How Do Compensation Incentives Affect Managerial Decisions?

Evidence from Internal Capital Markets

by

Li Yong

Mercy College

Abstract:

This paper examines how incentives from the level of CEO compensation affect firms' internal capital allocation decisions. I first document that multi-segment firms invest more in segments associated with higher levels of executive compensation, and that the effect is more pronounced in restructuring firms that have undergone changes in their segments. Furthermore, I present evidence that following restructuring activities, CEOs enjoy both a higher level of compensation and a faster growth rate in that compensation.

Keywords: Executive compensation, internal capital markets
JEL classification: G30, G31, J33, M52

Introduction

Although numerous studies address whether internal capital markets are efficient in allocating funds, little empirical research investigates the related question of how within-firm capital asset allocation decisions are affected by managerial incentives and particularly by incentives that derive from managers' compensation. The lack of attention to these incentives is puzzling as it would seem important to understand what factors affect a CEO's decisions before reaching a conclusion on the benefits and costs of the internal capital market. Previous studies consider indirect effects on the CEO decision-making process by focusing on the asymmetric information between headquarters and divisions and the rent-seeking behavior of division managers (Stein, 2003). These are certainly important features of the internal capital market. In this study, I consider direct effects on CEO decisions by examining the CEOs' own incentives from the level of their compensation and what benefits they derive from their investment allocation decisions.

Anecdotal evidence suggests that compensation committees generally rely on market and industry standards to set the level and structure of pay, and that pay levels and pay-for-performance sensitivities vary across industries (see, for example, Murphy, 1999; Bizjak, Lemmon, & Naveen, 2008; Faulkender & Yang, 2010). Thus the first natural question to be addressed is whether industry pay levels affect a conglomerate CEO's compensation. Using the Compustat Business Segment File and ExecuComp database, I find that a conglomerate CEO's compensation is positively related to the synthetic compensation of the firm's segments. This result remains robust with the use of various

measures of synthetic compensation and with the inclusion of additional control variables, such as firm size and market average compensation; thus, the possibility of endogeneity is reduced.

Given this evidence of the relation between conglomerate CEO compensation and component industry pay, the next step is to investigate whether CEOs change investment allocations in order to influence their compensation, ceteris paribus and whether their compensation increases subsequently. Important underlying assumptions in this analysis are that CEOs care about their future compensation and have the authority to reallocate funds across segments. To address the question of whether CEOs change investment allocations to influence their compensation, I examine whether conglomerate CEOs invest greater amounts in the segments associated with higher levels of industry executive compensation. The findings support the hypothesis, and they remain strong after I impose careful controls, including controls for segment size, cash flow, investment opportunity and segment fixed effects.

I also provide an additional analysis by examining whether the compensation effect is more pronounced in a restructuring sub-sample of the segment-year observations associated with changes in the firms' reported segments (either adding new segments or dropping previously reported segments). I hypothesize that in restructuring firms, segment capital expenditure is more sensitive to industry pay levels. The evidence indeed suggests that when conglomerate CEOs make these more drastic reallocation decisions, they tend to invest more in segments associated with higher levels of executive compensation.

To address the second half of the question regarding changes in allocation decisions, i.e., whether CEO compensation increases following the allocation decisions, I again focus on the sub-sample of companies that have undergone substantial changes in their segments. My results suggest that both the level and percentage change of CEO compensation are greater for the restructuring firms than for the market sample two years after the segment restructuring activities, thus providing support for the hypothesis.

This paper is part I in a series of research investigating the effects of compensation incentives on CEOs' within-firm investment decisions. It focuses on incentives from the level of their compensation. While previous work has examined the influence of rent-seeking behavior of division managers and the cross-sectional pattern of cross-subsidization on firms' internal capital markets, no previous study has explicitly considered CEOs' own incentives from their compensation. My findings shed light on the capital reallocation process, and point to the importance of additional fundamentals that drive CEOs' investment decisions beyond those previously documented in the academic literature. I am also the first to document that the effect of CEO compensation on segment investment is greater for a sub-sample of restructuring firms, which suggests that industry pay level is an important consideration for CEOs when they make drastic capital reallocation decisions.

The paper proceeds as follows. The next section reviews the related literature. Section II describes the data. Section III presents the main hypotheses, explains the methodology, and describes the findings. Section IV concludes.

Previous Studies on Internal Capital Markets and Executive Incentives

To investigate how capital is being allocated to investment projects, it is necessary to examine the capital allocation process not only across firms, but also within firms. I focus on the within-firm aspect of the problem, which is closely related to the operations of internal capital markets. The first question to ask is whether the internal capital market actively reallocates funds across a firm's divisions. A number of studies document the existence of active internal capital markets, in the sense that the investment of one division is affected by the cash flow of a firm's other divisions (see, for example, Lamont, 1997; Houston, James, & Marcus, 1997; Shin & Stulz, 1998).

A debate continues, however, both in theory and in practice about whether the internal capital market destroys or creates firm value. The literature has identified several mechanisms by which the allocation of funds in an internal capital market can lead to either increases or decreases in efficiency (see, for example, Gertner, Scharfstein, & Stein, 1994; Stein, 1997; Matsusaka & Nanda, 2002; Khanna & Tice, 2001; Maksimovic & Phillips, 2002; Rajan, Servaes, & Zingales, 2000; Scharfstein & Stein, 2000; Berger & Ofek, 1995; Shin & Stulz, 1998; Scharfstein, 1998; Lamont & Polk, 2002; Billet & Mauer, 2003; Xuan, 2009).

Recent studies in the internal capital market literature demonstrate that a connection exists between the cross-sectional pattern of inefficient cross-subsidization and managerial incentives. Scharfstein (1998) directly tests the prediction proposed by Scharfstein and Stein's (2000) model, and finds that investment inefficiencies are less pronounced in firms where one would expect agency problems to be less severe—firms

where top management has a large equity stake. Wulf (2002) addresses information and incentive problems in internal capital markets by examining the relation between compensation contracts for division managers and capital allocation in multi-divisional firms. She finds empirical evidence that is consistent with the hypothesis that division managers' compensation contracts are designed to reduce rent-seeking incentives. Datta, D'Mello, and Iskandar-Datta (2009) reach a similar conclusion as Scharfstein (1998) and suggest that equity-based compensation especially stock options reduce the misallocation of resources. All three papers focus on the cross-sectional differences in investment efficiency across firms, while in this study I explicitly examine the investment allocation within a firm. That is, I focus on the issue of which segments within a firm receive more funding and how that is related to the level of CEO compensation.

Data

The firm segment information comes from the Compustat segment research files, and is available from 1990 to 2002 The sample includes firms that subsequently delisted from Compustat because of mergers, bankruptcies, liquidations, etc. For each business segment, the following variables are included: sales, depreciation, capital expenditures, identifiable total assets, operating profits and SIC code. Segments that do not contain complete information on these variables are excluded from the sample. I make the distinction between single-segment and multi-segment firms, where single-segment firms are those that only report a segment in a given year, whereas multi-segment firms report at least two segments in a given year.

The data on CEO compensation come from the Standard & Poor's ExecuComp database and is available from 1992 through 2002. The ExecuComp database contains compensation data for up to five top executives in the 1,500 firms in the S&P indices: the 500 firms in the S&P 500 Index, the 400 firms in the S&P Midcap Index, and the 600 firms in the S&P Smallcap Index. The detailed compensation information for CEOs in each firm includes their salary, bonus, stock holdings, option grants and total direct compensation.[1] Since the sample of firms in ExecuComp is much smaller than that in the Compustat segment research files, a merger of the two datasets results in a total of 8,687 single segment firm-year observations and 7,542 multi-segment firm-year observations, which covers around 83% of all firms in ExecuComp. In this study I primarily focus on the multi-segment firms, but I use single-segment firms as controls to calculate industry stock returns, median Tobin's q and executive compensation.

All business segments are divided into 48 industries based on their SIC codes and the Fama and French 48-industry definition. Additional firm-level accounting variables come from the Compustat Industrial Annual File, and return and size data come from the Center for Research in Security Prices (CRSP).

Table I presents summary statistics on the principal variables used in this study. The three panels provide information on segment characteristics, firm characteristics, and CEO compensation, respectively. The mean (median) firm in my sample has 3.3 (3.0) segments and a debt ratio of 0.54 (0.55). The mean (median) segment has capital expenditures that constitute 34% (25%) of the firm's total investment in that year. They

[1] In cases where ExecuComp does not indicate which of the executives is the CEO, I assume the executive with the highest salary is the CEO.

have similar shares in the firm's total sales and cash flow. The standard deviation of segment cash flow, however, is very large, reflecting the substantial variation in segment performance. The summary statistics on segment characteristics are, to some extent, consistent with the pattern of cross-subsidization that has previously been documented in the literature; because segments seem to be receiving identical shares in firms' capital expenditures while their past cash flows vary a lot from segment to segment. The average (median) industry Tobin's q is 1.51 (1.36).

Table I: Summary Statistics

This table reports the summary statistics for the key variable used in this study. Data on compensation and segment characteristics are available from 1992-2002. Segment Tobin's q is the industry median Tobin's q for all single-segment firms in the industry in a particular year.

Panel A. Segment characteristics Variable					
	Mean	**Median**	**Standard Deviation**	**10th percentile**	**90th percentile**
Segment investment (as % of firm total investment)	34.13%	25.00%	33.32%	1.32%	84.85%
Segment sales (as % of firm total sales)	33.86%	26.38%	27.49%	3.61%	78.35%
Segment cash flow (as % of firm total cash flow)	34.12%	25.33%	210.22%	-0.17%	88.27%
Segment Tobin's q	1.51	1.36	0.61	1.04	2.03
Panel B. Firm characteristics Variable					
	Mean	**Median**	**Standard Deviation**	**10th percentile**	**90th percentile**
Number of segments	3.26	3.00	1.40	2.00	5.00
Firm leverage	0.54	0.55	0.17	0.30	0.76
Panel C. CEO compensation Variable					
	Mean	**Median**	**Standard Deviation**	**10th percentile**	**90th percentile**
CEO compensation ($000s)	4192	1951	8941	560	8429
Stock ownership	2.96%	0.30%	7.55%	0.03%	9.19%
Compensation in options	28.04%	24.21%	25.40%	0.00%	66.22%

The mean (median) CEO total compensation is $4,191,768 ($1,950,588), and the average CEO owns 2.96% of a firm's total shares, while the median is much lower. The mean fraction of compensation paid out in options is 28.04%. These numbers are

systematically larger than those reported in previous studies, reflecting the dramatic increase in the level of executive compensation and the use of equity-based incentive pay during the 1990s.

Relation between Compensation Incentives and Internal Capital Allocations

Actual and synthetic compensation

Both studies by Bizjak, Lemmon, and Naveen (2008), and Faulkender and Yang (2010) examine how peer groups and the competitive benchmarking process are used to set CEO and other executive compensation. They find that the use of peer groups and benchmarking are pervasive and important in setting CEO and other executives' compensation, and the two main criteria for selecting peer groups are industry and firm size. Given the active role of peer groups and benchmarking in setting pay levels, if we view multi-segment firms as portfolios of investments in various industries, it seems reasonable that CEO compensation of such firms should be tied to pay levels in these related industries. Thus, in this paper I test the hypothesis that the level of CEO compensation is positively related to the weighted average executive compensation of the industries in which the firm's segments operate.

Because pay at the segment level is not observable from the data, I need to develop estimates for segment pay levels. I use two alternative measures of synthetic segment compensation. The first measure is based on firm size and industry. Firm size is defined by the sales of single segment firms within each industry. Firm sales are used as a proxy for firm size mainly because of the observed consistency in the sensitivity of compensation relative to sales that has been documented in several previous studies (see,

for example, Baker, Jensen, & Murphy 1988; Rosen, 1992). Firms are divided into the 48 industry sectors designated by Fama and French (1997) according to their 4-digit SIC codes. To construct a measure in which firm size and industry are the two main considerations in executive compensation, for each of the 48 industries in each year, I regress CEO total direct compensation on firm total sales for all single-segment firms in the industry. I use total direct compensation, which includes salary, bonus, newly granted restricted stocks and executive stock option awards, and other forms of long-term compensation. All components of executive pay are considered because the competitive benchmarking process is shown to cover not only salaries and bonuses, but also equity-based incentive pay. The coefficients from the regressions are then able to capture the relation between CEO compensation and firm size (as depicted by firm sales) for each industry. I then define a synthetic compensation for each conglomerate segment as the predicted value from its industry's regression using the segment's actual sales figure. The synthetic compensation measures the level of CEO compensation associated with managing a particular segment, given the size of the segment and the industry in which it operates. Because this measure of synthetic segment compensation is based on the segment's industry and size, both factors work together to determine the pay level.

A second measure of synthetic segment compensation consists of the industry median compensation for all stand-alone CEOs in the segment's industry. It stands for the level of compensation associated with the CEO's management of a segment in a particular industry. Because this measure of synthetic segment compensation is industry specific but not size specific, it does not depend on the actual size of the segment.

With the segment compensation estimates, the total synthetic compensation for a multi-segment firm can be calculated as the weighted average of its segments' synthetic compensation estimates, either the asset-weighted sum of the predicted segment compensation estimates from industry regressions, or the asset-weighted sum of industry median compensation estimates. It is an estimate of the level of CEO compensation given the portfolio of segments and the industries in which the firm's segments operate. Because the synthetic segment compensation estimates are constructed from stand-alone firms that are independent from the operations of the multi-segment firm, they capture only the industry-specific component of compensation, but not the firm-specific component. Therefore, endogeneity is less of an issue here. That is, any correlation between the level of CEO compensation and the total synthetic compensation for a multi-segment firm is less likely to be due to the total synthetic compensation capturing the firm's own characteristics.

For each conglomerate firm, the actual CEO compensation can then be related to the synthetic compensation built from the estimates for each of the firm's segments. I use the following regression model:

(1) $$CEO\,compensation_{jt} = \beta_0 + \beta_1 (synthetic\ compensation)_{jt} + \beta_2 (squared\ synthetic\ compensation)_{jt} + \eta_j + \varepsilon_{jt}$$

This is a simple bi-variate regression with firm fixed effects. All t-statistics are based on panel corrected standard errors. I regress a CEO's total level of compensation on the weighted-average synthetic segment compensation and I also include a square term of the synthetic compensation to capture any possible concavity/ convexity of the relation. The

squared synthetic compensation is defined as the square of synthetic compensation times 10^{-4} for scaling purpose. The results are presented in Model (1) of Table II. Panel A uses predicted compensation as a measure of segment compensation while Panel B uses industry median compensations. For both models the coefficient on synthetic compensation is positive and significant at the one percent level, suggesting that a conglomerate CEO's compensation is positively related to the synthetic compensation of the firm's segments. The relation is not strictly linear, however, as indicated by the significantly negative coefficient on the square term. In fact the negative coefficient suggests a slightly concave relation between a conglomerate CEO's actual compensation and the synthetic compensation.

Table II: Actual and Synthetic Compensation

This table shows the coefficients from regressions of conglomerate CEOs' total direct compensation ($000s) against conglomerates' synthetic compensation and its square term. The synthetic compensation is the weighted average of segment compensations. In Panel A, segment compensation is the predicted value from the industry's regression using the segment's actual sales figure. The regressions estimate CEO compensation as a function of firm size for all single-segment firms for each industry-year. All business segments are divided into 48 industries based on their SIC codes and the Fama and French 48-industry definition. In Panel B, segment compensation is the industry median total compensation for all single-segment CEOs in the industry. The squared synthetic compensation is defined as the square of synthetic compensation times 10^{-4}. In Model (2) I include firm size as measured by the firm's total sales, and the market average total compensation for all CEOs in that year. Results base on panel regression with fixed effects for firms. Coefficients on firm fixed effects and constants are not reported. All t-statistics are based on the panel corrected standard errors (PCSEs), which adjust for autocorrelation and heteroskedasticity. T-statistics are provided in parentheses.

Dependent variable: CEO compensation		
Panel A. Predicted Value from Regression as Synthetic Compensation		
Independent Variable	Model (1)	Model (2)
Synthetic compensation	0.1026***	0.0380**
	(4.17)	(2.26)
Squared synthetic compensation	-0.0015***	-0.0010**
	(-2.68)	(-1.98)
Market average CEO compensation		0.7042***
		(11.25)
Total sales		0.3363***
		(3.82)

R^2	0.50	0.53
Number of observations	7408	7408
Panel B. Industry Median Compensation as Synthetic Compensation		
Independent Variable	Model (1)	Model (2)
Synthetic compensation	1.5659***	0.4239**
	(8.46)	(2.20)
Squared synthetic compensation	-0.5580***	-0.1700***
	(-7.65)	(-2.63)
Market average CEO compensation		0.6751***
		(10.40)
Total sales		0.3346***
		(3.95)
R^2	0.50	0.53
Number of observations	7499	7499

To rule out the possibility that the relation between actual and synthetic compensation is driven by these variables' mutual correlations with the market average compensation or firm size, I re-estimate the model with the inclusion of two additional control variables:

$$\begin{aligned} CEO\,compensation_{jt} = {} & \beta_0 + \beta_1 (synthetic\ compensation)_{jt} \\ & + \beta_2 (squared\ synthetic\ compensation)_{jt} \\ & + \beta_3 (market\ average\ CEO\ compensation)_t \\ & + \beta_4 (total\ sales)_{jt} + \eta_j + \varepsilon_{jt} \end{aligned} \quad \textbf{(2)}$$

Market average CEO compensation is defined as the cross-sectional average of CEOs' total direct compensation across all firms in a given year. Firm total sales is used as a proxy for firm size. The results are shown in Model (2) of Table II. The coefficients on these two variables are significantly positive at the 1% level, suggesting that the market level of compensation and firm size are important determinants of CEO compensation. After adding them, the coefficients and t-statistics of the synthetic compensation and its

square terms are much smaller, but the patterns still exist. All four coefficients are significant at the 5% level. The finding suggests that the relationship between CEO compensation and segment-level pay is not due to their correlations with the general level of compensation in the market.

These results indicate that a CEO's actual compensation is related to industry pay at the segment level. This positive relation creates incentives for managers to invest relatively more in highly compensated industries, thus a natural question to ask is whether CEOs can influence their compensation through investment allocation choices. Thus in the next section, I further investigate whether CEOs take the opportunity to influence their pay structure through internal capital allocation decisions.

Segment investment and the level of compensation

Based on the fact that firms use peer groups and competitive benchmarking to set levels of salaries, bonuses and stock option grants, managers have incentives to actively participate in the construction of peer groups in order to manipulate the compensation process in their favor. Moreover, since multi-segment firms' CEO compensation is positively related to the weighted average pay in the related industries in which the firms' segments operate, it is natural to investigate whether CEOs change investment allocations in order to favorably influence their compensation contract. In particular, I test the hypothesis that CEOs of multi-segment firms allocate more funds in segments associated with higher levels of industry pay. It is important to examine whether such relation exists after controlling for the other economic factors that might be affecting their investment decisions.

This hypothesis is based on the assumption that CEOs have the power to reallocate funds across segments, and that they are the ones making the final investment decisions. I also control for other economic factors that have previously been shown to affect firms' investment decisions, such as a segment's size, past performance, growth opportunity, and industry (see, for example, Shin & Stulz, 1998; Scharfstein, 1998). Larger segments, segments with better past performances and/or greater growth opportunities may get more funding. Since these factors may be correlated with industry pay levels, I need to control for them in order to examine the marginal effect of segments' pay levels on their capital expenditures. For example, Smith and Watts (1992) suggest that firms with more growth opportunities have higher executive compensation, and use more stock-option awards.

To test this hypothesis, I examine whether relative capital expenditures in a segment are related to the weighted average synthetic segment compensation controlling for other decision factors. Specifically I estimate the following model in which segment capital expenditure as a fraction of the firm's total capital expenditure is the independent variable:

$$\begin{aligned}\frac{CAPX_{i,j}(t)}{\sum_i CAPX_{i,j}(t)} = \beta_0 \; &+ \; \beta_1(Number\ of\ segments_j(t)) \\ &+ \; \beta_2\left(\frac{ASSET_{i,j}(t-1)}{\sum_i ASSET_{i,j}(t-1)}\right) + \beta_3\left(\frac{CF_{i,j}(t-1)}{\sum_i CF_{i,j}(t-1)}\right) \\ &+ \; \beta_4(q_{i,j}(t-1)) + \beta_5\left(\frac{segment\ compensation_{i,j}(t-1)}{market\ avg\ compensation\ (t-1)}\right) \\ &+ \; \beta_6(segment\ pay\ for\ performance\ sensitivity_{i,j}(t-1) \\ &+ \; \eta_{i,j} + \varepsilon_{i,j}(t)\end{aligned} \tag{3}$$

Where

$CAPX_{i,j}(t)$= the capital expenditure of the ith segment of firm j during year t;

$ASSET_{i,j}(t-1)$= the book value of the assets of segment i of firm j during year t-1;

$CF_{i,j}(t-1)$= the cash flow of the ith segment of firm j during year t-1, where cash flow in turn is defined as the sum of operating profits and depreciation.

I include two compensation variables at the segment level as explanatory variables, segment compensation and segment pay-for-performance sensitivity. Segment compensation is the synthetic segment compensation (as defined earlier and estimated from industry cross-sectional regressions) divided by the market average compensation. Segment pay-for-performance sensitivity is defined as the pay-for-performance sensitivity of all stand-alone CEOs in the segment's industry in a particular year. It is estimated from a cross-sectional regression of changes in executive compensation on changes in shareholder wealth. These two variables are of interest because I want to investigate whether industry compensation characteristics play a role in a firm's investment decisions. Segment compensation is a proxy for the relative level of pay while pay-for-performance sensitivity represents the risk-sharing feature implied by compensation contracts. To reduce the possibility of endogeneity and reverse causation, the segment compensation and pay-for-performance sensitivity measures (as well as the other control variables to be introduced below) are measured at the end of a firm's prior fiscal year, while the dependent variable, segment proportional capital investment, is measured in a firm's current fiscal year.

Segment fixed-effects are included to accommodate the segment-specific component. I also control for other firm and segment characteristics such as a firm's total number of segments, relative segment size, cash flow, and investment opportunities. Relative segment size is defined as segment assets as a fraction of the firm's total assets. Similarly, segment cash flow is measured as segment cash flow divided by the firm's total cash flow. Although Tobin's q is probably the most commonly used proxy for investment opportunities, it is not a possible proxy here because it cannot be computed at the segment level due to the inability to observe a segment's market value. A viable alternative proxy is to compute the median q for all single-segment firms in each year in each of the 48 industries designated by Fama and French (1997), and that is the measure used in this paper.[2]

The results from tests of this hypothesis through panel regressions are presented in Model (1) of Table III. Consistent with the hypothesis, the coefficient estimate on the segment compensation variable is significantly positive, suggesting that multi-segment firms invest more in segments associated with higher levels of executive compensation. The economic magnitude of the effect, however, is quite mild. A one-standard-deviation increase in segment compensation is associated with a 0.36% increase in capital expenditure fraction, which is a 1.45% (1.06%) increase for a median (mean) segment. In the meantime, segment pay-for-performance sensitivity, cash flow, and industry median q do not appear to affect segment investment, suggesting that past performance and growth opportunity are not important determinants of segment investment. This is

[2] On the definition of Tobin's q I follow Kaplan and Zingales' (1997) method. They measure Tobin's q as the market value of assets divided by the book value of assets.

somewhat consistent with previous findings that segment investment does not adequately respond to measures of investment opportunities. In fact, the only other control variables that seem to matter are the total number of segments, and segment size as measured by assets fraction. The total number of segments is negatively related to segment investment by construction. The coefficient on segment size is significantly positive, suggesting that larger segments receive more funding from headquarters.

Table III: Segment Investment and the Level of Compensation

This table shows the coefficients from regressions of the ratio of segment investment as a fraction of the firm's total investment against number of segments, segment asset as a fraction of firm total asset, segment cash flow as a fraction of firm total cash flow, segment Tobin's q, segment compensation and segment pay-for-performance sensitivity. Segment compensation is the synthetic segment compensation divided by the market average compensation. Segment pay-for-performance sensitivity is defined as the pay-for-performance sensitivity of all stand alone firms in the segment's industry in a particular year. It is estimated from a cross-sectional regression of change in executive total compensation on change in shareholder wealth. Segment Tobin's q is the industry median q for all single-segment firms in the industry in a year. All business segments are divided into 48 industries based on their SIC codes and the Fama and French 48-industry definition. In Model (2) I include a restructuring dummy and its interactions with the segment compensation and segment pay-for-performance sensitivity. The restructuring dummy equals to one when the segment is associated with a firm that has changed its reported segments by either adding a new segment or dropping an existing segment. Results base on panel regression with fixed effects for segments. Coefficients on segment fixed effects and constants are not reported. All t-statistics are based on the panel corrected standard errors (PCSEs), which adjust for autocorrelation and heteroskedasticity. T-statistics are provided in parentheses.

Dependent variable: segment investment/firm total investment		
Independent Variable	Model (1)	Model (2)
Number of segments	-0.0248***	-0.0288***
	(-7.06)	(-8.76)
Segment assets/firm total assets	0.2229***	0.2147***
	(3.55)	(3.49)
Segment cash flow/firm total cash flow	-0.0013	-0.0013
	(-1.17)	(-1.19)
Segment Tobin's q	0.0012	0.0011
	(0.38)	(0.34)
Segment compensation	0.0024***	0.0011
	(2.61)	(1.10)
Segment pay-for-performance sensitivity	0.0001	0.00003
	(0.52)	(0.23)
Restructuring dummy		-0.0164
		(-0.58)
Segment compensation * restructuring dummy		0.0029**
		(2.38)
Segment pay-for-performance sensitivity *		0.0003

restructuring dummy		(0.50)
R^2	0.75	0.75
Number of observations	23070	23070

I also provide an additional analysis by examining whether the compensation effect is more pronounced when conglomerate CEOs make more drastic reallocation decisions, such as adding a new segment or dropping an existing segment. This leads to the hypothesis that multi-segment firms are more likely to add (drop) segments with greater (lesser) levels of compensation. In order to test this hypothesis, I introduce a restructuring dummy and its interaction terms with the segment compensation variables into the regression. This dummy variable takes on the value of one if a firm has any changes in its reported segments, either by adding new segments or dropping existing segments. This sub-sample of firms is associated with more drastic investment decisions. One drawback to this analysis is that in some cases firms may simply be changing their reporting of existing segments, rather than actually adding or dropping segments. In that case, the noise caused by reporting issues may make it more difficult to measure changes due to restructurings. Since segment research files do not specify the reason or source of changes, adding a segment may be due to: (1) acquiring an existing firm; (2) starting a new segment from scratch; (3) changes in reporting (for example, when the size of an existing segment reaches the reporting threshold of 10% of firm sales or assets, the firm has to report it). Likewise, dropping a segment may be either due to selling an existing segment or reporting changes. It is virtually impossible to scan for reporting changes given the size and complexity of this dataset. Nevertheless, on average, noise due to

reporting should cancel out over time and cross firms, leaving the net effect of restructuring more important.

As can be seen from Model (2) of Table III, the segment compensation effect is evident in this restructuring sub-sample. In fact most of the significance of the coefficient on segment pay level is captured by the interaction term between pay level and the restructuring dummy. A one-standard-deviation increase in synthetic segment compensation in this sample is associated with an additional 0.29% increase in capital expenditure fraction, which is a 1.17% (0.86%) increase for a median (mean) segment. The evidence suggests that when multi-segment firms make these more drastic reallocation decisions, they tend to invest more in segments associated with higher levels of executive compensation. These results imply that firms are more likely to add or drop segments based on their levels of compensation such that the net effect of these restructurings is to provide the CEO with greater compensation.

Compensation following segment restructurings

If CEOs engage in reallocation activities in order to influence their future pay checks, we expect their pay level to rise following such reallocations. To observe this effect, I focus on the sample of restructuring firms. If CEO compensation increases due to reallocation activities, then we should observe a similar or stronger effect in the restructuring sample because these firms have made more drastic allocation decisions; thus, their CEOs are more likely to benefit from pay raises. I then compare their pay changes with those of the market sample, and test the following hypothesis: the change in CEO compensation is relatively greater for firms that have recently restructured than for

other firms. In particular, I compare the level and percentage change of CEO compensation for two samples: the restructuring sample and the market sample, two years after the segment restructuring activities. The restructuring sample is as defined before. The market sample covers all firms in a given year. Through this comparison I can examine whether following major reorganizations, the CEO pay for the restructuring firms increases faster than that of firms in general.

The level of compensation is depicted in Figure 1. The market average CEO compensation increases steadily throughout the 1990s, tops in year 2000, and then declines afterwards. In comparison, the average compensation for restructuring CEOs is much more volatile. However, for eight out of nine years, it stays above the market average compensation, and the mean difference of $703,000 is significant at the 5% level with a t-statistic of 2.67 (paired t-test for mean differences is used).

Figure 2 plots the average percentage change of CEO compensation. Again, the restructuring sample almost always has higher growth rate than the market sample, suggesting that the pattern observed in Figure 1 is not due to engogeneity in that restructuring firms have high levels of compensation to begin with. The mean difference of 61 percent is significant at the 5% level with a t-statistic of 2.96 (again, paired t-test for mean differences is used).

The evidence is consistent with the hypothesis that following segment restructurings, CEOs benefit from both a higher level of compensation and a faster growth rate in that compensation.

The results presented in this section are robust to the use of alternative measures of firm size, synthetic compensation, and investment opportunities. Moreover, the results remain unchanged even after controlling for CEO turnover, tech segment dummy, dropping the smallest segment from each firm-year, and aggregating the compensation data at the firm level to include other executives in the analysis. In addition, the results are not sensitive to sample selection and the inclusion of year dummies.[3]

Conclusion

In this study, I investigate how within-firm investment decisions are affected by incentives that derive from the level of CEO compensation. My overall results indicate that multi-segment firms invest more in those segments associated with industries that have higher executive compensation. Moreover, the impact of managerial compensation on segment investment is more pronounced in the restructuring sample, when firms make more drastic investment decisions, either by adding new segments or by dropping existing ones. The results are consistent with the idea that industry pay level is an important consideration for CEOs when they allocate funds across segments.

Because endogeneity is a potential problem when drawing inferences about the causal relation between compensation incentives and capital allocation decisions, I deal with the problem in the following ways. First, I use lagged control variables in the regression analyses. Second, I try to account for all other factors that have been documented to affect firms' investment decisions, including size, past performance, and

[3] Due to space constraints, these results are not reported here but are available upon request.

investment opportunities. Third, I use firm and segment fixed effects to accommodate the firm-specific and segment-specific components that are not captured by the control variables.

This paper represents a first investigation of the effects of compensation incentives on CEOs' within-firm investment decisions by focusing on incentives from the level of compensation. My future research will also consider incentives from the structure of compensation, such as stock options. In particular, I would like to examine whether CEOs in multi-segment firms respond to option incentives in their compensation by tilting toward high-risk investments. Moreover, future research can examine the value consequences of CEOs' actions, and their implications for the design of optimal compensation contracts.

References

Baker, G. P., Jensen, M. C., & Murphy, K. J. (1988). Compensation and incentives: practice vs. theory. *Journal of Finance, 43*(3), 593-616.

Berger, P. G., & Ofek, E. (1995). Diversification's effect on firm value. *Journal of Financial Economics, 37*(1), 39-65.

Billett, M. T., & Mauer, D. C. (2003). Cross subsidies, external financing constraints, and the contribution of the internal capital market to firm value. *Review of Financial Studies, 16*(4), 1167-1201.

Bizjak, J. M., Lemmon, M. L., & Naveen, L. (2008). Does the use of peer groups contribute to higher pay and less efficient compensation? *Journal of Financial Economics, 90*(2), 152-168.

Datta, S., D'Mello, R., & Iskandar-Datta, M. (2009). Executive compensation and internal capital market efficiency. *Journal of Financial Intermediation, 18*(2), 242-258.

Fama, E. F., & French, K. R. (1997). Industry costs of equity. *Journal of Financial Economics, 43*(2), 153-193.

Faulkender, M., & Yang, J. (2010). Inside the black box: the role and composition of compensation peer groups, *Journal of Financial Economics, 96*(2), 257 – 270.

Gertner, R. H., Scharfstein, D. S., & Stein, J. C. (1994). Internal versus external capital markets. *Quarterly Journal of Economics, 109*(4), 1211-1230.

Houston, J., James, C., & Marcus, D. (1997). Capital market frictions and the role of internal capital markets in banking. *Journal of Financial Economics, 46*(2), 135-164.

Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics, 112*(1), 169-215.

Khanna, N., & Tice, S. (2001). The Bright Side of Internal Capital Markets. *Journal of Finance, 56*(4), 1489-1528.

Lamont, O. (1997). Cash flow and investment: Evidence from internal capital markets. *Journal of Finance, 52*(1), 83-109.

Lamont, O., & Polk, C. (2002). Does diversification destroy value? Evidence from

industry shocks. *Journal of Financial Economics, 63*(1), 51-77.

Maksimovic, V., & Phillips, G. (2002). Do conglomerate firms allocate resources inefficiently across industries? Theory and evidence. *Journal of Finance, 57*(2), 721-767.

Matsusaka, J., & Nanda, V. (2002). Internal capital markets and corporate refocusing. *Journal of Financial Intermediation, 11*(2), 176-211.

Murphy, K. (1999). Executive compensation. In Ashenfelter, O., & Card, D. (editors), *Handbook of Labor Economics* (pp. 2485-2563). New York, NY: Elsevier.

Rajan, R. G., Servaes, H., & Zingales, L. (2000). The cost of diversity: The diversification discount and inefficient investment. *Journal of Finance, 55*(1), 35-80.

Rosen, S. (1992). Contracts and the market for executives. In Werin, L., & Wijkander, H. (editors), *Main Currents in Contract Economics*. Oxford: Blackwell Press.

Scharfstein, D. S. (1998). The dark side of internal capital markets II: evidence from diversified conglomerates. *NBER working paper* 6352.

Scharfstein, D. S., & Stein, J. C. (2000). The dark side of internal capital markets: divisional rent-seeking and inefficient investment. *Journal of Finance, 55*(6), 2537-2564.

Shin, H., & Stulz, R. M. (1998). Are internal capital markets efficient? *Quarterly Journal of Economics, 113*(2), 531-552.

Smith, C., & Watts, R. (1992). The investment opportunity set and corporate financing, dividend, and financing policies. *Journal of Financial Economics, 32*(3), 263-292.

Stein, J. C. (1997). Internal capital markets and the competition for corporate resources. *Journal of Finance, 52*(1), 111-133.

Stein, J. C. (2003). Agency, information and corporate investment. In Constantinides, G., Harris, M., & Stulz, R. (editors), *Handbook of the Economics of Finance (*pp. 111-163). Amsterdam, North Holland: Elsevier Science B.V.

Wulf, J. (2002). Internal capital markets and firm-level compensation incentives for division managers. *Journal of Labor Economics, 20*(2), 5219-5262.

Xuan, Y. (2009). Empire-building or bridge-building? Evidence from new CEOs' internal capital allocation decisions. *Review of Financial Studies*, *22*(12), 4919-4948.