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Why is Industry Related to CEO Compensation?: A Managerial Discretion Explanation

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Abstract: Although research on CEO compensation is voluminous, only limited attention has been paid to the role of industry. In this paper we develop an industry-level explanatory theory based on the concept of managerial discretion, and test it using a multi-level structural equation modeling approach at the industry level. In contrast to previous work, this theory offers an explanation of why, and how, industry is related to CEO compensation. In a sample of 933 firms in 109 3-digit SIC industries, we find that the level of industry discretion is significantly related to both the level of CEO compensation, and the proportion of performance-contingent CEO compensation. The implications of these findings for industry-level research in general, and research on CEO compensation in particular, are discussed.

Key Words: Executive compensation, managerial discretion, methodology, multi-level.

INTRODUCTION

An industry is a collection of firms with similar structural characteristics. Firms in the same industry often deal with similar markets and common organizational routines, and are subject to comparable external influences. As such, industries have been of interest to a wide range of scholars in economics [1], sociology [2], strategy [3], and organization theory [4]. Thus, it is somewhat surprising in both a conceptual and empirical sense that research on CEO compensation- which is quite voluminous by most standards [5] and typically relies on these same underlying disciplines for theory-has for the most part disregarded the potentially important role of industry as an explanatory factor. It is true, as we will show, that a large number of empirical studies of CEO compensation have inserted controls for industry; nevertheless, there are few, if any, empirical studies of CEO compensation that have explicitly modeled an industry-level explanatory theory, and tested it at the industry unit of analysis.

The purpose of this study is to redress this imbalance in the literature by bringing industry into our conceptualization and empirical investigation of the determinants of CEO compensation. This is important because, as we demonstrate below, researchers have consistently conceded that industry is an important consideration in understanding CEO pay, yet formal empirical tests of why industry is of such apparent importance have been lacking. In fact, it is common for studies of CEO compensation to adopt an implicit "*ceteris paribus*" assumption with respect to the role of industry. For example, in indicating that industry factors were beyond the scope of their study, Finkelstein and Hambrick [6] noted, "there should be little doubt of their importance, however" (p. 122). This approach of acknowledging the importance of industry but disregarding its potential to yield interesting theoretical insights to the understanding of CEO compensation is common in this area of work.

Recent research on executive compensation has opened the door to an industry-level explanation of CEO pay. For example, Finkelstein and Boyd [7] found that the level of managerial discretion (measured at the firm level) was strongly associated with CEO compensation, a finding that may well be more powerful at the industry level. Managerial discretion arising from industry sources provides CEOs with the flexibility and freedom to make strategic decisions that will affect firm performance - positively or negatively [8]. The greater potential efficacy of CEOs in high-discretion industries is expected to both increase the level of CEO compensation and promote the greater use of performance-contingent pay. The discretion hypothesis, then, offers an explanation of not only why industry is important, but also a prediction of which industries will exhibit higher pay and more performance-contingent pay for CEOs.

While research in the discretion vein is by now well-established in the literature, none of the previous work has explicitly and fully modeled and tested whether discretion is an appropriate industry-level explanation for pay patterns. Stated differently, there has yet to be a study that tests whether managerial discretion provides an adequate explanation for the differences in CEO pay across industries that have been observed, but never fully explained, in previous work. Hence, the key research question in this study is not whether managerial discretion is related to CEO compensation, but whether discretion accounts for differences in pay levels and forms between industries. Marshalling compelling evidence on this question requires careful attention to unit of analysis and the adoption of analytic techniques that can parse out industry effects from firm-level effects. Hence, a secondary contribution of this study is the application of a structural equation multi-level model that decomposes variance into between-industry and within-industry (i.e., firm-level) components. Because this methodology is new to

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the strategy field - and may well have other applications of interest to strategy scholars - we include a rather detailed description of the approach.

The paper is organized as follows. First, we review the conceptual and empirical treatment of industry in the CEO compensation literature, concluding that industry has been seen more as an add-on control variable than an interesting theoretical construct in its own right. Next, we briefly review the discretion argument, and its implications for CEO pay across industries, suggesting two ways in which discretion affects compensation between industries. Finally, we describe a methodological approach that enables a direct test of whether discretion explains differences in CEO pay patterns across industries by parsing out the firm-level effects of discretion. Our results provide compelling evidence that discretion may indeed be an important theoretical explanation for why CEO pay practices differ across industries.

THEORY AND HYPOTHESES

Research on CEO compensation has historically been driven by an interest in testing economics-based hypotheses on the relative importance of sales and profits in explaining CEO pay levels [9]. More recently work in this area has focused on agency theory by seeking to explain why and how the misalignment of incentives between shareholders and boards on the one hand, and CEOs on the other hand, has resulted in inefficient compensation practices [10]. Executive compensation has also been examined in recent years from competing perspectives such as social comparison theory [11] power [12] and organizational symbolism [13, 14]. With these broader perspectives has come a much deeper understanding of compensation practices in organizations. At the same time, however, the general trend of research on compensation toward more complex theoretical conceptualizations has taken us further away from what may well be a primary influence on CEO pay - the industrial environment of the firm.

Consider the significant body of work on inter-industry wage differentials in economics and industrial relations that dates back many years [15]. This work, which is often based on population-level studies of general wages (and not CEO compensation), has established that wage levels are not uniform across industries, and seeks to identify why this pattern exist [16]. The major findings from this area of research are (1) the extent of unionization in an industry is positively associated with earnings [17], (2) firms in industries with greater ability of pay - typically assessed in terms of industry profitability [18] or measures of industry monopoly power [19] - have higher average earnings, (3) industries with larger than average establishment sizes pay more than other industries [20], and (4) human capital variables are related to wage levels [16]. Although a model of CEO compensation is not the same as a model of general employee earnings, several of these factors have analogous meaning in the context of CEO pay. For example, ability to pay and establishment size seem quite analogous to firm profitability and firm size, respectively. In addition, human capital variables such as CEO equity and tenure have been investigated in the CEO compensation literature and seem relevant as well. Thus, insights from research on inter-industry wage differentials in the economics and industrial relations literatures offer alternative explanations for CEO pay in an industry and warrant consideration in any empirical analysis.

Empirical Treatment of Industry in the CEO Compensation Literature

Research on CEO compensation in the strategy, accounting, and finance literatures has paid much less attention to the role of industry. Because there have been literally hundreds of studies of CEO compensation [5], it is not feasible to exhaustively review all of them. However, clear patterns are readily apparent in the literature even without such a formal review. With the exception of a small number of studies that have tested whether average CEO pay in an industry is related to CEO pay [21, 22], previous research has typically modeled industry as a control variable, and has tended to adopt one of three dominant approaches to handling the industry question.

The most common method of controlling for industry is to include a set of dummy variables in regression equations testing some other aspect of CEO pay [11, 23, 24]. Not only does this approach technically violate the "independence of observations" assumption (the same industry appears multiple times in the typical sample), in almost every instance industry dummy variables are based on a 2-digit SIC classification - a rather coarse-grained definition of industry [25]. The adoption of a 2-digit SIC level definition of industry was also used in studies by Deckop; Gerhart and Milkovich [26, 27] that offered suggestions for why industry might be an explanatory factor for CEO compensation. While both of these studies are to be commended for emphasizing industry to a greater degree than most other work, formal consideration of the industry effect was limited, and no attempt was made to explicitly test why CEOs in one industry may be paid more than CEOs in another industry. Nevertheless, Deckop [26] does recommend that future studies adopt "more precise measures of industry" (p. 225), something we do here.

A second approach used to control for industry in studies of CEO compensation is the single-industry study. These studies typically recognize that industry is an important consideration, but choose to focus on other aspects of compensation by limiting the sample in this way [6, 28-30].

A third method in which industry has been studied is to stratify a sample by industry. This approach typically involves a comparison of results across industries under the premise that the nature of the relationship between a set of explanatory factors and CEO compensation will be influenced by industry differences [12, 31, 32]. Studies of this type are not common, however, and their focus tends to be on how industry might moderate a relationship and not on how industry directly affects CEO compensation.

In addition to these three rather common approaches, there are some other ways researchers have attempted to deal with industry. For example, work on relative performance evaluation examines whether firm performance relative to some metric, such as industry performance, accounts for CEO pay [33]. And some studies of CEO compensation rely on such broad-based samples that the effect of industry is assumed to have been randomized away [7]. In sum, it is apparent that previous research on CEO compensation has paid a great deal of attention to industry, but has yet to formally examine precisely why industry is such an important factor in understanding CEO pay. The following section addresses this fundamental issue.

What does Industry Mean

We have seen that the issue of industry is considered relevant in much of the previous work on CEO pay. In addition, pay surveys that appear in the business press, as well as those from compensation consulting organizations and the Conference Board traditionally report compensation data on an industry-by-industry basis. But why is industry so important? What does industry mean for CEO pay?

Several explanations have been offered in the literature. We have already noted that one research stream in economics and industrial relations - which is concerned with understanding inter-industry wage differentials and not CEO compensation - has focused attention on such factors as unions, monopoly power, profitability, and size. In contrast, scholars who study CEO compensation seldom offer precise explanations for why industry may affect CEO pay. In work that has addressed this issue, however, three different perspectives can be identified.

First, some have argued that industry is important because it represents a demarcation of the managerial labor market, with the relative supply and demand of CEOs in an industry having consequences for CEO pay levels [21, 26]. Unfortunately, this argument appears at odds with anecdotal evidence indicating that firms often hire new CEOs from other companies in completely different industries (e.g., John Sculley moving from PepsiCo to Apple; Louis Gerstner moving from RJR Nabisco to IBM). With a CEO labor market that operates with such amorphous boundaries across industries, labor market effects are unlikely to be industry-based. It is perhaps for this reason that there have been few empirical investigations of the supply and demand hypothesis [34, 35]. And in one of the few studies explicitly focused on the CEO labor market, [36] report that even premiums paid to external successors are unaffected by industry, further suggesting that the supply and demand of CEOs in an industry has little bearing on pay levels. Thus, this explanation does not appear to hold promise as the basis for an empirical examination of how industry affects CEO pay patterns.

A second explanation that is sometimes offered is that industry is an important referent for boards in setting pay, in part because the social comparisons of greatest relevance to managers may be those with peers in other firms in the same industry [21], and in part because compensation consultants emphasize industry benchmarks in their own work [24, 37]. The implication of this argument is that industry pay "norms" may be highly influential in the setting of CEO pay, and indeed there is direct evidence for this effect [21, 22]. As promising as this explanation appears, however, it is important to point out that the "industry benchmark" hypothesis only explains why, but not how, industry is an important predictor of CEO pay. That is, while the notion of industry-based comparisons made by boards, managers, and compensation consultants suggests that all industries will be subject to these forces, it does not provide conceptual guidance on the extent to which different industries will be impacted, making it difficult to use these insights as the basis of an industry-level theory of CEO pay differentials.

A third approach to understanding why industry affects CEO pay patterns emerges from a collection of studies conjecturing that economic and structural characteristics of industries might account for differences in pay patterns. For example, such aspects of industry membership as the regulatory environment [32], barriers to entry [31], and market demand [27] have been suggested as key factors that account for inter-industry differences in compensation. None of these factors, however, has been directly measured at the industry-level in an empirical investigation to test whether they do explain CEO pay patterns across industries. In addition, while such characteristics of industry structure may account for differences in industry pay patterns, a coherent theory-based explanation for why CEOs in one industry are paid more, and receive greater performance-contingent compensation than CEOs in another industry, has yet to emerge from this literature.

Industry Discretion

The construct of managerial discretion - defined as the latitude of options top managers have in making strategic choices [8] - offers an explanation that may account for the often wide disparities observed in inter-industry pay patterns. As conceptualized by Hambrick and Finkelstein [8], industries that confer significant managerial discretion on CEOs are those characterized by product differentiability [38], growing markets [3], demand instability in that growth [39], market concentration [40], low levels of capital intensity [41], and low levels of regulation [42]. Such industries offer CEOs greater flexibility in decision-making and create fewer constraints on strategic choice; in sum, high-discretion industries offer CEOs more opportunity to impact organizational outcomes.

This opportunity translates into greater CEO compensation because the potential marginal product of CEOs in high-discretion industries is greater than it is for CEOs in low-discretion industries [7]. For example, opportunities to significantly impact firm performance are likely to be quite limited in industries such as electric utilities that are still broadly regulated, or sell commodity products, or are very capital intensive because of the constraints imposed by the structural conditions prevalent in such industries. In contrast, CEOs in industries that offer greater latitude of options to employ in designing and implementing strategic choices because of the lack of regulation, the highly differentiated nature of the products sold, or strong growth rates (e.g., computer equipment) have a much greater opportunity to affect firm performance. These differences in discretion conferred by the industry are expected to have a significant impact on the nature of CEO compensation patterns.

Beyond the greater range of options that characterize high-discretion industries, such industries also tend to be more complex to understand and manage [35]. This complexity arises for the most part from the greater information-processing demands faced by CEOs in high-discretion industries [43]. For example, industries with highly differentiable products are often R&D-based and require significant coordination and integration across business units [43, 44]. Demand instability increases information-processing demands

[45] and, hence, the complexity of the CEO's job [46] by "creating new opportunities and crises that often necessitate strategic adaptations" (p. 847) [39]. Relatively deregulated industries are also more complex than regulated industries because the coordination efforts needed to manage multiple strategic domains are inherently greater. All of these factors merge together in high-discretion industries to create a wider range of critical contingencies that must be managed, increasing information-processing requirements and the complexity of the CEO's job [43].

Finally, high-discretion industries create greater uncertainty for CEOs than do low-discretion industries. This is certainly true when higher-discretion deregulated industries are compared to lower-discretion regulated industries. For example, not only is outcome uncertainty greater in deregulated industries because models of cause and effect are still emerging [29], but regulatory agencies are no longer buffering firms from the environment as well [47]. Uncertainty also arises from a greater emphasis on growth in high-discretion industries, because there is inherently greater variability in outcomes from strategies based on growth than stability [48]. Finally, industries characterized by product differentiability [43, 49] and demand instability [29] - both important dimensions of discretion - create uncertainty that must be managed.

Taken together, the broad range of options, the complexity of the CEO's job, and the challenge of managing uncertainty that are characteristic of high-discretion industries place a significant premium on CEOs who have the capability to succeed in such environments. The potential marginal product of CEOs in such industries is considerable, suggesting that the "equilibrium wage" [50] will be greater than it might be in other industries. The difference between a "good" CEO and a "bad" CEO is more substantial in high-discretion industries than in low-discretion industries because CEOs in high-discretion industries have greater opportunity to affect firm performance, positively or negatively. Paying premiums for the most highly skilled CEOs under these conditions seems important in light of their potential impact on their organizations, and the performance of their organizations. Hence, this difference in potential marginal product is expected to affect CEO pay across industries.

Hypothesis 1: The greater the level of industry discretion, the greater the level of CEO compensation.

Performance-contingent compensation may also be affected by industry discretion. Since CEOs in high discretion industries have greater opportunity to impact organizational outcomes such as firm performance than CEOs in low discretion industries, it is likely that boards in high-discretion industries will also be more inclined to construct compensation plans that reflect the potential efficacy of CEOs to affect firm performance. One way to do this is to structure compensation so that a greater proportion of a CEO's total pay is contingent on firm performance. Boards in lower discretion industries would be less likely to employ performance-contingent compensation plans because strategic choices in such industries are much more constrained, making it considerably more difficult for CEO actions to affect firm performance.

Our expectations on performance-contingent compensation are also supported by research from an agency perspective. High-discretion industries - characterized by greater opportunities, complexity, and outcome uncertainty - tend to increase monitoring costs because of the difficulties of tightly controlling CEO decision-making in an environment where constraint is relatively limited. There is some evidence that boards tend to rely on performance-contingent compensation plans to reduce monitoring costs under these conditions [23, 51]. In addition, the industry characteristics that define high-discretion industries - such as product differentiability and market growth - often impose relatively long time horizons on CEO decision-making. For example, R&D efforts typically take many years to materialize [52], creating additional monitoring challenges that are often resolved by relying less on salary and more on long-term pay components such as stock options and long-term incentive plans, both of which are also performance-contingent [43, 53].

Although this specific notion of discretion driving performance-contingent compensation has not been tested, there has been some corroborative work. In a study of the relationship between pay and performance across industries, Ely [32] found that (1) electric utility firms had the fewest number of (among firms in the retail grocery, oil and gas, and banking industries) performance-contingent pay plans, and (2) none of four industry-specific measures of firm performance in the electric utility industry were related to CEO compensation, while two-thirds of the industry-specific performance measures in the other three industries were significantly associated with CEO pay. Since the electric utility industry likely exhibits many of the characteristics of a low-discretion industry, these findings are consistent with our own expectations.

Hypothesis 2: The greater the level of industry discretion, the greater the proportion of performance-contingent CEO compensation.

METHODS

Unit of Analysis

Both hypotheses in this study are at the industry unit of analysis. Data on firms and on CEO compensation, however, are at the firm unit of analysis, creating an aggregation problem that is endemic to much cross-level research in organization science [54-56]. While traditional analytic approaches have been used in the literature to address this issue, they are not without their problems. For example, assigning a score to a lower level unit based on the higher level unit in which it is nested (i.e., a series of dummy variables for different industries represented among sample firms) violates the requirement of independence of observations that is central to statistical analyses [57]. A second approach that simply aggregates the data to the higher unit of analysis confounds firm- and industry-level variance, a particularly important consideration in a study that poses an industry-level explanation for a firm-level outcome [58].

The analytic approach adopted here attempts to overcome these difficulties by relying on a multi-level structural equation model [59]. This approach (1) explicitly models both firm and industry level residuals to address the partial interdependence of firms within the same industry, (2) allows simultaneous investigation of within-industry (using independent variables at the firm-level to predict firm-level outcomes) and between-industry (using independent variables at the industry-level to predict industry-level outcomes) variance, (3) minimizes the biases imposed by measurement error or unreliability [60], and (4) captures the indirect and simultaneous effects among independent and dependent variables [59]. As such, the structural equation multi-level modeling approach makes it possible to test industry-level hypotheses with predominantly firm-level data. Given how common such data structures are in strategy, the methodology employed here may also hold promise for other studies that seek to study cross-level phenomena.

Sample

The first step in constructing the sample was to define the industry unit of analysis. We chose the 3-digit SIC level - a compromise between the coarser 2-digit level and the more fine-grained, but smaller sample 4-digit level[1]. Data were obtained for the three-year period 1992-1994 from both the COMPUSTAT Industry Segment file (for financial data) and COMPUSTAT's Execucomp database (for CEO compensation and demographic data). The Execucomp database provides detailed information on compensation of firms in the S&P 500, S&P Midcap 400, and S&P SmallCap 600. Starting with the entire set of companies included in the Industry Segment file, we selected firms with sales in their primary SIC industry that were greater than 50%. Next, we eliminated firms in any industry where we could not identify at least three firms that could meet this 50% test. These steps were necessary to ensure that (1) firms under consideration were not so diversified as to make inter-industry comparisons meaningless [25], and (2) there were sufficient number of firms in an industry to obtain reasonable estimates of between-industry and within-industry variance in CEO pay[2]. Then, we matched each of these Industry Segment firms with companies listed in the Execucomp database to ensure that compensation data were available. Finally, observations with completely missing data for at least one of the independent variables in the study were eliminated. The resulting sample consisted of 109 3-digit SIC industries, covering a total of 933 firms.

Measures

CEO Compensation

We used two measures of CEO compensation. The first - total CEO compensation - consisted of the log of the sum of salary, bonuses, other annual payments (e.g., gross-ups for tax liabilities, perquisites, preferential discounts on stock purchases), the value of stock options granted (using Black-Scholes), the value of restricted stock granted, and payouts from long-term incentive plans. As such, this is one of the most comprehensive measures of CEO compensation available to date. The second - the proportion of performance contingent compensation - was measured as the sum of bonuses, the value of stock options granted (using Black-Scholes), the value of restricted stock granted, and payouts from long-term incentive plans, all divided by total CEO compensation. Both measures were derived from COMPUSTAT's Execucomp database, and were averaged across 1992-1994 to lessen the effect of a single-year outlier value. The resulting measures, then, represent the total CEO compensation and proportion of contingent CEO compensation for a firm from 1992 to 1994.

Discretion

Based on [7, 8, 61], we used seven indicators to measure discretion. Each of the first five measures below was based on five-year (1988-1992) firm averages. *Market growth* was operationalized as the annualized sales growth rate. Severe skew required that the log of growth be used in the analysis. Fast-growing industries have more investment opportunities [48], increasing both the range of options and the variability of outcomes associated with those options [8]. *R&D intensity*[3], and *advertising intensity* - proxying for product differentiability - were each measured as a proportion of net sales. Industries characterized by differentiability emphasize multiple and varied discretionary options that tend to be more complex [29] and uncertain [48] than in other industries. *Demand instability* was operationalized as the standard deviation of market growth over five years[4]. When demand is unreliable, standard options cannot be counted on and uncertainty is greater, increasing industry discretion [8]. *Capital intensity* was measured as total property, plant and equipment, divided by the number of employees. Capital-intensive industries tend to be less adaptable to change because of high fixed costs [62], focus less on new strategic options than maintenance of existing assets [8], and exhibit less uncertainty in growth patterns [49]. As such, capital intensity signifies less discretion.

The final two measures were industry-level measures, and not based on firm-level data; hence, they were modeled exclusively at the industry level. *Concentration (industry structure)* was measured by the Herfindahl index, which is published by the Commerce Department for some industries, and which we estimated using the MINL transformation [63] for the remaining industries. While firms in concentrated industries tend to have more discretion in interacting with supplier and buyer industries [40], the restrictive competitive landscape may also work toward limiting choice [64].

[1]A 4-digit SIC definition of industry includes more industries than a 3-digit definition, but the requirement of having at least 3 firms in an industry (noted below) meant that so many 4-digit industries dropped out of the sample as to yield even fewer observations than were available from a 3-digit definition.

[2]Clearly, there is a tradeoff between overall sample size (i.e., number of industries) and the minimum number of firms needed in an industry to be included in the sample. Even with our reliance on two of the most comprehensive datasets available that provide financial and compensation information, we were forced to deal with this tradeoff. For example, if a decision rule of five or more companies in an industry is used to determine inclusion in the sample - a relatively modest increase from three or more - the total number of industries in the sample decreases to 54. Hence, there are some inherent data limitations that are worth noting. Nevertheless, other studies of industry compensation have also adopted the criteria of three or more companies in an industry (e.g., Gerhart and Milkovich, 1990). The average number of firms in an industry in our sample was more than nine, with 50% of the industries in the sample comprising at least 6 firms.

[3]Because of severe non-normality, R & D intensity was transformed into a continuous categorical variable where a zero value was coded a 1, a value between zero and 0.028 was a 2, and values greater than 0.028 were coded as 3 (Tabachnick & Fidell, 1989).

[4]Demand instability was computed in each year between 1988-1992 on the basis of the most recent five-year market growth rates. Thus, demand instability for a firm in 1988 was based on market growth rates from 1984-1988. The analysis used the log of demand instability.

Hence, although industry concentration may be an important indicator of discretion, its effect is complex [8]. *Regulation* was computed as the average proportion of articles in an industry that referred to regulation in the 1988-1992 editions of Funk & Scott Index United States[5]. Because firms in regulated industries face restrictions on what they can do, complexity and uncertainty are reduced [42, 47]. Hence, regulation signifies less discretion.

Control Variables

There are several other factors that influence the setting of CEO compensation, and that are included here as control variables. Among the most prominent predictors of CEO pay are firm size and profitability. The evidence for size is extensive, both in studies of compensation at the individual firm level [65] and the industry level [20]. Although the evidence on profitability is much less clear, there is enough work at the firm [10] and industry [18] levels to warrant its inclusion as a control variable here. We used two indicators of firm size - the log of sales and total firm assets. In a similar manner, firm profitability was operationalized with two indicators - return on assets and return on equity.

Chief executives, by virtue of their position and power in an organization, may also have influence on their pay packages [35]. While there are many potential indicators of CEO influence that could be used, they tend to be highly correlated. In this study, we use two measures - CEO equity and CEO tenure - that signify CEO power, but are also broader so that their inclusion might encompass other dimensions of CEO influence. Such relatively broad-based measures are preferred when modeled as control variables and where the express purpose of a control variable is to help account for alternative explanations for CEO compensation rather than test a specific alternative hypothesis.

Numerous studies have used CEO equity as a predictor of executive pay [6]. As a measure, shares owned by a CEO not only taps into his/her power, it also captures potential alignment with shareholders' interests [10]. CEO equity was measured as the proportion of outstanding shares owned by a chief executive [66]. In addition, it is common in studies of CEO compensation to control for the tenure of the CEO, which may signify enhanced power through co-optation of the board [67], or represent an attribute of CEO human capital [11]. We measured CEO tenure as the number of years the CEO has been in that position at his or her firm [27].[6]

All data were examined for non-normality and outliers. Where necessary, outliers (no more than 1% at either end of the distribution) were submitted to a log transformation to lessen their effect on the analysis. Variables containing extreme outliers with negative values were first re-coded by adding a constant to each value so that the smallest value was one, and then the outliers were log transformed.

Explanation of Model

For our study, we conceptualized CEO discretion and our other control factors as latent traits [7]. The outcome variables, Total Compensation and Proportion Performance Contingent Compensation (PPCC) are observed or manifest variables. To accurately capture the effect of discretion and the control variables on CEO compensation, we adopted a multi-level approach to modeling the measurement and structural components of the equation.

Our multi-level model contained both measurement and structural components, which were applied similarly at the firm level and at the industry level. Standard LISREL model notation is used in the model notation below. Because the compensation outcome variables (y) are manifest and the model has no latent endogenous variables, the structural model notation reflects the latent variables as ξ rather than η, and model coefficients as Γ rather than β The MPLUS program models manifest outcome variables as artificial variable-specific latent variables [68].

The general model stipulates, at each level (firm and industry), there are two components: a measurement part and a structural part. The measurement component specifies a model connecting latent variables thought to represent a theoretical concept to one or more measures of observed variables. The coefficients (λ) in the Λ matrix show the expected changes in the observed variables for one unit change in the true level of the latent variable (ξ for x variables and η for y variables). The structural part of the model consists of equations expressing relations among exogenous and endogenous variables on each other. γ and β coefficients in the $\mathbf{\Gamma}$ and $\mathbf{B}$ matrices show the expected change in a response latent variable (η) given a one unit change in the predictor latent variable (either ξ or η). The two models are then combined into a multi-level Structural Equation Model (SEM) that occurs simultaneously at the firm level (within) and industry (between) level. These models were denoted as follows, for each *i*=firm and *c*=cluster of industries occurring at the firm level (*W*= within clusters), and at the industry level (B= between clusters):

$$x_{Wci} = \Lambda_W \xi_{Wci} + \delta_{Wci}$$

is the within part of the measurement component (1)

$$y_{Wci} = \Gamma_W \xi_{Wci} + \zeta_{Wci}$$

is the within part of the structural component (2)

and

$$x_{Bc} = \nu + \Lambda_B \xi_{Bc} + \delta_{Bc}$$

is the between part of the measurement component (3)

$$y_{Bc} = \alpha + \Gamma_B \xi_{Bc} + \zeta_{Bc}$$

is the between part of the structural component (4)

where

x_{wci} and x_{Bc} is a vector of observed predictor variables theorized to load to the latent trait; y_{wci} and y_{Bc} is a vector

[5] The Funk & Scott directory lists articles from the business and trade press in a given year, and can be searched by industry and keyword, such as regulation. Previous studies have used this data source to measure innovativeness (O"Reilly and Flatt, 1989) and environmental contingencies (Finkelstein, 1992).

[6] Because the number of companies in an industry varies across industries in our sample, we added an additional, methodological, control to ensure that variation in this variable was not somehow connected to CEO compensation. It was not significant at the industry or firm level of analysis.

of the observed response variable; ν and α are the nu and alpha vector(s) of the overall measurement intercepts and structural intercepts (respectively). Λ_W and Λ_B is the lambda matrix containing information regarding factor loadings or measurement slopes (λ). The rows of the matrix represent the observed dependent variables in the model and the columns represent the latent variables. ξ_{Wci} and ξ_{Bc} is the xi matrix containing the exogenous latent variable(s) coefficients. Γ_W and Γ_B is the gamma matrix which contains the regression coefficients (γ) for the regression of the observed response variable (y) on the latent exogenous variables. The row represents the observed response variable in the model; the columns represent the latent variables in the model. δ_{Wci} and δ_{Bc} are the delta vectors containing the measurement errors of the observed dependent variables for the measurement model. The covariance matrix of this vector is Θ. ζ_{Wci} and ξ_{Bc} are the zeta vectors containing the errors/ disturbances of the latent variables for the structural model. The covariance matrix of this vector is Ψ.

The multilevel model combines the between- and within-separate models and allows paths to be estimated between the industry-level variables and the intercepts of the within-firm equations. It is assumed that the means of all the variables are equal to zero, or the variables are expressed in deviation scores. Furthermore, ζ, δ, and ξ are uncorrelated, **B** has zeros in the diagonal, and **I - B** is non-singular. We also assume that the intercepts and means of the within-industry endogenous and exogenous variables vary over between-industry units, and there exists a model that holds at the between-industry level that is hypothesized to explain variation in the means of the within-industry variables. For the purposes of this article, we want to model variation in the intercepts and means of the firm level variables. To date, it is not possible to model variation in the slopes contained in **Γ** and they are assumed to be fixed.

Combined, the measurement component of our model for between- and within-industry clusters would be denoted and explicated in as follows, where given nomenclature take on definitions above. To simplify the exposition for this analysis, the between component represents the industry contributions to the variables in the model. The within component represents the within-industry contribution of the firm, once the industry effects are removed.

$$x = \nu + \Lambda_B \xi_{Bc} + \delta_{Bc} + \Lambda_W \xi_{Wci} + \delta_{Wci} \quad \text{Measurement (5)}$$

For the measurement part of the model (5) we captured the following. For each firm, the observed variables of Market Growth (x_1), R& D Intensity (x_2), Advertising Intensity (x_3), Demand Instability (x_4), and Capital Intensity (x_5) were thought to represent the latent trait of *CEO Discretion* *(ξ_1)*. Two additional observed variables, Industry Regulation (x_6) and Industry Concentration (x_7), were modeled as industry-level indicators of *CEO Discretion*. Sales (x_8) and Assets (x_9) were theorized to represent the latent trait of *Size (ξ_2)*, while Return On Assets (ROA, x_{10}) and Return On Equity (ROE, x_{11}) characterized *Performance (ξ_3)*. *CEO Factors (ξ_4)* were measured by Equity (x_{12}) and Tenure (x_{13}). The paths of Demand Instability, Assets, ROE, and CEO equity were set to 1 as referents. This part of the model can be interpreted in line with a conventional factor analysis in that the within factor (ξ_{Wci}), and the within residual (δ_{Wci}) refer to the individual-firm level variation [69]. In a multilevel model, this is the within-group variation. The factors account for all covariation among the firm-level *x* variables, representing the 4 latent traits: *CEO Discretion*, *Firm Size*, *Performance* and *CEO Factors* for these 933 firms. The residuals are viewed as measurement errors, that is, variable-specific individual variation not accounted for by the factor. These errors are independent of the factor and are independent of each other.

The between part of (ξ_{Bc}) departs from conventional analysis in that it addresses across-industry variation rather than across-firm variation. Here the factors are interpreted in light of different industry effects, with latent traits representing underlying industry-level dimensions of the theoretical measured construct(s), rather than firm-level aspects. Different Λ_B coefficients provide weights representing the differential contribution of the measured observed variables to theoretical underlying constructs at the industry level.

The structural (6) part of the model is similar to a SEM or regression, in that it accounts for the relationship of the exogenous latent traits in predicting the observed outcome variable, CEO compensation. As stated earlier, we assume that the levels of the within-firm variables (contained in α) vary across the industries and this variation can be explained by an industry level model. The multilevel structural model combined the between- and within- models and allows paths to be estimated between industry level variables and the intercepts of the within-industry equations.[7] For this model, we estimated paths between the means and intercepts of the within-industry model at the between-industry level. We also included two industry level exogenous variables in the model.

Hence, for each *i*=firm and *c*=cluster of industries, this aspect of the model takes the following form:

$$y = \alpha + \Gamma_B \xi_{Bc} + \zeta_{Bc} + \Gamma_W \xi_{Wci} + \zeta_{Wci} \quad \text{Structural (6)}$$

For each firm, CEO compensation is regressed on the latent traits of *CEO Discretion*, *Firm Size*, *Performance*, and *CEO Factors*. The direct effects of this model are embodied by the **Γ** matrix. Only variation in the intercepts and means of the firm level variables is allowed. To date, it is not possible to model variation in the slopes contained in the **Γ** matrix, and thus they are assumed to be fixed. In line with the multilevel interpretation of the measurement component of the model, within-industry direct effects (ξ_{Wci}) refer to the unique firm-level variation among the γ coefficients, after accounting for industry effects. Between-industry direct

[7] This model can also be conceptualized in terms of a hierarchical random intercept model. Level 1 gives a within equation with random intercepts varying across the 103 industries and level 2 describes this intercept variation in terms of predictors (cf., Bryk & Raudenbush, 1992).

effects (ξ_{Bc}) represent the variation between the exogenous latent traits and CEO compensation at the industry level, after accounting for the firm-level variation.

Parameter estimation is accomplished using three sample covariance matrices: the total sample covariance matrix (S_T) that estimates Σ_W and Σ_B in multilevel case; the sample pooled within-group covariance matrix (S_{PW}) which is a consistent and unbiased estimator of Σ_W; and the sample between group covariance matrix (S_B). The between group covariance matrix is a consistent and unbiased estimator of $\Sigma_W + s\Sigma_B$, where s is the common group or cluster size [70].

In the two-level case with C clusters, the likelihood is formulated for C multivariate normal observation vectors, where each vector contains all variables for all individuals in the cluster. Unlike conventional analysis, the independence of observations is not assumed over all N observations, but only over the C clusters. The covariance matrices of Σ_B and Σ_W contain the parameters of interest, while the intraclass correlation is modeled using Σ_B. In this article, we assume the common case of no mean structure. In the balanced case with no mean structure, the standard between and pooled-within sample covariance matrices provide sufficient information for maximum-likelihood estimation. In the unbalanced case information is also needed on each cluster's mean vector [70].

The three sample covariance matrices are as follows:

$$S_T = (N-1)^{-1} \sum_{c=1}^{C} \sum_{i=1}^{Nc} (y_{ci} - \bar{y})\ (y_{ci} - \bar{y})' \tag{7}$$

$$S_{PW} = (N-C)^{-1} \sum_{c=1}^{C} \sum_{i=1}^{Nc} (y_{ci} - \bar{y}_c)\ (y_{ci} - \bar{y}_c)' \tag{8}$$

$$S_B = (C-1)^{-1} \sum_{c=1}^{C} n_c\ (\bar{y}_c - \bar{y})\ (\bar{y}_c - \bar{y})' \tag{9}$$

In the multi-level case, the matrix S_T (used in conventional covariance structure analysis) provides a consistent estimator of the total covariance matrix $\Sigma_B + \Sigma_W$. Furthermore, the pooled within matrix (S_{PW}) is a consistent and unbiased estimator of Σ_W, and the between matrix (S_B) is a consistent and unbiased estimator of $\Sigma_B = \Sigma_W + s\ \Sigma_B$, where s reflects the cluster size.

$$s = \left[N^2 - \sum_{c=1}^{C} N_c^2 \right]\ \left[N(C-1) \right]^{-1} \tag{10}$$

For balanced data, s is the common cluster size. For unbalanced data and large number of clusters, s is close to the mean of the cluster sizes. The between matrix S_B is the covariance matrix of cluster means $\overline{Y_c}$ weighted by the cluster size. The ML estimate of Σ_W is S_{PW}, while the ML estimate of Σ_B is:

$$\hat{\sum}_B = (S_B - S_{PW})/s \tag{11}$$

To remedy the necessity for a term for each distinct cluster size, Muthen [70] developed a quasi-likelihood estimator. The MUML [71, 72] estimator minimizes the fitting function by:

$$F_{MUML} = C\ \left\{ \ln\ \left| s\sum_B \right| + trace\ \left[\left(\sum_W + s\sum_B \right)^{-1} S_B \right] - \ln\ \left| S_B \right| - p \right\} + (N-C)\ \left\{ \ln \left| \sum_W \right| + trace\ \left[\sum_W^{-1} S_{PW} \right] - \ln\ \left| S_{PW} \right| - p \right\} \tag{12}$$

Where C is the number of clusters, s is defined in (10), p is the number of variables, N is the total number of observations, and S_B and S_{PW} are the conventional between and pooled-within sample covariance matrices of (9) and (8). Since this fitting function is analogous to that of a conventional two-population covariance structure analysis using ML estimation under normality, parameter estimates are based on a multiple group modeling approach. Specifically, a sample of C observations is considered the first population, while N-C observations are used for the second population [70]. Group 1 consists of the parameterization of the entire model and reads in the between-cluster covariance matrix, which estimates the sum $\sum_W + s\sum_B$. A vector containing between- and within-cluster means is also required. In order to obtain correct estimates of parameters, the between-cluster relations must be scaled by $\sqrt{s}$.

In Group 2, the within-cluster part of the model is specified and constrained to be equal to the corresponding within-cluster elements in Group 1. The variables of the between-cluster portion of the model are treated as missing in the within-cluster part of the model by creating dummy values as place holders. Group 2 reads in the pooled within-group covariance matrix, a consistent and unbiased estimator of $\sum_W$. Group 2 also includes a null mean vector whose dimension is the total number of between- and within-cluster variables [70].

The intraclass correlation is estimated as the ratio of between variance and total variance for variables of interest in the model [73]. The further one deviates from the conventional assumption of all observations being independent, the greater the intraclass correlation. The intraclass correlation in our study is similar to that obtained by a random effects ANOVA [74] and is calculated as:

$$\rho_c = \left[\hat{\sum}_B \right] \Big/ \left(\left[\hat{\sum}_B \right] + \left[\hat{\sum}_{PW} \right] \right)$$

RESULTS

Table **1**, Panel **A** includes firm and industry means and standard deviations, while Panel **B** reports correlations among the variables in the study at the industry and firm levels of analysis. Correlations between discretion indicators and the other independent variables were relatively modest, suggesting that multicollinearity problems were not present.

The final column of Table **1**, Panel **B** presents the Intraclass correlations (ICC), calculated as the ratio of the between-industry variances to the sum of the between- and within-industry variances. Intraclass correlations provide a measure of the degree of between-industry variance in the within-industry (or firm level) variables. Muthen [69] suggests that substantively large intra-class correlations provide empirical evidence that a multi-level analysis is necessary

Table 1. Descriptive Statistics - Panel A: Means and Standard Deviations

Variable	Firm Mean	St. Deviation	Industry Mean	St. Deviation
N	**933**		**109**	
1. Total Compensation ($ thousands)	1840.84	2422.53	1941.80	1276.65
2. Proportion Performance Contingent Compensation (PPCC)	0.52	0.22	0.53	0.10
3. Advertising Intensity	0.02	0.03	0.02	0.02
4. Capital Intensity	179.31	338.10	100.96	163.43
5. R&D Intensity[a]	1.86	0.85	1.77	0.71
6. Demand Instability	0.33	1.55	0.24	0.44
7. Market Growth	0.70	4.50	0.48	1.11
8. Assets ($ millions)	4162.67	13706.65	3747.29	7331.65
9. Sales ($ millions)	2850.51	8075.02	2742.02	3432.68
10. CEO Tenure	12.16	6.90	12.38	4.08
11. CEO Equity	11.89	26.21	13.62	15.68
12. Return on Equity	0.02	0.88	0.05	0.16
13. Return on Assets	0.04	0.10	0.04	0.04
14. Concentration	33.18	14.87	33.18	14.87
15. Regulation	0.01	0.03	0.01	0.03

Panel B. Pearson Product Moment Correlations at Industry Level (above Diagonal) and Firm Level (Below Diagonal), and Intra-Class Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Intra-Class Correlation
1. Total Compensation	--	0.48	0.17	-0.15	-0.08	-0.04	0.04	0.38	0.35	-0.07	-0.07	-0.13	-0.03	0.12	0.08	0.12
2. PPCC	0.46	--	0.09	-0.30	0.20	0.07	0.11	0.19	0.02	0.02	-0.19	0.08	-0.12	0.06	0.04	0.16
3. Advertising Intensity	0.07	0.08	--	-0.22	0.08	-0.05	0.10	-0.06	0.09	0.14	0.07	0.11	-0.21	0.18	0.04	0.53
4. Capital Intensity	-0.08	-0.19	-0.25	--	-0.20	-0.06	-0.18	0.11	0.01	-0.16	-0.25	0.03	0.36	0.04	0.27	0.56
5. R&D Intensity[a]	-0.02	0.14	0.17	-0.33	--	0.16	0.01	-0.06	-0.19	0.01	-0.02	0.17	-0.14	-0.03	0.04	0.87
6. Demand Instability[b]	-0.03	0.06	0.02	-0.08	0.26	--	0.57	-0.02	-0.45	-0.20	0.21	0.23	0.24	-0.06	0.03	0.27
7. Market Growth[b]	-0.05	0.10	0.09	-0.16	0.22	0.61	--	-0.23	-0.43	-0.00	0.22	0.02	-0.18	-0.14	0.05	0.28
8. Assets	0.42	0.15	-0.03	0.05	-0.06	-0.11	-0.15	--	0.43	0.00	-0.17	-0.11	0.28	0.12	0.12	0.13
9. Sales[b]	0.41	0.20	-0.02	0.05	-0.20	-0.49	-0.41	0.44	--	0.03	-0.19	-0.06	0.18	0.27	-0.03	0.24
10. CEO Tenure	0.00	-0.03	0.09	-0.11	0.03	-0.02	0.09	-0.04	-0.04	--	0.18	-0.04	-0.34	-0.08	-0.13	0.16
11. Equity	-0.13	-0.15	0.06	-0.17	0.04	0.19	0.22	-0.13	-0.28	0.13	--	-0.00	-0.17	-0.27	-0.04	0.16
12. Return on Equity	-0.04	-0.05	-0.01	-0.03	-0.11	0.23	-0.00	-0.02	-0.11	-0.08	-0.06	--	0.28	0.02	0.02	0.07
13. Return on Assets	0.03	-0.16	-0.18	0.25	-0.19	0.00	-0.25	0.16	0.17	-0.14	-0.14	0.26	--	-0.13	-0.14	0.24
14. Concentration	0.07	0.02	0.05	-0.01	-0.03	-0.03	-0.06	0.10	0.17	-0.04	-0.14	0.01	0.03	--	-0.02	--
15. Regulation	0.02	-0.07	-0.04	0.23	-0.01	-0.06	-0.05	0.10	0.07	-0.09	-0.10	0.03	-0.01	-0.04	--	--

[a]Categorical variable. [b]Correlations using log transformed variables.[c] Approximate values for significance of r at industry level: $r > 0.165$, $p < .10$; $r > 0.196$, $p < .05$; $r > 0.256$, $p < .01$; $r > 0.324$, $p < 001$; at firm level $r > 0.052$, $p < .10$; $r > 0.062$, $p < .05$; $r > 0.081$, $p < .01$; $r > 0.104$, $p < .001$.

for accurate interpretation of the effects under question. For many of the discretion variables, it is clear that there is considerable between-industry variance. Greatest among these is R & D Intensity, with an ICC of 0.87. Similarly, advertising intensity and capital intensity each has ICCs greater than 0.50, pointing out the value of a multi-level analysis.[8]

[8] In addition, as a preliminary test of whether industry effects explained variance in compensation, we ran preliminary regressions using 108 dummy variables for the 109 different levels of industries (at the SIC3 level). When all industry effects were entered, we had accounted for almost 29% of the variance in PPCC and 28% of the variance in Total Compensation, confirming that industry was indeed a major explanatory influence on CEO pay patterns.

The multi-level modeling approach assumes that the intercepts and means of the within-industry model vary across industries and that a separate industry model can account for the intercept and mean variation of the firm level variables. The multi-level model combines the between- and within-industry models and allows paths to be estimated between the industry level variables and the intercepts of the within-industry level equations. We were interested in explaining the variability of two compensation variables, total CEO compensation and the proportion of performance contingent

CEO compensation (PPCC). Explanatory variables of discretion, performance, size, and CEO factors were considered latent traits. Figs. (**1** and **2**) depict the models.

Fig. (**1**) shows the model examining the effect of discretion on total CEO compensation. Model fit indices indicate a moderately well-fitting model. The Chi-square statistic for the model was 353.95 (114 df). Since this statistic is highly sensitive to sample size [75, 76], we weighted the chi-square statistic by the degrees of freedom [77]. The adjusted ratio was 3.11, which indicates a reasonable fit to the data. The root-mean squared residual - which ranges from 0 to 1, with lower values indicating better fit - was 0.05.

For the latent trait of discretion, the factor loading of demand instability was set to 1.0 as a referent. At the within-industry (firm) level, factor loadings were only partially in line with expectations, and only one of the loadings reached significance. At the industry level, however, factor loadings were generally in the predicted direction and highly significant - lambda coefficients for all variables except capital intensity, concentration, and regulation were positive. At the industry level, coefficient alpha indicating composite reliability of the discretion trait reached 0.74[9], while the alpha at the firm level was 0.45[10].

The latent trait of size resulted in substantial and significant factor loadings at both the between- and within-industry levels. Composite reliabilities (coefficient alpha) were 0.73 and 0.66 at the between- and within-industry levels, respectively. Indicators for performance resulted in mixed loadings across the model levels. Finally, measurement indicators for the latent trait of CEO factors did not reach significance, with reliabilities of 0.67 and 0.27 at the between- and within-industry levels, respectively. For the control variables, the paths of assets, return on equity, and CEO equity were all set to 1 as referents.

The coefficient of determination (R^2) for the model in Fig. (**1**) is 0.92 at the between-industry level, and 0.33 at the within-industry (firm) level. This suggests that considerably more of the explanatory power of the model in predicting total CEO compensation occurs at the between-industry level, rather than at the within-industry (firm) level. As Fig. (**1**) shows, the gamma coefficient between discretion and total CEO compensation is positive and significant, at both the between-industry and within-industry levels. Since the coefficients are standardized by using the variances of the continuous latent variables and the background and/or outcome variables, interpretation can be based on the relative magnitude of these coefficients. For example, the standardized coefficient for the path between discretion and total CEO compensation at the between-industry level is 1.29, while the same coefficient within industries is 0.26, indicating that much of the predictive variability between discretion and total CEO compensation is due to the effect of industry. Notwithstanding the improved statistical power at the firm level, the comparative size of the effect (or β) between discretion and total CEO compensation is much greater at the industry level[11]. Further, tests of equality between the between- and within- paths were significant (t=2.25, $p < 0.05$).

Not only do these results indicate that discretion at the industry unit of analysis is a stronger predictor of compensation than discretion at the firm level, they also provide strong support for Hypothesis 1 by showing that industry discretion is significantly related to total CEO compensation over and beyond any firm-level effects of discretion on compensation. In other words, this result is not due to the aggregation bias that often plagues studies where the phenomenon of interest is complex and multi-level.

The size of the firm was positively related to compensation at both levels, although this effect was slightly stronger (but not significant) at the industry level. Both firm performance and CEO factors were not significantly related to total CEO compensation at either the firm or the industry level.

Fig. (**2**) contains the model investigating the effect of CEO discretion on the proportion of performance contingent CEO compensation. Fit indices indicate that these data fit the model reasonably well. Chi square was 329.99, but when corrected for the model degrees of freedom the ratio dropped to 2.84. Root mean squared error was 0.05, as in the model of total CEO compensation. The measurement component of the multi-level model produced largely the same results as the model predicting total CEO compensation as well. Although the composite reliability for discretion at the industry level was slightly improved at α=0.75, coefficient alpha remained the same at the firm level. Sales loaded significantly on size, with composite reliabilities above 0.72 at both levels of analysis. Similar to the previous model, the reliability of the latent variable performance was 0.63 at the firm level and 0.52 at the industry level. Finally, CEO tenure loaded positively and significantly on the latent trait of CEO factors, with reliabilities similar to the previous model.

As with total CEO compensation, much of the relationship between discretion (and the control variables) and PPCC at the firm level is due to industry (R^2=0.92 vs. 0.19). Specifically, the standardized coefficient between CEO discretion and PPCC was much greater at the industry level (γ=2.6) than at the firm level (γ=0.22), and the between- and within- industry paths were significantly different from each other (t=1.99, $p < 0.05$). Hence, not only is Hypothesis 2 supported, but these results also indicate that industry discretion is significantly related to the proportion of performance-contingent CEO compensation after controlling for the firm-level influence of discretion on pay.

DISCUSSION

The results we report here are compelling: for really the first time, we provide a formal and explicit test of an industry-level explanation for CEO compensation patterns in a

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[9] Composite reliabilities were computed using the formula specified by Fornell and Larker, 1981. For computation of reliability indices, the values of capital intensity and regulation were reflected, so that factor loadings would be positive.

$$\rho_\eta = \frac{\left(\sum_{i=1}^{p}\lambda_{yi}\right)^2}{\left(\sum_{i=1}^{p}\lambda_{yi}\right)^2 + \sum_{i=1}^{p}Var(\varepsilon_i)}$$

[10] Because model variances were small and insignificant for demand instability at the firm level, the variance was fixed to 0.00.

[11] The greater sample size and smaller standard errors at the firm level produce larger t-statistics at the firm level than what is encountered at the industry level.

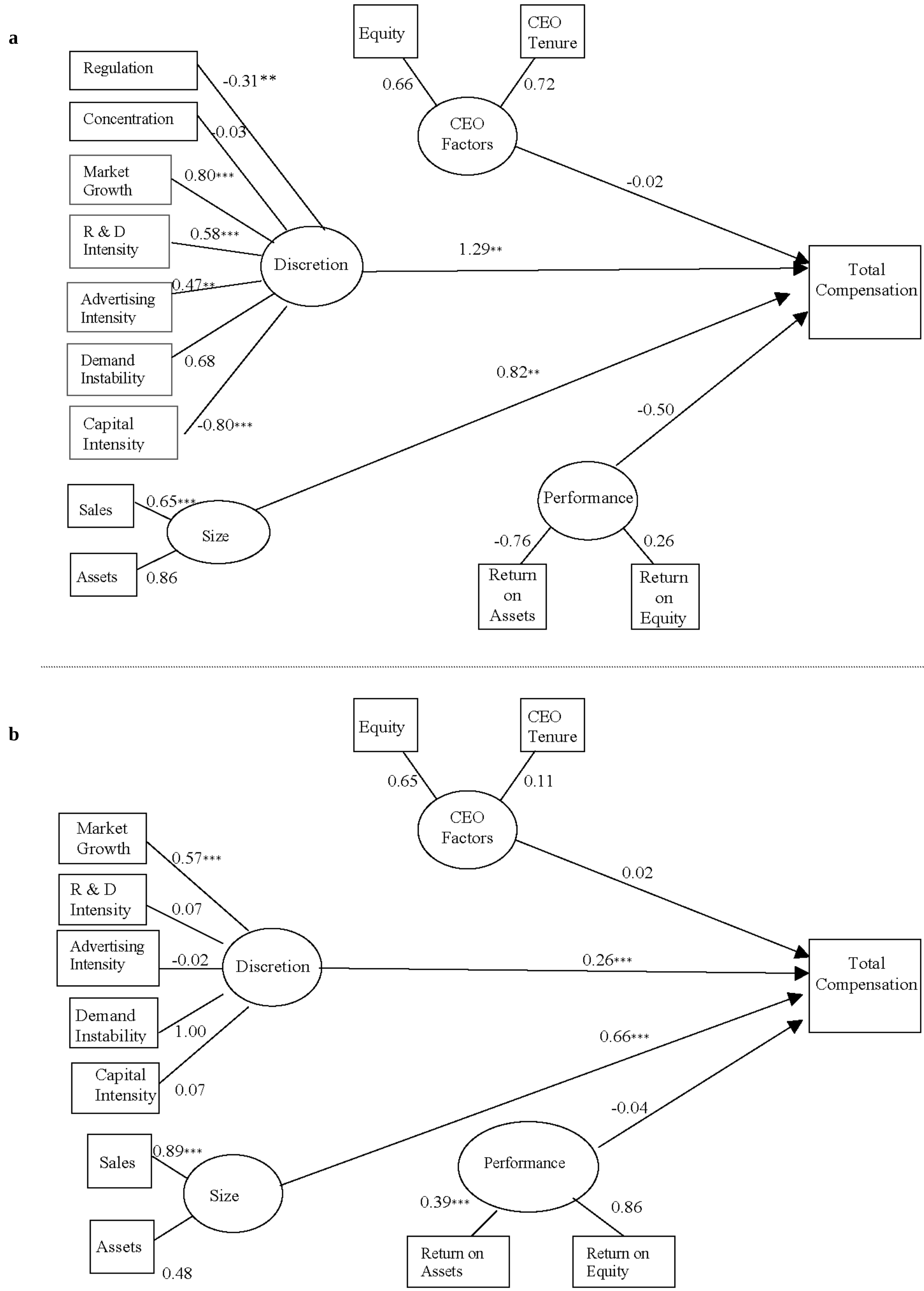

Fig. (1). (**a**) Between industries (**b**) within industries.

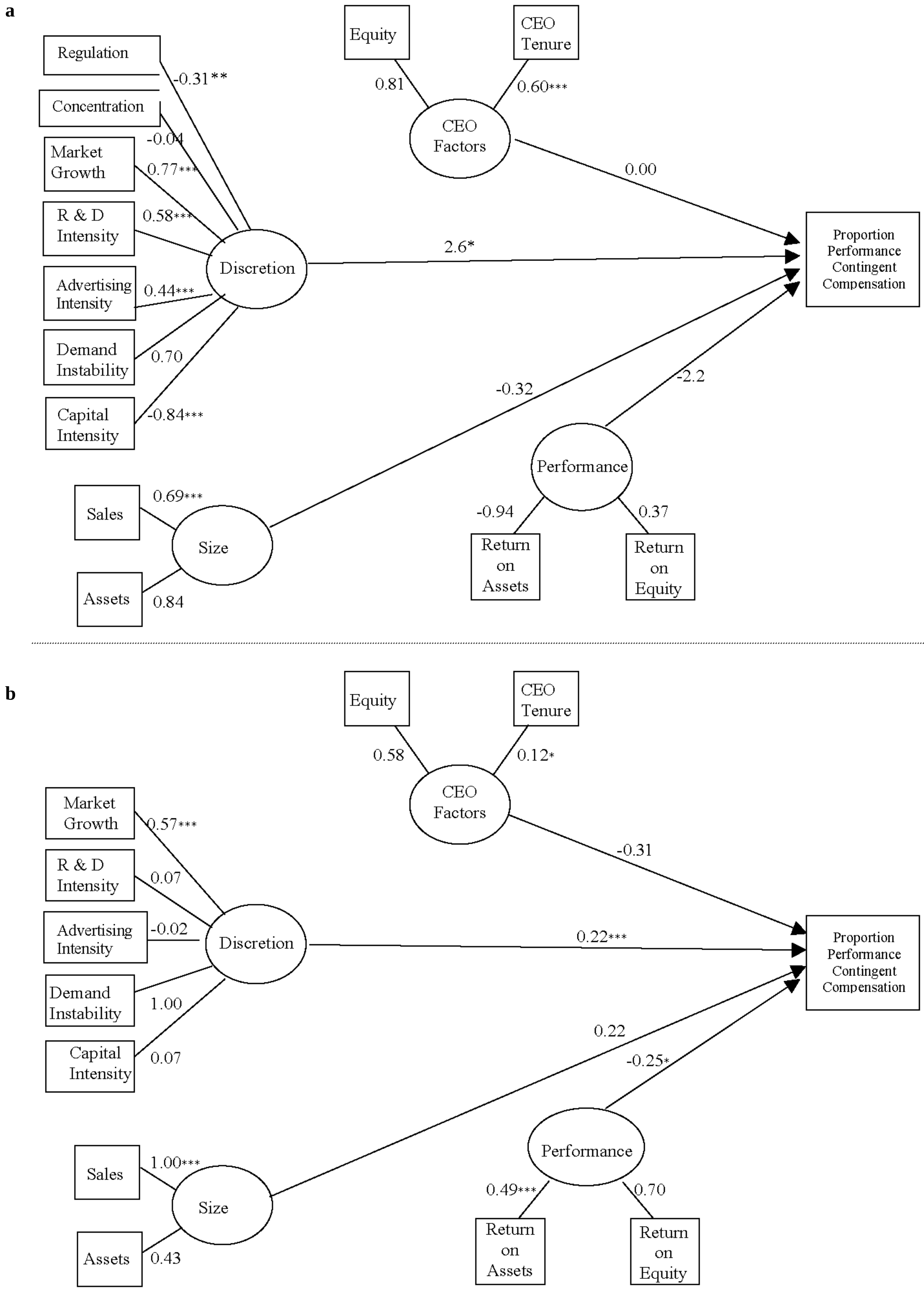

Fig. (2). (**a**) Between industries (**b**) within industries.

relatively large sample of industries. In contrast to most studies of CEO compensation, we offer a theory-based explanation for the "industry effect". Rather than being an uninteresting phenomenon that simply warrants statistical control, we offer here a different perspective, one that views the role of industry as theoretically intriguing as well as of substantial magnitude in an empirical sense. Even after controlling for such potentially relevant factors as size and profitability, industry discretion was significantly related to both total CEO compensation and the proportion of performance contingent CEO compensation. In all, these results are strong, based on theory, and have the potential to open up research on executive compensation, and on the role of industry in explaining organizational phenomena, in new ways.

Industry and CEO Compensation

The importance of industry in understanding organizational phenomena cannot be underestimated. There are several well-established theories that researchers in strategy and organization theory have relied on for some time to explain why industry (or environment) is so important. Although not without controversy [78], theories on resource dependence [4], population ecology [41], and institutionalization [79] have been used to explain not only firm performance, but a whole range of other organizational phenomena ranging from organizational foundings [80] to mergers and acquisitions [81]. The present study can be seen in the same light. Our findings indicate that CEO compensation is heavily influenced by the industry in which a firm competes, with the level of discretion emanating from the industry a key driving force.

There may be other attributes of an industry that account for the different patterns of CEO compensation prevalent across industries. We tried to control for several of these alternatives - such as profitability and size- in the empirical analysis, but other influences are possible as well. For example, we reviewed other work that focused on economic and structural characteristics of industries, although we also noted that this research was more suggestive than theoretical. Nevertheless, it may be that our operationalization of industry discretion overlaps somewhat with some of these other explanations (e.g., R&D intensity may be an informative indicator of the economic conditions prevalent in an industry). Even with this potential noise in our analysis, however, we were able to demonstrate a significant effect for industry discretion. Further, our approach of actually collecting and measuring specific indicators of discretion in an industry - as opposed to just relying on industry itself to proxy for discretion - lends some assurance that the industry discretion hypothesis is being fairly tested in the analysis. So, while there may be other explanations for why industry is an important predictor of CEO compensation (and indeed of compensation patterns in general), the results in this study provide strong support for the role of industry discretion in explaining CEO pay.

Industry influences aside from industry discretion may be helpful in extending the present work. Of particular interest in this regard is the possibility that isomorphic pressures in an industry give rise to homogeneous pay patterns among firms. To the extent industries differ in how much pressure they create for firms to conform to some "industry norm" - perhaps because of differences in the prevalence of social comparisons, or of the role of compensation consultants, within an industry - there will be differences in how much CEO compensation varies among firms in the same industry. The greater the isomorphic pressure toward conformity, the greater the homogeneity in CEO pay.

As compelling as such an hypothesis may appear, there are two caveats worth pointing out. First, this hypothesis does not speak to the question of CEO pay levels, only variation in pay levels, in an industry. As such, it does not represent an alternative explanation to the industry discretion hypothesis tested here. Second, empirical investigation of industry isomorphism is likely to be problematic because of difficulties in precisely measuring the extent of such pressure in different industries. Perhaps some combination of measures such as board interlocks [82], structural equivalence [40], and intraindustry executive ties [83] can be used to assess the degree of industry isomorphism. While challenging to conduct, such a study would be valuable for its potential extension of the role of industry in CEO pay patterns, an important step in building a theory-based industry-level explanation for CEO compensation.

Methodological Considerations

One of the major challenges in investigations of complex phenomena is to empirically tease out underlying relationships that drive the outcome of interest. A major obstacle is disentangling the multi-level nature of many data structures, a problem that has existed in the strategy and organization science literatures for some time [55]. A multi-level structural equation model of the type used here is one way to address this challenge. Not only does such a model explicitly investigate two units of analysis simultaneously (as a form of hierarchical linear modeling), it also minimizes biases imposed by measurement error in the latent constructs (the structural equation component of the model). Hence, the methodology matches the complexity of the data structure by decomposing variance into, in this study, industry and firm level components while minimizing measurement error.

The benefits of a multi-level structural equation model are apparent in a study such as this one where there is a hypothesis at one unit of analysis that is independent of the same type of relationship occurring at another unit of analysis. Rather than managing around various aggregation biases, our approach enables a fair test of such a hypothesis. By demonstrating that (1) industry discretion was significantly related to CEO compensation patterns, (2) the industry effect held even after controlling for firm-level discretion effects on pay, and (3) the effect of discretion at the industry level was greater than it was at the firm level, we can produce strong evidence in favor of the industry discretion hypothesis. The same approach may be useful in other investigations of complex multi-level phenomena as well - organizational versus individual learning, the relative importance of industry versus firm in explaining firm performance, and CEO versus top management team effects on organizational strategy and structure, to name a few.

It seems clear that there are many extensions to the present study - both substantive and methodological - worth pursuing. Our goal in this paper was to develop and test an industry-level explanation for CEO compensation patterns.

Findings in support of industry discretion go a long way toward meeting this goal. Future research directed toward a more complete model of the role of industry in the setting of CEO compensation seems warranted.

ACKNOWLEDGEMENTS

This paper benefited from the helpful comments of John Haleblian, Michael Young, Phil Anderson, Richard D'Aveni, and Yong-Min Kim. Methodological and technical expertise was provided by Lynn Foster-Johnson, Sarah Leonard, and Bengt and Linda Muthen. The generous support of the Tuck School at Dartmouth College is greatly appreciated.

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Received: November 12, 2008 Revised: January 16, 2009 Accepted: January 16, 2009