

**TMT COORDINATION NEEDS AND THE CEO PAY GAP:
A COMPETITIVE TEST OF ECONOMIC
AND BEHAVIORAL VIEWS**

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Abstract

Some strategies require senior managers to tightly coordinate their decisions, and this creates opposing pressures on the *CEO pay gap*, defined as the difference in pay between a firm's CEO and other TMT members. While smaller gaps promote collaborative behavior, larger ones create tournament-like incentives that address monitoring problems associated with joint decisions. Therefore, a behavioral view predicts that higher coordination needs will encourage smaller pay gaps, and the combination of smaller gaps and greater coordination needs will enhance firm performance. An economic view, particularly tournament theory, predicts the opposite. A competitive empirical test found that: (1) tournament theory better predicted the size of CEO pay gaps; (2) there was a balance between the two views as predictors of firm performance – some results supported tournament theory, while an equal number supported the behavioral view; and (3) there were several paradoxes between pay and performance. For instance, pay gaps increased with capital investment, but the interaction of higher investment and larger gaps yielded lower performance. Overall, a mix of economic and behavioral ideas was required to fully explain the results.

Managers are usually paid more than their subordinates, even those who are outstanding managers themselves. Mid-level managers, for instance, are paid more than front-line supervisors, and CEOs are paid more than other senior executives. Behavioralists and economists have radically different views of such across-rank pay gaps, particularly when coordinated decision making is required. Behavioralists contend that large pay gaps undermine coordination by creating feelings of relative deprivation among subordinates (Cowherd & Levine, 1992; Martin, 1981), and by establishing strong temptations for subordinates to sabotage their coworkers to win promotion (Dye, 1984; Milgrom & Roberts, 1988). In contrast, economists focus on problems with shirking and free-riding that arise when joint work efforts make it hard to distinguish individuals' marginal contributions. They contend that when substantial coordination is required, large pay gaps are beneficial because they provide strong, tournament-like incentives that retain their potency even though monitoring individual efforts is impractical (Lazear & Rosen, 1981; Rosen, 1986).

This study addresses these conflicting ideas about across-rank pay gaps. First, it identifies specific conflicts between the economic views embodied in tournament theory and the behavioral views embodied in theories of relative deprivation, organizational politics, and allocation preferences. Second, it develops several pairs of rival hypotheses that put those theories to a stringent competitive test. Other studies have discussed general tensions between economic and behavioral views (e.g., Bok, 1993; Main, O'Reilly, & Wade, 1993; Siegel, 1996), but none has rigorously tested them head-to-head. To do so, we believe that it is critical to assess multiple pairs of rival hypotheses to determine if (1) a clear, consistent winner emerges; (2) opposing influences consistently cancel one another; or (3) the competing views are potential complements because some empirical evidence supports one view, while different evidence supports the other.

This study is able to distinguish between these three possibilities, while earlier ones have not. Doing so proved to be important because our tests revealed a set of contrasting and sometimes paradoxical results that neither an economic nor behavioral view, by itself, could fully explain. Instead, a complementary mix was required, a finding important to future theory building.

Many studies have examined the pay of individual executives (e.g., Finkelstein & Hambrick, 1989; Gomez-Mejia, Tosi, & Hinkin, 1987; Murphy, 1985; Westphal & Zajac, 1994), but there has been very little research on the pay of top management teams (TMTs), or differences in pay within them (Siegel, 1996; Siegel & Hambrick, 1996).

This study examines the *CEO pay gap*, defined as the difference between a CEO's compensation and the average pay of other top management team members. Other aspects of pay inequality (Allison, 1978) or TMT pay dispersion (Siegel, 1996) might be considered; however, studying the CEO pay gap is important because it allows a competitive test of tournament theory (Lazear & Rosen, 1981; Rosen, 1986) and behavioral theories about relative deprivation (Cowherd & Levine, 1992; Martin, 1981), organizational politics (Dye, 1984; Milgrom & Roberts, 1988), and allocation preferences (Leventhal, 1976; Leventhal, et al., 1980). This test is noteworthy because it addresses tensions between economic perspectives that emphasize competition as a means to elicit effort from agents (e.g., Fama, 1980; Gibbons & Murphy, 1990; Williamson, 1975), and behavioral perspectives that emphasize the role of cooperation (e.g., Barnard, 1938; Bartlett & Ghoshal, 1993; Ghoshal & Moran, 1996).

To construct this test, we consider *coordination needs*, which exist when top executives must jointly process information to resolve interdependencies among different parts of the firm (cf. Galbraith, 1973; Hambrick & Siegel, 1998; Thompson, 1967). For example, coordination needs are typically higher in larger firms because their subunits are more numerous, specialized, and differentiated than in smaller organizations (Blau & Schoenherr, 1971; Haveman, 1993). As firms become larger, they become more difficult to manage, and teams of top managers play a more important role in coordinating their activities (Chandler, 1962). The following subsections develop competing views about coordination needs and CEO pay gaps.

A Behavioral View of the CEO Pay Gap

A behavioral perspective suggests that across-rank pay gaps are a critical part of a firm's social-psychological and socio-political context and have a profound effect on whether people selfishly pursue their own interests or cooperatively contribute to broader organizational goals. One component of this perspective is relative deprivation theory (Cowherd & Levine, 1992; Martin, 1981, 1982), which is

part of the extensive literature on distributive justice (Greenberg, 1987). Deprivation theory argues that individuals compare their pay to that of people at higher organizational ranks. If lower-level workers perceive that they have received less than they deserve, they feel deprived, which leads to adverse reactions such as absenteeism or strikes. In addition, cooperation suffers because employees become less committed to organizational goals, and their cohesiveness declines (Cowherd & Levine, 1993; Deutsch, 1985).

Relative deprivation is particularly germane to the CEO pay gap for two reasons. First, it involves upwards comparisons between lower-level employees and their superiors. For instance, secretaries, hourly workers, and lower-level managers have been found to experience relative deprivation because of pay differences between themselves and senior managers (Cowherd & Levine, 1992; Martin, 1981). Thus, deprivation is an across-rank phenomenon that speaks to differences between CEOs and other members of the TMT (Siegel, 1996).

Second, deprivation involves comparisons of outcomes with little regard for differences in inputs, such as effort, ability, or skills (Martin, 1981). Employees often downplay input differences because of a strong, society-wide preference for equal outcomes (Jasso & Rossi, 1977), and because people overestimate their abilities and contributions relative to others (Cook & Yamagishi, 1983; Meyer, 1975). In addition, pay differentials are readily observed, while input differences are hard to measure, so employees tend to judge what they receive, not what they contribute (Pfeffer & Langton, 1993). As a result, large pay differences, even those driven by real differences in productivity, are often major sources of dissatisfaction (Bloom, 1999; Cowherd & Levine, 1992; Martin, 1982; Pfeffer & Langton, 1993). Deprivation theory therefore suggests that large CEO pay gaps will be perceived as unjust even if CEOs routinely contribute more than other TMT members.

The political economy literature reaches similar conclusions regarding cooperative behavior and large pay gaps. A politically informed view recognizes that employees face choices about: (a) their overall level of effort, (b) the split of their overall effort between self-serving and cooperative ends, and (c) their emphasis on politics, particularly efforts to make themselves look good and their peers look bad (Dye, 1984; Milgrom & Roberts, 1988; Lazear, 1989). The size of pay gaps across hierarchical ranks is critical because it influences each of those choices. Large pay gaps increase overall effort by subordinates

(choice a), but do so by promoting self-serving efforts at the expense of cooperative ones (choice b), and also increase the likelihood of political sabotage (choice c). Among executives, sabotage includes withholding vital information from peers, attempting to damage the reputation of one's rivals, engaging in covert influence attempts with superiors, and polishing one's own reputation rather than paying attention to substantive operating issues (Dye, 1984; Eisenhardt & Bourgeois, 1988; Finkelstein & Hambrick, 1988; Milgrom & Roberts, 1988).

Political economy theory concludes that when teamwork is vital, the hazards of sabotage and decreased cooperation overwhelm the benefits of greater, but more self-serving efforts. This indicates that firms requiring substantial cooperation should make across-rank pay differences relatively small, smaller even than differences in marginal contributions would warrant (Milgrom & Roberts, 1988; Lazear, 1989). Such pay compression is particularly important at the highest ranks because promotion contests favor individuals who are both politically adept and likely to engage in sabotage (Lazear, 1989). Consequently, this literature suggests that smaller CEO pay gaps will be more efficient in firms with substantial coordination needs.

Few empirical studies have tested ideas about relative deprivation or political sabotage among top executives, and those that have offer conflicting results. Main et al. (1993) found that TMT pay dispersion had a positive relationship with profitability, regardless of executive team interdependence, which contradicts political economy arguments. In contrast, Hambrick and Siegel (1998) found that smaller interranks pay gaps were associated with higher stock returns in industries where executive collaboration was important. These limited and conflicting results suggest that further study of top executives is needed.

It is important to note that relative deprivation and political economy theories are *reactive* (Greenberg, 1987) since they focus on individuals' responses to pay gaps. In comparison, other behavioral theories are *proactive* because they describe how pay is set. In particular, allocation preference theory (Freedman & Montanari, 1980; Greenberg, 1987; Leventhal, 1976; Leventhal, et al., 1980) contends that pay is set with an eye towards avoiding dissatisfaction among recipients. As Leventhal (1976: 108) states, such dissatisfaction "may have serious negative consequences for the

allocator. He may be subjected to criticism and pressure from dissatisfied individuals ... Such criticism is inherently unpleasant and may also pose a threat to the allocator's authority and status".

Allocation preference theory concludes that compensation decisions are not made in a vacuum, but instead, involve reciprocal relationships between those who set pay and those who receive it. Empirical work on non-executives has identified several conditions where pay will be distributed relatively equally, even when there are substantial differences in individual performance. These include: (1) when it is important to maintain social harmony; (2) when it is difficult to assess individuals' marginal contributions; (3) when competition among group members is likely to result in the sabotage of interdependent work efforts; and (4) when cooperation is vital (Lawler, 1971; Leventhal, 1976; Leventhal, et al., 1980; Steiner, 1972). In turn, each of these conditions is likely to exist in firms with substantial coordination needs.

To summarize, the behavioral view, which encompasses ideas about relative deprivation, organizational politics, and allocation preferences, indicates that smaller pay gaps will promote cooperation and lower the chances that executives will either sabotage their rivals or undermine the authority of pay setters. Therefore, this view predicts that in firms with greater coordination needs, CEO pay gaps will be smaller, and the combination of higher coordination needs and smaller gaps will enhance firm performance. As detailed later, such combinations, which involve a fit between gap size and coordination needs, may involve either mediated or moderated relationships (cf. Prescott, 1986; Venkatraman, 1989). The following section shows that an economic view draws opposing conclusions.

An Economic View of the CEO Pay Gap

Economists point to competition for pay and promotion as a means to elicit strong efforts from agents who are otherwise prone to shirking and free-riding (Gibbons & Murphy, 1990; Jensen & Meckling, 1976). In particular, tournament theory (Green & Stokey, 1983; Lazear & Rosen, 1981; Rosen, 1986), which is based on a game-theoretic view of principal-agent relations, speaks directly to the size of CEO pay gaps. That theory was developed to explain the very large pay gaps typically observed between CEOs and the executives directly below them. As Lazear and Rosen (1981: 847) state: "On the day that a given individual is promoted from vice-president to president, his salary may triple. It is difficult to argue that his skills have tripled in that one-day period". Standard economic

theory, where pay is linked to marginal product, cannot explain such outcomes, but they are explainable if agents are viewed as contestants competing for promotion in a sequential elimination tournament with a very large, winner-take-all prize.

Tournament theory asserts that when monitoring is reliable and inexpensive, optimal effort is obtained by paying agents on the basis of their marginal products. Promotion choices are also straightforward because principals can simply compare contestants' marginal contributions. However, monitoring difficulties vary across firms (Jensen & Meckling, 1976), and as oversight becomes more costly and unreliable, three problems arise: (1) agents have stronger incentives to shirk, (2) paying agents on the basis of their marginal product is less feasible, and (3) identifying the best candidates for promotion is increasingly difficult. These problems give principals incentives to implement tournaments where: (a) pay is successively higher at each rank; (b) the size of pay gaps between successive ranks increases with hierarchical level; and (c) the pay gap between the CEO and the next highest-ranking executive is particularly large. Each of these pay characteristics is expected to become more pronounced as monitoring becomes harder.

Under such conditions, tournaments have three potential advantages over contracts that pay for marginal product. First, pay is based on the ordinal ranking of agents' contributions. Ranking is simpler than precisely measuring marginal products, so monitoring costs are lower. Second, large prizes are inherently motivating (Ehrenberg & Bognanno, 1990; Becker & Huselid, 1992), which gives lower-level contestants strong incentives to be ranked highly so that they can eventually compete for the very large rewards at the top of the firm. This discourages shirking, so principal agent interests tend to self-align in tournaments, and there is little need for the costly supervision needed to enforce a marginal-product contract. Third, agents who have been successful in prior promotion contests have incentives to continue striving rather than resting on their laurels. This occurs because the size of interrank pay gaps increases with hierarchical level, and the gap between the CEO and the next-highest rank is the largest of all (Rosen, 1986).

Empirical research on executives supports some of these ideas. Lambert et al. (1993) found that interrank pay gaps were successively larger at higher managerial ranks, and the pay gap between the CEO and the next-highest executive was particularly large. Main et al. (1993) and O'Reilly et al.

(1988) observed that the chances of a winning a tournament decrease with the number of competitors. This suggests that to maintain strong incentives, CEO pay gaps will increase with the number of vice presidents (VPs) competing for the top job. Main and colleagues found support for this, however, O'Reilly and colleagues found a negative relationship, which contradicts tournament theory. These studies indicate that CEOs are paid a good deal more than other executives, yet such differences may exist simply because the most able are promoted and their influence increases with hierarchical rank, an outcome consistent with marginal-product contracting. So it is important to establish not only that large pay gaps exist (cf. Lambert et al., 1993), but also that gap size varies with tournament conditions, such as the number of competitors (Main et al., 1993; O'Reilly et al., 1988). Limited and conflicting evidence on that matter indicates that further study is needed.

On the whole, tournament theory holds that as monitoring difficulties increase, larger CEO pay gaps reduce the need for costly supervision and provide strong incentives that better align principal-agent interests. Monitoring is particularly difficult when there is joint production and task interdependence (Eisenhardt, 1989; Jones & Hill, 1988; Konrad & Pfeffer, 1990), such as when TMT members must collectively resolve interdependencies among different parts of the firm. So this theory predicts that CEO pay gaps will be larger in firms with greater coordination needs, and the combination of higher needs and larger gaps will enhance firm performance.

Hypothesis Development

As seen here, behavioral and economic theories reach conflicting conclusions about CEO pay gaps. This makes it possible, to quote Popper (1959: 108), to “choose the theory which best holds its own in competition with other theories; the one which, by natural selection, proves itself the fittest to survive.” But to do so effectively, we believe, it is critical to develop and test several pairs of competing hypotheses. As Sutton and Staw (1995: 377) state, “theory stems from a single or small set of research ideas” that produce an extensive “set of interrelated propositions and hypotheses”. Similarly, Kaplan (1968: 298) describes how a social science theory involves a “network of relations so as to constitute an identifiable configuration or pattern.” Since theories involve webs of interconnections, any single test is insufficient to support one theory over another. Instead, strong competitive tests require multiple trials.

To accomplish this, we consider how a firm's diversification strategy, technology, and structure contribute to coordination needs within its TMT. Other factors like environmental volatility may also affect those needs, but they are beyond the scope of this study. The following subsections develop competing hypotheses about coordination needs and the size of CEO pay gaps, and how combinations of those factors affect firm performance.

Diversification and gap size. Two aspects of diversification strategy are likely to affect coordination needs: (1) the relatedness of a firm's businesses; and (2) the number of businesses (i.e., product-market areas) that it pursues (Chandler, 1962; Galbraith, 1973). Related diversification requires top executives to take an active role in resolving reciprocal interdependencies, coordinating resource exchanges, and leveraging core competencies across business areas (Michel & Hambrick, 1992; Prahalad & Bettis, 1986; Rumelt, 1974). So as relatedness increases, greater demands for coordinated information processing are placed upon the TMT (Hill & Hoskisson, 1987; Jones & Hill, 1988).

Similarly, the number of businesses that a firm pursues affects coordination needs. In related diversifiers, larger numbers of businesses increase the operational interdependencies that the TMT must address (Chandler, 1962; Jones & Hill, 1988; Michel & Hambrick, 1992). In unrelated diversifiers, larger numbers of businesses add to the amount of information that top executives must consider to make informed decisions about investment flows in those firms' internal capital markets (Henderson & Fredrickson, 1996; Hill & Hoskisson, 1987; Jones & Hill, 1988). Since a single executive can critically evaluate only a limited number of investments (Bower, 1970: 35), monitoring and allocating investments among numerous businesses becomes a team effort¹.

As noted earlier, behavioral theory concludes that pay will be allocated more equally when coordination needs are greater, while tournament theory indicates that larger pay gaps will be used to resolve the monitoring difficulties associated with joint work efforts. Applied to the aspects of diversification strategy considered here, this suggests two pairs of competing hypotheses:

¹ Related and unrelated diversification can be considered as separate constructs, both conceptually (Jones & Hill, 1988) and empirically (Palepu, 1985). Here, we expect that once the total number of businesses is accounted for, unrelated diversification will contribute relatively little to coordination needs (Hill & Hoskisson, 1987; Jones & Hill, 1988), so our analyses control for unrelatedness, but it is not a focus of our hypotheses.

- H1(behavioral):** There will be a negative relationship between the relatedness of a firm's businesses and the size of the CEO pay gap.
- H1(tournament):** There will be a positive relationship between the relatedness of a firm's businesses and the size of the CEO pay gap.
- H2(behavioral):** There will be a negative relationship between number of businesses and the size of the CEO pay gap.
- H2(tournament):** There will be a positive relationship between number of businesses and the size of the CEO pay gap.

Technology and gap size. Technology is another source of coordination needs. Here we consider both R&D spending and capital investment activity, which represent critical long-term commitments. The strategic implications of such investments bring them squarely within the purview of top management (Bantel & Jackson, 1989; Bower, 1970; Prahalad & Bettis, 1986).

As either capital investment or R&D activity increases, some combination of the following occurs: (1) the number of investment projects grows; or (2) the size and complexity of the average project increases. As noted above, a single executive can critically evaluate only a limited number of projects, so evaluating numerous activities becomes a team effort, particularly because there are often multiple and conflicting demands for capital, personnel, and top management attention across technology proposals (Bower, 1970; Hayes & Abernathy, 1980). Conversely, very complex projects often exceed the cognitive grasp of any single executive (Thompson, 1967), so multiple executives are required for thorough evaluation.

The long, multi-year lags between technology expenditures and potential future revenues further complicate such decisions. To make informed choices across competing projects, executives need a deep understanding of technological and competitive risks, the capabilities of different project teams, and emerging contingencies that may demand large-scale redirections of resources across projects (Brown & Eisenhardt, 1997; Wheelwright & Clark, 1992). Objective financial controls based on past performance provide little guidance about these future-oriented decisions (Hayes & Abernathy, 1980), so instead, strategic control processes and detailed understanding are vital (Baysinger & Hoskisson, 1990). Again, such complex decisions create substantial coordination needs that demand team efforts. A behavioral view concludes that smaller pay gaps enhance such coordination, while tournament theory concludes that larger gaps better address the monitoring difficulties that arise with such joint decision making:

- H3(behavioral):** There will be a negative relationship between R&D activity and the size of the CEO pay gap.
- H3(tournament):** There will be a positive relationship between R&D activity and the size of the CEO pay gap.
- H4(behavioral):** There will be a negative relationship between capital investment activity and the size of the CEO pay gap.
- H4(tournament):** There will be a positive relationship between capital investment activity and the size of the CEO pay gap.

Structure and gap size. We also consider two structural factors that are likely to influence coordination needs: firm size and the number of vice presidents. Larger firms are more structurally complex than smaller ones, and have subunits that are more specialized and differentiated (Blau & Schoenherr, 1971; Haveman, 1993). So as firms become larger, they become more difficult to manage, and TMTs play a more important role in coordinating their activities (Chandler, 1962). Similarly, coordination needs will be greater in firms with more vice presidents. Employing more VPs has definite costs, both monetary (salary, staff, etc.), and procedural, because larger groups are more difficult to integrate (Gooding & Wagner, 1985; Levine & Moreland, 1990). Despite this, some firms employ numerous VPs because they expect to better coordinate their business activities (Chandler, 1962; Galbraith, 1973; Lawrence & Lorsch, 1967). Once again, such coordination needs create opposing pressures on the CEO pay gap, which suggests two pairs of competing hypotheses:

- H5(behavioral):** There will be a negative relationship between firm size and the size of the CEO pay gap.
- H5(tournament):** There will be a positive relationship between firm size and the size of CEO pay gap.
- H6(behavioral):** There will be a negative relationship between the number of VPs and the size of the CEO pay gap.
- H6(tournament):** There will be a positive relationship between the number of VPs and the size of CEO pay gap.

Performance implications. What are the effects of coordination needs and gap size on firm performance? The behavioral perspective suggests two related possibilities. One is that larger gaps are universally detrimental to performance because relative deprivation and political sabotage decreases cooperation and organizational commitment. Cowherd and Levine (1992), for instance, found that product quality was lower when pay gaps between executives and lower-level workers were larger, and

Bloom (1999) found that the performance of professional baseball teams was lower when players' pay was more dispersed. Combined with the earlier hypotheses, which predict that coordination needs affect gap size, this suggests a mediated relationship: Coordination needs → CEO pay gaps → Firm performance. If so, gaps will have a direct and negative effect on performance, one that mediates the effects of coordination needs:

H7(mediated-behavioral): There will be a negative relationship between the size of CEO pay gaps and firm performance, one that mediates the effects of coordination needs.

A related possibility involves moderation. Pfeffer and Langton (1993) found that social interaction moderated the relationship between faculty pay dispersion and productivity, and Hill, Hitt, and Hoskisson (1992) found that diversification strategy moderated the relationship between executive pay and profitability. These studies and others (e.g., Gomez-Mejia, 1992) suggest that a firm's strategy and structure interact with pay to affect performance. Given this, one could argue that some firms are particularly reliant on TMT coordination, including those that are larger, more diverse, or pursuing corporate-level economies through their technologies or TMT structure (Chandler, 1962; Jones & Hill, 1988). Larger gaps may be particularly harmful in such firms because greater needs for coordinated decision making conflict with greater incidences of relative deprivation and political sabotage. Such firms would pay the costs of pursuing strategic integration (e.g., more R&D investment, more capital investment, more executive time and compensation), but realize few benefits. If so, the interaction of coordination needs and CEO pay gaps will be negatively related to performance.

H7(moderated-behavioral) The interaction of larger CEO pay gaps and greater coordination needs will have a negative relationship with firm performance.

Tournament theory offers contrasting ideas. One is that larger pay gaps lead to higher performance, regardless of coordination needs, because they elicit stronger individual effort. For instance, empirical studies show that firm performance is higher when TMT pay is more dispersed (Main et al., 1993), and professional athletes perform better when there are larger prize gaps between first and second place (Becker & Huselid, 1992; Ehrenberg & Bognanno, 1990). Again, combined with the earlier hypotheses about coordination needs and gap size, this suggests a chain (coordination needs → gap size → performance), in which gap size has a direct and positive effect on performance that mediates the impact of coordination needs:

H7(mediated-tournament): There will be a positive relationship between the size of the CEO pay gaps and firm performance that will mediate the effects of coordination needs.

A second tournament-based idea involves moderation. Consider that even though tournaments can overcome problems with shirking that arise when principals cannot accurately assess agents' marginal contributions, tournaments actually impose cost penalties when monitoring is simple relative to contracts that pay for individual productivity (Green & Stokey, 1983; Lazear & Rosen, 1981). Penalties include: (a) the CEO is paid much more than his or her marginal product; and (b) lower-ranking executives, to fund the CEO's prize, are paid much less than what they produce, which is extremely demotivating when employees can easily compute their marginal contributions (Lazear & Rosen, 1981). If so, then large gaps are potential replacements for tight monitoring, but their efficiency is contingent upon high needs for coordination. This suggests a moderated relationship:

H7(moderated-tournament) The interaction of larger CEO pay gaps and greater coordination needs will have a positive relationship with firm performance.

In conclusion, a firm's diversification strategy, technology, and structure each affect the need for coordinated decision making within its TMT. In turn, behavioral and economic views offer conflicting predictions about (a) the relationship between those needs and the size of CEO pay gaps, and (b) relationships between coordination needs, gap size, and firm performance. Moreover, within both the tournament and behavioral views, there are contrasting ideas about mediated and moderated performance effects.

RESEARCH METHOD

Sample

To test these ideas, data were collected on the top executives and firms in four industry groups -- chemicals, high-tech equipment, natural resources, and conglomerates. As reported later, these groups yielded a sample with considerable variation on the independent and dependent variables, which increases our confidence that the results will generalize.

The chemicals group was composed of the chemical manufacturers listed in Fortune's annual survey of industrial corporations. The high-tech equipment group combined firms in Fortune's office equipment and computer category with the firms in its scientific and photographic equipment sector. The natural resources group combined firms in Fortune's petroleum refining category with those listed

under mining and crude oil production. Conglomerates were studied to insure broad variation in measures of relatedness and number of businesses. Fortune does not identify such firms, so we used the Business Week and Forbes annual surveys to construct that group (Henderson & Fredrickson, 1996). To control for differences across industry groups, we employed dummy variables where conglomerates were the omitted category.

Data were collected for the years 1985 and 1990, which produced a sample of 189 firm-years (chemicals = 43 observations; high-tech equipment = 54; natural resources = 55; conglomerates = 37). Some firms moved in and out of the listings across years, so the sample included 26 firms that appeared in 1985 only, 43 in 1990 only, and 60 that appeared in both years. Thus, the total sample size was $26 + 43 + (2 \times 60) = 189$. As reported later, steps were taken to verify that the results were unaffected by the repeated observations. To control for inflation and any other time-related differences, the year was coded as a dummy variable (1985 = 0; 1990 = 1). Observing two years that were relatively far apart helps us to rule out idiosyncratic period effects, which enhances generalizability.

Measures

Dependent variables. Hypotheses 1 through 6 involve CEO pay gaps, which were assessed using cash, long-term, and total compensation. Data on pay were collected from proxy statements. Here, *cash compensation* includes all remuneration in the form of salary and bonus. *Long-term compensation* equals the value of stock options, performance unit or share plans, restricted stock, phantom stock, and long-term management incentive plans. *Total compensation* is the sum of cash and long-term pay.

As defined earlier, the CEO pay gap equals the difference in pay between a firm's chief executive and the average pay of its other TMT members. In their proxy statements, public firms are required to disclose the compensation of their CEO and the four other highest-paid executives. The pay of other managers is seldom listed. Given this, TMTs were operationally defined to include the CEO and the four other highest-paid managers, an approach used by Main et al. (1993). In turn, CEO pay gaps for cash, long-term, and total pay were defined as the natural log of the quantity equal to the CEO's pay minus the average pay of the four non-CEOs listed in a firm's proxy. Natural logs were used to reduce heteroscedasticity in our regression models.

Note three things about these measures. First, this approach may either omit TMT members or include persons that are not part of the top group, however, this should not create serious problems. The sampled firms were quite large (average annual sales = \$8.59 billion), so most TMTs probably had more than five people. Also, the difference in pay between a firm's CEO and the next highest ranking executive is typically quite large, while subsequent pay gaps are much smaller, and become smaller still if more executives are considered (Lambert et al., 1993). Consequently, the TMTs studied here may have other members, but including their pay would likely have little impact on the calculated size of CEO pay gaps.

A second thing about these measures is that long-term pay was valued using the procedure described by Lambert and colleagues (1993), in which stock options are valued at 25 percent of their exercise price. This produces values in the same range as the Black-Scholes model (Lambert et al., 1993), but to insure robustness, we followed the advice of those authors and also valued options at 50 percent of their exercise price. Results were unchanged. Grants associated with performance plans were valued by multiplying the number of performance units, performance shares, or phantom shares by their respective target values (when stated prospectively) or by the actual payout per unit (if stated retrospectively). Restricted stock was valued by multiplying the number of shares by the share price on the date of the grant.

The amount of pay ultimately received under a long-term plan is uncertain at the time that it is awarded, and there is little consensus among researchers about how to value such grants (see Lambert et al., 1993 for discussion). For example, the ultimate proceeds from stock options are dependent on the future performance of the stock, whether an executive remains with the firm, and the executive's risk preferences. So as in any study of long-term pay, our results reflect the assumptions used to value it.

The third feature of the cash, long-term, and total pay gaps is that they are difference scores. Authors such as Cronbach and Furby (1970) have argued that such scores should not be used as dependent variables, however, Allison (1990) demonstrates that those concerns are unfounded. In fact, difference scores offer the benefit of eliminating specification error associated with unobserved firm-level factors that might cause the pay of a firm's CEO and other TMT members to vary in tandem (cf. Allison, 1990; Kenny & Cohen, 1979).

Firm performance, the dependent variable in hypothesis 7, was measured by annual *return on assets* (ROA), which was obtained from COMPUSTAT. Return on equity (ROE) yielded similar results. ROA was also used as a control in the analyses of CEO pay gaps since chief executive pay may vary with firm performance (Finkelstein & Hambrick, 1989; Murphy, 1985). Results of the pay gap analyses were unchanged when other performance controls (e.g., 3-year average, 2-year average, and year-to-year change in ROA, ROE, and stock price) were used.

Independent variables. *Relatedness* was measured using the Jacquemin and Berry (1979) entropy index: $\text{Relatedness} = -\sum P_i \ln(1/P_i)$, where P_i equals the percentage of sales a firm received from its i^{th} 4-digit SIC segment within its primary 2-digit industry (Davis & Duhaime, 1989; Hoskisson, Hitt, Johnson, & Moesel, 1993; Palepu, 1985). Segment sales and primary industry designations were obtained from the COMPUSTAT Business Segment Tapes. *Number of businesses* was measured using the count of 4-digit SIC codes listed for a firm in Standard & Poor's Register of Corporations, Directors and Executives.

R&D activity (annual R&D expenditures divided by sales) and *capital investment activity* (annual capital equipment expenditures divided by sales) were obtained from COMPUSTAT. This measure of capital investment is similar to ones for capital intensity, such as the net value of property, plant, and equipment divided by number of employees; however, those measures assess accumulations across time and may be high in a given year only because of decisions made long ago. Coordination activities associated with old investments may have become routine events handled by lower-level employees. Since that is not our focus, we consider new capital investment, which involves non-routine decisions that likely require executive attention.

Firm size was measured as the natural logarithm of employees, data that were obtained from COMPUSTAT. The *number of VPs* was assessed by counting the number of corporate officers in each firm as listed in Standard & Poor's Million Dollar Directory (O'Reilly et al., 1988).

Control variables. Several factors were controlled that might affect either CEO compensation or firm performance. CEOs' pay has been linked to their time in office (Finkelstein & Hambrick, 1989; Hill & Phan, 1991), so *CEO tenure*, measured in years, was controlled. Also, CEOs who were outside successors may command higher pay (Frank & Cook: 1995: 70; Hambrick & Finkelstein,

1995). Thus, the *outsider* dummy variable was coded using data on company tenure and CEO tenure obtained from Forbes. CEOs were designated as outsiders if company tenure minus CEO tenure was less than or equal to one year.

CEOs who share power with others may be paid less because they are unable to dominate the pay-setting process (Finkelstein, 1992). Using data from proxy statements, the *shared power* dummy was coded 1 if any of the following were true: (a) someone other than the CEO chaired the board of directors; (b) the CEO cochaired the board; or (c) another executive held the title of Chief Operating Officer. That variable was coded 0 otherwise.

CEO pay gaps may be larger in firms with higher levels of executive pay; for instance, a gap of \$100,000 may be unremarkable when all TMT members earn over \$1 million, but noteworthy when all earn less than \$200,000. Thus, the *team's average pay* was assessed for cash, long-term, and total compensation. Those variables equaled the average pay (in \$100,000) of the five executives listed in a firm's proxy statement, one of whom was the CEO. This also controls for the possibility that gap size varies because CEO pay has a constant ratio to that of other TMT members and scaling factors differ across firms. In addition, pay dispersion among non-CEOs may affect whether they collaborate (Pfeffer & Langton, 1993), so *non-CEO dispersion* was controlled by calculating the coefficient of variation (Allison, 1978) for cash, long-term, and total pay among the four highest-paid non-CEOs in each firm.

Finally, unrelated diversification may have a negative effect on firm performance (Bettis, 1981; Rumelt, 1974), so we used an entropy measure to control for it. *Unrelated diversification* equaled $\sum P_i \ln(1/P_i)$, where P_i was the percentage of total sales a firm received from its i^{th} 2-digit SIC segment (Hoskisson et al., 1993; Palepu, 1985).

RESULTS

Table 1 provides descriptive statistics for all variables. Table 2 breaks out the means and standard deviations by industry group. Note that the groups were not homogeneous. For example, the natural resources group had the highest average capital investment, but the standard deviation of that measure was also the highest among those firms.

 Insert Tables 1 and 2 about here

Model Specification

The data were analyzed with multiple regression models where the six indicators of coordination needs (R&D activity, number of businesses, etc.) were treated as separate variables. The independent variables were not scaled and aggregated because we did not expect that they would covary substantially. For instance, firms investing heavily in R&D to differentiate their products might either focus on a single niche or target a number of different businesses (Porter, 1985). Table 1 bears this out: correlations among the independent variables were modest.

Two supplementary analyses validated this approach. First, we ran a factor analysis on the six independent variables. This yielded a six-factor solution where each variable loaded heavily on a completely separate factor ($r > .95$ in each case), and all other loadings were low ($|r| < .22$). Thus, each of the six factors was essentially identical to a different indicator of coordination needs. Second, we assessed multicollinearity in the regression models using the matrix decomposition techniques (Judge et al., 1988: 870) available through the COLLIN option in SAS's PROC REG. The highest condition index was 6.04 in the gap size models, and 11.40 in the ROA models, numbers that are far below the maximum acceptable threshold of 20 (Belsley, Kuh, & Welsch, 1980). This indicates that collinearity did not affect the hypothesis tests. Overall, these factor and collinearity analyses confirmed that the independent variables were empirically distinct.

Hypothesis Tests

Pay gap size. Table 3 contains regression models that predict the size of CEO pay gaps for cash, long-term, and total compensation. Models 1 and 2 examine the cash pay gap, models 3 and 4 the long-term pay gap, and models 5 and 6 the total pay gap. Controls were entered in models 1, 3, and 5. The independent variables were added in models 2, 4, and 6. Positive and significant effects for the independent variables support tournament theory and contradict the behavioral perspective. Negative relationships do the opposite. Null relationships support neither theory.

 Insert Table 3 about here

Hypothesis 1 considers the relationship between gap size and the relatedness of a firm's businesses. As seen in models 2 and 6 of Table 3, that relationship was not significant for the cash or total pay gaps, so neither of the competing theories was supported. Model 4 shows a positive and significant relationship for the long-term pay gap, which supports tournament theory and contradicts the behavioral perspective. Hypothesis 2 addresses number of businesses. Models 2 and 6 report positive and significant relationships between that variable and the size of the cash and total pay gaps. Those results support tournament theory and contradict the behavioral perspective. Model 4 indicates a null relationship for long-term pay.

Hypothesis 3 involves capital investment activity. Model 2 shows a null result for cash pay. Models 4 and 6 reveal positive and significant relationships for the long-term and total pay gaps, results that support tournament theory and contradict the behavioral view. Hypothesis 4 concerns R&D activity. Its effect was not significant in models 2 or 6. In contrast, model 4 indicates a positive and significant association with the long-term gap, which supports tournament theory.

Hypothesis 5 regards firm size, and as models 2, 4, and 6 show, size had a positive and significant relationship with all three pay gaps. Those results support tournament theory and contradict the behavioral perspective. Hypothesis 6 involves the number of VPs. Models 2 and 6 show a negative and significant association, outcomes that support the behavioral perspective and contradict tournament theory. That relationship was not significant for long-term pay.

Performance. Hypothesis 7 advanced four competing possibilities: Larger pay gaps might yield higher performance (economic view) or lower (behavioral view), and each might arise from mediated relationships (coordination needs → pay gaps → performance) or moderated ones (coordination needs x pay gaps → performance). Table 4 shows the regression models predicting performance measured by return on assets. For readability, its coefficients have been multiplied by 100. Model 1 contains the controls, model 2 adds the indicators of coordination needs, and model 3 further adds pay gaps. Since the cash and total pay gaps were highly collinear, the total pay gap was dropped. Results were unchanged when the total pay gap was used instead of cash.

Insert Table 4 about here

If pay gaps are a mediator, then (i) coordination needs should have significant effects in model 2, and (ii) pay gaps should have significant effects in model 3, and (iii) coefficients for coordination needs that are significant in model 2 should be smaller or non-significant in model 3 (Baron & Kenny, 1986; Venkatraman, 1989). As model 2 shows, firm size was the only indicator of coordination needs that was even marginally significant, and an F-test of the ΔR^2 between models 1 and 2 (cf. Cohen, 1968; Greene, 1993: 206) was not significant ($p > .11$), so it may well be spurious. Also, pay gaps were not significant in model 3, and the coefficient for size was actually larger and more significant in model 3 than model 2. Consequently, none of the three criteria for mediation were met. In other analyses not shown here, we performed several path analyses using the CALIS procedure in SAS to further assess the Coordination Needs \rightarrow Pay Gap \rightarrow Performance model. Those analyses, which are available from the authors by request, revealed the same relationships between coordination needs and pay gaps reported in Table 3 and further showed that the pay gap-to-performance relationship was not significant. So overall, there was no support for either the mediated-economic or mediated-behavioral versions of hypothesis 7.

Next, we assessed whether pay gaps moderated the relationship between coordination needs and performance. It should be noted that many studies reveal that cross-sectional relationships between executive pay and performance are very weak or non-existent (e.g., Gomez-Mejia, Tosi, & Hinkin, 1987; O'Reilly et al., 1988; Henderson & Fredrickson, 1996), particularly for cash pay (Murphy, 1985; Finkelstein & Hambrick, 1989). Therefore, we expected much stronger results when interactions were formed using long-term rather than cash or total compensation. Analysis confirmed this. No interactions were significant when pay gaps were measured by total compensation, and interactions of the cash pay gap with capital investment activity and number of businesses were marginally significant. However, as shown in model 4 of Table 4, results for the long-term pay gap were considerably stronger.

Model 4 shows that four of the six interactions were significant, as was an F-test of ΔR^2 ($p < .03$) that compared it to model 3, which contained main effects only. Diagnostics revealed some collinearity

in model 4, so the two non-significant interactions were dropped in model 5. Other analyses, not shown here, revealed that the remaining interactions mediated the marginally significant ones involving cash pay gaps, so long-term pay gaps were driving the results. Therefore, the following discussion focuses on model 5, in which interactions of the long-term gap with relatedness, number of businesses, capital investment, and number of VPs were all significant, and ΔR^2 was significant ($p < .02$) compared to model 3.

To interpret model 5, we calculated $\partial \text{ROA} / \partial x_i$ (e.g., Schoonhoven, 1981; Gupta & Govindarajan, 1984) for x_i equal to each of the four indicators of coordination needs in its interactions. For instance, $\partial \text{ROA} / \partial \text{relatedness} = (-21.576/100) + \{(1.554/100) * \text{long-term gap size}\}$. Across the observed range of gap size, that slope changed from positive, for large gaps, to negative, for small ones, which signals a non-monotonic relationship (Schoonhoven, 1981). To visualize this, Figure 1 graphs $\text{ROA} = \beta_1 \text{ relatedness} + \beta_2 \text{ gap size} + \beta_3 \text{ relatedness} * \text{gap size}$ for three different gaps: large = $\mu + \sigma$; medium = μ ; and small = $\mu - \sigma$, where μ and σ are the mean and standard deviation of the long-term pay gap. As seen there, in firms with higher levels of related diversification, larger pay gaps were associated with higher performance, which supports the moderated-tournament version of H7 and contradicts the moderated-behavioral version. Though not graphed, the number of VPs x gap size interaction yielded similar results. In contrast, smaller pay gaps were beneficial in firms with more businesses or higher capital investment activity, results that support the moderated-behavioral prediction and contradict the moderated-tournament version. Figure 2 graphs results for number of businesses, which are also representative of those for capital investment. Overall, this indicates that neither theory could fully explain performance. Instead, complementary elements of each were required.

 Insert Figures 1 and 2 about here

Robustness of Results

To establish robustness, we added other interactions (e.g., relatedness x number of businesses; gap size x relatedness x number of businesses), and quadratic terms (e.g., number of businesses²) to the models in Tables 3 and 4. None were significant, and the other results were unchanged. For the performance analyses, we also assessed interactions between non-CEO pay dispersion and the

measures of coordination needs. None of those were significant and the other results were unchanged, so we are confident that CEO pay gaps are driving the reported outcomes, not dispersion among the rest of the TMT.

The sample contained 60 firms observed in both 1985 and 1990. Repeated observations like this may create correlated error terms that inflate t-statistics, so we reestimated our models on subsamples containing only one observation per firm (Davis-Blake & Uzzi, 1993: 213). Each subsample included all observations from firms sampled in only one year ($n = 69$), plus exactly one observation, randomly selected, from each firm that contributed data in both 1985 and 1990 ($n = 60$). The models in Tables 3 and 4 were reestimated four times using different sets of randomly selected observations. All results were robust.

DISCUSSION

This study puts tournament and behavioral theories to a competitive test. A behavioral view concludes that cooperation is more likely and sabotage less when pay gaps between hierarchical ranks are small (Cowherd & Levine, 1992; Dye, 1984). This suggests that CEO pay gaps will be smaller in firms with greater coordination needs, and the combination of smaller gaps and higher coordination needs will yield better performance. In contrast, tournament theory contends that when monitoring is difficult, larger gaps better elicit strong efforts from agents (Lazear & Rosen, 1981; Rosen, 1986), which suggests that pay gaps will be larger, and larger gaps will yield higher performance when coordination needs make monitoring particularly tough.

Table 5 summarizes our findings. Recall that results supporting one theory also contradict the other. Blank cells indicate null results that support neither view. Overall, the results suggest that the two theories are complements – portions of each are needed to comprehensively explain these outcomes, and neither theory, by itself, did a complete job. In addition, Table 5 reveals three important subpatterns: (1) tournament theory dominated the behavioral perspective in predicting the size of CEO pay gaps; (2) there was a balance between those theories as predictors of firm performance; and (3) there were several paradoxes between how executive pay is allocated and the associated levels of performance. The following discussion explores these subpatterns and further considers why results for the number of VPs differed from the rest.

Insert Table 5 about here

The Three Subpatterns

Gap size. As seen in Table 5, nine test results indicated that pay gaps were significantly larger in firms with greater coordination needs, results that covered five of the six independent variables. Consequently, tournament theory better predicted the size of CEO pay gaps than did the behavioral view. What might explain this? To now, we have said little about who allocates executive pay, however, both boards of directors and CEOs often have influences that are independent of labor market forces or efficiency concerns (Finkelstein & Hambrick, 1988; Main et al., 1988). Our results make it tempting to speculate that large gaps exist because CEOs take advantage of boards in situations where monitoring is difficult. But if such difficulties provide special freedom to dictate pay, why don't such CEOs also boost their colleagues' pay also? This question is particularly salient given the arguments of allocation preference theory, which contends that allocators equalize pay when cooperation is essential.

Here, with an eye toward future theory building, we offer a different explanation involving threats and opportunities perceived by CEOs and boards in firms with substantial coordination needs. Decision makers typically perceive threats in situations where they lack control (Dutton & Jackson, 1987), moreover, they exhibit a threat bias where attention to downside risk crowds out consideration of upside opportunities (Jackson & Dutton, 1988). As noted earlier, joint work efforts offer opportunities for collaborative synergy, but they also undermine the ability of CEOs and boards to monitor, and hence control, other members of the TMT. Consequently, this lack of control may pose a threat that pushes aside attention to potential collaboration.

If so, CEOs and boards may view tournaments as an attractive way to set pay because they induce strong effort despite weak monitoring (Becker & Huselid, 1992). The resulting competition may harm collaboration, but that may be secondary to CEOs and boards who are seeking control. This conjecture raises several questions. For instance, how important is TMT control to boards and CEOs? On what dimensions (e.g., effort, conflict) do they most wish to assert control, and what strategic factors do they believe are the biggest threats to it? Similarly, do they view loafing as a bigger threat

than sabotage, and if so, what mechanisms, such as consensual decision processes, do they use to manage the latter? As these questions indicate, threat perceptions may be a critical contingency factor that swings CEOs and boards away from behavioral considerations towards economic ones where control is asserted via incentives (cf. Jensen & Meckling, 1976). So when threats arise, most executives may begin to act like agency theorists regardless of whether it's effective (cf. Ghoshal & Moran, 1996). Consequently, future study of perceived threats associated with controlling the TMT may offer new insights into why an economic view often crowds out the behavioral considerations needed for cooperation.

Firm performance. A second subpattern in Table 5 is the balance between tournament and behavioral theories as predictors of firm performance. For relatedness and number of VPs, the interaction of larger pay gaps and greater coordination needs was associated with higher performance, which supports tournament theory. Yet for number of businesses and capital investment activity, the interaction of smaller gaps and greater coordination needs was associated with higher performance, which supports the behavioral perspective.

What caused these mixed results? Our arguments drew on research suggesting that coordination needs affect the ability of superiors to monitor subordinates and hold them responsible for bottom-line performance (Eisenhardt, 1989; Konrad & Pfeffer, 1990). That ability is undoubtedly important, but so too is the ability of peers to mutually monitor and control one another (Ouchi, 1979). Reflecting on the mixed results seen here, we now speculate that there are tradeoffs between superior-subordinate and peer-to-peer monitoring that vary across different sources of coordination needs. In the following discussion, we cast CEOs and boards in the role of superiors, and TMT members below the CEO in the roles of subordinates and peers.

In firms with many vice presidents or high levels of relatedness, subordinates may have little personal accountability to superiors for bottom-line performance, yet behavioral monitoring among subordinates may be high. For instance, the resource sharing that underpins related diversification obscures individual contributions (Jones & Hill, 1988), but it also brings lower-level executives into frequent contact in situations where reciprocity and mutual accommodation are important (Michel & Hambrick, 1992). Consequently, such executives may have weak incentives to improve the bottom line

and strong ones to accommodate their peers. Similarly, some firms employ numerous VPs to integrate their business activities (Chandler, 1962; Galbraith, 1973; Lawrence & Lorsch, 1967), and such integration both obscures individual contributions and leads to frequent contact among boundary spanners.

In such firms, large CEO pay gaps may be effective because (a) they represent coveted prizes that overcome potential problems with shirking and free-riding fostered by low personal accountability, and (b) they do not create pervasive political sabotage, which is held in check by mutual monitoring among peers. If so, this would explain why tournament theory better predicted performance in firms with high levels of relatedness or large numbers of VPs.

In sharp contrast, bottom-line accountability to superiors may be high, and behavioral monitoring among peers may be low in firms with many businesses or high levels of capital investment. Firms with numerous businesses have many separate profit centers (Baysinger & Hoskisson, 1990), and similarly, high capital investment is common in vertically integrated firms (Balakrishnan & Wernerfelt, 1986) that are divided into multiple upstream and downstream units, each with bottom-line responsibility (Eccles & White, 1988). In such firms, the profusion of profit centers should lead to high personal accountability, but mutually enforced norms of cooperation are likely to be low because of contentious, politicized battles over inter-unit resource allocations and transfer prices (Bower, 1970; Eccles & White, 1988).

In companies with many profit centers, large CEO pay gaps may be ineffective because (a) high accountability already promotes strong effort, and (b) tournament competition encourages sabotage among executives whose relationships are already strained and politicized. If so, this would explain why behavioral theory better predicted performance in firms with many businesses and high levels of capital investment. Again, the overall mixture of results indicates that future research is needed to better integrate behavioral and tournament theory. As discussed here, a promising avenue involves exploring tensions between accountability to one's superiors for financial performance and accountability to one's peers for cooperative behavior.

Paradoxes. A third subpattern in Table 5 involves several paradoxes between pay allocation and the associated levels of firm performance. For instance, firms with more businesses or capital investment had larger CEO pay gaps, outcomes consistent with tournament theory, but in such firms,

performance was higher when pay gaps were smaller, outcomes supporting the behavioral view. This suggests a paradox: Pay gaps apparently discourage cooperation in firms whose horizontal diversification and capital investment strategies would greatly benefit from it.

As discussed earlier, the size of CEO pay gaps may depend on control threats perceived by chief executives and boards, while performance may depend on how executives below the CEO appraise their accountability to one another. This implies a critical decoupling that may explain these paradoxes: Pay gaps reflect the concerns of CEOs and boards, while performance depends on relationships among lower-level managers. This decoupling also highlights why it is important to consider tensions within top management groups rather than treating them as a unified whole (Hambrick, 1994). A unified view is often taken in agency research (e.g., Gomez-Mejia, Tosi, & Hinkin, 1987; Tosi & Gomez-Mejia, 1989), but attention to coordination needs and across-rank pay gaps brings these tensions into sharp focus.

VP results. The final conclusion to draw from Table 5 is that results for the number of vice presidents differed from the others. CEO pay gaps were smaller in firms with more VPs, which supports the behavioral view and contradicts the other results that all support tournament theory. Moreover, there was a paradox between pay allocation and firm performance involving the number of VPs that was the mirror image of the two described above. For VPs, behavioral theory predicted gap size, and tournament theory predicted performance, while the opposite was true for number of businesses and capital investment.

Why are the VP results so different? Building on our earlier discussion, we suspect that a large collection of VPs constitutes a powerful political force that influences how CEOs and boards regard other executives, and how such executives behave toward one another. CEOs and board members, recognizing the collective power of numerous VPs, may equalize pay across ranks to remove a salient source of inequality and dissatisfaction (cf. Leventhal, 1976). However, frequent contact among numerous VPs who are responsible for business integration (cf. Chandler, 1962; Lawrence & Lorsch, 1967) may also enforce collaborative norms among peers. If so, large pay gaps may be effective in firms with many VPs because they promote effort without creating pervasive sabotage. Again, this suggests that synthesizing economic and behavioral theories may require a better understanding of (a) the concerns

and threats that superiors perceive with regard to controlling subordinates, and (b) norms of accommodation and reciprocity among peers.

Other Observations

Like all research, this study has limitations, one of which is that its data are growing old. Since 1990, our final year of observation, executive pay has exploded, particularly for CEOs. If anything, we expect this makes CEO pay gaps a more salient phenomenon and one with even greater performance implications, however, future research is needed to ascertain this. A second limitation is a lack of direct controls for executives' skills and responsibilities. A portion of any CEO pay gap likely exists because CEOs have more responsibility than other TMT members, and CEOs were judged, when they were appointed, to be comparatively capable. In our models, the intercept and other controls should largely account for this, but a better approach would involve longitudinal analyses using fixed-effects time-series models, which would control for stable differences between a CEO's capabilities and the average of other TMT members. Again, this points to a need for further study.

Those limitations notwithstanding, our results have clear implications for top executives, particularly board members and CEOs. Our finding that executive pay was consistently set in ways that foster competition in firms particularly requiring cooperation is clearly at odds with the emphasis on teamwork that is increasingly purveyed by consultants and reported in the business press. If CEOs and boards are preaching the gospel of teams throughout their firms but rewarding self-promotion and individualism in their executive pay, this is likely to create confusion and cynicism. This may occur not only among top executives, but also among lower-level managers who are considering whether the long push for the executive suite is worth it, and even among front-line employees making decisions about their organizational commitment (cf. Cowherd & Levine, 1992). Given this, we wonder if the benefits of large pay gaps that we discovered are perhaps short-lived compared to the discontent that they gradually breed among the many employees who will never have a realistic shot at the corner office. This suggests that CEOs and boards should consider the mixed signals that their executive pay packages are sending, signals that affect both their own credibility and what type of person – driven, but political, individualistic, and possibly cynical – that will self-select into their executive ranks.

Concluding Remarks

The theories studied here offer profoundly different descriptions of human nature. The tournament perspective draws heavily on agency theory, which holds that individuals are calculative self-maximizers who respond strongly to monetary incentives and work hard to evade administrative controls (Jensen & Meckling, 1976). Such opportunism, which involves “self-interest seeking with guile” (Williamson, 1975: 9), is argued to be pervasive, so firms enhance their efficiency by using internal competition for large monetary rewards to align the interests of principals and agents. Indeed, firms are viewed as market substitutes where pay and promotion contests stand in for the price system to productively channel self-interest (Fama, 1980; Williamson, 1975). As Williamson (1991: 162) states, firms are merely “a continuation of market relations, by other means”.

In stark contrast, behavioral theory asserts that opportunism is not hard-wired. Instead, socio-political context, which includes how people are paid, largely determines whether opportunism or cooperation prevails (Cowherd & Levine, 1992; Dye, 1984; Lazear, 1989; Martin, 1982). Moreover, cooperation plus shared purpose enables firms to adapt in ways that markets cannot because markets rivet attention to near-term, easily measured outcomes, while cooperation and shared purpose reduce opportunism, encourage innovation, enable collective action, and guide behavior in ambiguous situations where relevant price information is missing (Barnard, 1938; Bartlett & Ghoshal, 1993; Ghoshal & Moran, 1996; Ghoshal & Moran, 1996). Consequently, a behavioral view concludes that markets and hierarchies are not substitutes.

These disparate views are the subject of extensive commentary by authors such as Granovetter (1985), Perrow (1986), and Ghoshal and Moran (1996), but very few, if any, empirical studies have put these conflicting ideas to a rigorous competitive test. This study does so, and its results suggest that both market-like incentives and socio-political forces are important. When we undertook this study, we expected that this competitive test would yield a clear and consistent winner. Having completed it, we are now struck by the complex interplay of economic and behavioral forces that surround the CEO pay gap. This complexity begs further consideration of the tradeoffs among strong monetary incentives, subordinates’ accountability for bottom-line performance, norms of reciprocal accommodation among peers, and the felt need for CEOs and boards to exert control. Future study of these forces stands to

enrich our understanding of executive pay and the numerous tensions between economic and behavioral views of the firm.

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TABLE 1
Means, Standard Deviations, and Correlations of All Variables

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Cash pay gap	12.90	0.66																
2. Long-term pay gap	10.80	4.61	.36															
3. Total pay gap	13.40	0.81	.84	.62														
4. Relatedness	0.23	0.32	.01	.11	.03													
5. Number of businesses	8.89	7.96	.27	.09	.23	.38												
6. R & D activity	0.03	0.04	-.20	.09	-.12	.05	-.08											
7. Capital investment activity	0.09	0.09	-.03	.11	.07	-.07	-.16	-.04										
8. Size	9.91	1.27	.29	.19	.32	.23	.44	.17	-.24									
9. Number of VPs	18.98	12.12	-.10	-.10	-.11	.06	.15	.20	-.02	.49								
10. CEO tenure	8.57	8.41	.04	-.19	-.04	-.02	.05	.09	-.06	.09	.14							
11. ROA	0.06	0.07	-.00	.01	-.06	-.01	-.01	.12	-.01	-.04	-.02	.06						
12. Outsider (dummy)	0.11	0.32	.13	.11	.17	-.04	-.05	-.01	-.15	.07	-.18	.10	-.05					
13. Year (dummy)	0.54	0.50	.45	.32	.48	-.03	-.02	-.04	.08	-.11	-.33	-.07	.02	.02				
14. Shared power (dummy)	0.70	0.46	-.09	-.01	-.03	-.03	.05	-.14	-.01	-.08	.01	.01	-.10	.12	-.04			
15. Team's avg. pay (cash)	4.22	5.19	.52	.19	.42	-.13	.10	-.10	-.03	.08	-.01	.05	.06	.15	.24	-.03		
16. Team's avg. pay (long-term)	3.10	6.97	.31	.29	.50	-.15	.04	-.04	.10	.14	.05	-.00	-.03	.02	.23	.03	.59	
17. Team's avg. pay (total)	7.32	10.86	.45	.28	.53	-.16	.08	-.07	.05	.12	.03	.02	.01	.08	.26	.00	.85	.92

NOTE: THIS TABLE IS CONTINUED ON THE FOLLOWING PAGE

TABLE 1 (cont.)
Means, Standard Deviations, and Correlations of All Variables*

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
18. Non-CEO dispersion (cash)	25.09	15.85	.21	-.09	.15	-.09	.04	-.28	.04	-.04	-.13	.13	-.05	.00	.17	.17	.35	.12
19. Non-CEO dispersion (long-term)	41.09	38.07	.06	.38	.18	-.07	-.09	-.06	-.04	-.18	-.19	-.02	.08	.25	.16	.04	.19	.17
20. Non-CEO dispersion (total)	28.56	17.30	.16	.03	.25	-.07	.01	-.21	.04	-.02	-.15	.21	-.04	.02	.17	.13	.26	.30
21. Unrelated diversification	0.54	0.47	.24	-.02	.14	-.01	.44	-.46	-.05	.23	.01	.09	-.15	.06	-.10	.07	.14	.03
22. High-tech group	0.28	0.45	-.20	.05	-.12	-.15	-.28	.72	-.06	.10	.13	.01	.09	.00	-.03	-.17	-.02	.03
23. Chemicals group	0.23	0.42	.03	.08	-.00	.34	.09	-.03	-.06	-.11	-.10	.05	.16	-.03	.06	-.00	-.05	-.10
24. Natural resources group	0.29	0.46	-.02	-.11	-.06	-.32	-.18	-.53	.22	-.29	-.06	-.11	-.22	-.08	-.05	.19	-.21	-.10

Variable	17	18	19	20	21	22	23
18. Non-CEO dispersion (cash)	.24						
19. Non-CEO dispersion (long-term)	.20	.18					
20. Non-CEO dispersion (total)	.32	.75	.43				
21. Unrelated diversification	.08	.17	-.03	.13			
22. High-tech group	.01	-.16	.03	-.09	-.50		
23. Chemicals group	-.09	-.11	.06	-.10	-.06	-.34	
24. Natural resources group	-.17	.09	-.05	.06	.14	-.40	-.35

* N = 189; $p < .05$ for all $r > 0.14$; $p < .01$ for all $r > 0.18$. Pay gaps equal the natural log of the difference between the CEO's pay and the average pay of the four highest-paid non-CEOs listed in a firm's proxy statement. Size equals the natural log of employees. Year = 1 for 1990, and 0 for 1985. Team's average pay is measured in \$100,000.

TABLE 2
Means and Standard Deviations by Industry Group

Variable	Industry Group			
	Chemicals	High-Tech Equipment	Natural Resources	Conglomerate
Cash pay gap	12.93 (0.58)	12.68 (0.77)	12.87 (0.54)	13.19 (0.60)
Long-term pay gap	11.57 (2.92)	11.31 (3.53)	10.21 (4.97)	10.81 (4.94)
Total pay gap	13.39 (0.70)	13.24 (0.95)	13.32 (0.76)	13.72 (0.71)
ROA	0.08 (0.07)	0.07 (0.08)	0.04 (0.06)	0.06 (0.04)
Relatedness	0.43 (0.41)	0.15 (0.26)	0.07 (0.13)	0.34 (0.34)
Number of businesses	10.19 (8.65)	5.37 (4.41)	6.64 (4.13)	16.26 (10.51)
R&D activity	0.03 (0.02)	0.08 (0.04)	0.01 (0.01)	0.02 (0.02)
Capital investment activity	0.08 (0.04)	0.09 (0.04)	0.13 (0.14)	0.07 (0.10)
Firm size	9.65 (1.13)	10.11 (1.15)	9.34 (1.34)	10.76 (0.96)
Number of VPs	16.64 (9.90)	21.40 (14.79)	17.74 (9.24)	19.97 (13.51)
Year	0.60 (0.49)	0.52 (0.50)	0.51 (0.50)	0.57 (0.50)
CEO tenure	9.40 (9.21)	8.72 (8.21)	7.14 (7.45)	9.49 (9.12)
Outsider	0.09 (0.29)	0.11 (0.32)	0.07 (0.26)	0.81 (0.40)
Shared power	0.70 (0.46)	0.57 (0.50)	0.84 (0.37)	0.68 (0.47)
Team's average pay	3.72	4.08	2.52	7.64
-- cash	(5.26)	(4.20)	(4.30)	(6.19)
Team's average pay	1.84	3.46	1.99	5.78
-- long-term	(3.43)	(8.01)	(5.38)	(9.59)
Team's average pay	5.55	7.54	4.50	13.43
-- total	(7.65)	(11.00)	(8.52)	(14.47)
Non-CEO dispersion	21.92	21.07	27.31	31.33
-- cash	(11.67)	(11.07)	(12.92)	(25.28)
Non-CEO dispersion	45.27	43.00	37.90	38.20
-- long-term	(42.84)	(38.05)	(38.61)	(31.76)
Non-CEO dispersion	25.31	26.21	30.21	33.31
-- total	(13.97)	(18.52)	(14.47)	(21.64)
Unrelated diversification	0.48 (0.39)	0.17 (0.28)	0.64 (0.40)	0.99 (0.43)

N = 189; Standard deviations shown in parentheses.

TABLE 3
Multiple Regression Models of CEO Pay Gaps for Cash, Long-Term, and Total Compensation

Predictor	Cash		Long-Term		Total	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Relatedness		0.011		1.608 **		0.043
Number of businesses		0.011 *		0.029		0.014 *
R&D activity		-0.874		15.602 *		-0.470
Capital investment activity		0.388		9.183 ***		1.344 *
Firm size		0.176 ***		0.885 ***		0.236 ***
Number of VPs		-0.008 *		-0.044		-0.012 **
High-tech group	-0.088	0.106	1.532	1.694 *	-0.062	0.140
Chemicals group	0.060	0.213 †	1.381	1.709 *	0.040	0.205
Natural resources group	0.096	0.218	-0.047	0.956	-0.028	0.092
Year	0.487 ***	0.440 ***	2.137 ***	1.912 ***	0.609 ***	0.550 ***
ROA	-0.000	0.001	-0.011	-0.005	-0.006	-0.005
CEO tenure	0.002	0.004	-0.085 ***	-0.075 ***	-0.006	-0.004
Outsider	0.153	0.238 *	0.707 *	1.239 *	0.348 *	0.487 ***
Shared power	-0.133	-0.142 †	0.177	0.219	-0.084	-0.081
Team's average pay	0.051 ***	0.052 ***	0.108 ***	0.105 **	0.027 ***	0.026 ***
Non-CEO dispersion	-0.001	0.001	0.031 **	0.037 ***	0.006 †	0.006 *
Unrelated diversification	0.252 *	0.066	1.316	0.848	0.214 †	-0.025
R ²	0.442 ***	0.594 ***	0.254 ***	0.331 ***	0.443 ***	0.620 ***
(F-statistic)	(12.104)	(13.971)	(6.535)	(4.710)	(12.147)	(15.513)
ΔR^2 from controls		0.152 ***		0.077 ***		0.177 ***
(F-statistic)		(10.146)		(4.351)		(12.522)

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

• $N = 189$. Table contains nonstandardized regression coefficients.

TABLE 4

Multiple Regression Models of ROA

Predictor	Model 1	Model 2	Model 3	Model 4	Model 5
Relatedness		-2.685	-2.589	-21.576 **	-22.051 **
Number of businesses		0.060	0.048	0.678 *	0.785 **
R&D activity		-13.690	-11.519	18.035	-20.705
Capital investment activity		3.273	3.846	53.990 *	51.360 *
Firm size		-0.926 †	-1.163 *	-0.303	-1.630 **
Number of VPs		0.007	0.014	-0.329 **	-0.300 *
Long-term pay gap			0.034	1.241	0.143
Cash pay gap			0.996	1.031	0.883
Relatedness x Long-term gap				1.554 **	1.571 **
Num. of businesses x Long-term gap				-0.049 *	-0.059 **
R&D activity x Long-term gap				-3.468	
Cap. invest. activity x Long-term gap				-4.723 *	-4.455 *
Firm size x Long-term gap				0.120	
Number of VPs x Long-term gap				0.032 **	0.028 **
High-tech group	-1.079	-1.064	-1.108	-1.110	-1.078
Chemicals group	0.177	-0.285	-0.497	-0.470	-0.542
Natural resources group	-1.245	-3.124 †	-3.308 †	-3.273 †	-3.678 *
Year	0.779	0.066	0.043	0.358	0.197
CEO tenure	-0.018	-0.016	-0.016	0.004	0.009
Outsider	-2.794 †	-3.318 *	-3.695 *	-2.518	-2.722 †
Shared power	-1.024	-0.943	-0.802	-0.616	-0.707
Team's average pay	0.000	0.000	0.000	0.000	0.000
Non-CEO dispersion	0.019	0.014	0.012	-0.022	-0.022
Unrelated diversification	-2.311 †	-2.522 †	-2.600 †	-3.078 *	-2.806 *
R ²	0.091 †	0.143 *	0.150 †	0.220 *	0.213 **
(F-statistic)	(1.626)	(1.686)	(1.579)	(1.855)	(1.951)
ΔR^2 from previous model		0.052	0.007	0.070 *	-0.007
(F-statistic)		(1.722)	(0.720)	(2.468)	(0.799)

† p < .10; * p < .05; ** p < .01 (two-tailed tests)

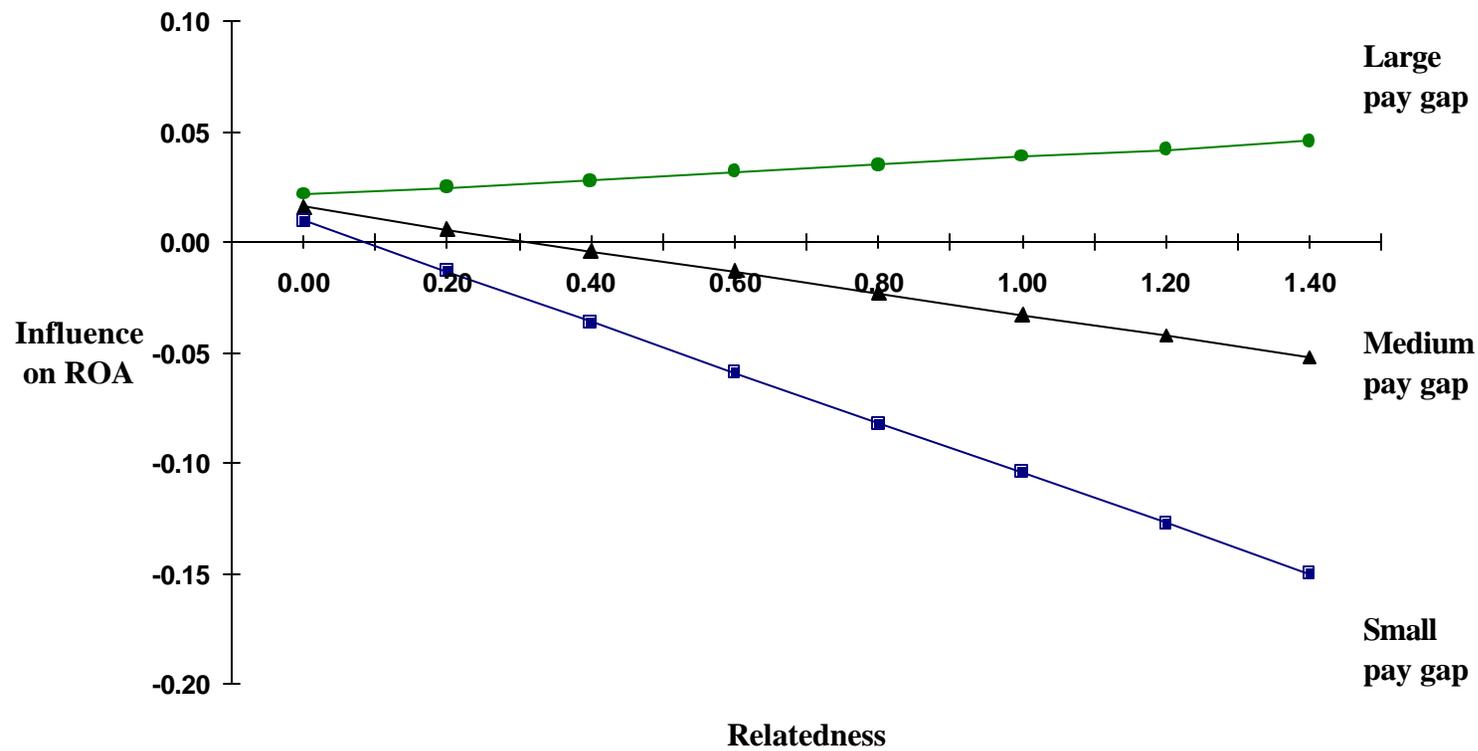
- N = 189. Table contains nonstandardized regression coefficients multiplied by 100. The R^2 for model 5 is significantly higher than that of model 3 ($p < .02$).

TABLE 5
Summary of Competitive Test Results

Indicators of Coordination Needs	H1 - H6: Size of the CEO Pay Gap			H7: Firm Performance Coordination Needs x Long-Term Pay Gap Interactions
	Cash Compensation	Long-Term Compensation	Total Compensation	
Relatedness		Tournament (+)		Tournament (+)
Number of businesses	Tournament (+)		Tournament (+)	Behavioral (-)
R&D Activity		Tournament (+)		
Capital investment activity		Tournament (+)	Tournament (+)	Behavioral (-)
Firm size	Tournament (+)	Tournament (+)	Tournament (+)	
Number of VPs	Behavioral (-)		Behavioral (-)	Tournament (+)

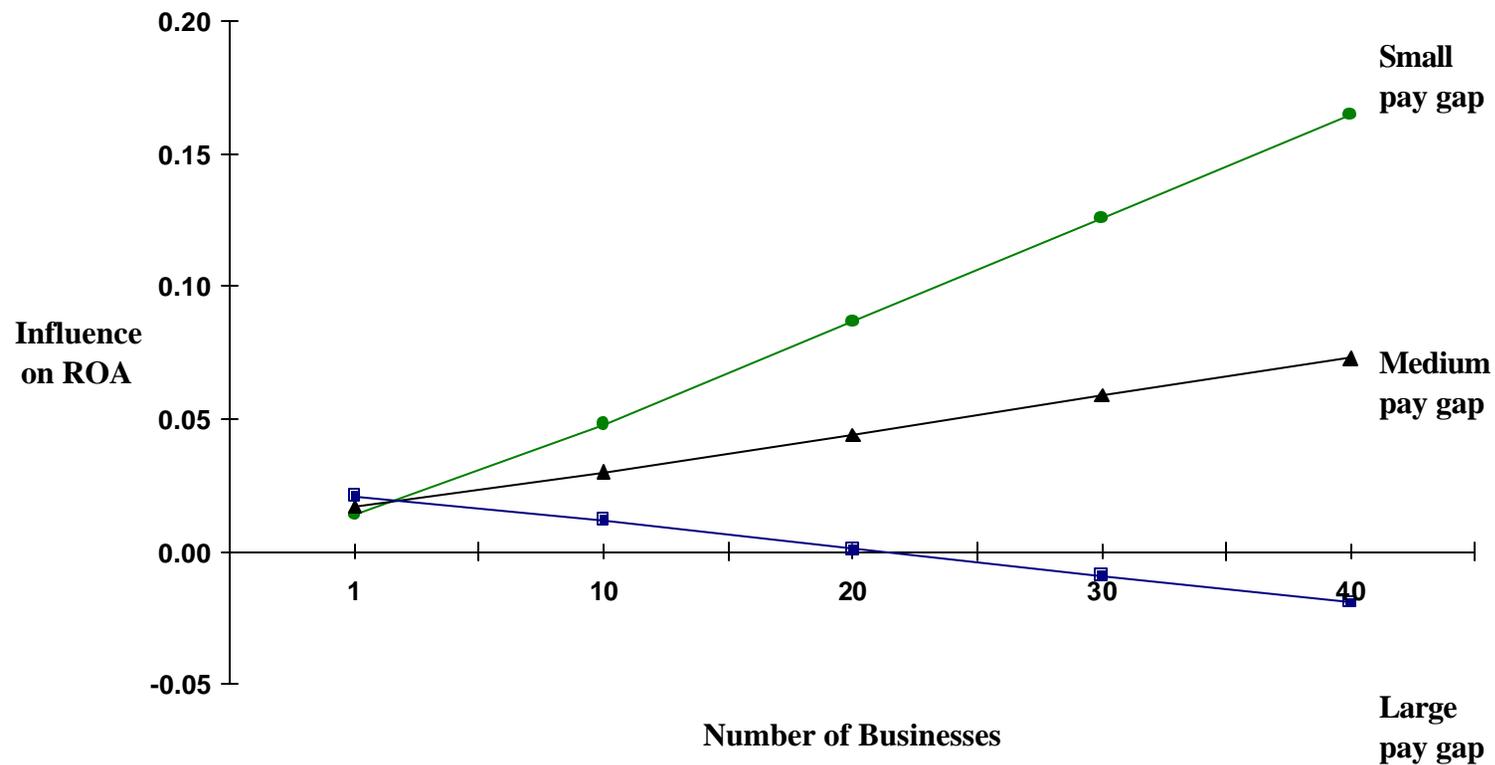
- Cells indicate whether empirical results supported the tournament or behavioral perspectives. Blank cells indicate non-significant relationships that support neither theory. Tournament support involves positive relationships, while negative associations support the behavioral view.

FIGURE 1
ROA vs. Relatedness at Different-Sized CEO Pay Gaps



- Observed range of relatedness is 0.00 - 1.32. For gap size, large = $\mu + \sigma$; medium = μ ; and small = $\mu - \sigma$, where μ and σ are the mean and standard deviation of the long-term CEO pay gap. This result supports tournament theory and contradicts the behavioral perspective.

FIGURE 2
ROA vs. Number of Businesses at Different-Sized CEO Pay Gaps



- Observed range of number of businesses is 1 - 41. For gap size, large = $\mu + \sigma$; medium = μ ; and small = $\mu - \sigma$, where μ and σ are the mean and standard deviation of the long-term CEO pay gap. This result supports the behavioral perspective and contradicts tournament theory.

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