

Executive Compensation as a Moderator of the Innovation – Performance Relationship¹

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Little research has been done to try and connect type of compensation with the use of a specific competitive strategy. We propose that compensation (percentage of base, bonus, options-granted, and stock for the top management team) will moderate the innovation strategy to performance relationship based on risk and time horizon. Analyses of panel data from 1994 to 1998 for 380 firms show that the innovation strategy to performance relationship is moderated by bonus and options-granted compensation. These findings suggest that implementing an innovation strategy and using a high percentage of bonus compensation will lead to greater performance. Alternately, implementing an innovation strategy and using a low percentage of options granted will create the best outcome. Our findings help shed light on the firm-specific mechanisms that enable strategy implementation.

Recent global and economic conditions have reduced the slack available to organizations and have also heightened the need for effective strategy implementation. Given global economic realities, it is critical that firms focus on all aspects of the organization necessary to implement their chosen strategy. Previous research has demonstrated that a variety of organizational attributes are critical to implementation efforts. These include supply chain coordination, organizational design, workforce configuration, and human resource management policies (Shaw, Gupta & Delery,

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2001; Slater & Olson, 2001). Firms that establish a better fit between organizational attributes and their strategy are better able to implement the strategy and have performance advantages as well (Allen & Helms, 2002; Gomez-Mejia, 1992; Lerner & Wulf, 2007; Slater & Olson, 2001; Yanadori & Marler, 2006; Xue, 2007).

A second area of popular concern, particularly after highly visible corporate collapses, bankruptcies, and accounting scandals, is the role of executive compensation in firm performance. Much of the current compensation research has been framed using agency theory (Fama & Jensen, 1983; Jensen & Meckling, 1976) and has provided inconsistent findings (Barkema & Gomez-Mejia, 1998). As a result of these divergent findings, some researchers have suggested looking outside of the agency framework (Garen, 1994; Jensen & Murphy, 1990). We agree that limiting our viewpoint to agency theory and considering only the direct relationship between compensation and performance is too restrictive. This restriction is not only responsible for some of the divergent compensation results, but has also delayed the integration of compensation research in the area of strategy implementation.

An issue at the intersection of the implementation and compensation research is the role of executive compensation in strategy implementation. As noted by Barkema and Gomez-Mejia:

An unresolved issue that remains to be explored is the extent to which the design of a CEO compensation package supports the implementation of a given strategy or instead, helps determine a firm's strategic choices (1998, p. 139).

While Barkema and Gomez-Mejia do not focus explicitly on strategy implementation, they do provide a general framework for understanding executive compensation based on criteria, governance, and contingencies.

Our research contributes to the literature by examining the importance of executive compensation for firms implementing an innovation strategy. We chose to investigate innovation strategies since such strategies incorporate two constructs relevant to compensation research: time horizon and risk. Time horizon, as used in compensation research, typically is defined as either short-term or long-term. Time horizon is especially important to innovation strategy since innovation itself is generally considered a long-term commitment. There is a great deal of up-front research and development (R&D) expenditure that must be undertaken before receiving any future benefit. In addition, innovation strategies incorporate greater strategic risk. As strategy risk increases, executives will attempt to reduce their exposure to this risk (Harrison & March, 1984; Miller & Friesen, 1982) even though risk-taking has been shown to have a positive effect on firm performance (Aaker & Jacobsen, 1987; Gilley, Walters & Olson, 2002).

In summary, this study is intended to extend the compensation and innovation literatures in three ways. First, we attempt to understand the role compensation plays in enabling the implementation of an innovation strategy. Second, we base our moderating arguments on the role of risk and time-horizon in combination with compensation and strategy. Finally, we employ a panel data methodology (380 firms over a 5 year time period) in order to benefit from both cross-sectional and time series data.

Innovation Strategy and Executive Compensation

The major thrust of our argument is that the appropriate executive compensation policy will facilitate the implementation of an innovation strategy. Thus, we expect executive compensation to moderate the relationship between innovation strategy and firm performance. To develop our argument, we begin by briefly discussing innovation and then exploring four elements of executive compensation as a function of time horizon and risk.

Innovation Strategy

One way in which firms try to compete within (and buffer against) the competitive landscape and environmental uncertainty is through the increased use of innovation, either for preemptive reasons or in response to internal or external environmental change (Damanpour, 1991; Hage, 1980; Thompson, 1967). A defining component of an innovation strategy is the firm's spending on R&D. The operationalization of innovation as R&D spending is well-suited for the purposes of this study for three reasons. First, R&D decisions are directly related to the implementation of an innovation strategy. Second, R&D spending is under the direct control of the CEO and top management team (TMT). Thus, executive compensation policies are likely to have a greater effect on the firm's R&D spending. Third, decisions about R&D spending incorporate (either explicitly or implicitly) statements about risk preferences and organizational time horizons. Each of these two constructs is used below to characterize important elements of executive compensation.

Executive Compensation

Many of the important differences between the various forms of compensation can be represented by two interdependent constructs: risk and time-horizon (Table 1). We suggest that risk is a crucial factor in the compensation-performance relationship. Risk reduction is dependent on the type of compensation provided. If executives are not in fear of losing compensation based on performance, they may be more likely to take on the additional strategy risk. If their compensation is tied directly to firm performance and a loss of compensation is possible, the need to reduce their risk would be more likely, resulting in the desire to implement a less risky strategy.

Table 1: *Compensation Time Horizon and Risk Relationship*

	Low Risk	High Risk
Short-Term	Q1 Base	Q2 Bonus
Long-Term	Q3 Options	Q4 Stock

Base compensation. Quadrant 1 (Table 1) shows slow risk and short-term and is defined as basic cash compensation that an employer provides in exchange for work performed. Because of this low compensation risk, executives would feel more at liberty to attempt implementation of a higher-risk strategy (i.e. base would be

considered over bonus because of the lower risk). Innovation strategy is defined as high risk/high return (Hansen & Hill, 1991; Hitt, Hoskisson & Ireland, 1990). Therefore, if executive compensation is not contingent upon implementation success, as in base compensation, the strategic leadership would enjoy more freedom to attempt to implement a higher risk strategy. Firm executives would be motivated to implement an innovation strategy because of the transparent potential for payout.

As the proportion of base pay increases, the strategic leaderships' comfort with risk taking would also increase (especially when compared to bonus). An alternate perspective on base compensation is that if no compensation risk were involved, executives would be less likely to implement a more risky strategy due to their desire to follow the status quo. However, as defined, innovation strategy is high risk/high return. Anticipation of high return may be one factor that drives risk-taking and enables the implementation of an innovation strategy.

Therefore we hypothesize,

Hypothesis 1: The percentage of base compensation moderates the relationship between innovation strategy and firm performance.

Bonus compensation. Quadrant 2 (Table 1) reflects high-risk and short-term bonus compensation and ties compensation to short-term success or performance measures. Bonus is considered high-risk because of the short-term nature and the contingency on performance (especially when compared to base). Bonus pay is often predicated on specific performance standards, thus the TMT is aware of what needs to be accomplished in order to capitalize on the bonus pay component. The risk of not being granted a bonus is an important factor to consider. However, bonus has a short-term time frame which provides the TMT with less ambiguity and better forecasting techniques. It is easier to forecast the result of a decision in the short-term versus considering the long-range implications of decisions as in the case of options compensation. Compared with strictly base compensation, bonus compensation has greater risk in implementing a high-risk innovation strategy.

A short-term, results-based bonus, especially if it constitutes a large portion of the compensation package, will discourage executives from taking the long-term risk involved with innovation strategy because of the lack of predictable compensation. Implementing an innovation strategy is a long-term endeavor. A firm needs to make a conscious decision to pursue innovation and needs to provide ample resources. If a firm were to provide short-term compensation in the form of bonus, this would not support the long-term orientation of the innovation strategy. Thus, no relationship would be present to tie bonus and firm performance together. If executives are presented with specific performance criteria for bonus compensation, they will most likely do whatever is necessary to gain that bonus, instead of focusing on the long-term implications. Another aspect of bonus compensation is the difference between a bonus being available (which motivates future performance) and the actual awarding of a bonus which rewards prior performance. Stock and options are similar in that they reward future performance with anticipation as the motivator and realization (or nonrealization) as the reward.

Hypothesis 2: The percentage of bonus compensation moderates the relationship between innovation strategy and firm performance.

Options compensation. Options compensation which is low-risk and long-term (see Quadrant 3, Table 1), provides the most flexibility for executives. The individual executive has the most control over options, as individuals choose whether or not to exercise them. This compensation method provides the strategic leadership with the ability to hedge against a negative outcome using their incentive compensation. In the event that their projects/innovations are unsuccessful, the strategic leadership could choose not to exercise their options and instead wait until the firm moves into a more favorable position. This flexibility promotes risk-taking by the TMT and mitigates the inherent risk of an innovation strategy.

To better understand options compensation, we contrast it with stock compensation based on three key differences: 1) amount of control and flexibility, 2) downside risk, and 3) ability to buffer. Ultimately, stocks and options are the same piece of company ownership. However, the options alternative gives individuals the choice of whether or not they want that piece of ownership at a specific point in time, with a specific price and value. Options must be exercised to become shares of stock, with the decision of timing being made somewhat by the individual. The second major difference is downside risk. With stock compensation, downside risk is always present. If the firm's stock begins to fall, the strategic leadership has no way to change their compensation. However, with options, if the stock begins to fall, the strategic leadership could choose not to exercise their options and thus, endure no downside risk. Although the risk of options is much lower, and the downside risk is minimal, there are some who would argue that options do carry with them an opportunity cost, which should be figured into downside risk. Finally, because the environment is constantly changing, the use of options provides executives with the opportunity to buffer against poor performance and fluctuations in internal and external environments.

Options carry with them no downside risk essentially, whereas stock compensation does carry some of that risk. It is this lack of risk that promotes more risk-taking in strategy implementation. The risk literature provides support for the distinction between stock and options compensation by suggesting that as contingent compensation increases, managers' risk-taking propensity decreases (Finkelstein & Hambrick, 1988; Zajac, 1992). Presumably, options are given in lieu of a higher level of base compensation, with the thought that executives will be positively motivated to look for long-run increases in the stock's value. The lack of downside risk aligns options compensation with innovation strategy and should improve firm performance. From the dynamic perspective (as opposed to a static one), options do carry risk. This is especially apparent in today's economic environment where executives and directors have lost substantial amounts of money because of the increased use of options compensation. As the firm's stock price falls below the options purchase price, the value of the compensation becomes worthless.

So with innovation strategy (high-risk), options will provide less compensation risk than that of stock compensation. Therefore,

Hypothesis 3: The percentage of options compensation moderates the relationship between innovation strategy and firm performance.

Stock. The final quadrant, Quadrant 4 (Table 1), is stock compensation (high-risk and long-term). As compensation risk increases, so does the strategic leaderships' risk aversion, making it less likely that they will attempt to implement a risky endeavor such as an innovation strategy (Beatty & Zajac, 1994; Gomez-Mejia, 1994; Gray & Cannella, 1997; Hill & Phan, 1991; Wiseman & Gomez-Mejia, 1988). Stock compensation is considered pay for performance and the strategic leadership does not have discretionary control over this type of compensation. Restricted and common stock is awarded to executives without their making the decision to exercise (unlike options compensation). Similar to bonus type compensation, a specified level of performance is defined, and if the strategic leadership meets or exceeds this target, they are rewarded (i.e. bonus is also high-risk on the short-term continuum). Because of this lack of exercise choice and long-term characteristic, stock carries the most risk for executives. Stock compensation is used to align the interests of the TMT with the shareholders by providing rewards for increasing shareholder value (Jensen & Murphy, 1990). The TMT's fear of adversely affecting present shareholder value would deter the TMT from taking what they perceive to be high-risk actions. In the case of high innovation strategy (high-risk), a low-risk compensation type would be preferred (i.e. base or options). Thus,

Hypothesis 4: The percentage of stock compensation moderates the relationship between innovation strategy and firm performance.

Methods

Sampling and Data Collection

Publicly traded firms were selected from ten industries that varied based on R&D intensity. Only publicly traded firms were used because of the sensitive nature of compensation data. A two-stage process was employed during sample identification. First, compensation data were collected by industry from the *Execucomp* database which contains data on companies in the Standard & Poor (S&P) 1500. Next, these data were matched to data from *Compustat*, removing companies with missing R&D data. We selected the final sample based on industries with the greatest number of matches and varying levels of R&D intensity (measured by R&D expenditure/number of employees) (Hill & Snell, 1988; Scherer, 1984).

Compensation data covered a 5-year time span (1994-1998). Performance data were lagged to cover 1995-1999 in order to better estimate the effect of compensation on future performance (Finkelstein & Boyd, 1998). Our final sample consisted of 1900 observations and included data on 380 firms. All dollar values were adjusted for inflation and all data were archival. In addition, outliers were removed from the sample and normality was checked for each variable. Variables that were not normal were transformed when possible by using the natural log.

Independent and Moderator Variables

Innovation strategy. Innovation strategy was measured using R&D expenditure per sales as an indicator of what is being accomplished from R&D money spent, controlling for firm size. This strategy also provides a richer variable than using R&D expenditure alone (Hansen & Hill, 1991; Hay & Morris, 1979; Meyer-Krahmer & Reger, 1999; Scherer, 1984). This is an important indicator of an innovation strategy since the focus is on how companies transform R&D money into a successful outcome.

Compensation. Compensation data came from the S&P's *Execucomp* database, which is compiled from SEC Filings requiring compensation information for the CEO and the 4 highest paid executives. Compensation was divided into base, bonus, options granted, and stock representing both short- and long-term compensation. All compensation was reported in dollars. The value of options granted was estimated using a Black-Scholes based (1973) option valuation model, which incorporates the exercise price of the option, the option term until exercise, an interest rate factor, a volatility factor, and dividend rate.

To calculate percent compensation, we summed each compensation type over all executives listed. A grand total of all compensation (base, bonus, stock, options granted) for each TMT was then calculated for use in generating the percentage compensation figure. These percentages were used for hypothesis testing, trying to tease out the role each compensation type plays in enabling the implementation of an innovation strategy.

Dependent and Control Variables

Financial performance. Return On Assets, Return On Equity, and Earnings Per Share data were collected from the *Compustat* database maintained by the S&P. After preliminary analysis provided similar results for all three financial measures, we performed a factor analysis to assess the number of factors present (Gomez-Mejia, Tosi & Hinkin, 1987; Tosi & Gomez-Mejia, 1994). This analysis suggested the presence of only one factor with all component loadings greater than 0.5. The loadings were as follows: EPS (.781); ROA (.882); ROE (.862); Eigenvalues (2.132); Percent of Variance=71.057. In order to create one aggregate measure, we multiplied the variable's z-score by the factor loading, then summed the three weighted scores to create the final variable called financial performance (Gomez-Mejia et al., 1987; Tosi & Gomez-Mejia, 1994).

Control variables. We controlled for industry using dummy variables based on a 2-digit SIC code. Company and year were also controlled through dummy variables from our use of the least squares dummy variable (LSDV) analysis, which categorizes data into groups.

Analysis

We employed a panel data methodology using LSDV because of our use of cross-sectional (380 firms) as well as time series data (5-years). Two of the key problems with panel data methodology are heteroscedasticity and auto-correlation (Hannan & Young, 1977). In this case, ordinary least squares (OLS) are ineffective in determining the regression estimates.

To interpret the direction of the moderating term, a graphing procedure was used whereby the independent variable (innovation strategy) was categorized as high or low, as was the moderator variable (i.e. high percent base compensation and low percent base compensation) (Cohen & Cohen, 1983; Dwyer & Fox, 2000; Hitt et al., 2001; McFarlin & Sweeney, 1992; Welsh & Dehler, 1988). This information was then graphed, resulting in two representative lines plotted against the independent variable (x-axis) and the dependent variable (y-axis). For example if the moderator of interest was percent base compensation the resulting lines would be high percent base compensation and low percent base compensation. The lines were then interpreted for the direction of slope, as well as interception of the two lines.

Results

The correlations, means, and standard deviations of all the study variables are presented in Table 2. Innovation strategy (measured by R&D/Sales) is positively and significantly correlated with percent base compensation and percent options compensation. Alternatively, innovation strategy is negatively and significantly correlated with percent bonus compensation and percent stock compensation. Financial performance is significantly correlated with all independent and moderator variables.

Table 2: Descriptive Statistics and Zero-Order Correlation Coefficients

Variable	Mean	S.D.	1	2	3	4	5
<i>Performance</i>							
1. Financial Performance	.08	1.76					
<i>Innovation Strategy</i>							
2. R&D Expenditure/ Sales	.27	2.68	-.23***				
<i>Short-Term Compensation</i>							
3. TMT % Base	.36	.19	-.14***	.04*			
4. TMT % Bonus	.18	.12	.29***	-.11***	-.02		
<i>Long-Term Compensation</i>							
5. TMT % Options	.33	.24	-.12***	.08***	-.63***	-.47***	
6. TMT % Stock	.03	.07	.09***	-.05*	-.15***	-.06***	-.12***

N=1900

* p<.05

** p<.01

***p<.001

(two-tailed tests)

Table 3 presents the results of hypothesis testing. The results are presented in hierarchical fashion to better represent the effect of the interaction between innovation strategy and compensation. Model 1 includes dummy variables for company, year, and industry (coefficients not shown), innovation strategy, and compensation. Model 2 expands on Model 1 by adding the interaction between innovation strategy and compensation.

Hypothesis 1, which predicted a significant moderating effect of base compensation on the innovation strategy-performance relationship, was not supported. The coefficient for base compensation was not significant with financial performance as the dependent variable.

Table 3: Results of Generalized Least Squares Regression Analysis of Innovation Strategy and Base Compensation Effects on Firm Financial Performance

Independent Variables	Financial Performance							
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
R&D/Sales	-.75 ^{***}	-.75 ^{***}	-.61 ^{***}	-.49 ^{***}	-.72 ^{***}	-.68 ^{***}	-.70 ^{***}	-.70 ^{***}
% Base Compensation	-.35 ^{***}	-.34 ^{***}						
% Bonus Compensation			.34 ^{***}	.41 ^{***}				
% Options Compensation					.02	.05		
% Stock Compensation							.10*	.09*
R&D/Sales X % Base Compensation		.00						
R&D/Sales X % Bonus Compensation				.37 ^{***}				
R&D/Sales X % Options Compensation						-.20 ^{***}		
R&D/Sales X % Stock Compensation								-.04
R ²	.15	.15	.15	.19	.11	.12	.12	.12
F	27.83 ^{***}	25.50 ^{***}	27.46 ^{***}	32.92 ^{***}	20.37 ^{***}	20.45 ^{***}	20.52 ^{***}	18.85 ^{***}

Coefficients reported are unstandardized. * p<.05 ** p<.01 ***p<.001

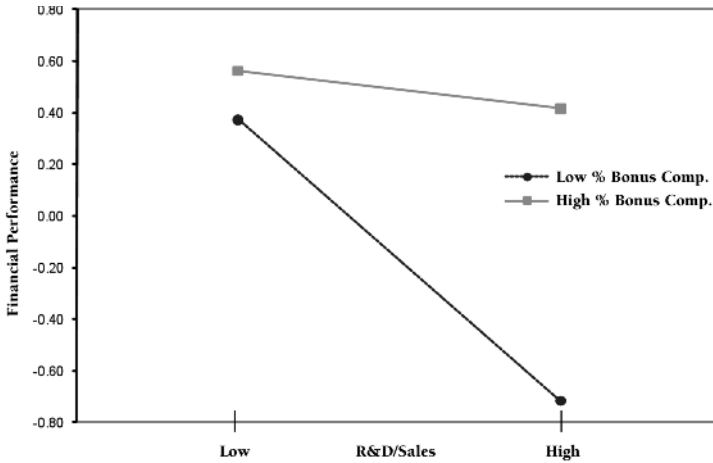
Hypothesis 2, which predicted a significant moderating effect of bonus compensation on the innovation strategy-performance relationship, was supported. All of the eight models with the interaction term entered were significant. The coefficients for percent bonus compensation were both positive and significant with financial performance as the dependent variable ($\beta=.37$, $p<.001$; $F=32.92$, $p<.001$).

Hypothesis 3, which predicted a significant moderating effect of options compensation on the innovation strategy-performance relationship, was also supported. The coefficient for percent options granted compensation was both negative and significant with financial performance as the dependent variable ($\beta=-.20$, $p<.001$; $F=20.45$, $p<.001$).

Hypothesis 4, which predicted a significant moderating effect of stock compensation on the innovation strategy-performance relationship, was not supported for financial performance.

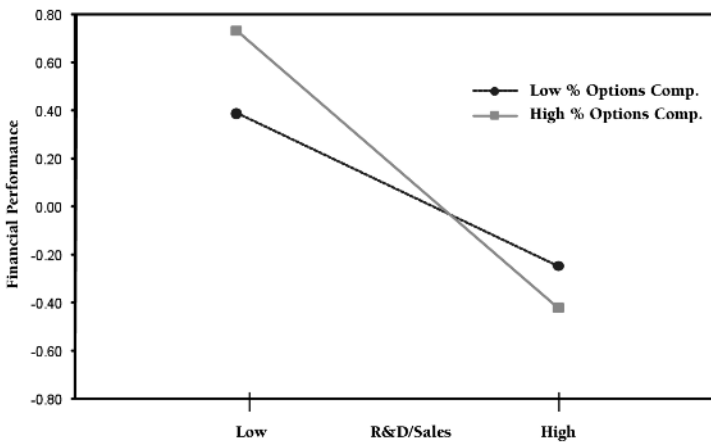
The models with significant interaction effects were further analyzed to correctly interpret the interaction effects. We followed Dwyer and Fox (2000) and graphically represented the moderating effect of compensation on innovation strategy and performance. Figure 1 illustrates the bonus compensation interaction for financial performance. The interaction graph for bonus compensation suggests that for both low and high innovation strategy (measured as R&D/Sales), the use of high bonus compensation is most beneficial. We interpret the results in this manner because the low and high base compensation lines do not intersect (nor are they parallel).

Figure 1: Interaction Between R&D/Sales and TMT Percent Bonus Compensation



The options compensation graph (Figure 2) has the most interesting interpretation because the high and low compensation lines intersect. This suggests that for high innovation strategy (measured as R&D/Sales), the use of low-percent options granted compensation is most beneficial. Alternatively, for low innovation strategy, the use of high-percent options granted appears to provide improved financial performance.

Figure 2: Interaction Between R&D/Sales and TMT Percent Options Granted Compensation



Discussion and Conclusion

In this paper, we investigated the relationship between innovation strategy and firm performance, especially under various conditions of short- and long-term compensation. Our findings provided a road map for companies that are pursuing an innovation strategy and need to design the most beneficial compensation package for

their top management team. Companies pursuing an innovation strategy should design their compensation packages in such a way as to be heavy on bonus and light on option type pay. For companies not focused on innovation, compensation packages should still be heavy on bonus type pay, but also heavy on option pay.

We drew on agency theory as well as the risk and time horizon relationship in order to frame our ideas and explain this relationship. Analyses of data from 380 firms over 5 years support some of our assertions. Results indicated that compensation does moderate the innovation strategy to the firm performance relationship when considering bonus and options compensation. More specifically, we found that short- and long-term compensation have different driving mechanisms in organization decision-making when regarding strategy implementation.

We used a two-by-two matrix to model our arguments and show the distinction between types of compensation. These arguments were also framed using risk to try and understand what is driving managers' decision-making. Our results suggest that all strategies, whether they be low- or high-risk require short-term compensation. This provides additional support for the focus of compensation being placed on the time component of compensation, as opposed to the risk component. Our findings defined this difference by showing that high-percent bonus compensation is related to greater performance levels, no matter the strategy risk involved. We believe these findings emphasize the pay-for-performance relationship (one that is especially prevalent in today's organizations) and highlight the positive benefits of bonus compensation. Bonus compensation has the added benefit of being a clearer, more predictable form of compensation since bonus pay occurs in the short-term. It is easier for managers to forecast and predict short-term effects of strategy implementation than long-term effects.

Alternatively, long-term compensation and level of risk provide different findings. Our findings suggest that if low-risk strategies are being implemented, compensation can be tied directly to performance in the form of long-term compensation without any reduction in firm performance. In contrast, when high-risk strategies are being implemented, long-term compensation must not be tied directly to performance in order to foster better firm results. This result is an important finding and should be considered when determining compensation packages.

Contributions, Limitations, and Future Directions for Research

We made three significant contributions to the strategic management literature. First, we tried to address and translate Barkema and Gomez-Mejia's (1998) call for research into how compensation is related to strategy implementation. This paper is one of the first to treat compensation as a moderating factor and suggests that compensation enables the implementation of a specific strategy. Secondly, we extended the compensation literature by basing this moderating relationship not only on compensation time-horizon, but the risk relationship as well. Finally, we utilized panel data methodology, which maintains the richness of cross-sectional and time-series data.

In spite of the above contributions, there are some important limitations to this research. One such limitation was the use of completely archival data. Although some would argue that archival data are more accurate than informant data, archival also has

limited richness. The main limitation for this study arises when measuring innovation strategy. We were looking to capture the broadest possible conceptualization of innovation strategy. However, using archival sources limited our measuring capability. Although we set out to cast a broad net, the R&D measure used is skewed toward product innovation.

Sample selection was also a problem. In the original design of the study, we attempted to sample from 6 industries (2 low R&D intensity, 2 medium R&D intensity, 2 high R&D intensity) providing a "balanced" sample. In addition, we hoped to stratify the sample by size to focus on business level decisions, as opposed to corporate level ones. The available data did not allow for this split. Of the 380 companies in the final sample, 348 fell in the greater-than \$100,000,000 sales category. Our final sample selection consisted of 10 industries. This change in the design was necessary due to limited compensation data. The final sample was also somewhat unbalanced. A single industry, Chemical and Allied Products (SIC 28), considered high R&D intensity had 86 companies. At the next level of R&D intensity, 4 industries were represented with 202 companies. At the low R&D intensity end, 5 industries were represented with 92 companies.

This study moved research a step closer to understanding the intricacies of strategy implementation. Although this study did not open the "black box" of implementation, it did shed some light on mechanisms that enable implementation. Future studies might look to broaden the sample with additional industries and a more balanced design to enhance the generalizability. Investigating other strategies and the role of the enabling mechanism holds many possibilities as well.

There are also additional opportunities in considering other enabling mechanisms. For instance, options research is becoming much more popular and useful in examining the incentive relationship. We merely scratched the surface looking at options granted as representative of long-term compensation in this study. A much more in-depth investigation of options may help to shed more light on this "special" compensation type, especially as ethical and legal issues surround this form of compensation. Options have many more components to consider such as type of options granted, time period for vesting, and awards schedule, all of which may prove to be a driving factor for the interaction between strategy and compensation.

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