheme should thus provide CEOs with incentives to take risks while insulating them (at least partially) against potential bad outcomes. While this is commonly theorized as an attractive approach to aligning shareholder and executive interests, it does not appear to have been empirically tested.

II. What is the evidence so far?

Jensen and Murphy (1990) find the CEO wealth changes $3.25 for every $1,000 change in shareholder wealth. They also find that salary and bonus (as opposed to wealth) changes only 2.2¢ per $1,000 change in shareholder wealth, and total pay[2] changes by about 3.3¢ per $1,000 change in shareholder wealth. They suggest that this link between pay and performance, while statistically significant, is too weak to provide proper incentives to the CEO. The link is economically insignificant, they argue, because CEO compensation is constrained by political forces.

Other authors have tried to both (1) find new approaches to better illuminate the pay-performance link, on the hypothesis that the link appears weak only because of econometric problems, such as omitted variables; and (2) investigate further the issue of political constraints on CEO compensation. Tevlin (1996), for example, suggests that, in addition to a variety of econometric problems, compensation will be more strongly linked to firm performance the higher are the costs of monitoring the CEO. Attempting to correct for these problems yields an elasticity of compensation to performance much higher than that previously estimated.

Other authors note that existing empirical work ignores certain features of compensation contracts. Boschen and Smith (1995) note that top executives actually are involved in multi-year relationships with their firms, and thus one should look at the long-term, dynamic relationship of compensation and performance to find the complete compensation-performance link. Indeed, they find a much stronger pay-performance link than do Jensen and Murphy using this technique. Aggarwal and Samwick (1999) test the prediction that the relationship between compensation and performance should increase with the variance in firm performance. They confirm this prediction

and note that when the account for firm performance variance the pay-performance link becomes much more economically significant than the Jensen-Murphy finding.

Joskow, Rose, and Wolfram (1996) investigate the issue of political constraints on pay of top executives in the electric utility industry. They note that earlier work had documented the lower pay of top executives in industries subject to economic regulation, and in this 1996 paper they confirm that changes in CEO pay are constrained by political factors.

Hallock and Oyer (1999) take this question a step further and ask whether executives especially focus on performance measures during the time periods that they are being evaluated. The authors find that the timing of sales during the year can benefit managers, but that the timing of profits does not. They conclude that while executives can game their pay somewhat, the effect is small relative to overall compensation.

III. Remaining Questions

A. Limiting downside risk

The first question addressed here is whether and how the pay-performance link differs in good times and bad times. As discussed above, aligning the incentives of top executives with those of the firm's shareholders is assumed to involve making the executives less risk-averse. One way to accomplish this goal is to limit the CEO's downside risk in making decisions. This implies that the CEO should be punished less for a decision leading to a decrease in the firm's market value than he is rewarded for a similar increase in market value. The empirical literature has thusfar ignored this simple question. Most of the literature estimates the pay-performance relationship as if it were the same regardless of whether the firm's market value increases or decreases.

B. Pay-performance and the corporate ladder

The second issue is whether and how the pay-performance link changes as one moves up (or down) the corporate ladder. The very top executive presumably has the most control over the firm's decisions, and thus her pay should be most closely tied with performance. Those just below her make decisions that probably have less direct effect on the value of the firm. Thus, we may expect pay and performance to be linked for those executives just below the number one spot, but rewards for good performance should be greater for the top person. And while Milgrom and Roberts (1992) note that incentive pay seems to be much lower for middle-level managers than it is for top managers, the literature appears to have not yet extensively examined the issue among those at the very top of the firm. The one exception is Aggarwal and Samwick (1999), who run their regressions separately for the top executives and all other executives. They find that CEO compensation is more sensitive to performance than is the compensation of other executives.

IV. Data

The data for the analysis in this paper come from the Standard & Poor's Execucomp database, which contains compensation data on top executives and financial data on their firms from 1991 - 1995.[3] The database contains 38,617 person-year observations of compensation data, and 7,763 firm-year observations of financial data. I matched compensation data for each executive-year in the database with financial information for their firm-year for each year the data were available.

The variables of interest include firm market value, total executive compensation, and executive rank in the firm (as measured by salary and bonus). An executive's rank can be from

one to eight, but the median rank is three, and only a quarter of all observations are on executives with a rank lower than four. Table 1 contains more precise definitions of the variables. Change in compensation is differenced compensation, and change in market value likewise is differenced market value.

Table 2 highlights some summary statistics. We see first that while compensation averaged $1.2 million across all executives, the top executives averaged about $2.2 million, the second-ranked executives $1.2 million, third-ranked $910,000, and all other executives $739,000. The table also provides some preliminary evidence supporting both hypotheses tested in this paper: that compensation is more closely linked to performance in good years than in bad, and that the pay-performance link increases the higher one moves up the corporate ladder. On average, compensation increases by about $187,000 when the firm's market value increases, but also increases by just over $19,000 when the firm's market value *decreases*. These simple statistics suggest that it may be inappropriate to assume that the relationship between pay and performance is constant regardless of performance.

We also see that the largest raises, on average, go to CEOs, with smaller raises down the chain. When the firm's market value decreases, CEO compensation declines by less than $1,000, but when market value increases, CEO compensation increases by about $383,000. The story is less clear for lower-ranked executives. Second-ranked executives see compensation increases of about $30,000 in bad years and $221,000 in good years. Executives ranked fourth and below receive increases of almost $33,000 in bad years and $79,000 in good. The statistics for third-ranked executives, however, are a bit puzzling. In good years their compensation increases, on

average, by about $151,000, which sensibly puts them in between the number two and four-plus executives, but in bad years their compensation *decreases* by about $10,000.[4]

V. Methods and Results

The basic equation to estimate is the same as that used by Jensen and Murphy and others; essentially, regressing changes in compensation on changes in market value:

$$D(Compensation) = b_0 + b_1 * D(Market\ Value) + e \qquad (1)$$

where β_1 measures pay-performance sensitivity.

I first estimate equation (1) in its simple form. The first column of Table 3 shows the results of this regression. The table reveals that for each $1000 increase in firm value, executive compensation increases by $0.068 (about twice the Jensen-Murphy finding).[5] However, this result may not give an accurate picture of the pay-performance link if the relationship itself is a function of firm performance or the executive's relative position in the firm.

A. Market value up versus market value down

If a compensation contract is constructed to encourage risk-taking behavior, we might expect executives to be rewarded when the firm does well, but to be relatively insulated from downturns in firm performance. To test this hypothesis I add a dummy variable that indicates whether the firm's market value increases in a given year, and interact it with the change in market value. Equation (2) reflects this addition.

$$D(Compensation) = b_0 + b_1 * D(Market\ Value) + b_2 * D + b_3 * [D * D(Market\ Value)] + e \qquad (2)$$

where D is a dummy variable that equals one when the firm's market value increases.

The second column of Table 3 shows the results of this estimation. The coefficient on change in market value is negative, but not significant (t-statistic of 1.55). The coefficients on the market value change dummy and the interaction term are both highly significant, and suggest that when market value increases the executive receives an increase of about $115,000 (the coefficient on the dummy variable), and an additional $0.11 for each $1000 increase in firm value. When the firm's market value decreases, we cannot reject the hypothesis that compensation remains unchanged, though the sign of the relevant coefficients suggest that in this case executive compensation may increase slightly.

To rephrase these results, consider that the average increase in market value among firms that saw an increase in this sample was approximately $1.027 billion. The regression results imply that executives' compensation in these firms in these years increased by approximately $228,000,[6] or about $0.22 per thousand dollar increase in firm value. If market value decreases, however, the executive receives, at worst, no increase in compensation.

In addition to confirming what agency theory suggests should be true—that firms should limit the downside risk to the top executives to help align their incentives with those of the shareholders—these results may also help explain why pay-performance estimates in the existing literature tend to be statistically significant, but economically so small. Contracts may be written so as to promise the executives large, predetermined compensation increases when the firm does well, with modifications to that amount depending on *how well* the firm does. Thus, estimating pay-performance sensitivity across all firms regardless of the firm's performance may ignore the effects of an important component of an executive's contract and seriously bias downwards the estimated pay-performance sensitivity.

B. Pay-Performance and the Corporate Ladder

The second issue I address is how the pay-performance sensitivity changes with the executive's rank in the firm. To explore this question I add to the model dummy variables indicating whether the executive is ranked number one, two, or three (with the excluded dummy being all rankings below three). I then interact these dummy variables with change in market value. Equation (3) reflects this update:

$$D(Compensation) = b_0 + b_1*D(Market\ Value) + b_2*D + b_3*[D*D(Market\ Value)] + d_1*CEO_1 + d_2*CEO_2 + d_3*CEO_3 + a_1*[CEO_1*D(Market\ Value)] + a_2*[CEO_2*D(Market\ Value)] + a_3*[CEO_3*D(Market\ Value)] + e \quad (3)$$

where CEO_1 is the top executive, CEO_2 is the second-ranking executive, and CEO_3 is the third-ranking executive.

The third column of Table 3 shows the results of estimating this equation. The constant coefficient suggests a base increase of about $49,000. Top executives see an additional $105,000 plus $0.13 for every $1000 increase in firm value. Second-ranked executives see an increase of about $49,000 in addition to the base, and another $0.06 for every $1000 increase in firm value. Third-ranked executives see only the base increase—the coefficients on both their dummy variable and interaction terms are not statistically significant. These results confirm the hypothesis (and common sense) that sensitivity to firm performance increases as executives move up the ranks.

VI. Conclusion

This paper has examined two important issues of CEO compensation—how do changes in compensation differ in good times as compared to bad and how does the compensation-performance link among the top executives differ as they move along the corporate ladder? These questions are important because they are largely empirically unexplored areas of agency theory,

and because these factors may help explain why existing estimates of the compensation-performance link appear to be so small.

This analysis reveals that pay and performance are strongly linked when the firm's market value increases, but not when market value decreases. The result not only confirms what agency theory would predict—that executives should be at least partially insulated from the downside risk of making big decisions—but also that the link between compensation and performance may be much stronger than previously estimated. When firms do well, top executives receive large raises that are adjusted depending on how well the firm did, but when the firm does badly, the CEO sees little compensation revision, up or down. Second, the analysis confirms that pay and performance are less strongly linked for those immediately below the top manager in the firm.

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Table I
Variable Definitions

Variable	Description
Market value	The close price for the fiscal year multiplied by the company's common shares outstanding.
Relative market value	Percent change in firm market value less percent change in the industry's market value.
Total compensation	Salary, bonus, other annual compensation, total value of restricted stock granted, total value of stock options granted (using the Black-Scholes valuation methodology), long-term incentive payouts, and all other.
Executive rank	The ranking of the company executive by total salary and bonus

Table II
Average compensation and changes in compensation conditional on changes in firm market value

		Average compensation	Average change in
All executives	All years	$1,205,184	$94,578
	Years when market value decreases		$19,268
	Years when market value increases		$187,451
CEO	All years	$2,198,958	$184,420
	Years when market value decreases		-$831
	Years when market value increases		$382,785
Executive 2	All years	$1,250,519	$117,997
	Years when market value decreases		$30,947
	Years when market value increases		$221,744
Executive 3	All years	$910,579	$79,633
	Years when market value decreases		-$10,308
	Years when market value increases		$151,483
Executive 4+	All years	$739,117	$59,461
	Years when market value decreases		$32,729
	Years when market value increases		$79,007

Table III
The pay-performance link: regression results
(t-statistics in parentheses)

Dependent variable	Percent change in total compensation		
Mean of dependent variable	113816		
Constant	83991.9	2068.48	49190.40
	(5.60)	(0.08)	(1.80)
change in market value	0.07	-0.05	0.02
	(10.40)	(1.55)	(1.65)
Market value increased?		115312	
		(3.59)	
(value up) * (change in value)		0.11	
		(3.71)	
CEO			104600.00
			(2.43)
Executive 2			49242.50
			(1.12)
Executive 3			11086.30
			(.25)
CEO * (change in value)			0.13
			(6.92)
Exec2 * (change in value)			0.06
			(3.47)
Exec3 * (change in value)			0.03
			(1.54)
Number observations			
R-squared	0.01	0.01	0.02

[1] With some exceptions, of course. Sridharan (1996), for example, examines factors affecting levels of pay, and finds the composition of the board of directors can influence the level of CEO pay.

[2] Defined as the sum of salary, bonus, value of restricted stock, savings and thrift plans, and other benefits not including value of stock options granted or the gains from exercising stock options. (Jensen and Murphy (1990), note to Table 1).

[3] While the database supposedly contains information from 1991 - 1995, very little data exist for 1991. Merging the firm financial and executive compensation data causes all the 1991 observations to drop out.

[4] The regressions below will show, however, that this decrease is not statistically significant.

[5] The constant indicates that even with no change in market value total compensation increases by about $84,000, on average.

[6] The constant (115,312) plus the coefficient on the interaction term (0.11) times the average increase in market value in thousands (1,027,509). [115,312 + (0.11)(1,027,509) = 228,339].