COMPENSATION STRATEGY: DOES BUSINESS STRATEGY INFLUENCE COMPENSATION IN HIGH-TECHNOLOGY FIRMS?

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Drawing on the strategic employee group concept, this study empirically examines whether a firm’s innovation strategy influences compensation systems for strategic employee groups in the high-technology industry. We focus on compensation packages for R&D employees who play a critical role in successful implementations of innovation strategy. Using compensation data for middle-level managers and professional employees from 237 firms in the high-technology industry, we found that a firm’s strategic intention to pursue innovation has a significant influence on the relative pay level, compensation time horizon, and stock option vesting period lengths of this strategic employee group.

When properly designed, compensation systems promote desirable employee behaviors, which are instrumental to the successful implementation of business strategies (Gerhart and Rynes, 2003; Milkovich and Newman, 2005). As a result, good fit, or alignment, between an organization’s business strategy and its compensation systems should lead to improved organizational effectiveness (Gerhart, 2000; Gomez-Mejia and Balkin, 1992). Based on this premise and its implication for organizational effectiveness, both researchers and practitioners expect firms pursuing different business strategies to have different compensation systems with business strategy representing a key influence on compensation design.

This study provides empirical evidence on the influence of business strategy on organizational compensation systems in U.S. high-technology firms. We show that a firm’s strategic intention to pursue innovation, which we call ‘innovation strategy,’ influences compensation systems below the executive level in the high-technology industry, and, in particular, strategic employee groups (Gomez-Mejia and Balkin, 1992a; Milkovich 1988). Strategically, if some employee groups are more important than others, then organizations may choose to develop compensation systems that consider these differing strategic contributions. For example, R&D employees in high-technology firms pursuing innovation are often regarded as strategic employee groups because their efforts directly influence the organizations’ innovation capabilities (Gomez-Mejia and Balkin, 1992a; Milkovich, Gerhart, and Hannon, 1991).

This is one of the first empirical studies to investigate whether and how an organization’s business strategy shapes strategic employee groups’ compensation. The study also contributes to researchers’ efforts (e.g., Balkin and Gomez-Mejia, 1987, 1990; Boyd and Salamin, 2001; Gomez-Mejia, 1992; Gomez-Mejia and Balkin, 1992a)
to generalize the relationship between business strategy and compensation design. Examining multiple dimensions of firm-level compensation systems, which more accurately describes the array of a firm’s strategic compensation decisions (Gerhart, 2000), we investigate the effect of a firm’s strategic intention to pursue innovation on three dimensions of strategic employee groups’ compensation systems: (1) pay structure (the difference in pay level between R&D employees and other employees); (2) compensation time horizon (the ratio of long-term pay to short-term pay); and (3) pay design (stock option vesting period lengths).

Our study proceeds as follows. We develop our theoretical framework and hypotheses in the next section. We then specify our analytical approach using hierarchical linear modeling and compensation data collected on thousands of managerial and professional employees across multiple firms in the high-technology industry. In the following sections, we discuss our results and their implications for theory.

**THEORY AND HYPOTHESES**

Balkin and Gomez-Mejia conducted a stream of studies that suggested business strategies influenced firm-level compensation systems (Balkin and Gomez-Mejia, 1987, 1990; Gomez-Mejia, 1992; Gomez-Mejia and Balkin, 1992a). Over the ensuing two decades, other researchers have built on this strategic compensation perspective. Offering an international dimension, Boyd and Salamin (2001) examined Swiss financial institutions and reported a significant correlation between organization business strategies and compensation systems. Several studies also examined whether a certain combination of business strategies and compensation systems resulted in better performance (e.g., Montemayor, 1996; Rajagopalan, 1997).

Common to these studies was their use of either diversification strategy or Miles and Snow’s (1978) typology. While both are valid strategic dimensions, organizational strategies are not limited to these. Indeed, some human resource management researchers have argued that such measures of strategy are too generic to accurately describe the relationship between business strategy and human resource practices (Chadwick and Capelli, 1999; Wright and Sherman, 1999). They suggested that relationships between human resource practices and business strategy would be more precisely understood if studies focused on a single industry and researchers developed a strategy measure that was particularly relevant to that industry.

Within the high-technology industry, Balkin, Markman, and Gomez-Mejia (2000) reported that CEO pay levels were related to a firm’s innovation activities and thus highlighted the influence of innovation strategy on compensation systems within this industry. Other research has also suggested that compensation systems in firms in the high-technology industry are distinct from those in the other industries (Balkin and Gomez-Mejia, 1987; Diaz and Gomez-Mejia, 1997) and that the differences are related to differences in the degree to which firms are research intensive.

In the high-technology industry, being technologically innovative increases an organization’s potential to develop a source of sustained competitive advantage (Arora, Fosfuri, and Gambardella, 2001). Consequently, an emphasis on innovation is a legitimate strategic direction for firms in this industry (Hill and Snell, 1988). The most straightforward action for a firm that pursues innovation is to increase its resource allocation to R&D investments to enhance the firm’s technological advantage. R&D investments also help the firm develop absorptive capacity, which enables the firm to generate new knowledge through the knowledge gained from external resources (Cohen and Levinthal, 1990; Tsai, 2001).

One may think that all firms in the high-technology industry emphasize innovation since high-technology firms are often defined as firms that emphasize R&D; e.g., firms whose R&D expenditures exceed a certain proportion of their sales (e.g., Balkin et al., 2000). However, firms competing in this industry exhibit sizeable variance in their focus on R&D investments. Some firms in the high-technology industry diversify their business and operate in multiple industries (e.g., business consulting, financing) simultaneously. As a result, the relative importance of pursuing innovation may not necessarily be high in such firms.

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1 Balkin and Gomez-Mejia (1987) is the only exception. It examined the effect of product life cycle on compensation systems.
Strategic employee groups and pay structure

While coordinated work among various employee groups is essential, some groups may be regarded as more strategically important because they contribute more to organizational competitiveness. These groups also might be difficult to replace or substitute (Gomez-Mejia and Balkin, 1992a). Gomez-Mejia and Balkin (1992a: 101) called such important employees ‘strategic employee groups’ and argued that, given their importance, an organization should tailor its compensation packages to meet their preferences.

When firms pursue innovation, R&D employees are critically important because they directly influence their firm’s technological advantage (Gomez-Mejia and Balkin, 1992a; Milkovich et al., 1991). Firms that pursue innovation rely on human resources that actually develop innovative products in order to reap the returns on R&D investments. Consequently, the importance of R&D employees increases as a firm allocates more resources to R&D investments (Balkin and Bannister, 1993; Hambrick and MacMillan, 1985).

Resource dependence theory (Pfeffer and Salancik, 1978) also provides an explanation for why the design of compensation packages for strategic employee groups may differ from other employees. Resource dependence theory asserts that employees in positions critical to acquiring resources (e.g., money, technology, accreditation from regulatory agencies) or controlling such resources, either internally or externally, will have considerable influence over the organization. Gomez-Mejia and Balkin (1992b) found that employees most critical to a firm’s mission, such as research producing faculty in Research I Institutions where there was a higher resource dependence on research, tended to be higher paid and provided greater incentives. Pfeffer and colleagues also found that organizations offered employees in resource critical positions better compensation packages such as higher pay levels in order to attract and retain strategic resources (Pfeffer and Davis-Blake, 1987; Pfeffer, Davis-Blake, and Julius, 1995).

Variance in firms’ emphasis on innovation will lead to differences in their perceptions about which employee groups are strategic. Thus, the strategic importance of R&D employees will increase as a firm emphasizes innovation. Higher relative importance of a strategic employee group in generating critical resources should be manifested in their compensation packages. Consequently, as a firm’s emphasis on innovation increases, so will the difference in pay level between R&D employees and other employees.

Hypothesis 1: Innovation strategy moderates the relationship between employee group and employee pay level in high-technology firms such that the greater the emphasis on innovation, the higher the relative pay level of R&D employees to other employees.

Strategic employee group, time horizon, and pay design

Innovation strategy requires a long-term perspective as it takes many years to realize benefits from R&D investments (Balkin et al., 2000; David, Hitt, and Gimeno, 2001). David et al. (2001: 144) describe R&D investments as ‘temporal trade-offs,’ since these investments often involve sacrificing short-term performance in order to achieve greater long-term profitability. A long-term perspective is desirable for successful implementation of innovation strategy. Consequently, a strategic compensation system supporting this strategic orientation should aim to emphasize a long-term perspective among its employees, especially among R&D employees, who constitute a strategic employee group for such a firm.

Compensation time horizon is an important dimension of compensation systems (Gomez-Mejia and Balkin, 1992a) because some pay forms are based on short-term results (e.g., merit pay, annual bonus) while other pay forms direct attention to long-term outcomes (e.g., stock options, stock grants). Researchers have long recognized this temporal dimension of compensation (e.g., Gomez-Mejia and Balkin, 1992a; Hoskisson et al., 1989) although there is limited empirical evidence concerning its determinants. Given the importance of a long-term perspective in successful implementation of innovation strategy, compensation time horizons for R&D employees should be designed so as to direct R&D employees’ attention to their firm’s long-term success. Consequently, a firm pursuing an innovation strategy should design compensation time horizons that place greater emphasis on long-term pay forms relative to short-term pay forms.

A firm that emphasizes long-term pay relative to short-term pay while pursuing an innovation...
strategy, however, may also increase employee compensation risk because long-term performance is more uncertain than short-term performance. Employees, therefore, may perceive greater compensation risk with an increased emphasis on long-term pay in their compensation packages (Beatty and Zajac, 1994). Traditional agency theory-based research has suggested that organizations with greater performance risk should avoid pay packages that increase compensation risk (e.g., Bloom and Milkovich, 1998). The combination of firm-level performance risk arising from the uncertainty associated with R&D investments (Baysinger, Kosnik, and Turk, 1991; Greve, 2003; see Larraza-Kintana, 2000, for an alternative perspective) and compensation risk from more uncertain long-term pay may shift too much risk to agents, resulting in less optimal actions and decisions (Hoskisson et al., 1989).

Although research suggests agency costs associated with increasing compensation risk is a valid concern in general, it may be, however, less relevant for strategic employee groups whose critical contributions to their organization’s effectiveness give them greater employment security (Baron, Davis-Blake, and Bielby, 1986; Lepak and Snell, 1999; Osterman, 1987). A basic implication of resource dependence theory (Pfeffer and Salancik, 1978) is that organizations seek to retain employees in strategic employee groups because organizations critically depend on the resources these strategic employee groups provide. The strategic human resource management perspective also supports this implication. This perspective suggests that human resource practices for employee groups whose strategic value is high and who make unique contributions to organizations are characterized by higher job security, emphasis on promotion within, and extensive training (Lepak and Snell, 2002). Consequently, strategic employee groups are likely to have greater employment security than other employees in general.

As suggested by the behavioral agency model (Wiseman and Gomez-Mejia, 1998), the variability of future income streams plays an important role in shaping employees’ risk perceptions. Given greater job security, strategic employee groups will be insulated from future income uncertainty. Greater employment security, therefore, will serve to offset perceptions of compensation risk associated with a greater emphasis long-term pay.

Employees who are retained in R&D jobs also may be less risk-averse individuals (cf. Gomez-Mejia and Balkin, 1989) who are more comfortable with the inherent uncertainty associated with a job in which output is more uncertain than that of other jobs (e.g., administrative jobs). Indeed, some researchers claim that R&D employees are more willing to accept compensation risk in return for the greater upside potential offered by financial incentives compared to compensation without such incentives (Balkin and Bannister, 1993).

In sum, in the context of strategic employee groups, the potential negative influence implied by agency theory of increased compensation risk resulting from an increased emphasis on long-term pay should be less critical than it is for those who are not considered part of a strategic employee group. Consequently, R&D employees’ compensation in firms pursuing innovation should reflect a greater proportion of long-term pay to short-term pay consistent with the firm’s business strategy.

Hypothesis 2: Innovation strategy has a positive effect on the relative emphasis of long-term pay to short-term pay in R&D employees’ compensation in high technology firms.

Business strategy should also influence the pay designs of compensation systems. We argue that the length of stock options’ vesting period represents an aspect of pay design which is related to strategically desirable employee behavior. Stock option vesting period refers to ‘the amount of time it takes for an option to become exercisable’ (National Center for Employee Ownership, 1998). Recipients of stock options usually have to wait a specified number of years before exercising options to realize financial gains. A survey by the National Center for Employee Ownership (2001) reported that vesting periods generally range from 1 to 7 years. Four years is the most common, but there is sizeable variation across firms. It is likely that some across-firm variance reflects an organization’s strategic intention.

A stock option’s value depends on firm stock performance over time; consequently, stock option vesting periods direct stock option recipients’ attention to their firm’s future stock performance.

2 This idea is based on a comment from an anonymous reviewer.
The vesting period keeps recipients from putting too much focus on short-term performance, which may be detrimental to future performance. Given that innovation strategy is successfully executed when the interests of R&D employees are aligned with their firms' long-term success, a firm that pursues innovation will be motivated to set longer vesting periods for R&D employees. By doing so, the firm expects its R&D employees to pay greater attention to their firm’s future performance and to the successful exploitation of R&D investments. Hence, the strategic compensation perspective suggests that a high-technology firm pursuing an innovation strategy will lengthen stock option vesting periods particularly for its R&D employees.

Furthermore, strategic human resource management researchers argue that high-quality human capital is a source of sustained competitive advantage and the role of human resource practices is to contribute to a firm’s effort to build its competitive advantage by attracting, retaining, and motivating high-quality human capital (Wright, McGahan, and McWilliams, 1994). Talented R&D employees are clearly a potential source of sustained competitive advantage for a firm that pursues innovation. High turnover of these employees is costly not only due to the costs of searching for and hiring new employees but also because new knowledge is often created through the interactions among R&D employees. Thus each employee is needed on a longer-term basis to capture learning curves that are synergistically developed with peers. Extending the stock option vesting period discourages recipients from changing firms because, in order to exercise options, recipients must stay with their firms until their options become exercisable (Core and Guay, 2001). Consequently, a longer vesting period encourages employees to stay with their firms longer. As a result, firms pursuing an innovation strategy will seek to retain R&D employees by extending stock option vesting periods.

**Hypothesis 3**: Innovation strategy has a positive effect on the length of the vesting period of stock options granted to R&D employees in high technology firms.

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³ This idea is based on a comment from an anonymous reviewer.

**METHODS**

**Data**

The data were obtained from SC/CHiPS annual compensation survey of participating firms in the high-technology industry compiled by Clark Consulting. The database contains individual employees’ compensation data as well as information on employees’ jobs, job levels, and tenure for more than 100 firms operating in the high-technology industry (e.g., computer hardware, computer software, and telecommunications) from 1997 to 2000. We collected firm-level information from Standard & Poor’s COMPUSAT, which we merged with our compensation database. While both public and private firms participated in the compensation survey, this study excluded private firms because of the difficulty in collecting firm-level information. Our data collection effort yielded 1,073,711 employees below the executive level (e.g., middle-level managers and professional employees) from 237 firm-years. It includes 474,727 R&D employees from the same firms. Both established and newly emerging firms were included in our dataset; the size of firms measured in terms of the number of employees ranges from fewer than 100 to over 100,000.⁴

**Dependent variables**

To test our hypotheses, we used three dependent variables: pay level (Hypothesis 1), the ratio of long-term pay to short-term pay (Hypothesis 2), and the length of the stock option vesting period (Hypothesis 3). For the measure of pay level, we used total pay, short-term pay, and long-term pay. Total pay includes virtually all forms of monetary (e.g., base pay, profit sharing awards) and non-monetary compensation (e.g., stock options, employee benefits). Monetary values of employee benefit plans represent hypothetical values that an employee would need to purchase equivalent plans in the marketplace. In addition to total pay, we used short-term pay and long-term pay as pay-level measures to examine whether there are any differences in the effect of innovation strategy on the levels of these two pay categories, whose time horizon is different. Short-term pay

⁴ To maintain anonymity of the firms in our dataset, we do not provide exact number of employees.
includes base pay, profit-sharing award, and other short-term incentives (i.e., cash award related to annual corporate, division, unit or individual performance). Base pay is included in short-term pay since it is revised annually or more frequently based on short-term performance and increased skill. Long-term pay includes equity-based compensation (e.g., stock options). The value of long-term pay was estimated using the Black–Scholes pricing model. These definitions of short-term pay and long-term pay are consistent with Balkin et al. (2000). Since our datasets include compensation data collected from different years (i.e., 1997–2000), the rate of inflation was adjusted using the Consumer Price Index (CPI).

The ratio of long-term pay to short-term pay (long-term to short-term ratio) was calculated for the dependent variable to test Hypothesis 2.

Vesting period was measured by number of years.

Because the distributions of total pay, short-term pay, long-term pay, and long-term to short-term ratio are skewed, we applied a logarithmic transformation.

### Independent variables

**Innovation strategy**

We used each firm’s R&D intensity, calculated as R&D expenditure (in dollars) divided by the number of employees (Hill and Snell, 1988), as a proxy for innovation strategy. We recognize that several researchers claim that R&D intensity may not fully capture organization innovation activities because every dollar spent on R&D investment does not always lead to innovation. These researchers suggest that research take account of the outcome of innovation as well as the inputs. Consequently, they either develop new measures such as a composite measure of R&D expenditure and the number of patents (Balkin et al., 2000) or employ other measures such as the number of new products developed (Kochhar and David, 1996). These approaches would be valid if one were interested in an organization’s innovative activities or its innovative capability. In this study, however, we are interested in a firm’s intention to pursue innovation. Intention to pursue innovation is different from innovation activities or innovative capability. The latter two are more associated with innovation strategy implementation, whereas a firm’s strategic intention is best measured by its resource allocation. Thus, we believe that R&D intensity is the most relevant measure for our analyses. When calculating each firm’s R&D intensity, the rate of inflation was adjusted using the CPI. Because the distribution of this variable is skewed, we used a logarithmic transformation.

**Control variables**

We included several relevant control variables. They are individual- and firm-level variables and industry membership.

**Individual-level variables**

The first individual-level control variable is job family. Our dataset provides three categories of job family: R&D jobs, technical jobs, and administrative jobs. R&D jobs include semiconductor engineers, CAD engineers, and development engineers. Technical jobs include business systems analysts, data base specialists, and application programmers. Administrative jobs include finance, legal, and human resources. We used an indicator variable, R&D job, 1 if an employee holds an R&D job and 0 otherwise. Job family was controlled for only when we tested Hypothesis 1, which was concerned with the difference in pay level between an R&D job group and other job groups. In testing Hypotheses 2 and 3, we only used R&D employees in the dataset.

We also controlled for employee job level. There are eight job levels based on the scope of jobs and their responsibility. Levels 1–5 are professional contributors, and levels 6–8 are middle-level managers. Executives were excluded from our analyses. A higher number corresponds to a higher job level. Finally, we included employee tenure, which was measured as years in the job.

**Firm-level variables**

First, we included firm size as a control variable. Research suggests that firm size influences both pay level (Ehrenberg and Smith, 2003) and mix of different pay components (Zenger and Marshall, 2000). We used the number of a firm’s employees to control for firm size. We also controlled for firm performance. More profitable firms may be able to pay more. Anderson, Baker, and Ravindran (2000) reported that firm performance was
positively associated with the relative importance of incentives. We used return on assets (ROA) to measure firm performance. In addition, we added each firm’s price–earnings ratio (P/E ratio) and cash flow. P/E ratio indicates the market value of the firm and it may influence the firm’s stock option decisions (e.g., how many options should be granted). P/E ratio was calculated by dividing a firm’s stock price (fiscal year closing price) by earnings per share. Since stock options do not require contemporaneous cash payment, firms that are short on cash flow may be motivated to use stock options. Finally, we included year dummy variables. As the distribution of firm size is skewed, we applied a logarithmic transformation.

Industry membership

We also controlled for industry. In our datasets, each firm self-reported its industry membership based on a categorization supplied by Clark Consulting. There are 12 subsets of industry in our dataset, including computer hardware, semiconductor, PC software, peripheral, communications, defense, applied special services, consumer electronics, telecommunication services, storage, manufacturing equipment, and others.

Model

Owing to the multilevel structure of our dataset, we used hierarchical linear modeling (Littell et al., 1996). To test Hypothesis 1, we estimated this model:

\[
(\text{Pay level})_{ijk} = \beta_{0jk} + \beta_{1jk}(\text{R&D Job})_{ijk} + \beta_{2jk}(\text{Tenure})_{ijk} + \epsilon_{ijk} \\
\beta_{0jk} = \gamma_{00k} + \gamma_{01k}(\text{Firm size})_{jk} + \gamma_{02k} \\
\times (\text{Firm performance})_{jk} + \gamma_{03k}(\text{P/E ratio})_{jk} \\
+ \gamma_{04k}(\text{Cash flow})_{jk} + \gamma_{05k}(\text{Innovation strategy})_{jk} \\
+ \gamma_{06–08k}(\text{Year dummies})_{jk} + U_{0jk} \\
\beta_{1jk} = \gamma_{10k} + \gamma_{11k}(\text{Innovation strategy})_{jk} + U_{1jk} \\
\gamma_{00k} = \tau_{000} + V_{00k} \\
\]

To test Hypotheses 2, we estimated the following model:

\[
(\text{Long-term to short-term ratio})_{ijk} = \beta_{0jk} \\
\beta_{0jk} = \gamma_{00k} + \gamma_{01k}(\text{Firm size})_{jk} + \gamma_{02k} \\
+ \beta_{1jk}(\text{Job level})_{ijk} + \beta_{2jk}(\text{Tenure})_{ijk} + \epsilon_{ijk} \\
\beta_{0jk} = \gamma_{00k} + \gamma_{01k}(\text{Firm size})_{jk} + \gamma_{02k} \\
\times (\text{Firm performance})_{jk} + \gamma_{03k}(\text{P/E ratio})_{jk} \\
+ \gamma_{04k}(\text{Cash flow})_{jk} + \gamma_{05k}(\text{Innovation strategy})_{jk} \\
+ \gamma_{06–08k}(\text{Year dummies})_{jk} + U_{0jk} \\
\gamma_{00k} = \tau_{000} + V_{00k} \\
\]

To test Hypothesis 3, we estimated the third model:

\[
(\text{Vesting period})_{ijk} = \beta_{0jk} + \beta_{1jk}(\text{Job level})_{ijk} + \beta_{2jk}(\text{Tenure})_{ijk} + \epsilon_{ijk} \\
\beta_{0jk} = \gamma_{00k} + \gamma_{01k}(\text{Firm size})_{jk} + \gamma_{02k} \\
\times (\text{Firm performance})_{jk} + \gamma_{03k}(\text{P/E ratio})_{jk} \\
+ \gamma_{04k}(\text{Cash flow})_{jk} + \gamma_{05k}(\text{Innovation strategy})_{jk} \\
+ \gamma_{06–08k}(\text{Year dummies})_{jk} + U_{0jk} \\
\gamma_{00k} = \tau_{000} + V_{00k} \\
\]

In these equations, \( ijk \) means employee \( i \) in firm \( j \) in industry \( k \). \( \beta \) s and \( \gamma \) s are predictors. \( \tau_{000} \) is the industry mean of \( \gamma_{00k} \). \( U_{0jk} \) and \( U_{1jk} \) are firm-level random effects, and \( V_{00k} \) is an industry-level random effect. \( \epsilon_{ijk} \) is an error term. \( U_{0jk} \), \( U_{1jk} \), \( V_{00k} \), and \( \epsilon_{ijk} \) are all assumed to be iid-normal with means 0 and their variances are \( \delta^2_{U0jk} \), \( \delta^2_{U1jk} \), \( \delta^2_{V00k} \), and \( \delta^2_{\epsilon_{ijk}} \). When testing Hypothesis 1, we used three pay-level measures for the dependent variable: short-term pay, long-term pay, and total pay. For firm-level independent variables, we took a 1-year lag. For instance, we estimated total pay in year \( t \) using individual-level information in year \( t \), firm-level information in year \( t–1 \), and industry membership in year \( t \).

Hypothesis 1 addresses the pay differentials between R&D employees and other employee groups. Consequently, pay data that combined R&D employees and other employee groups were analyzed. We examined whether \( \gamma_{11k} \) in the first equation is positive and significant in order to test Hypothesis 1. Hypotheses 2 and 3 are concerned with the compensation packages for R&D employees. Consequently, R&D employees’ pay data were analyzed. For testing Hypotheses 2 and 3, we examined whether \( \gamma_{05k} \) is positive and significant in the second and third equations, respectively.
RESULTS

Descriptive statistics and a correlation matrix for the data are presented in Table 1. We show two sets of correlations in our matrix: the lower left values are correlations using all employees (for the analysis testing Hypothesis 1) and the upper right values are correlations using only R&D employees (for the analyses testing Hypotheses 2 and 3). Descriptive statistics and correlations were calculated using the datasets, which merged individual compensation information with firm-level information. In other words, the means of firm-level variables (e.g., firm size, firm performance) were weighted by the number of individual observations in each firm. An unweighted mean size of firms measured by the number of employees is 27,922; although there is substantial variation, firms in our datasets are relatively large. The mean total pay for all employees in our dataset is $118,159.

The results of our hierarchical linear model (HLM) analyses that estimated pay level are presented in Table 2. As explained above, we used three dependent variable measures: short-term pay, long-term pay, and total pay. We calculated the differences in $-2\log$ likelihood ratio between the equations with the interaction (i.e., R&D job and innovation strategy) and those without it and we confirmed that adding this interaction term significantly improved the goodness of fit of our models. The moderation effects of innovation strategy on the relationship between R&D job and pay level ($\gamma_{11k}$) were all positive and significant ($p < 0.001$ for all). It suggests that the stronger the firm’s intention to pursue innovation, the higher the relative pay level of R&D employee group as compared to other employee groups. This supports Hypothesis 1. The direct effect of innovation strategy ($\gamma_{00k}$) was also positive and significant. This result is consistent with the result in Balkin et al. (2000), which reported a positive relationship between firm innovation and CEO pay level.

Table 3 describes the results of the HLM analyses that estimated long-term to short-term ratio and the length of the stock option vesting period in R&D employees’ compensation packages. The left column is the result of the analysis of long-term to short-term ratio. The effect of innovation strategy on long-term to short-term ratio ($\gamma_{00k}$) was positive and significant ($p < 0.001$), suggesting that innovation strategy increases the emphasis on long-term pay relative to short-term pay. This supports Hypothesis 2. The right column of Table 3 is the result of the analysis that estimated the length of the stock option vesting period. The effect of innovation strategy ($\gamma_{00k}$) was positive and significant ($p < 0.001$), suggesting that innovation strategy has the effect of extending the length of the vesting period of stock options. This supports Hypothesis 3.\(^5\)

DISCUSSION

This study examined whether a firm’s business strategy influences its compensation systems in high-technology firms. The uniqueness of this study is that we focused on compensation systems of strategic employee groups (Gomez-Mejia and Balkin, 1992a; Milkovich, 1988) and their relationship with the intention to pursue an innovation strategy, one of the most critical business strategies in the high-technology industry (Hill and Snell, 1988). Given the critical role strategic employee groups play for firm success, the fit between business strategy and compensation systems should be more salient in strategic employee groups’ compensation packages. Our analyses supported this assertion. Examining the compensation packages for R&D employees, we showed that a firm’s intention to pursue innovation influences compensation design: specifically, pay level for R&D employees relative to others, compensation time horizon of R&D employees, and their length of the stock option vesting period.

Our analyses indicated that organizations differentiate the compensation designs of strategic employee groups and non-strategic employee groups based on their differing strategic contributions. Although not reported, we also examined whether innovation strategy influenced non-R&D employee groups’ time horizon and their stock option vesting period lengths. Our analyses indicated that innovation strategy influenced the long-term to short-term ratio ($\gamma_{00k} = 1.284, p < 0.001$) and stock option vesting period lengths ($\gamma_{00k} = 0.372, p < 0.01$) for non-strategic employee groups, although the effect sizes were smaller than those for R&D employee groups.

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\(^5\)While our correlation matrix shows that innovation strategy and cash flow are highly correlated, the results were essentially the same when we ran our models without cash flow.
Table 1. Descriptive statistics and correlations

<table>
<thead>
<tr>
<th>Variable</th>
<th>All employees</th>
<th>R&amp;D employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>1. Total pay*</td>
<td>4.73</td>
<td>0.41</td>
</tr>
<tr>
<td>2. Short-term pay*</td>
<td>4.36</td>
<td>0.32</td>
</tr>
<tr>
<td>3. Long-term pay*</td>
<td>1.24</td>
<td>1.74</td>
</tr>
<tr>
<td>4. Long-term to short-term ratio</td>
<td>-1.57</td>
<td>9.91</td>
</tr>
<tr>
<td>5. Vesting period</td>
<td>4.17</td>
<td>0.92</td>
</tr>
<tr>
<td>6. R&amp;D job</td>
<td>0.44</td>
<td>0.50</td>
</tr>
<tr>
<td>7. Job level</td>
<td>3.57</td>
<td>1.60</td>
</tr>
<tr>
<td>8. Tenure</td>
<td>2.79</td>
<td>1.44</td>
</tr>
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<td>9. Firm size*</td>
<td>11.00</td>
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<td>10. Firm performance</td>
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<tr>
<td>11. P/E ratio</td>
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<td>23.23</td>
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<tr>
<td>12. Cash flow</td>
<td>2.59</td>
<td>2.28</td>
</tr>
<tr>
<td>13. Innovation*</td>
<td>10.14</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Values below the diagonal are for the all employee sample ($N = 1,073,711$) and above are the R&D employee sample ($N = 474,727$). Correlations greater than $|0.002|$ below the diagonal and $|0.003|$ above the diagonal indicate $p < 0.05$.

* Indicates the variables are logarithmic.
Results of year dummies are available on request.

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Table 2. Results of hierarchical linear model analysis on pay level

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Short-term pay</th>
<th>Long-term pay</th>
<th>Total pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual-level variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D Job ($\beta_{1,1}$)</td>
<td>-0.148*</td>
<td>-1.234**</td>
<td>-0.219*</td>
</tr>
<tr>
<td>Job level ($\beta_{2,1}$)</td>
<td>0.148***</td>
<td>0.337***</td>
<td>0.175***</td>
</tr>
<tr>
<td>Tenure ($\beta_{3,1}$)</td>
<td>0.021***</td>
<td>-0.035***</td>
<td>0.011***</td>
</tr>
<tr>
<td>Firm-level variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size ($\gamma_{0,1}$)</td>
<td>0.018***</td>
<td>0.004</td>
<td>0.030***</td>
</tr>
<tr>
<td>Firm performance ($\gamma_{0,2}$)</td>
<td>0.002*</td>
<td>0.028***</td>
<td>0.004***</td>
</tr>
<tr>
<td>P/E ratio ($\gamma_{0,3}$)</td>
<td>-0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Cash flow ($\gamma_{0,4}$)</td>
<td>-0.002</td>
<td>-0.044</td>
<td>-0.010</td>
</tr>
<tr>
<td>Innovation ($\gamma_{0,5}$)</td>
<td>0.059***</td>
<td>0.517***</td>
<td>0.110***</td>
</tr>
<tr>
<td>Moderation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D job x Innovation ($\gamma_{1,1}$)</td>
<td>0.028***</td>
<td>0.144***</td>
<td>0.035***</td>
</tr>
</tbody>
</table>

$N = 1,073,711$ employees from 237 firms

* $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Results of year dummies are available on request.

Table 3. Results of hierarchical linear model analysis on long-term to short-term ratio and stock option vesting period length

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Long-term to short-term ratio</th>
<th>Vesting period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual-level variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job level ($\beta_{1,1}$)</td>
<td>0.599***</td>
<td>0.002***</td>
</tr>
<tr>
<td>Tenure ($\beta_{2,1}$)</td>
<td>-0.062***</td>
<td>-0.010***</td>
</tr>
<tr>
<td>Firm-level variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size ($\gamma_{0,1}$)</td>
<td>-0.101</td>
<td>0.057</td>
</tr>
<tr>
<td>Firm performance ($\gamma_{0,2}$)</td>
<td>0.057**</td>
<td>0.035***</td>
</tr>
<tr>
<td>P/E ratio ($\gamma_{0,3}$)</td>
<td>-0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Cash flow ($\gamma_{0,4}$)</td>
<td>-0.070</td>
<td>-0.159*</td>
</tr>
<tr>
<td>Innovation ($\gamma_{0,5}$)</td>
<td>1.445***</td>
<td>0.389***</td>
</tr>
</tbody>
</table>

$N = 474,727$ employees from 237 firms

* * $p < 0.001$; * * $p < 0.01$

Results of year dummies are available on request.

Consequently, non-strategic employee groups’ compensation packages are also influenced by firm business strategy. This mirroring effect may occur so as not to completely decouple pay systems across subunits to maintain a certain level of internal pay equity among different employee groups. To maintain internal equity, organizations may try to minimize differences by designing non-strategic employee groups’ compensation packages so that they appear to be similar to strategic employee groups’ compensation. It would be interesting to empirically examine if there is such a cascading effect (e.g., from strategic employee groups’ compensation packages to non-strategic employee groups’ compensation packages).

We also encourage further research on the relationship between business risk, compensation risk, compensation time horizon, and employee risk perceptions. Consistent with the strategic compensation perspective and the behavioral agency model (Wiseman and Gomez-Mejia, 1998), we showed that strategic employee groups in firms that pursued innovation had a greater proportion of long-term pay to short-term pay in their compensation packages. Contrasting traditional agency theory with the behavioral agency model, we argued that increased compensation risk imposed by increasing long-term pay could be offset by lower employment risk in the case of strategic employee groups who benefit from better employment security compared to other employees. The results of our study revealed the potential usefulness of the behavioral agency model in explaining non-executive employees’ risk perceptions. In order to strengthen our findings, testing employees’ income risk perceptions, both for strategic employee groups and other employees, would be useful.

This study has several limitations. One caveat is that we focused on innovation strategy. We believe this is a reasonable strategy dimension in high-technology firms. Yet it is not the only effective strategy and the examination of the relationship between other business strategy dimensions and compensation management would be beneficial. The task of exploring relevant business strategies is still an unresolved issue for compensation researchers (Gerhart, 2000). Another issue that needs to be addressed is the time period in which the research was conducted. We used data from 1997 to 2000, when the U.S. economy exhibited remarkable performance, and so did high-technology firms. While our data are relatively recent as compared with other studies (e.g., Balkin and Gomez-Mejia, 1990; Gomez-Mejia, 1992; Gomez-Mejia and Balkin, 1992a; Boyd and Salamin 2001), in 2001 and after, the economy slowed substantially and many high-technology firms suffered significant financial and market value losses. Analyzing the compensation data from 2001 or after may provide us with...
different insights on compensation management of strategic employee groups.

Finally, we examined compensation time horizons, which represent a relatively neglected dimension of compensation management. From the viewpoint of fit with innovation, we believe that this dimension is relevant. To bolster this finding, replicating past studies conducted in other contexts using this time horizon measure would be useful.

In conclusion, our study confirms that high-technology firms develop their compensation systems considering both their innovation strategy and strategic employee groups. Given our large sample size of actual employee compensation data, our study makes a significant contribution to generalizing the influence of firms’ business strategy on organization compensation systems. Expanding our research framework to other industries, however, will substantially improve our knowledge of strategic compensation.

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REFERENCES


