Geographic and Industrial Corporate Diversification: The Level and Structure of Executive Compensation

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We explore the relation between corporate diversification and CEO compensation. We document that geographic diversification provides a compensation premium, while industrial diversification is associated with lower levels of CEO pay. We also examine the effect of corporate diversification on the structure and performance criteria of CEO compensation contracts. We find that both diversification strategies are associated with a greater use of incentive-based compensation and with a greater reliance on market-based, rather than accounting-based measures of firm performance. Finally, we address the question of whether shareholders reward CEOs for corporate diversification. We document that while value-enhancing geographic diversification is rewarded, non-value-enhancing industrial diversification is penalized.

1. Introduction

The academic and business communities have shown a strong interest in the structure and level of executive compensation. Recent studies have also provided theory and evidence on the relation between chief executive officer (CEO) compensation and firm characteristics.[1] An underlying theme of this literature is that CEO compensation is a function of the scope and complexity of the CEO's task,

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1. See for example Gaver and Gaver (1993), Baber et al. (1996), and Bryan et al. (2000) for evidence on investment opportunities and CEO compensation. Similarly, Rose and Shepard (1997) report that industrial diversification is associated with greater CEO compensation, while Finkelstein and Hambrick (1989) find no evidence of an association between compensation and industrial diversification. Compensation issues are also discussed in the management literature. For example, Carpenter and Sanders (1998) report a positive but weak relationship between management team compensation and firm geographic diversification. Their results are predicated on a single-year study (1992 data) of 258 firms.

firm risk, and the impact of these attributes on shareholder wealth. In this study, we extend this line of research by exploring the empirical relation between CEO compensation and both geographic and industrial corporate diversification. We argue that, since corporate diversification affects the complexity of the operating environment, the risk of the CEO's human capital, and firm value, these diversification strategies are important determinants of the level and structure of CEO compensation.[2]

Specifically, we investigate the effects of corporate diversification on *"what"* and *"how"* CEOs are rewarded. To provide evidence on the *"what"* question, we explore the relation between both forms of corporate diversification and the levels of CEO pay. We investigate the *"how"* question in three ways. First, we examine the influence of corporate diversification on the use of incentive pay in CEO compensation. Second, we explore the link between corporate diversification and the relative importance of performance measures in executive compensation (i.e., accounting vs. market measures of performance). Third, we analyze how CEOs are rewarded (penalized) for value enhancing (reducing) corporate diversification by examining the impact of changes in corporate diversification on changes in CEO compensation.[3]

Our analysis of 7,085 firm-year observations from 1991 to 1996 strongly suggests that the level as well as the structure of executive compensation are related to both geographic and industrial diversification. We document an increase (reduction) in total compensation associated with geographic (industrial) diversification. We also find that CEOs derive a greater portion of their income from incentive-based compensation with both greater geographic and industrial diversification. Our empirical analysis also suggests that there is a greater reliance on market-based performance measures associated with greater corporate diversification. Finally, using first-difference specifications that isolate the change in compensation for a change in corporate diversification, we find that CEOs are rewarded for value-enhancing geographic diversification, but are penalized for embarking on value-reducing industrial diversification.

To demonstrate that our findings are due to economic factors and not problems with our empirical design or chance correlations, we consider several alternative specification tests to check the robustness of our basic findings. Our results remain generally consistent with our expectations.

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2. Human capital describes the accumulated knowledge and skills of the CEO. Human capital risk refers to the extent to which personal and nondiversifiable risk is imposed on the CEO. Various studies (e.g., May [1995]) suggest that a large part of a typical CEO's human capital is firm-specific. When firm performance is poor, CEOs risk the loss of their jobs and much of their earnings potential. This suggests that CEOs are subject to considerable human capital risk and that relative to shareholders, they may have a higher demand for firm-specific risk reduction.

3. To avoid an omitted variable bias, we consider both forms of corporate diversification simultaneously in all of our testing. Consistent with Bodnar et al. (1998) we find that failing to control simultaneously for both industrial and geographic diversification leads to biased coefficient estimates. Specifically, regressions without geographic diversification lead to biased estimates of the industry coefficient estimate (multinational firms tend to be involved in multiple industries).

This study contributes to current research by documenting systematic evidence on the effects of the two main forms of corporate diversification on the level and structure of CEO compensation. It also offers new insights on the linkages between these firm characteristics and the motivation strategies employed to induce managers to make decisions that are consistent with shareholder wealth maximization.

The paper is organized as follows. Section 2 develops and presents our predictions, based on the theoretical relation between corporate diversification and executive compensation. Section 3 describes the sample selection process and the data sources. Section 4 reports the results of our empirical analyses. It also discusses various alternative specifications and measures we employ to test the robustness of our results. Section 5 summarizes the results and implications of the study.

2. Theory and Hypothesis Development

Prior theory suggests that the level of executive compensation is a function of the complexities and demands of the CEO's job. Specifically, marginal productivity and human capital theories argue that corporate complexity and investments in human capital determine executive pay (Rosen [1982]; Agarwal [1981]). Both theories suggest a simple matching model, where managers with higher ability are matched with positions in which the marginal return to ability is higher (Rosen [1982]; Rose and Shepard [1997]).

The human capital risk of the manager is another important determinant of managerial compensation. For example, the principal-agent models (e.g., Holmstrom [1979]) stress the need to consider the potential disadvantages of forcing managers to bear excessive human capital risk.[4] A premise of agency literature is that undiversified CEOs and diversified shareholders have divergent risk preferences, which results in CEOs requiring greater compensation for greater firm risk. Thus, shareholders need to compensate managers for bearing additional risk attributable to value-enhancing activities (e.g., management of investment opportunities or geographic diversification). Similarly, managers should be penalized for risk-reducing but value-decreasing diversification strategies (e.g., industrial diversification).[5] Substantial empirical evidence provides support that complexity and risk are major determinants of CEO pay (Rosen [1982]; Smith and Watts [1992]; Baber et al. [1996]).

Agency theory also suggests that CEO compensation should be tied to changes

4. Based on prior literature (Core et al. [1999]) we proxy the CEO's human capital risk with firm risk.

5. Extant literature (e.g., Amihud and Lev [1981, 1999]; Denis et al. [1997]) argues that industrial diversification strategy provides a classic example of the "agency cost hypothesis." According to these studies, managers maintain value-decreasing industrial diversification strategy if their private benefits from this form of diversification activity exceed their private costs. An important benefit from industrial diversification is the reduction in managers' personal portfolio risk. We discuss this issue in greater detail in Section 2.2.

in shareholder wealth (principal's objective). Although we do not focus on the value effects of corporate diversification, the question of whether shareholders reward (penalize) CEOs for value-enhancing (decreasing) diversification strategies, based on the value effects of these forms of diversification, is of interest. Recent theoretical and empirical evidence suggests that, while geographic diversification is on average associated with increase in firm value (shareholder wealth), industrial diversification reduces shareholder wealth.[6]

2.1 Geographic Diversification and Executive Compensation

A common perspective is that multinational firms represent the most complex managerial decision-making environment (e.g., Finkelstein and Hambrick [1989]). Firm geographic diversification is associated with firm complexity due to the dependence on multiple foreign markets (Bodnar et al. [1998]). This complexity is a function of cultural and legal diversity and is manifested in differential customer, supplier, labor, regulatory, and capital markets (Gomez-Mejia and Palich [1997]). Firm complexity is also caused by difficulties inherent in developing, coordinating, and maintaining organizational networks in an international environment (Bartlett and Ghoshal [1989]). Effective decision making with this diverse and more complex information set requires greater ability and should be associated with greater compensation. Moreover, recent research also suggests a positive relation between firm risk and geographic diversification due to greater exchange rate risk, political risk, and differing levels of country risk, which dominate the risk reduction associated with investing in imperfectly correlated markets (Bartov et al. [1996]; Reeb et al. [1998]; He and Ng [1998]). Based on the greater complexity and risk associated with the management of international operations, we argue that the level of CEO compensation should be associated with the degree of geographic diversification.

The increased complexity of international operations should also affect the structure of executive compensation because the cost and difficulty of monitoring manager behavior is influenced by geographic diversification. In particular, shareholders and boards of directors can have difficulty monitoring managers as they have less information about firm operations (and greater difficulty in interpreting the information they have) due to geographic constraints, cultural differences, higher auditing costs, differing legal systems, and language differences (Reeb et al. [1998]).

These national differences also increase the complexity and difficulty of the information processing demands faced by the CEO. Consequently, the CEO possesses more specialized knowledge of the firm's local markets and operations, ex-

6. The evidence on geographic diversification is provided, for example, in Errunza and Senbet (1984), Morck and Yeung (1991), and Bodnar et al. (1998), while the industrial diversification evidence is found in Berger and Ofek (1995) and Bodnar et al. (1998).

acerbating the information asymmetry between the shareholders and the CEO. Consistent with the agency-theoretic perspective, a number of empirical studies find a greater use of incentive compensation in settings where managers' actions are more difficult to observe (e.g., Gaver and Gaver [1993]). Therefore, as observing management actions becomes more difficult with increasing international activities, shareholders are motivated to offer contracts that are more incentive based (i.e., by linking CEO pay to indicators of firm performance). If so, then the use of incentive CEO compensation varies directly with corporate geographic diversification.

We also focus on the effect of geographic diversification on the choice between market- and accounting-based performance measures in CEO compensation. Agency theory and empirical evidence suggest that accounting-based measures of performance are incrementally useful over market-based measures in CEO compensation contracts (e.g., Holmstrom [1979]; Banker and Datar [1989]; Bushman and Indjejikian [1993]; Baber et al. [1996]). However, this usefulness depends on the incremental informativeness of earnings about managerial effort or its role in efficient risk sharing between the shareholders and the CEO. For example, when accounting returns are less informative with respect to the CEO's actions (e.g., when IOS is a substantial portion of firm value) there is greater reliance on market-based measures than on accounting-based measures (Smith and Watts [1992]; Gaver and Gaver [1993]; Baber et al. [1996]; Bryan et al. [2000]).

We posit that geographic diversification leads to different choices in the appropriate measures of managerial performance. Specifically, we expect greater relative importance of market-based performance measures versus accounting-based measures for firms with greater geographic diversification. This expectation is predicated on two separate arguments. First, Rosen (1982) notes that managers have discretion in choosing among various accounting or reporting alternatives, which can be used to manipulate accounting earnings. The potential for manipulating earnings is higher in international settings than in a domestic environment because of the ability and incentive of managers to arbitrage differing accounting and tax regimes, resulting in a noisier measure (Scholes et al. [1992]). Agency theory (Holmstrom [1979]) suggests that the weight placed on a performance measure varies inversely with its noisiness.

The second argument is based on foreign exchange exposure. Although accounting and economic exposure have differing implications, the potential for imperfect hedging suggests that accounting-based performance measures are noisier than stock performance in an international context. With the increased potential for accounting earnings manipulation in the international firm and the potential for increased noise due to foreign exchange exposure, we predict a direct relation between reliance on stock return performance measures and geographic diversification.

Finally, we focus on the shareholder wealth impacts of geographic diversification and the effect on CEO compensation. The evidence from the securities mar-

kets indicates that geographic diversification is, on average, associated with greater shareholder value (Errunza and Senbet [1984]), which suggests that managers should be rewarded for this value enhancing activity.

These geographic diversification arguments indicate four testable implications: (1) CEO total compensation varies directly with geographic diversification; (2) the use of incentive compensation, relative to the fixed portion, varies directly with geographic diversification; (3) geographic diversification is associated with a greater use of market-based rather than accounting-based performance measures in CEO compensation; and (4) a change in geographic diversification varies directly with a change in CEO compensation.

2.2 Executive Compensation and Industrial Diversification

Substantial research on industrial diversification focuses on valuation consequences. Recent research finds a penalty associated with industrial diversification research (Berger and Ofek [1995]; Bodnar et al. [1998]).[7] Based on value effects, we predict that changes in industrial diversification will be negatively associated with changes in CEO compensation. As argued in Section 2.1, agency theory suggests that shareholders would penalize managers for value-decreasing activities. However, the sign of the association between levels of industrial diversification and levels of CEO compensation is unclear. While industrial diversification increases the scope of the firm and hence the complexity of the CEO task (resulting in higher pay), the CEO can use firm-level diversification to minimize the risk to her personal portfolio (and should receive lower compensation). Based on the premise of decreased risk and increased complexity with industrial diversification, we expect an industrial diversification premium or discount in compensation depending on which effect dominates. Because we control for geographic diversification and size (i.e., other proxies of complexity), we predict that the risk effect dominates. Moreover, because industrial diversification is commonly found to reduce shareholder value, we argue that this form of diversification should result in lower managerial compensation.[8] Thus, we posit that the level of CEO compensation is negatively related to corporate industrial diversification.

The greater environmental complexity associated with industrial diversification can also affect the structure of executive compensation. In other words, the greater the number of business segments within a firm, the greater the monitoring diffi-

7. The reason for the difference between geographic and industrial diversification stems from the fact that while investors can obtain industrial diversification on their own, international portfolio investments do not replicate the ability to arbitrage capital, labor, product, and tax markets. Therefore, although industrial diversification can reduce the risk to the CEO, it contradicts the interests of shareholders. Thus, the negative relation indicates a penalty to discourage diversification that can be more efficiently achieved by investors.

8. Amihud and Lev (1981, 1999) suggest that managers pursue industrial diversification in order to reduce their human capital risk. In this context, the reduction in compensation can be viewed as purchasing insurance to reduce the human capital risk.

culties. For example, as a firm becomes more diversified, the CEO has to become familiar with the characteristics of multiple industries and competitors in each of those industries. This suggests greater information asymmetry with multiple lines of business, product lines and competitors, resulting in a greater use of formal incentive plans. Industrial diversification as a form of complexity also signifies greater managerial discretion and information asymmetries between shareholders and managers about investments in new lines of business or product lines (i.e., industrial diversification). This suggests the need for greater incentive compensation. Therefore, as with geographic diversification, complexity arguments suggest that industrial diversification and reliance on incentive compensation vary directly.

Firm complexity through industrial diversification also suggests greater reliance on market measures as a firm becomes more industrially diversified. In general, firms characterized by information asymmetry are more likely to design CEO compensation contracts that are less sensitive to short-term performance. Prior accounting literature (e.g., Warfield et al. [1995]) suggests that, when information asymmetry is high, shareholders lack resources or information to monitor CEOs' actions. Such circumstances indicate a relatively high potential for earnings management. The implication is that industrial diversification increases the noise in accounting earnings as a performance measure in CEO compensation contracts. We therefore predict a greater reliance on market-based compensation with greater firm industrial diversification.

The industrial diversification arguments indicate four testable implications: (1) CEO total compensation is negatively related to industrial diversification; (2) the use of incentive compensation, relative to fixed compensation, varies directly with industrial diversification; (3) industrial diversification is associated with a greater use of market-based rather than accounting-based performance measures; and (4) a change in industrial diversification varies negatively with a change in CEO compensation.

3. Data Description

3.1 Data Sources and Sample Selection

Our empirical analysis employs two databases. CEO compensation data are from Standard & Poor's Compustat ExecuComp (1991–1996). This database includes information on 1,836 U.S. firms (S&P 500, mid-cap and small-cap indices) and contains short-term compensation (e.g., salary and bonus) and long-term compensation (such as long-term incentive plans, restricted stock, stock appreciation rights, and stock options granted).

The second data source, the Disclosure WorldScope database, provides accounting and financial market information. For a firm-year observation to be included, the market value of equity, the book value of equity, earnings before extraordinary items, earnings before interest and taxes, total assets and sales, foreign assets and sales, and the number of industry segments must be available. These

data requirements yield a sample of 7,085 firm-year observations on 1,572 U.S.-based firms for the period 1991–1996.[9]

3.2 Attribute Measures

3.2.1 GEOGRAPHIC DIVERSIFICATION

Burgman (1996) comments that no established criterion to determine the degree of geographic diversification (GEO) exists. Sullivan (1994) observes that a multi-item scale is more likely to "tap a broader range" of the total meaning of geographic diversification and that a measure of geographic diversification should include structural, performance, and cultural measures of diversification. We use a composite or index measure of firm geographic diversification based on reported accounting items that represent the three major attributes of international operations: structure, performance, and culture. These attribute measures (percentage of foreign assets to total assets, the ratio of foreign sales to total sales, and the number of geographic segments) are described in the following paragraphs.

The ratio of foreign sales to total sales and the percentage of foreign assets to total assets are common performance measures of geographic diversification (Sullivan [1994]; Reeb et al. [1998]). The number of geographic segments is another common measure of firm geographic diversification. With the introduction of the *Statement of Financial Accounting Standards (SFAS) No. 14* geographic statement disclosures have been required and have been used as a measure of cultural diversification (Gomez-Mejia and Palich [1997]).

These three measures, which are objective and are available for a large number of firms, are used to construct a composite measure that is based on archival data. Factor analysis simplifies the complex relations that exist among a set of variables by uncovering the common dimension(s) that account for the observed variance among the variables. As Baber et al. (1996) observe, an attractive feature of factor analysis is that a variety of observable attribute measures can be reduced to a single factor. Sullivan (1994) notes that the objective of constructing a multi-item index of this nature is to identify items that load on a single factor and have a high degree of intercorrelation. We find that the three items load on a single factor with a high degree of explained variance (85.39%).[10]

9. Firm observations range from one to six years of available data. Allowing firms to drop in and out of the sample minimizes survivorship bias concerns.

10. The factor loadings on the three underlying variables suggest that the three internationalization measures load heavily on the common factor. Details of the factor analysis are presented here.

	Communalities/Extraction	Factor Loadings
Foreign asset ratio (FAR)	0.89	0.94
Foreign sales ratio (FSR)	0.90	0.95
Number of geographical segments (NSG)	0.77	0.88

3.2.2 INDUSTRIAL DIVERSIFICATION

Industrial diversification is commonly measured using business segment data.[11] Consistent with the diversification literature, we define sales outside the firms' primary two-digit SIC code as diversification into unrelated business segments.[12] We report our tests using a measure of industrial diversification that incorporates the number of industries in which a firm operates as well as the relative importance of this diversification. Our measure of industrial diversification (IND) is computed as

$$\text{IND} = \left[\frac{\text{2DIG}}{\text{TSALES}}\right] * \text{NIND} \tag{1}$$

where 2DIG is the sales outside the primary two-digit SIC code, TSALES is the firm total sales, and NIND is the number of industries in which the firm reports operations using two-digit SIC codes.[13]

3.2.3 INVESTMENT OPPORTUNITY SET

Gaver and Gaver (1993) and Baber et al. (1996) use factor analysis to develop composite measures of the firm investment opportunity set (IOS). Following Baber et al. (1996) we also use factor analysis to form a composite measure of the investment opportunity set using prior investment intensity, growth in the market value of assets, the market-to-book ratio, and research and development expenditures.[14] Investment opportunity set is included as a control variable in each of our tests.

The communalities indicate that portion of the variances of the variables contributed by the common factor. The eigenvalue of the first factor is 2.562 and for the second (third) factor it is 0.330 (0.108). Since only one component has an eigenvalue above 1, it suggests that only one common factor represents geographic diversification. Factor analysis yields a composite measure with a mean of zero.

11. See for example Bodnar et al. (1998). For U.S. firms, segment data are reported when an industry is more than 10 percent of a firm's revenues as part of the disclosure requirements under *Statement of Financial Accounting Standards No. 14* (FASB [1976]).

12. Many studies examine industrial diversification in terms of related and unrelated diversification, which is operationalized by using both four-digit and two-digit SIC codes, respectively (e.g., Jacquemin and Berry [1979]). Our measure of industrial diversification corresponds to what is commonly termed unrelated (two-digit SIC) industrial diversification.

13. Similar results are achieved where the number of two-digit SIC code industries is used.

14. Prior investment intensity is measured as the sum of acquisitions, research and development, and capital expenditures deflated by depreciation and is computed for years t through $t - 2$. Growth in the market value of assets is computed as the geometric growth of assets from period $t - 2$ to t. The market to book ratio is measured as the market value of assets divided by the book value of assets for time period t. The R&D variable is measured as R&D deflated by the book value of assets. These components are available in the WorldScope database for each of the firm-year observations in our sample. See Baber et al. (1996) for details of variable selection process and computations.

3.3 Descriptive Statistics

Table 1 presents descriptive statistics for the sample. Panel A in Table 1 presents the means, medians, and standard deviations for various variables in the dataset. Specifically, information is provided on firm size, the degree of firm geographic diversification, the measure of industrial diversification, earnings before interest and taxes (EBIT), and the investment opportunity set proxy. In general, the mean and median values for the variables are dissimilar. For example, the mean geographic diversification is 0.73, while the median is 0.26.[15] This result is not surprising since the sample includes both domestic and international firms.

Although the mean level of industrial diversification in our sample is 0.29, the median value of zero indicates that over half of the firms operate in only one industry. The total assets and EBIT information suggests that there is a potential size effect. These results also indicate that the distributions are skewed. To minimize the potential problems associated with skewness, we employ deflators. We also control for size using the natural log of total assets.[16]

Panel B in Table 1 provides information on CEO compensation. Compensation data include total compensation, salary, cash bonuses, stock options and restricted stock, and other long-term compensation. Total compensation consists of two major components: short-term and long-term compensation. Short-term compensation consists of salary and cash bonus (annual bonus and other annual payments not categorized as salary or bonus). Long-term compensation includes the value of restricted stock granted, net value of stock options exercised[17] and other long-term compensation (long-term incentive payouts and all other compensation, e.g., contributions to benefit plans, severance payments). Mean and median total compensation during the period (1991–1996) are $1,774,270 and $895,940, respectively. Mean annual short-term compensation and long-term compensation are $896,780 and $877,500, respectively. The mean proportion of long-term compensation to total compensation is about 50 percent, while the mean proportion of the incentive component is about 73 percent.

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15. The composite measure of geographic diversification for a completely domestic firm is zero by construction. A more intuitive measure, such as the foreign asset ratio, gives a mean degree of geographic diversification of 12.01 percent while the foreign sales ratio is 13.62 percent.

16. A search for outliers identified 32 firm-year influential observations as potential problems using Studentized residuals. Consistent with previous compensation research, we report the results excluding these observations. Including these 32 firm-year observations leads to similar inferences in our testing. We also test for influential observations using three separate statistics (DFFITS, DFBETAS, and COOK's *D*) and find no evidence of an influential observation (i.e., none of the observations had DFFITS, DFBETAS, or COOK's *D* statistics of greater than one). Repeating the analysis truncating observations at the 1 percent, 3 percent, and 5 percent levels at each tail of the distribution for each variable also leads to similar inferences.

17. Compensation consultants (e.g., Mercer) have cautioned that over time, stock options appear twice: once as an estimated present value at grant and then again when the CEO exercises the options granted previously. Since we are using data across time, we have used the net value of stock options exercised instead of the total value of stock options granted. Repeating the analysis with the total value of stock options granted leads to similar inferences.

TABLE 1

Descriptive Statistics

Panel A: Variables	Mean	Median	Standard Deviation
Total assets (000s)	7,447,436	1,278,025	22,427,400
Composite geographic diversification*	0.73	0.26	1.00
Industry diversification**	0.29	0	0.56
Earnings (before extraordinary items) (000s)	446,105	109,143	1,239,598
Investment opportunity set	0.00	−0.02	1.00
Change in geographic diversification	0.06	0.00	0.44
Change in industrial diversification	0.001	0.00	0.59
Change in investment opportunity set	0.00	0.001	1.25
Panel B: Compensation (000s)	Mean	Median	Standard Deviation
Total compensation	1,774.27	895.94	4,164.02
Short-term compensation	896.78	648.81[a]	1,206.26
Salary	485.52	430.00	276.66
Cash bonus	411.26	218.81	1,110.93
Long-term compensation	877.50	16.22[a]	3,812.70
Stock options and restricted stock	727.02	0	3,751.06
Other long-term compensation	150.48	16.22	527.92

Data are comprised of 7,085 firm-year observations from 1991–1996. Panel A gives descriptive information regarding firm size, the composite measure geographic diversification, the number of industry segments, EBIT, and the investment opportunity set composite measure. Panel B presents descriptive information on total compensation, salary, cash bonuses, stock options and restricted stock, and other long-term compensation.

*Note: The composite measure of geographic diversification based on factor analysis for a completely domestic firm is zero by construction. The mean degree of geographic diversification using the foreign sales ratio is 13.62%, and foreign asset ratio, 12.01%.

**56.2% of the sample is in a single two-digit SIC code.

[a]The mean and median short-term compensation are the sums of the means and medians of salary and cash bonus respectively. Similarly, the mean and median of long-term compensation are the sums of the means and medians of stock options and restricted stock and other long-term compensation, respectively.

Additional information regarding our sample is in Table 2. Panel A provides a correlation matrix of the independent variables. The largest absolute correlation between the independent variables is 0.19, suggesting that multicollinearity is not a primary concern in our analysis. Consistent with the international business literature, geographic diversification is positively correlated with IOS, firm performance (measured as earnings before interest and taxes), and firm size (measured as the natural log of total assets). The data also indicate a negative correlation between industrial diversification and both IOS and firm performance, which is consistent with the value literature and with decreased risk in conglomerates. Consistent with the omitted variable bias noted in Bodnar et al. (1998), there is a positive correlation between geographical and industrial diversification.

TABLE 2

Summary Data

Panel A: Independent Variable Correlation Matrix	IOS	FPR	SIZE	GEO
Investment opportunity set (IOS)	1.00			
Firm performance (FPR)	0.09	1.00		
Firm size (SIZE)	−0.18	−0.19	1.00	
Geographic diversification (GEO)	0.16	0.08	0.16	1.00
Industry diversification (IND)	−0.04	−0.03	0.11	0.07[a]

Panel B: Univariate Analysis

Firm Type	Total Compensation	Incentive Compensation Total Compensation
Top quartile of geographic diversification	2,650.75	0.55
Domestic firms	1,586.42	0.47
Top quartile of industrial diversification	2,140.45	0.54
Single-industry firms	1,982.49	0.48

Panel A gives information regarding the correlation of the independent variables, while panel B provides univariate statistics (Sample size is 7,085 observations).

[a]Geographic and industrial diversification are significantly correlated at the 1% level (p-value = 0.000). Given this significant relation, our hypotheses suggest estimation bias for industry diversification if geographic diversification is omitted. We confirm this omitted variable problem using RESET (regression specification error test).

Panel B gives univariate comparisons of CEO compensation in firms with high degrees of geographic and industrial diversification, relative to nondiversified firms. We compare firms in the top quartile of the degree of geographic diversification with domestic firms, which are defined as those with a zero international activity. We also compare firms in the top quartile of the degree of industrial diversification with single-industry firms. Incentive compensation is measured as the sum of cash bonus compensation and the deferred stock plans, total compensation is the sum of incentive compensation and salary compensation. More explicit definitions are in the text.

Geographic diversification is measured using factor scores calculated using ratio for foreign assets to total assets, ratio of foreign sales to total sales, and the number of geographic segments. Industry diversification is the ratio of sales outside the primary two-digit SIC code to firm total sales multiplied by the number of industries in which the firm reports operations.

Panel B presents the univariate analysis for the sample, which provides preliminary support for our diversification arguments. In the univariate analysis, we compare firms in the top quartile of the degree of geographic diversification with purely domestic firms (defined as those with a zero international activity). Similarly, we compare firms in the top quartile of the degree of industrial diversification with single-industry firms (defined as those in only a single industry). Consistent with our geographic diversification arguments we find that geographically diversified firms pay more than domestic firms and place greater emphasis on incentive-based compensation. We also find greater emphasis on incentive-based compensation with

industrial diversification, and in the univariate setting (i.e., without controlling for geographic diversification), we find that industrially diversified firms pay more than single-industry firms.[18]

The Appendix shows the industry distribution of the sample. The sample is comprised of firms in 61 different primary two-digit SIC codes. Chemicals and allied products (SIC 28); industrial machinery and equipment (SIC 35); electronic and other electric equipment (SIC 36); electric, gas, and sanitary services (SIC 49); depository institutions (SIC 60); and business services (SIC 73) are the largest industry groups in the sample. Including dummy variables to distinguish manufacturing, service, and primary industries leads to similar inferences as those reported (dummy variable coefficient estimates are insignificant).

4. Empirical Testing

4.1 Compensation Level and Structure Specification

Our arguments suggest that CEO compensation is positively (negatively) related to firm geographic (industrial) diversification. To avoid the omitted variable bias demonstrated in Bodnar et al. (1998), we examine both dimensions of corporate diversification simultaneously. The following specification,[19] based on prior literature, is used to explore these hypotheses.

$$\begin{aligned} COMP_{i,t} = {} & A_0 + A_1\,(FPR_{i,t}) + A_2\,(IOS_{i,t}) + A_3\,(RET_{i,t}) + A_4\,(SIZE_{i,t}) \\ & + A_5\,(GEO_{i,t}) + A_6\,(IND_{i,t}) + \varepsilon_{i,t}, \end{aligned} \quad (2)$$

where COMP is CEO compensation, FPR is current firm performance (measured as earnings before interest and taxes [EBIT], and deflated by total assets), IOS is an investment opportunity set proxy, RET is the common stock return for period t, SIZE is the natural log of total assets, GEO is the composite measure of firm geographic diversification, IND is the industrial diversification measure, and ε is the error term (all measured at time t for firm i). CEO compensation is defined in terms of the natural log of total compensation and incentive compensation deflated by total compensation.[20]

Consistent with prior theory and empirical evidence (Smith and Watts [1992];

18. This suggests that examining industrial diversification in a univariate setting is problematic as uncontrolled geographic diversification contaminates the results (see Bodnar et al. [1998] for a full discussion of this issue).

19. This specification is similar to those in Bizjak et al. (1993) and Gaver and Gaver (1995). In Section 4.4, we also include additional variables. We proxy for CEO's characteristics with CEO's tenure and CEO's experience (Gibbons and Murphy [1992]). We also include measures of board and ownership structure, e.g., duality, CEO ownership and inside ownership (Core et al. [1999]). Results (unreported) are available from the authors on request.

20. Baber et al. (1998, 1999) suggest that the potential inclusion of both earnings levels and earnings changes in compensation specifications. We find that the results in Tables 3, 4, and 5 are robust to the inclusion of both earnings levels and changes in each of our specifications. Boschen and Smith (1995) also suggest the inclusion of lagged measures of earnings. We also find that our results are robust to the inclusion of lagged performance measures.

Gaver and Gaver [1993]; Baber et al. [1996]; Rosen [1982]), we expect CEO compensation to be related to the size and investment opportunity set of the firm. Similar to our study, the underlying premise is that executive compensation is determined by firm characteristics that affect the complexity and demands of the CEO's job and the CEO's human capital risk. We proxy for the investment opportunity set of a firm with the composite measure based on Baber et al. (1996) and size with the natural log of total assets. Based on previous literature (e.g., Jensen and Murphy [1990]) we also control for accounting performance (FPR) and stock performance (RET).

Positive coefficient estimates for A_5 (with total compensation and incentive compensation as dependent variables) are consistent with our hypotheses; suggesting that total compensation and the incentive component in the CEO package increase with firm level geographic diversification. With total compensation as the dependent variable, negative (positive) coefficient estimates for A_6 are consistent with the complexity and risk hypothesis and suggest that the risk reduction (complexity) effect is dominant. Our expectation is that due to the inclusion of other firm complexity measures, the A_6 coefficient estimate is negative. Our arguments further suggest a positive A_5 coefficient estimate with incentive compensation as the dependent variable. The predicted signs for the hypothesized coefficient estimates using both measures of CEO compensation are in Table 3.

In Table 3, column 1 presents the results of performing the regression specified in eq. (2) using total compensation as the dependent variable.[21] As predicted, A_5, the coefficient on GEO, is significantly positive.[22] This suggests that the higher the degree of firm level geographic diversification, the higher the level of total compensation of the CEO. This finding provides support for our hypothesis that the increased complexity of international operations and its effect on the human capital risk of the CEO command a higher equilibrium wage. On the other hand, A_6, the coefficient on IND, is significantly negative. This result suggests that the downward effect of industrial diversification on the human capital risk of the CEO is dominant and provides support for the hypothesis that industrial diversification is associated with lower executive compensation. From the manager's perspective, a compensation penalty is acceptable in exchange for a reduction in human capital risk. Another explanation from the shareholder's viewpoint is that the negative relation indicates a penalty to discourage diversification that can be more efficiently achieved by shareholders. As expected, total compensation is also significantly positively related to both measures of firm performance, growth options, and firm size. These results are also consistent with the argument that managers are rewarded

21. Significant heteroskedasticity and autocorrelation are detected. Further testing suggests a random effects model is the appropriate correction (Hausman test). Similar results are obtained using the Newey-West estimation procedure.

22. Repeating the analysis excluding firms with zero international activities and zero industrial diversification increases the explanatory power of our models. Further, since these diversification strategies affect CEO compensation after controlling for IOS, it suggests that IOS does not capture all the risk and complexity associated with the CEO's job.

TABLE 3

Compensation Levels with Geographic and Industrial Diversification

Dependent Variable and Parameter	Pred. Sign	Log of Total Compensation	Pred. Sign	Incentive Compensation Total Compensation
A_0 intercept	?	1.97*	?	−0.35*
		(14.58)		(−8.75)
A_1 investment opportunity set (IOS)[b]	+	0.05*	+	0.02*
		(5.45)		(6.23)
A_2 firm performance (FPR)[c]	+	2.49*	+	0.80*
		(18.88)		(19.44)
A_3 stock return (RET)[d]	+	0.05*	+	0.03*
		(3.92)		(5.39)
A_4 firm size (SIZE)[e]	+	0.33*	+	0.05*
		(34.95)		(18.71)
A_5 geographic diversification (GEO)[f]	+	0.11*	+	0.02*
		(7.05)		(3.01)
A_6 industry diversification (IND)[g]	−	−0.06*	+	0.01**
		(−3.53)		(1.89)
Adjusted R^2		0.32		0.16

Note that estimated coefficients are for regressions of the natural log of total CEO compensation and incentive compensation on the degree of geographic diversification and industrial diversification and various control variables (IOS, FPR, and Size) over the period 1991–1996.[a]

[a]Sample size is 7,085 observations. The regression model is $COMP_{i,t} = A_0 + A_1 (FPR_{i,t}) + A_2 (IOS_{i,t}) + A_3 (RET_{i,t}) + A_4 (SIZE_{i,t}) + A_5 (GEO_{i,t}) + A_6 (IND_{i,t}) + \varepsilon_{i,t}$.

[b]IOS is factor score representing investment opportunity set. Following Baber et al. (1996), the factor scores are calculated using prior investment intensity, growth in market value of assets, the market-to-book ratio and research and development expenditure to total assets.

[c]FPR denotes firm performance and is measured by annual earnings before interest and taxes and scaled by total assets.

[d]RET is the common stock return at the end of the fiscal year.

[e]SIZE is natural log of total assets.

[f]GEO is factor score representing the degree of geographic diversification. The GEO factor scores are calculated using ratio for foreign assets to total assets, ratio of foreign sales to total sales and number of geographic segments.

[g]IND denotes industry diversification and is measured as the ratio of sales outside the primary two-digit SIC code to firm total sales multiplied by the number of industries in which the firm reports operations.

*, ** Significant at the 1% and 10% levels, respectively. The standard errors used to compute the *t* statistics (given in parentheses below each OLS coefficient estimate) are from a random effects model.

for value-enhancing activity (i.e., geographic diversification) and penalized for value-reducing activity (i.e., industrial diversification).

Column 2 addresses the influence of geographic diversification (GEO) and industrial diversification (IND) on the structure of CEO compensation. With the ratio of incentive compensation to total compensation as the dependent variable, the coefficients on geographic and industrial diversification (GEO) are significantly

positive (at the 1% and 10% levels, respectively). This indicates that for greater levels of corporate diversification, CEOs derive greater proportions of their total compensation from the incentive component.[23] This is justified by the higher agency costs due to greater monitoring difficulties and higher information asymmetry induced by the complexity of diversified operations. Our analysis also confirms the results in Gaver and Gaver (1995) on the significantly positive relation between the investment opportunity set and incentive component of total compensation.

4.2 Compensation-Performance Choice Specification

The compensation performance choice arguments predict that CEO compensation is increasingly sensitive to market measures of firm performance, relative to accounting performance measures, as the degree of firm diversification increases. To explore these hypotheses the following specification is used:[24]

$$\begin{aligned}\Delta\text{TCOMP}_{i,t} = {} & B_0 + B_1\,(\text{RET}) + B_2\,(\Delta\text{ACE}) + B_3\,(\Delta\text{IOS}) \\ & + B_4\,(\text{RET} * \text{GEO}) + B_5\,(\Delta\text{ACE} * \text{GEO}) \\ & + B_6\,(\text{RET} * \text{IND}) + B_7\,(\Delta\text{ACE} * \text{IND}) \\ & + B_8\,(\Delta\text{GEO}) + B_9\,(\Delta\text{IND}) + \varepsilon_{i,t},\end{aligned} \tag{3}$$

where $\Delta\text{TCOMP}_{i,t}$ is the percentage change in total CEO compensation for firm i at time period t, ΔACE is the percentage change in accounting earnings, measured as earnings before extraordinary items, from $t-1$ to t, and $\varepsilon_{i,t}$ is the error term.[25] This model suggests that CEO compensation increases when shareholder wealth increases or when the accounting measures improve from the prior year. Based on previous literature (Smith and Watts [1992]), ΔIOS is included to control for the relation between CEO compensation and investment opportunities. ΔGEO and ΔIND are included to control for changing corporate diversification.

The principal focus in this test is on the coefficient estimates of the interaction terms, RET * GEO (RET * IND) and ΔACE * GEO (ΔACE * IND). A positive

23. Our arguments also suggest that using the ratio of salary to total compensation as the dependent variable would lead to negative coefficient estimates for A_4 and A_5. Repeating the analysis using salary (deflated by total compensation) as the dependent variable, we find this is the case at the 1 percent and 10 percent levels.

24. This specification is similar to that of Baber et al. (1996) who focus on how the relative sensitivity of compensation to market-based measures versus accounting-based measures varies with the relative abundance of IOS. Our results are robust to also including levels of geographic diversification, industrial diversification, and accounting earnings (i.e., GEO, IND, and FPR). We also test the model with an interaction term for the investment opportunity set and common stock returns (IOS * RET) and finding similar results to those reported in Table 5. These results are available from the authors upon request.

25. The change in total compensation is computed as: $(\text{TCOMP}_t - \text{TCOMP}_{t-1})$ and scaled by TCOMP_{t-1} and the change in accounting earnings is computed as $\text{Earnings}_t - \text{Earnings}_{t-1}$ and scaled by Earnings_{t-1}. Results are robust to restricting the sample to firms with positive earnings or controlling with a dummy variable that denotes negative earnings.

coefficient of B_4 or B_5 implies that the compensation performance choice varies directly with the degree of geographic diversification. However, to provide support for our hypothesis that corporate diversification is associated with greater market-based compensation, B_4 has to be significantly positive, while B_5 is 0 or negative. Similarly, for an industrial diversification affect, we posit a positive B_6 and a negative or zero B_7.[26] Table 4 gives the predicted signs for each hypothesized coefficient estimate in eq. (3).

The results of performing the regression specified in eq. (3) are presented in Table 4. The coefficients B_4 and B_6 are significantly positive, while B_5 is negative and B_7 is zero. These results are consistent with the prediction that the degree of corporate diversification is more associated with greater sensitivity to market-based measures than to accounting-based performance metrics. The coefficient estimate for ΔIOS is statistically significant at the 1 percent level, suggesting that growth options have an impact on compensation when pay-performance sensitivities are considered. Further, consistent with prior studies, we find a statistically strong association between change in total compensation and stock returns. We also find a significant and positive relation between change in total compensation and change in accounting returns. In aggregate, these results are consistent with the corporate diversification being associated with a greater emphasis on market-based performance measures in CEO compensation contracts. Finally, our results show that ΔGEO and ΔIND are insignificantly different from zero, which is not surprising given the relatively short time horizon and the effects of the interaction terms.

4.3 Corporate Diversification, Shareholder Wealth, and CEO Compensation

For completeness, we link our compensation study to the research on the value effects of corporate diversification. In contrast to the positive wealth effect associated with geographic diversification (e.g., Errunza and Senbet [1984]; Bodnar et al. [1998]), industrial diversification is associated with a decrease in shareholder wealth (e.g., Berger and Ofek [1995]; Bodnar et al. [1998]). We therefore test the proposition that shareholders will reward (penalize) CEOs for increasing (decreasing) shareholder wealth with corporate diversification. We test this proposition by examining the effect of changes in corporate diversification on changes in CEO compensation. We include changes in size, IOS and firm performance as control variables.

Table 5 presents the results of this test. As expected, changes in compensation are positively (negatively) related to changes in geographic (industrial) diversification. The evidence suggests that, after controlling for firm size, CEO compensation increases with changes in geographic but decreases with changes in industrial

26. Because security returns and accounting performance are scaled differently, $B_4 > B_5$ and $B_6 > B_7$ are not sufficient support for the hypotheses that reliance on market relative to accounting performance increases with diversification.

TABLE 4

Compensation Sensitivity and Corporate Diversification

Dependent Variable and Parameter	Predicted Sign	Δ Total Compensation
B_0 intercept	?	0.28*
		(9.11)
B_1 stock return (RET)	+	0.47*
		(5.47)
B_2 change in accounting earnings (ΔACE)	+	0.01***
		(1.82)
B_3 change in investment opportunity set (ΔIOS)	+	0.07**
		(2.06)
B_4 return * geographic diversification (RET * GEO)	+	0.33*
		(5.48)
B_5 change in accounting earnings * geographic diversification (ΔACE * GEO)	−/0	−0.005**
		(−1.96)
B_6 return * industrial diversification (RET * IND)	+	0.26**
		(2.06)
B_7 change in accounting earnings * industrial diversification (ΔACE * IND)	−/0	0.004
		(0.77)
B_8 change in geographic diversification (ΔGEO)	?	0.03
		(0.65)
B_9 change in industrial diversification (ΔIND)	?	0.09
		(1.23)
Adjusted R^2		0.06

Estimated coefficients for regressions of CEO compensation on market and accounting performance measures over the period 1991–1996.[a] Interaction variables are included to assess the relative sensitivity of compensation to market- versus accounting-based measures with variability in firm geographic diversification. We hypothesize that the RET * GEO (ΔACE * GEO) coefficient estimate is positive (zero or negative).

[a]Sample size is 7,085 observations.

The regression model is: $\Delta TCOMP_{i,t} = B_0 + B_1\,(RET) + B_2\,(\Delta ACE) + B_3\,(\Delta IOS) + B_4\,(RET * GEO) + B_5\,(\Delta ACE * GEO) + B_6\,(RET * IND) + B_7\,(\Delta ACE * IND) + B_8\,(\Delta GEO) + B_9\,(\Delta IND) + \varepsilon_{i,t}$, where $\Delta TCOMP_{i,t}$ is change in total CEO compensation (includes salary, cash bonus, value of restricted stock and stock options and other long-term compensation) in period t for firm i scaled by $TCOMP_{t-1}$; RET is annual common stock return at the end of fiscal year; ΔACE is change in annual accounting earnings before extraordinary items scaled by period $t - 1$ earnings before extraordinary items; IOS is factor score representing investment opportunity set. Following Baber et al. (1996), factor scores are calculated using prior investment intensity, growth in market value of assets, the market-to-book ratio and research and development expenditure to total assets. GEO is factor score representing the degree of geographic diversification. The GEO factor scores are calculated using ratio for foreign assets to total assets, ratio of foreign sales to total sales and number of geographic segments. IND denotes industry diversification and is measured as the ratio of sales outside the primary two-digit SIC code to firm total sales multiplied by the number of industries in which the firm reports operations. As described in Section 4.4, results are robust to other scaling measures.

*, **, *** Significant at the 1%, 5%, and 10% levels, respectively. The standard errors used to compute the t statistics (given in parentheses below each OLS coefficient estimate) are from a random effects model.

TABLE 5

Changes in Compensation and Corporate Diversification

Dependent Variable and Parameter	Predicted Sign	Δ Total Compensation
D_0 intercept	?	0.32*
		(8.84)
D_1 change in geographic diversification ΔGEO	+	0.21***
		(1.82)
D_2 change in industrial diversification ΔIND	−	−0.19**
		(−2.18)
D_3 change in investment opportunity set	+	0.14**
(ΔIOS)		(2.39)
D_4 change in accounting earnings at time t	+	0.01*
(ΔACE_t)		(3.73)
D_5 change in accounting earnings at time $t - 1$	+	0.002
+ (ΔACE_{t-1})		(0.44)
D_6 change in accounting earnings at time $t - 2$	+	0.004
(ΔACE_{t-2})		(0.77)
D_7 change in market returns at time t (RET_t)	+	0.08*
		(7.59)
D_8 change in market returns at time $t - 1$	+	0.02*
(RET_{t-1})		(2.81)
D_9 change in market returns at time $t - 2$	+	0.001
(RET_{t-2})		(0.74)
D_{10} change in firm size (ΔSIZE)	+	0.00
		(1.24)
Adjusted R^2		0.09

Note that estimated coefficients are for regressions of change in CEO compensation on change in corporate diversification over the period 1991–1996.[a] Control variables include change in the investment opportunity set, current and lagged accounting returns, and current and lagged market returns. We hypothesize that the coefficient estimate for ΔGEO (ΔIND) is positive (negative).

[a]Sample size is 7,085 observations.

The regression model is: $\Delta TCOMP_t = D_0 + D_1\ (\Delta GEO) + D_2\ (\Delta IND) + D_3\ (\Delta IOS) + D_4\ (\Delta ACE_t) + D_5\ (\Delta ACE_{t-1}) + D_6\ (\Delta ACE_{t-2}) + D_7\ (RET_t) + D_8\ (RET_{t-1}) + D_9\ (RET_{t-2}) + D_{10}\ (\Delta SIZE) + \varepsilon_{i,t}$, where $\Delta TCOMP_t$ is change in total CEO compensation (includes salary, cash bonus, value of restricted stock and stock options and other long-term compensation) in year t for each firm, scaled by $TCOMP_{t-1}$; ΔGEO is the change in the factor score representing the degree of geographic diversification. The GEO factor scores are calculated using ratio for foreign assets to total assets, ratio of foreign sales to total sales and number of geographic segments; ΔIND is the change in industrial diversification, which is measured as the ratio of sales outside the primary two-digit SIC code to firm total sales multiplied by the number of industries in which the firm reports operations; ΔIOS is change in the factor score representing investment opportunity set, which is calculated using prior investment intensity, growth in market value of assets, the market-to-book ratio and research and development expenditure to total assets; ΔACE is change in annual accounting earnings before extraordinary items scaled by previous period earnings; RET is annual common stock return at the end of fiscal year; and ΔSIZE is the change in firm size.

*, **, *** Significant at the 1%, 5%, and 10% levels. The standard errors used to compute the t statistics (given in parentheses below each OLS coefficient estimate) are from a random effects model.

diversification. This result is consistent with Lambert and Larcker (1987), who find that CEOs can increase their compensation through acquisitions only if those acquisitions increase shareholder wealth.

4.4 Robustness Checks

In this section, we design additional procedures to investigate the robustness of our primary results in Tables 3 and 4. Prior compensation literature suggests that CEO characteristics and measures of board and ownership structure are determinants of CEO compensation levels. To control for the potential omitted variable problem, we make three adjustments to the compensation level model (eq. [2]). First to control for measures of CEO characteristics, we include a dummy variable to denote observations with management changes during the sample period. Firms with management changes make it more difficult to allocate blame and praise in the transition year (Murphy and Zimmerman [1993]). The dummy variable approach also provides a control for CEO experience (i.e., managers with greater than one year experience versus those without). Second, we include tenure (number of years as a CEO) as a control variable. Evidence in Gibbons and Murphy (1992) indicates that, the longer the tenure, the more entrenched and powerful the CEOs become, and the greater the tendency to pursue their own interests to the detriment of shareholders' interests. Third, we proxy for the effectiveness of monitoring by the board of directors and CEO power by using a dummy variable to denote when the CEO is also the chairman of the board of directors (Yermack [1996]) and by the percentage of outstanding shares owned by the CEO. We also control for ownership structure with the percentage of outstanding shares owned by officers, directors, and their families as well as nonfiduciary shares owned by other firms and by individuals with more than 5 percent of the outstanding shares of the firm. Our primary results are robust to including these variables.

Two other procedures are used to consider the robustness of our results. First, theory and evidence suggest that the level and structure of executive compensation in regulated industries are different than in an unregulated environment. Prior studies argue that executives in regulated firms are paid lower because of fewer investment opportunities (Smith and Watts [1992]) and political pressure (Jensen and Murphy [1990]). We use a dummy variable to denote observations with regulated industries (utilities, transportation, and financial). Primary results remain qualitatively the same.

Second, with reporting disclosure changes in 1993, the parameter estimates may not be stable over the test period. We examine the models in eqs. (2) and (3) using both a dummy variable to denote pre-1993 time period and period subset regressions. The results of these analyses corroborate the results reported in Tables 3 and 4. Furthermore, this evidence suggests a greater use of incentive-based contracts beginning in 1993 and a decrease in the percentage of fixed salary compensation. Repeating the analysis on a year-by-year basis and by using annual dummy variables also leads to similar inferences. Additional testing using salary as an al-

ternative deflator for the compensation variables in eqs. (2) and (3) provides additional support for our predictions.

5. Summary and Conclusion

This study provides evidence on the relation between corporate diversification and CEO compensation. Economic theory suggests that executive compensation is a function of complexity of the CEO's task, the risk of human capital, and the impact on shareholder wealth. We therefore develop testable implications between two forms of corporate diversification and management compensation, based on their effects on complexity, risk, and firm value. Overall, the empirical results support the proposition that the level and structure of CEO compensation is a function of corporate diversification.

We find that geographic diversification is associated with higher CEO pay, while industrial diversification is related to a diversification discount. We interpret this evidence to suggest that although both diversification strategies are associated with increases in the complexity and demands of the CEO's job, their effects on the human capital risk of the CEO and shareholder wealth are dissimilar. Our analysis implies that while CEOs earn a premium for the complexities associated with value-enhancing geographic diversification, there is a penalty associated with value-reducing industrial diversification.

Three additional results of our analysis provide important insights on the relation between corporate diversification and CEO compensation. First, we document that more diversified firms are more likely to use incentive compensation plans. We argue that the complexity of the managerial task and environment will be a major source of high and persistent information asymmetry between shareholders and managers. Based on agency theory, the resulting monitoring difficulties suggest a greater use of an incentive-based pay.

Second, we also find that corporate diversification is associated with greater sensitivity to market-based performance measures as opposed to accounting-based measures. These results are consistent with the theoretical work on the choice of performance measures. With greater firm-level diversification and its attendant complex environment, accounting measures become noisier, and firms tend to place more weight on market-based metrics.

Third, using first-difference specification, we find that CEOs are on average rewarded (penalized) for firm complexity due to geographic (industrial) diversification. Since extant diversification literature suggests that geographic (industrial) increases (decreases) shareholder wealth, this result is consistent with agency theory.

In summary, this study contributes to the literature on executive compensation in three important ways. First, the results indicate that, after controlling for the investment opportunity set and size of the firm, the degree of corporate diversification affects the level and structure of CEO compensation. Second, the results also show that firm characteristics, in the form of geographic and industrial diver-

sification, are important considerations in the efficient design of executive compensation contracts regarding the choice of performance measures. Finally, the evidence indicates that CEO contracts reward value-enhancing firm complexity due to geographic diversity while penalizing non-value-enhancing firm complexity due to unrelated industrial diversity.

APPENDIX

Industry Classification (Two-Digit SIC Codes)*

Industry	SIC	Firms	Industry	SIC	Firms
Agricultural Production—Crops	01	2	Water transportation	44	6
Forestry	08	2	Transportation by air	45	14
Metal mining	10	18	Transportation services	47	5
Oil and gas extraction	13	48	Communication	48	37
Nonmetallic minerals except fuels	14	3	Electric, gas, and sanitary services	49	131
General building contractors	15	14	Wholesale trade—durable goods	50	38
Heavy construction excl. building	16	4	Wholesale trade—nondurable goods	51	26
Special trade contractors	17	1	Building materials and garden supplies	52	5
Food and kindred products	20	37	General merchandise stores	53	25
Tobacco products	21	2	Food stores	54	14
Textile mills products	22	12	Automotive dealers and service stations	55	6
Apparel and other textile products	23	20	Apparel and accessory stores	56	17
Lumber and wood products	24	10	Furniture and home furnishing stores	57	10
Furniture and fixtures	25	7	Eating and drinking places	58	25
Paper and allied products	26	24	Misc. retail	59	27
Printing and publishing	27	32	Depository institutions	60	107
Chemicals and allied products	28	92	Nondepository institutions	61	15
Petroleum and coal products	29	16	Security and commodity brokers	62	18
Rubber and misc. plastics products	30	15	Insurance carriers	63	77
Leather and leather products	31	7	Insurance agents, brokers, and service	64	7
Stone, clay, and glass products	32	13	Holding and other instruments	67	18
Primary metals industries	33	37	Hotels and other lodging places	70	12
Fabricated metal products	34	21	Personal services	72	6
Industrial machinery and equipment	35	88	Business services	73	94
Electronic and other electric equipment	36	93	Auto repair services and parking	75	3
Transportation equipment	37	49	Motion pictures	78	85

APPENDIX (*continued*)

Industry	SIC	Firms	Industry	SIC	Firms
Instruments and related products	38	65	Amusement and recreation services	79	4
Misc. manufacturing industries	39	9	Health services	80	29
Railroad transportation	40	10	Educational services	82	3
Local and interurban passenger transit	41	1	Engineering and management services	87	21
Trucking and warehousing	42	11			

*This appendix represents the industry affiliation of the 1,572 firms in our sample over the period 1991–1996.

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