

# Powerful CEOs and Their Impact on Corporate Performance

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Executives can only impact firm outcomes if they have influence over crucial decisions. On the basis of this idea, we develop and test the hypothesis that firms whose CEOs have more decision-making power should experience more variability in performance. Focusing primarily on the power the CEO has over the board and other top executives as a consequence of his formal position and titles, status as a founder, and status as the board's sole insider, we find that stock returns are more variable for firms run by powerful CEOs. Our findings suggest that the interaction between executive characteristics and organizational variables has important consequences for firm performance.

In some firms, the CEO makes all the major decisions. In other firms, decisions are more clearly the product of consensus among the top executives. If different individuals have different opinions, then the distribution of decision-making power within firms may affect which decisions are made. Managerial decisions may or may not affect firm outcomes, but if they do, both executive characteristics and organizational variables could influence firm performance.

In this article, we use these ideas to develop a simple hypothesis about how the CEO's ability to influence decisions will affect firm performance. Building on Sah and Stiglitz (1986, 1991) and on a large management and organizational literature on managerial discretion, we

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argue that in a firm in which the CEO makes the most relevant decisions, the risk arising from judgment errors is not well diversified. That is, the likelihood of either very good or very bad decisions is higher in an organization in which the CEO's power to influence decisions is greater than in an organization in which many executives are involved in the decision-making process. Therefore, our hypothesis is that variability in firm performance increases with the degree of CEO influence, because decisions with extreme consequences are more likely to be taken when the CEO is more powerful.

Because our hypothesis concerns differences in performance *variability*, we apply heteroskedasticity tests to our data. Our sample contains data on 336 firms from the 1998 Fortune 500 over the period from 1992 to 1999. We measure the CEO's power to influence decisions using firm-level characteristics of the Executive Office, such as whether the current CEO is a founder of the firm, whether he is the only insider sitting on the board, and the CEO's concentration of job titles.

We find evidence that stock returns are more variable in firms in which the CEO has greater power to influence decisions. We find similar results using *ROA* and Tobin's *Q* as alternative measures of performance. The results hold both across and within firms and are statistically and economically significant for some measures of CEO power. The evidence is particularly compelling when we use the status of the current CEO as a founder of the firm as a measure of power. However, the other measures of power also appear to be positively related to performance variability, particularly the variable measuring whether the CEO is the only insider sitting on the board. We analyze these results further by using the industry classification of Hambrick and Abrahamson (1995) to identify industries in which managers are likely to have high discretion to influence decisions. We find that all three of our measures of CEO power are positively associated with stock return variability in such industries. After performing additional tests which address potential endogeneity concerns, we conclude that the positive correlation between CEO power and performance variability is consistent with causation running from power to performance.

Our paper adds to a large literature in economics, finance, and organizational theory that tries to assess the impact of managers on firm outcomes. In the organizational literature, there is some controversy over whether top executives matter. An early reference on the view that managers do not matter is Lieberman and O'Connor (1972), who find that CEO effects have little additional explanatory power for firm profitability (Finkelstein and Hambrick, 1996; Pfeffer, 1997). In contrast, authors such as Child (1972), Hambrick and Mason (1984), and Tushman and Romanelli (1985) argue that executives do matter, an idea which is supported by numerous large-sample studies evaluating the importance

of executives for outcomes (Weiner and Mahoney, 1981). Many papers in economics and finance analyze related questions. For example, Hermalin and Weisbach (1988) and Agrawal and Knoeber (2001) find evidence consistent with firms optimally choosing directors for their characteristics. Denis and Denis (1995), Weisbach (1995), Parrino (1997), and Huson, Malatesta and Parrino (2001) all show evidence that CEO turnover is related to firm outcomes. Malmendier and Tate (2005) and Bertrand and Schoar (2003) identify some characteristics of top executives that are related to firm outcomes. We contribute to this literature by documenting results which suggest that a manager's impact on firm performance depends on organizational variables. In particular, specific CEO characteristics (such as the CEO's opinions) should translate more directly into firm outcomes if decision-making power is more centralized in the hands of the CEO.

We develop our theoretical hypothesis and discuss related literature on managerial effects and decision-making in groups in Section 1. We describe our measure of CEO power in Section 2 and the data in Section 3. We test our empirical hypothesis in Section 4 and investigate endogeneity issues in Section 5. Section 6 concludes.

## 1. Theoretical Arguments and Related Literature

Two important issues in this paper are the definition of power and its measurement. Although there are several different definitions of power in organizations, according to Pfeffer (1997), "in order to demonstrate influence and control, most definitions of power include the idea of overcoming resistance" (page 138). In addition, to distinguish power from chance, it is necessary that the ability to overcome resistance be *consistent* (March, 1966). Accordingly, we view powerful CEOs as those who can consistently influence key decisions in their firms, in spite of potential opposition from other executives. However, this definition does not lend itself to natural and unequivocal measures of CEO power, because CEO power may come from many formal and informal sources (Pfeffer, 1992). We postpone to Section 2 the discussion of the practical problems that arise when measuring a CEO's decision-making power.

Our hypothesis is that firms in which the CEO has less power to influence decisions will have less extreme performances. With less power, more moderate decisions will be taken because the CEO will have to compromise with other members of the top-management team when they disagree with him. Similar ideas have been discussed in the economics, management, organization theory, and organizational behavior literature.

The most related argument that can be found in the economics literature is in the work of Sah and Stiglitz (1986, 1991). They compare outcomes

under different structures of group decision-making when individuals make judgment errors. In their models, because group members may disagree, group decision-making entails a *diversification of opinions* effect. The final group decision will be a compromise that reflects the different opinions of the group members. In their 1986 paper, they show that larger groups are more likely to reject bad projects because a project will only be accepted if several group members agree that it is good. For the same reason, large groups are also less likely to accept good projects. As they state most clearly in their 1991 paper, one of the implications of their theory is that performance should be less variable when a greater number of executives have influence over decisions.<sup>1</sup> In their work, increases in the size of the decision-making group have similar effects as a decrease in the power of a particular decision-maker. Thus, the hypothesis that performance variability increases with CEO power follows naturally from their setup.<sup>2</sup>

Sah and Stiglitz justify their assumption that managers may disagree using the ideas that communication is costly or that people differ in their abilities to process information.<sup>3</sup> Other authors suggest that disagreement is especially likely when the decision-making group in consideration is a top-management team. Finkelstein and Hambrick (1996) argue that managerial biases, egos, and experiences affect firm behavior because of the ambiguity and complexity that characterize the tasks of top managers. According to Mischel (1977), strategic decision-making in firms is a “weak situation,” one in which the choices of decision-makers are likely to vary widely and are hard to predict.

The idea that variation in senior executives’ choices is important for understanding firm behavior underlies the large management and organizational behavior literature on managerial discretion, which is surveyed by Finkelstein and Hambrick (1996). This approach is part of a debate on whether managers “matter” for firm decisions and outcomes. Hannan and Freeman (1977) de-emphasize the impact of managerial choices on firm performance because of organizational and environmental constraints that limit the scope of managerial actions. In contrast, Hambrick and Mason (1984) and Tushman and Romanelli (1985) argue that executive

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<sup>1</sup> Sah and Stiglitz’s models do not have a clear prediction for the effect of the size of the decision-making group on average performance. This relationship depends on variables such as the profitability of projects, the probability that projects are either good or bad, and on the convexity of the function relating managerial decisions to performance. See Sah and Stiglitz (1986, 1991).

<sup>2</sup> The analogy with the discussion in Sah (1991) is particularly clear. He develops a conjecture that countries which are run by autocrats should have more volatile performances than democratic countries. Our hypothesis can also be seen as a reinterpretation of Sah’s conjecture about the effect of political systems on economic performance. Almeida and Ferreira (2002) provide empirical evidence which is consistent with Sah’s conjecture.

<sup>3</sup> Due to human fallibility, managers may make mistakes even when they have the right incentives (Sah and Stiglitz, 1986, 1991; Bhidé, 2001).

leadership is a fundamental driving force in the evolution of organizations. In particular, the managerial discretion literature argues that managers' impact on organizational outcomes depends on how much discretion they have:

“...discretion attenuates the relationship between executive characteristics (values, experiences and so on) and organizational outcomes. Namely, if high discretion exists, executive orientations become reflected in organizational outcomes; if low discretion exists, they do not.” (Hambrick and Finkelstein, 1987)

Our hypothesis in this paper is a natural consequence of blending together the notions of “weak situation” and managerial discretion. Because top managers make decisions in weak situations, the quality of their decisions is bound to be variable. In situations in which the CEO is more powerful, he has more discretion to influence decisions. The final decision will thus reflect the CEO's opinion more directly and will be more variable than decisions made by a group of top managers.<sup>4</sup>

The social psychology literature on group decision-making has also analyzed the specific effect of group processes on different dimensions of group decisions, such as their extremity and riskiness. As discussed by Moscovici and Zavalloni (1969), a natural hypothesis is that the “group consensus” (the final choice made by a group) represents “an averaging, a compromise among individual positions.” This idea is supported by a number of experimental research findings, such as those of Kogan and Wallach (1966), who find that group judgment represents the average of the prior individual judgments even when consensus is achieved via group discussion of each prior judgment.<sup>5</sup>

Neither Sah and Stiglitz's theory nor the management and organizational behavior literature discussed above are based on agency arguments. Agency theory generally does not predict a positive effect of CEO power on performance variability. On the other hand, it might predict a negative effect of variability on CEO power. Demsetz and Lehn (1985) have suggested that an increase in uncertainty may increase the scope for moral hazard. Therefore, when uncertainty increases, principals should

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<sup>4</sup> Although the management and organizational behavior literature never explicitly develops the hypothesis that a CEO's power to influence decisions should be positively related to variability in decisions and performance, many papers on top-management teams are consistent with the underlying mechanism that drives our hypothesis. For Halebian and Finkelstein (1993), dominant CEOs may “nullify the effects of the other members.” For Eisenhardt and Bourgeois (1988), in situations where the CEO is less dominant, there is “greater sharing of information and more consensus” in decision-making.

<sup>5</sup> There is also some experimental evidence on phenomena that attenuate the diversification effect of groups. Different situations in which groups appear to make risky choices have been labeled as “risky shifts” (Wallach and Kogan, 1965), “group polarization” (Moscovici and Zavalloni, 1969), and “group-think” (Janis, 1982). As pointed out by a referee, the conceptualization of risk in this literature is somewhat different from our notion of variability in outcomes, thus it is unclear whether these phenomena affect our empirical tests.

put more constraints on agents' behavior.<sup>6</sup> Assuming that realized volatility is a good proxy for the underlying uncertainty in the firm's environment, Demsetz and Lehn's argument would predict a *negative* correlation between performance variability and CEO power. Such a negative correlation would, if anything, make it more difficult for us to find a positive effect of power on variability.

## 2. Measuring CEO Power to Influence Decisions

In order to perform our empirical tests, we need to measure how much decision-making power is concentrated in the hands of the CEO. "Power" is a concept that has different dimensions to it, not all of them easily observable. Focusing on the power of individuals in top-management teams, Finkelstein (1992) identified four sources of power: structural power (related to the distribution of formal positions within an organization), ownership power, expert power, and prestige power. In our work, we try to identify whether other individuals at the top of the managerial hierarchy are participating in decision-making with the CEO. The higher the number of relevant decision-makers, the less powerful the CEO is likely to be. Thus, we focus mostly on structural power, particularly the power the CEO has over the board and other top executives as a consequence of his formal position and titles, status as a founder, and status as the sole insider on the board. Our paper therefore does not provide evidence that *all* forms of CEO power are related to performance variability.

Our first measure of CEO power is a dummy variable that indicates whether the CEO is also one of the company's founders. Consistent with the management literature (Donaldson and Lorch, 1983; Finkelstein, 1992), we consider CEOs who are also founders to be more influential.

Our second measure of CEO power is a dummy that indicates whether the CEO is the only insider on the board. We expect that if an inside manager (other than the CEO) sits on the board, he is more likely to participate in top decision-making with the CEO.<sup>7</sup> Thus, we consider CEOs in firms with more than one inside manager on the board to have less influence power. Our interpretation of the "CEO only insider" variable is related to the number of individuals who can influence decision-making together with the CEO. This is consistent with the idea that other insiders may be rivals for the CEO's power and position (Ocasio, 1994). However, this interpretation differs from

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<sup>6</sup> For example, if the scope for agency problems increases, it might be desirable to separate the positions of chairman of the board and CEO (e.g. Core, Holthausen, and Larcker, 1999). Similarly, it might be desirable to have a CEO position occupied by someone other than a founder of the firm.

<sup>7</sup> For example, Finkelstein (1988) asked 444 top managers to rate their influence and the influence of the other managers on strategic decisions within their (102) firms. The average rating for board members was higher than the rating for non-members, even when CEOs were excluded from the analysis. The differences were statistically significant, consistent with the notion that there is a gap between the power of inside board members and other executives.

the one usually given to this variable in the agency literature, which tends to view a board dominated by insiders as a sign that the corresponding firm is not run in the interests of minority shareholders.

Our third and final measure is a dummy variable that measures the concentration of titles in the hands of the CEO. This variable is equal to one if the CEO accumulates both the titles of chairman and president. For example, if the CEO is not the chairman of the board, we expect him to have less influence over decisions, since the chairman often has an important role in strategic decision-making.<sup>8</sup>

To the extent that the successor to the CEO is involved in decision-making prior to becoming CEO, the CEO-succession process of a firm also influences the degree of joint decision-making in the firm. The two most familiar types of CEO-succession processes (Vancil, 1987; Brickley, Coles and Jarrell, 1997) are *horse races*, in which the firm conducts a tournament among eligible candidates for the position of CEO, and *passing the baton*, in which the firm chooses a designated successor for the CEO. In the latter case, a new CEO often also has the title of president. Once he plans his succession, he hands the title of president to the heir apparent. If the CEO has an heir apparent, then there is a gain to groom him by involving him in CEO level decision-making. Thus, if the CEO does not also hold the title of president, we expect him to have less power to influence decisions.

In contrast, if a firm's succession process typically consists of a horse race, then the candidates for the CEO position are more likely to be of equal rank and thus have titles such as vice president or executive vice president (Naveen, 2000) or the candidates may have titles associated with different divisions. If the firm conducts a tournament for the CEO, then it may be difficult to involve all candidates fairly in CEO decision-making. In addition, involving the candidates in CEO decision-making may have drawbacks since the tournament losers generally leave the firm. In this case, the firm will be less likely to have a president or COO, and the highest concentration of titles in the hands of the CEO occurs when he is the chairman. Therefore, we also set our dummy measuring the concentration of titles to be equal to one if the CEO is the chairman, and no president or COO title exists. Our dummy measuring the concentration of titles in the hands of the CEO will thus be equal to one either if the CEO is the chairman and the president or if the CEO is the chairman and no president or COO exists.<sup>9</sup>

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<sup>8</sup> The chairman is frequently an ex-CEO, who retains the title of chairman during a probationary "training" period for the new CEO. This suggests that upon becoming chairman, the former CEO still participates in decision-making.

<sup>9</sup> Our dummy measuring a CEO's concentration of titles is similar to the BOSS variable used by Morck, Shleifer and Vishny (1989). The difference is that our measure allows for the fact that the president/COO title may not always exist, while they also measure whether the CEO is the sole signer of the letter to shareholders in annual reports.



### 3. Data Description

Our sample consists of data on publicly traded firms in the 1998 Fortune 500 from 1992 to 1999. We exclude financial firms and utilities, and restrict our sample to the set of firms for which data are available on ExecuComp (2000). From Standard and Poor's ExecuComp (2000), we obtain annual information on all executives mentioned in the firms' executive compensation table as well as financial information. We obtain monthly stock returns for the sample firms as well as value-weighted market returns from CRSP. We gather the remaining financial information from Compustat and the date of the firm's incorporation from Moody's Industrial Manuals (1999), proxy statements, and annual reports for fiscal 1998. Our final sample consists of data on 336 firms during the 1992–1999 time period.<sup>10</sup>

The data we gather on executives contain information on whether the named executive sits on the board and the title of each executive. If the named executive is the CEO, we also obtain the year in which he became CEO and his ownership in the firm. We define the dummy "CEO only insider" in a given year to be equal to one if no executive mentioned in the firm's executive compensation table other than the CEO sits on the board during that year. We define the dummy "CEO's concentration of titles" to be equal to one if the CEO is both the chairman and the president or if he is the chairman and the firm has no president or COO amongst the executives mentioned in the compensation table for that year.<sup>11</sup>

We define an indicator variable "CEO = founder" to be equal to one if the current CEO is one of the founders of the firm and zero otherwise. Since ExecuComp (2000) does not contain information on whether the CEO is also a founder, we construct this variable in the following manner. We set "CEO = founder" in a given year equal to zero if the firm was incorporated at least 64 years prior to the current year, because in such cases it is unlikely that the firm would have a founder as the current CEO. Founders should also be a part of the company from the very beginning.

<sup>10</sup> Because our sample consists of 1998 Fortune 500 firms, our sample is biased toward large firms, at least in the later years. One might argue that larger firms will have CEOs who are less powerful than CEOs of average firms. While this bias could reduce the average level of CEO power in our sample, it should not affect our tests if there is enough variability in CEO power among large firms. Similarly, the fact that we select a sample of firms which were part of the Fortune 500 in 1998 and collect data on them from 1992 until 1999 could bias our sample toward relatively successful firms. This bias may reduce the overall variability of performance in our sample, because firms which performed very poorly between 1992 and 1999 may not be in the sample. However, this bias should, if anything, work against us finding a positive correlation between power and performance variability, because firms with greater variability are the ones which are more likely to do poorly and exit the sample. Thus, if our hypothesis is true, the sample selection bias would reduce the variability of performance more in the subsample of firms run by powerful CEOs.

<sup>11</sup> According to Regulation S-K of the Securities Act of 1933, the executives described in a firm's compensation table must include the four highest paid executives in the firm other than the CEO. While it is feasible that other insiders sit on the board or that the president/COO is not amongst the top four executives in terms of salary, we consider it unlikely.



Thus, we set “CEO = founder” in a given year equal to zero whenever the current CEO joined the company at a date four years or more after the firm’s date of incorporation.<sup>12</sup> For the remaining firm-years, we checked whether the current CEO was one of the firm’s founders in a variety of sources consisting of proxy statements, annual reports, and the internet. We set “CEO = founder” in a given year equal to one if any source explicitly named the current CEO as a founder or the main executive at the time the company began (including when it was spun-off).

We use stock returns (monthly stock returns including dividends from CRSP) as our main performance measure, but we also use return on assets (*ROA*) and a proxy for Tobin’s *Q* to verify the robustness of our results. The tests using *ROA* capture whether CEO power impacts accounting performance, while the relation between CEO power and *Q* captures the effect of power on market values. We define *ROA* as the ratio of net income before extraordinary items and discontinued operations to the book value of assets. Our measure of Tobin’s *Q* is the ratio of the firm’s market value to its book value. The firm’s market value is calculated as the book value of assets minus the book value of equity plus the market value of equity.

In Table 1, we present summary statistics concerning select financial variables, CEO characteristics, and our measures of a CEO’s power to influence decisions. In 9% of firm-years, the CEO is also one of the founders. In most firm-years, another insider other than the CEO sits on the board (71%). CEOs are more likely to accumulate the title of chair (86%) than the title of president (27%). Overall, CEOs have concentrated titles in 41% of the firm-years.

The correlations (not shown in the table) between our three measures of CEO power are relatively low, indicating that these measures capture different aspects of CEO power. The highest correlation is between “CEO’s concentration of titles” and “CEO only insider” (0.19). This is not surprising, given that these two variables may capture similar aspects of CEO power. For example, when the CEO is the chairman of the board and the president, it is less likely that there is another insider on the board (because the chairman and president are usually inside executives). In contrast, “CEO = founder” is negatively correlated both with “CEO’s concentration of titles” (−0.10) and with “CEO only insider” (−0.01).

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<sup>12</sup> The longest period of time a CEO has been working for his firm in our sample is 59 years. We set our cutoffs of 64 years and four years to account for missing data on CEO firm tenure. Since most firms are founded several years prior to the date of incorporation, and since we also check whether CEOs are founders when they joined the firm within four years of the firm’s date of incorporation, our procedure ensures that we check more CEOs than are likely to be founders.

**Table 1**  
**Summary of select financial variables, CEO characteristics, and power measures**

| Variable   | Number of observations | Mean  | Standard deviation | Minimum | Maximum |
|--|------------------------|-------|--------------------|---------|---------|
| <b>Financial variables and CEO characteristics</b> |                        |       |                    |         |         |
| Tobin's $Q$  | 2595                   | 2.01  | 1.38               | 0.81    | 19.15   |
| Return on assets ( $ROA$ )                         | 2633                   | 5.42  | 5.80               | -48.19  | 48.15   |
| Stock returns                                      | 30,689                 | 0.02  | 0.10               | -0.82   | 2.93    |
| Value-weighted market returns                      | 30,742                 | 0.02  | 0.04               | -0.16   | 0.08    |
| Leverage   | 2598                   | 0.21  | 0.13               | 0.00    | 1.04    |
| Assets in billions                                 | 2633                   | 11.08 | 26.23              | 0.02    | 405.20  |
| Capital expenditures/Sales                         | 2556                   | 0.07  | 0.06               | 0.00    | 1.28    |
| Number of segments                                 | 2543                   | 2.74  | 1.70               | 1.00    | 13.00   |
| Firm age   | 2622                   | 55.43 | 34.53              | 0.00    | 147.00  |
| CEO tenure as CEO                                  | 2257                   | 7.37  | 7.22               | 0.00    | 47.00   |
| CEO ownership                                      | 2304                   | 0.02  | 0.05               | 0.00    | 0.46    |
| CEO = chair dummy                                  | 2349                   | 0.86  | 0.35               | 0.00    | 1.00    |
| CEO = president dummy                              | 2349                   | 0.27  | 0.44               | 0.00    | 1.00    |
| Firm-years in which firm has a president           | 2571                   | 0.75  | 0.43               | 0.00    | 1.00    |
| Firm-years in which firm has a COO                 | 2571                   | 0.36  | 0.48               | 0.00    | 1.00    |
| <b>CEO power measures</b>                          |                        |       |                    |         |         |
| CEO = founder                                      | 2412                   | 0.09  | 0.29               | 0.00    | 1.00    |
| CEO only insider                                   | 2571                   | 0.29  | 0.45               | 0.00    | 1.00    |
| CEO's concentration of titles                      | 2349                   | 0.41  | 0.49               | 0.00    | 1.00    |

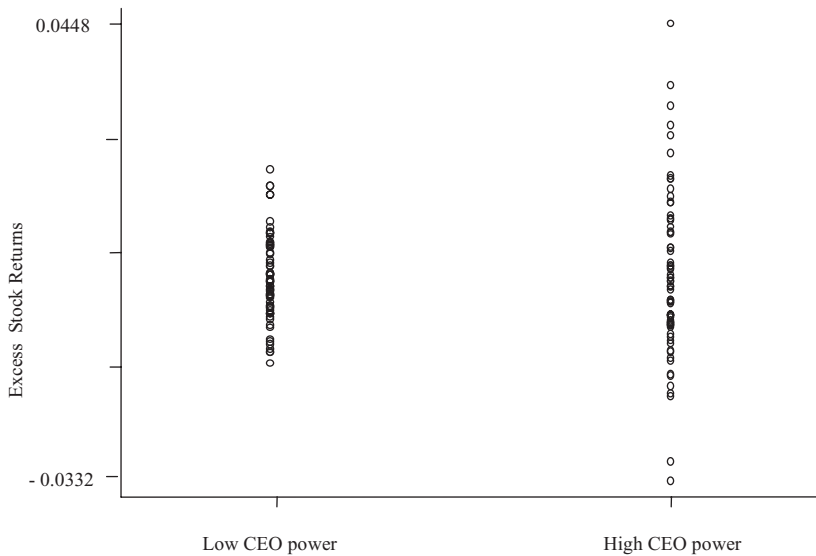
Sample consists of monthly stock returns and all 2633 firm-years of data for 336 publicly traded, non-regulated firms from the 1998 Fortune 500 which were available on ExecuComp (2000) during the years 1992–1999. Data on titles are constructed from 16,022 executive-years of data for these 336 firms during the years 1992–1999. Most financial data, all title data and CEO tenure are from ExecuComp (2000). Monthly stock return data (variable name = RET) and market returns (variable name = VWRETD) are from CRSP. Remaining financial data and segment data are from Compustat. Firm age is collected from Moody's Manuals (1999), proxy statements, and 10-Ks for fiscal 1998. Founder data are collected from a variety of sources consisting of proxy statements, annual reports, and the internet. The number of observations varies because of missing data. Tobin's  $Q$  = (book value of assets – book value of equity + market value of equity)/book value of assets.  $ROA$  = net income before extraordinary items and discontinued operations/book value of assets. Leverage = long-term debt/assets. Firm age = number of years since first date of incorporation. Number of segments is equal to the number of different two-digit SIC code industries in which the firm operates. CEO tenure is the number of years since the CEO was appointed CEO. CEO ownership is defined as the ratio of the number of shares owned by the CEO after adjusting for stock splits to total shares outstanding. CEO = founder is equal to one if the CEO is a founder of the company. CEO only insider is equal to one if the CEO is the only insider on the board of directors. CEO's concentration of titles is a dummy that is equal to one when both the CEO = chair and the CEO = president dummies are equal to one, or when the CEO = chair dummy is equal to one and the firm has neither a president nor a COO in that year.

#### 4. CEO Power and Performance Variability

In this Section, we apply heteroskedasticity tests to our data in order to test our main hypothesis. Our hypothesis has implications both for the variability of performance across firms and for within-firm variability of performance. Thus, we perform our tests using a panel of firms, in which both effects (across-firm and within-firm variabilities) should be present. However, the nature of our sample (many firms but relatively few years) suggests that the panel results might be driven primarily by across-firm variation in performance. Therefore, in Section 4.2, we also try to isolate the within-firm effects by regressing the standard deviation of the performance measures over the period from 1992 to 1999 on

our measures of CEO power and controls.<sup>13</sup> In Section 4.3, we examine whether the effect of CEO power on the variability of performance is greater in industries where managerial decision-making faces fewer environmental constraints. Finally, following Shivdasani and Yermack (1997), we consider the CEO’s involvement in director selection as an alternative measure of power in Section 4.4. In what follows, we are primarily concerned with providing evidence of a correlation between a CEO’s power to influence decisions and the variability of performance measures. We postpone the discussion of possible endogeneity problems and causality issues to Section 5.

Figure 1 presents some descriptive evidence which is consistent with our hypothesis. We construct average excess stock returns for each firm in our sample, by taking the difference between a firm’s average stock return



**Figure 1**  
**Best and worst performances and CEO power**

Figure 1 shows a plot of average stock-return residuals for very low and very high values of CEO power. The average excess stock return is the difference between a firm’s average stock return and its beta times the average market return, where firm betas are estimated from a standard market model using monthly stock returns over the 1992–1999 period. Average returns are averages of monthly returns over the period 1992–1999. We construct an aggregate power index that is the sum of our three measures of CEO power, CEO = founder, CEO only insider, and CEO’s concentration of titles. We categorize firms’ CEOs as having high power if the average of their aggregate power index is in the fifth quintile. We categorize firms’ CEOs as having low influence power if the average of their aggregate power index is in the first quintile.

<sup>13</sup> We also isolated the between-firm effect by replicating the same tests we perform for the panel using the averages of all variables from 1992 to 1999. The results are similar to the panel results, so we do not report them here.

and its beta times the average market return over the 1992–1999 period. For simplicity, we construct an aggregate power index that is the sum of our three measures of CEO power, “CEO = founder,” “CEO only insider,” and “CEO’s concentration of titles,” and plot the stock-return residuals for the firms with the highest 20% and the lowest 20% values of the index. The cross-sectional variability of performance is clearly higher in the sample in which CEO power is high. Thus, these firms are the ones with the best and the worst stock returns in the period we consider.<sup>14</sup> We now turn to formal tests of our hypothesis using a standard heteroskedasticity test.<sup>15</sup>

#### 4.1 Heteroskedasticity tests

In this section, we apply Glejser’s (1969) heteroskedasticity test to our sample. To conduct the Glejser test, we first need to specify a performance model for each of our performance measures, i.e. we need to control for variables which could explain performance *levels*. The test is applied to the residuals of these performance regressions. We describe our performance regressions in Section 4.1.1 and the results of our heteroskedasticity tests in Section 4.1.2.

**4.1.1 Performance models.** For stock returns (*SR*), we use a simple market model, with the market return *MR* (value-weighted market return from CRSP) as the single factor:

$$SR_{it} = \beta_i MR_t + u_{it} \quad (1)$$

We use monthly stock returns to estimate our betas and residuals for the period from 1992 to 1999.

For Tobin’s *Q* and *ROA*, we estimate models similar to those estimated by Morck, Shleifer and Vishny (1988), Yermack (1996), and Himmelberg, Hubbard and Palia (1999). The main difference is that we include our measures of CEO power among the explanatory variables because they may affect average performance, even though we have no clear prior for the direction of this relationship (see the discussion in Section 1, especially note 1). Our estimates for the empirical model we use for Tobin’s *Q* are as follows (heteroskedasticity-robust *t*-statistics are in parentheses):

<sup>14</sup> The standard deviation of residual returns is almost twice as high in the subsample with high CEO power (1.4 versus 0.7%). There are 69 firms in each subsample.

<sup>15</sup> Standard Goldfeld-Quandt tests show that the difference in variances depicted in Figure 1 is highly significant. A similar conclusion holds if we perform the tests for each component of our power index separately, if we use the alternative performance measures (*ROA*, *Q*), and if we use alternative cutoffs to split the sample into high and low CEO power subsamples.

$$\begin{aligned}
 Q = & 0.093 + 0.427 \text{ CEO = founder} + 0.110 \text{ CEO only insider} \\
 & \quad (0.327) \quad (3.713) \quad (1.718) \\
 & - 0.068 \text{ CEO's concentration of titles} + 3.909 \text{ CEO ownership} \\
 & \quad (-1.259) \quad (2.229) \\
 & - 11.655 (\text{CEO ownership})^2 + 0.127 \ln(\text{assets}) - 0.495 \frac{\text{capex}}{\text{sales}} \quad (2) \\
 & \quad (-2.245) \quad (4.379) \quad (-0.963) \\
 & - 0.001 \text{ firm age} + 0.092 \text{ ROA} + 0.082 \text{ ROA}_{t-1} \\
 & \quad (-1.000) \quad (7.076) \quad (6.833) \\
 & - 0.064 (\text{number of segments}) \\
 & \quad (-5.333)
 \end{aligned}$$

We use the same model for *ROA*, excluding *ROA* and lagged *ROA* from the right-hand side:

$$\begin{aligned}
 \text{ROA} = & 6.249 + 1.741 \text{ CEO = founder} - 1.193 \text{ CEO only insider} \\
 & \quad (4.716) \quad (3.200) \quad (-4.291) \\
 & + 0.060 \text{ CEO's concentration of titles} + 3.665 \text{ CEO ownership} \\
 & \quad (0.233) \quad (0.541) \\
 & + 34.367 (\text{CEO ownership})^2 + 0.064 \ln(\text{assets}) + 0.521 \frac{\text{capex}}{\text{sales}} \quad (3) \\
 & \quad (1.474) \quad (0.484) \quad (0.269) \\
 & + 0.009 \text{ firm age} - 0.487 (\text{number of segments}) \\
 & \quad (2.250) \quad (-8.254)
 \end{aligned}$$

The signs of the coefficients on all control variables are broadly consistent with those found in the previous literature. The measures of the CEO's power to influence decisions have ambiguous effects on average firm performance. We find that "CEO = founder" is positively and significantly correlated both with *Q* and *ROA*, but "CEO only insider" is negatively correlated with *ROA*, while positively and significantly correlated with *Q*. "CEO's concentration of titles" seems to have no effect on *ROA* and *Q*. Of the theoretical arguments discussed in Section 1, the most clear prediction for the direction of the effect of CEO power on performance comes from agency theory: if high power allows CEOs to become entrenched, power should have a negative effect on performance. The evidence from the level regressions is not consistent with this agency argument, indicating that our measure of CEO power may not be capturing entrenchment effects.

**4.1.2 Glejser tests.** To conduct the Glejser test, we regress the absolute value of the residuals  $\hat{u}$  from our empirical models for each of the three performance measures (equations 1, 2 and 3) on our measures of CEO power and a vector of controls  $\mathbf{z}$  which we hypothesize should be associated with the variability in firm performance:

$$|\hat{u}| = \alpha + \beta_1 \text{CEO} = \text{founder} + \beta_2 \text{CEO only insider} \\ + \beta_3 \text{CEO's concentration of titles} + \theta \mathbf{z} + e \quad (4)$$

An *F*-test of the hypothesis that all slopes equal zero is a test of the null hypothesis of homoskedasticity against the alternative that the variance of firm performance is a function of “CEO = founder,” “CEO only insider,” “CEO’s concentration of titles” and  $\mathbf{z}$ . To test whether a particular measure of power  $j$  affects the variability of performance we use a *t*-test for the null  $\beta_j = 0$ . A positive  $\beta_j$  and high *t*-statistics are evidence that the particular measure  $j$  is positively related to the variance of firm performance after controlling for the other measures of power and  $\mathbf{z}$ , our vector of controls.

Our benchmark vector of controls  $\mathbf{z}$  includes CEO ownership and its square, the degree of diversification (the number of different two-digit SIC segment codes), firm size (natural log of assets), firm age (number of years since date of incorporation), leverage (book value of long term debt divided by book assets), CEO tenure (the number of years since the CEO was appointed CEO) and its square, capital expenditures over sales, and two-digit SIC industry dummies.

We include ownership as a control because it might affect a CEO’s incentives to take risks. On the one hand, undiversified CEOs with high ownership stakes might have an incentive to reduce firm risk in order to reduce the riskiness of their personal portfolios. On the other hand, Amihud and Lev (1981) argue that firms with dispersed ownership (and thus, with potentially more severe agency problems) engage in more conglomerate acquisitions in order to reduce risk, even when this is not optimal for shareholders. If CEO ownership is high, the CEO will then have fewer incentives to reduce risk.

We include the tenure variables to control for life-cycle learning or signaling effects. We include leverage because it might affect the volatility of performance variables, particularly stock returns. We also expect bigger, older, and more diversified firms to exhibit less variability in performance. We include industry dummies to control for the fact that some industries might be inherently more volatile than others. Finally, we include any additional variables that we used in the first-stage regression to construct the residuals, because variables which affect average performance could also affect the variance of performance. We do not use firm fixed effects in our specification, because our measures of CEO power vary little over time for a given firm (in approximately 80% of the firm-years, the three measures of power are constant from one year to the next).<sup>16</sup> In addition, we

<sup>16</sup> In the context of the ownership literature, Himmelberg, Hubbard, and Palia (1999) argue for the use of firm fixed effects in regressions which relate ownership to firm performance. However, Zhou (2001) points out that if the explanatory variables change slowly over time (as do ownership and influence power), firm fixed-effect regressions may fail to detect relationships in the data even when they exist.

expect differences in variability to be more systematically related to industry, for which we control. We always use heteroskedasticity-corrected standard errors when calculating our  $t$ -statistics, since the residuals of these regressions are heteroskedastic by construction.<sup>17</sup>

In Table 2, we report the results of regression (4) for the three performance measures. The null of homoskedasticity is always easily rejected against the alternative that the variance of firm performance is a function of “CEO = Founder,” “CEO only insider,” “CEO’s concentration of titles,” since in all cases the estimated coefficients on the measures of CEO power are jointly significant at a 5% level or better.<sup>18</sup>

Column I reports the results for stock returns. Since we use monthly data for stock returns and annual data for the controls, we adjust the  $t$ -statistics for non-independence within firm-year(s). The results in column I suggest that all three of our measures of power are positively related to the volatility of excess stock returns. The coefficients on both “CEO = Founder” and “CEO only insider” are statistically significant at a 5% level or higher. The coefficient on “CEO’s concentration of titles” is positive but not statistically significant. The other coefficients in the regression also line up with our expectations. Bigger, older, and more diversified firms exhibit less variability in stock returns, and CEO ownership is positively correlated with stock-return variability. Squared ownership seems to have a negative effect on the dependent variable, indicating a non-linear relationship between ownership and the volatility of stock returns. Leverage has a positive coefficient, consistent with the presence of leverage effects.

The economic significance of the coefficients on the measures of CEO power also appear to be large, as compared with the effect of other variables. For example, the coefficient on “CEO only insider” indicates that if an executive other than the CEO sits on the board, the volatility of stock returns decreases by a magnitude that is equivalent to the effect of an increase of approximately 22 years in firm age or the addition of approximately three segments. The effect of “CEO = founder” is approximately equivalent to the effect of an increase in CEO ownership from 0 to 8%, a change that is more than one standard deviation in CEO ownership in our sample (5%). The effect of “CEO = founder” is also sizeable in itself. The average absolute value of the stock return residuals across all firm-years is 0.065. Thus, moving from a firm-year in which “CEO = founder” is equal to zero to a firm-year in which “CEO = founder” is equal to one increases the absolute value of stock return residuals by a

<sup>17</sup> The residuals  $e_t$  of these regressions have the following three features: (1) they have non-zero expected value, (2) they are autocorrelated, and (3) they are heteroskedastic. Amemiya (1977) shows that, asymptotically, the first two problems vanish. To correct for heteroskedasticity, we use the asymptotically-corrected covariance matrix of White.

<sup>18</sup> The  $F$ -tests of joint significance are reported at the bottom of Table 2.



**Table 2**  
**Heteroskedasticity tests for performance measures as a function of CEO power and other control variables**

| Dependent variable  | Absolute value of excess stock returns (I) | Absolute value of ROA residuals (II) | Absolute value of Tobin's Q residuals (III) |
|---|--|--------------------------------------|---|
| CEO = founder   | 0.012***<br>(4.49)                         | 0.985**<br>(2.19)                    | 0.416***<br>(4.28)                          |
| CEO only insider  | 0.003**<br>(2.24)                          | -0.218<br>(-1.09)                    | 0.032<br>(0.68)                             |
| CEO's concentration of titles   | 0.001<br>(0.82)                            | 0.303<br>(1.55)                      | 0.027<br>(0.60)                             |
| CEO ownership   | 0.158***<br>(5.03)                         | 7.945<br>(1.44)                      | 6.250***<br>(3.08)                          |
| CEO ownership squared   | -0.378***<br>(-4.06)                       | -11.470<br>(-0.59)                   | -18.660***<br>(-3.02)                       |
| CEO tenure  | -0.001<br>(-0.81)                          | -0.375<br>(-1.19)                    | -0.102*<br>(-1.90)                          |
| CEO tenure squared  | -0.001<br>(-1.63)                          | 0.042<br>(0.44)                      | 0.022<br>(1.19)                             |
| Leverage  | 0.027***<br>(5.27)                         | -1.489<br>(-1.29)                    | -0.822***<br>(-4.25)                        |
| Firm size   | -0.004***<br>(-6.48)                       | -0.084<br>(-0.73)                    | 0.067***<br>(2.6)                           |
| Firm age  | -0.001***<br>(-6.61)                       | -0.018<br>(-0.54)                    | -0.011<br>(-1.57)                           |
| Number of segments  | -0.001**<br>(-2.02)                        | -0.281***<br>(-5.79)                 | -0.048***<br>(-4.67)                        |
| Capex/sales   | 0.013<br>(1.10)                            | 1.322<br>(0.81)                      | 0.652*<br>(1.65)                            |
| Constant  | 0.123***<br>(21.66)                        | 6.104***<br>(5.63)                   | 0.753***<br>(3.21)                          |
| Number of observations  | 24,540                                     | 2078                                 | 1953  |
| F-statistic of joint significance test<br>for CEO = founder, CEO only insider,<br>and CEO's concentration of titles | 10.10***                                   | 2.74**                               | 6.13***                                     |
| R <sup>2</sup>  | 0.11                                       | 0.11                                 | 0.22  |

Table 2 shows the results of using Glejser's (1969) method to test whether the variance in performance is greater in firms in which our measures of CEO power are larger. To perform the tests for stock returns we construct excess stock returns  $\hat{u}_i$  for firm  $i$  from the market model:  $SR_{it} = \beta_1 MR_t + u_{it}$ , where  $SR$  denotes monthly stock returns,  $MR$  the monthly value-weighted market return, and  $t$  ranges from January, 1992 to December, 1999. We construct residuals  $\hat{u}_i$  for Tobin's  $Q$  from the following regression:  $Q = b_0 + b_1 \text{CEO} = \text{founder} + b_2 \text{CEO only insider} + b_3 \text{CEO's concentration of titles} + b_4 \text{CEO ownership} + b_5 \text{CEO ownership squared} + b_6 \text{ROA} + b_7$  one period lagged  $ROA + b_8 \text{capex/sales} + b_9 \text{firm age} + b_{10}$  number of segments  $+ b_{11} \ln(\text{assets}) + \text{year dummies}$ . We construct  $ROA$  residuals using the following model:  $ROA = b_0 + b_1 \text{CEO} = \text{founder} + b_2 \text{CEO only insider} + b_3 \text{CEO's concentration of titles} + b_4 \text{CEO ownership} + b_5 \text{CEO ownership squared} + b_6 \text{capex/sales} + b_7 \text{firm age} + b_8$  number of segments  $+ b_9 \ln(\text{assets}) + \text{year dummies}$ . We regress the absolute value of the residuals from these regressions on CEO = founder, CEO's concentration of titles and CEO only insider and controls including CEO ownership (measured by the ratio of the number of shares owned by the CEO after adjusting for stock splits to total shares outstanding), squared CEO ownership, CEO tenure (the number of years since the CEO was appointed CEO) and its square, leverage (long-term debt/assets), firm size (natural log of assets), firm age (number of years since first date of incorporation), Capex/sales and number of segments (two-digit SIC segments the firm operates in). All regressions include two-digit SIC code industry dummies. Robust  $t$ -statistics are in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10% levels, respectively. The coefficients on CEO tenure and firm age are multiplied by 10. The coefficient on CEO tenure squared is multiplied by 100.

factor of 18.5%. The corresponding impact of “CEO only insider” is approximately 4.6%.

Columns II and III use *ROA* and *Q* as alternative performance measures. All three of our measures of CEO power enter with positive signs in the regressions explaining the variability in *Q*, but only “CEO = founder” is significant (column III). When we use *ROA* (column II), the only significant variable is again “CEO = founder.” “CEO’s concentration of titles” enters positively in the *ROA* regression and with a higher *t*-statistic than in the stock-return regression (*p*-value of 0.12 for a *t*-statistic of 1.55). “CEO only insider” enters negatively in the *ROA* regression but is far from being statistically significant (*p*-value of 0.27).

The results from the tests in this section are consistent with our hypothesis that CEO power and performance variability are positively related. Furthermore, these results suggest that the retention of the CEO title by one of the founders is the most significant variable affecting the variability of performance, followed by the absence of insiders other than the CEO on the board. The evidence for “CEO only insider” is particularly strong for the variability in stock returns. “CEO’s concentration of titles” by itself does not play a significant role.

#### 4.2 Influence power and variability over time

The previous panel regressions use information both on within-firm and cross-sectional variability in performance. In order to check whether CEO power increases the likelihood of both good and bad decisions within a given firm, we also perform a test which allows us to isolate the effect of influence power on the within-firm, over-time variability in performance.

The tests performed in this section are also useful to differentiate our hypothesis from other plausible stories that focus primarily on differences in the cross-sectional variability in performance. One possibility is that CEOs who become powerful are either very good at maximizing firm value or very good at value-decreasing political activities. Because the panel results are also driven by cross-sectional variability, this story can potentially explain the results in Table 2, even if CEO power per se has no direct effect on firm performance.<sup>19</sup> However, this story does not necessarily imply that, *within the same firm*, high CEO power should be associated with both good and bad decisions, and thus higher variability of performance over time.

We compute the sample standard deviation of stock returns, *ROA* and *Q* for each firm using their monthly (for stock returns) and yearly (for *ROA* and *Q*) values from 1992 to 1999. Then, we regress them on the possible determinants of variability. We use the same set of controls as in equation 4. The data for the regressors are sample averages over the whole period (1992–1999).

<sup>19</sup> We thank an anonymous referee for suggesting this hypothesis.

Table 3 displays the results. As in Table 2, the measures of CEO power are jointly significant at a 5% level or better in all cases. Our measures of CEO power are also positively associated with the over-time, within-firm variability of performance. Similar to Table 2, “CEO = founder” has the most consistent effect across all specifications. In the stock-return regression (column I), only “CEO = founder” is significant, while the coefficients on both “CEO only insider” and “CEO’s concentration of titles” are positive but not significant.

The economic effect of the measures of CEO power on the within-firm volatility of stock returns also appears to be large. The magnitude of the

**Table 3**  
Cross-sectional regressions of standard deviation of performance measures on CEO power and other control variables

| Dependent variable   | Standard deviation of stock returns (I) | Standard deviation of ROA (II) | Standard deviation of Tobin's Q (III) |
|--|---|--------------------------------|---------------------------------------|
| CEO = founder  | 0.021***<br>(2.71)                      | 1.337*<br>(1.77)               | 0.616***<br>(2.77)                    |
| CEO only insider   | 0.007<br>(1.37)                         | 1.016*<br>(1.81)               | -0.079<br>(-0.58)                     |
| CEO's concentration of titles  | 0.005<br>(1.16)                         | 0.863*<br>(1.92)               | 0.105<br>(0.92)                       |
| CEO ownership  | 0.205**<br>(2.01)                       | 1.145<br>(0.11)                | 6.998<br>(1.44)                       |
| CEO ownership squared  | -0.487<br>(-1.65)                       | 13.739<br>(0.49)               | -16.509<br>(-1.24)                    |
| CEO tenure   | -0.001<br>(-0.96)                       | -0.085<br>(-1.28)              | 0.006<br>(0.50)                       |
| CEO tenure squared   | -0.073<br>(-0.38)                       | 17.268<br>(0.84)               | -6.987<br>(-1.57)                     |
| Leverage   | 0.035***<br>(2.70)                      | -0.451<br>(-0.30)              | -1.515***<br>(-4.47)                  |
| Firm size  | -0.008***<br>(-4.95)                    | -0.246<br>(-1.17)              | 0.037<br>(0.98)                       |
| Firm age   | -0.016***<br>(-3.29)                    | 0.344<br>(0.54)                | -0.107<br>(-0.92)                     |
| Number of segments   | -0.019<br>(-0.16)                       | -24.560**<br>(-2.21)           | -3.379*<br>(-1.76)                    |
| Capex/sales  | 0.071<br>(1.05)                         | 0.526<br>(0.10)                | 1.259<br>(1.26)                       |
| Constant   | 0.161***<br>(11.34)                     | 5.485***<br>(3.06)             | 0.443<br>(1.22)                       |
| Number of observations   | 320                                     | 320                            | 320                                   |
| F-statistic of joint significance test for<br>CEO = founder, CEO only insider and<br>CEO's concentration of titles | 4.70***                                 | 3.42**                         | 2.90**                                |
| R <sup>2</sup>   | 0.58                                    | 0.28                           | 0.41                                  |

Table 3 shows cross-sectional OLS regressions of the standard deviation of performance measures, computed for each firm over the 1992–1999 period, on CEO = founder, CEO's concentration of titles and CEO only insider and controls averaged over the 1992–1999 period. In column I, the dependent variable is the standard deviation of monthly stock returns (SR). In columns II and III, the dependent variables are the standard deviations of ROA and Tobin's Q. The regressions in all columns include two-digit SIC code dummies. Robust *t*-statistics are shown in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10% levels, respectively. The coefficient on CEO tenure squared is multiplied by 10,000. The coefficients on firm age and number of segments are multiplied by 100.

coefficients on “CEO only insider” and “CEO’s concentration of titles” are similar to the effect of one-standard-deviation changes in variables such as firm age and firm size. The coefficient on “CEO = founder” has an impact which is of the same magnitude as a one-standard-deviation change in CEO ownership. Its effect is also large in itself. The average standard deviation of stock returns is 0.094 in our sample. This means that increasing “CEO = founder” from zero to one increases stock return volatility by a factor of approximately 22%.

While in the  $Q$  regression “CEO = founder” is the only one of our three measures of power that significantly affects variability, the  $ROA$  regression (column II) suggests a more balanced role for the three measures of power. They all enter significantly in this regression, with coefficients of similar economic magnitude. Given that the average standard deviation of  $ROA$  across all firms is 3.21, the estimates imply that each of the three measures of power increases the variability in  $ROA$  by a factor of approximately 26 to 40% relative to the mean.

Our overall conclusions from the results in Tables 2 and 3 are the following. First of all, a CEO’s power to influence decisions seems to be positively related to the variability in firm performance, both in the panel tests (Table 2) and in the tests that isolate the within-firm, over-time variability of performance (Table 3). Of the three alternative measures of CEO power, the retention of the CEO title by one of the founders is the most consistently significant variable affecting performance variability, but there is also some evidence that the other two measures of power are positively related to performance variability, especially the absence of an insider on the board other than the CEO.

### 4.3 Industry measure of managerial discretion

Hambrick and Finkelstein (1987) classify the factors that affect managerial discretion into three main categories: internal organization, environmental factors (such as the industry in which the firm operates), and managerial characteristics.<sup>20</sup> In the previous sections, we used variables related to the internal organization of the firm to measure CEO power. In this section, we also examine the effect of environmental factors.

The management literature has argued that managerial discretion varies from industry to industry because of factors such as product differentiability, capital intensity, the degree of competition, and regulatory constraints (Finkelstein and Hambrick, 1996). Therefore, in this section we examine whether the effect of CEO power on the variability of performance is greater in industries where managerial decision-making faces fewer environmental constraints.

<sup>20</sup> Examples of managerial characteristics which affect a CEO’s power over the board can be found in Westphal and Zajac (1995).

We use Hambrick and Abrahamson's (1995) industry discretion ratings for seventy four-digit SIC code industries to classify the industries of our sample firms into high- and low-discretion categories.<sup>21</sup> To maximize the positive matches with our data we average their measures by two-digit SIC code industry, and construct an indicator variable ("high-discretion industry") which is equal to one for industries at the top 40% of the distribution of the two-digit SIC code rating of managerial discretion and is equal to zero for industries at the bottom 40% of the same distribution. We eliminate the firms in industries that rank from the 40% to the 60% percentile of the distribution, because managerial discretion in such industries is more likely to be measured with error.<sup>22</sup>

Table 4 reports the results of incorporating "high-discretion industry" into our analysis. We focus on stock returns in Table 4 and use the same control variables as in the previous tables with the exception of the two-digit industry dummies because they are collinear with "high-discretion industry" (we omit the coefficients on the control variables for the sake of brevity). Column I shows the results of replicating the same test as in Table 2, but with "high-discretion industry" added to the list of explanatory variables. The positive and significant coefficient on "high-discretion industry" is consistent with the idea that performance should be more variable in industries where managers have more discretion. An alternative explanation for this result, however, is that the partially subjective discretion ratings might at least implicitly depend on the underlying volatility of the industry.<sup>23</sup> Thus, performance volatility could be mechanically higher in firms belonging to high-discretion industries.

Next, we focus on the hypothesis that the effect of CEO power on volatility should be greater in industries in which managers have more discretion. Even if the discretion ratings are endogenously determined by the industry's volatility, it does not immediately follow that the effect of CEO power on volatility should be higher in such industries. The mechanical argument is essentially about the *level* of volatility in different industries, rather than about its determinants. To test this hypothesis, in column II we add the interactions between our three measures of power and "high-discretion industry."<sup>24</sup> Once we include the interaction terms,

<sup>21</sup> Hambrick and Abrahamson (1995) used a panel of academic experts to rate the degree of managerial discretion in seventeen selected industries and then examined the association between the specialists' ratings and observable characteristics. Using the coefficients from a regression of the ratings on these characteristics, they were able to extrapolate the classification to 53 additional industries.

<sup>22</sup> Some industries classified as low discretion are Petroleum and Coal Products (two-digit SIC code 29), and Electric, Gas, and Sanitary Services (two-digit SIC code 49). Some industries classified as high discretion are Industrial Machinery and Equipment (two-digit SIC code 35) and Wholesale Trade—Durable Goods (two-digit SIC code 50).

<sup>23</sup> Given the subjective nature of the ratings, we cannot tell for sure whether this is the case or not.

<sup>24</sup> This procedure is equivalent to dividing the sample in two when estimating the effect of CEO power, but still using the full sample to estimate the effects of the other variables on performance variability.

**Table 4**  
**Stock return variability as a function of CEO power interacted with industry ratings of managerial discretion**

| Dependent variable   | Absolute value of excess stock returns (I) | Absolute value of excess stock returns (II) | Standard deviation of stock returns (III) | Standard deviation of stock returns (IV) |
|--|--|---|---|--|
| High-discretion industry   | 0.006***<br>(3.88)                         | -0.001<br>(-0.37)                           | 0.012***<br>(3.24)                        | -0.001<br>(-0.28)                        |
| CEO = founder  | 0.017***<br>(5.55)                         | 0.002<br>(0.63)                             | 0.027***<br>(3.21)                        | 0.005<br>(0.49)                          |
| CEO only insider   | 0.004**<br>(2.42)                          | -0.002<br>(-1.40)                           | 0.009<br>(1.42)                           | -0.003<br>(-0.43)                        |
| CEO's concentration of titles                                    | 0.020<br>(1.61)                            | 0.008<br>(0.52)                             | 0.062<br>(1.42)                           | 0.028<br>(0.53)                          |
| CEO = founder*<br>high-discretion industry                       | -  | 0.018***<br>(3.41)                          | -   | 0.029**<br>(2.06)                        |
| CEO only insider*<br>high-discretion industry                    | -  | 0.013***<br>(4.01)                          | -   | 0.023*<br>(1.92)                         |
| CEO's concentration of titles*high-discretion industry           | -  | 0.004*<br>(1.71)                            | -   | 0.012<br>(1.38)                          |
| Type of test   | Glejser                                    | Glejser                                     | Variability over time                     | Variability over time                    |
| Number of observations   | 16,094                                     | 16,094                                      | 209                                       | 209                                      |
| F-statistic of joint significance test for the interaction terms | -  | 11.66***                                    | -   | 4.25***                                  |
| R <sup>2</sup>   | 0.09                                       | 0.10  | 0.47                                      | 0.51                                     |

In Table 4, we examine whether our measures of CEO power have greater impact on the variability of performance when CEOs are in industries where they are likely to have more discretion. We construct our measure of managerial discretion using Hambrick and Abrahamson's (1995) ratings of managerial discretion for seventy four-digit SIC code industries. We average their measures by two-digit SIC code industry, and then we construct a variable which is equal to 1 if the firm belongs to an industry in the top 40% of the distribution of the rating of managerial discretion, and is equal to 0 if the firm belongs to an industry in the bottom 40% of the distribution of the rating of managerial discretion. We examine the direct role of this variable in columns I and III, and we interact it with our measures of CEO power in columns II and IV. Columns I and II show the results using the Glejser test, and columns III and IV show cross-sectional OLS regressions of the standard deviation in stock returns, computed for each firm over the 1992–1999 period, on our measures of power and the same controls we use in Tables 2 and 3 averaged over the 1992–1999 period. The coefficients and *t*-statistics on the controls are omitted for the sake of brevity. The regressions do not include two-digit SIC industry dummies because they are collinear with the industry ratings. Robust *t*-statistics are shown in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10% levels. The coefficient on CEO's concentration of titles is multiplied by 10.

our three measures of power are no longer significantly different from zero. Since by construction these variables measure the effects of CEO power on performance variability *in the subsample of firms operating in low-discretion industries*, this implies that power has virtually no effect on variability in those industries. In contrast, the coefficients on all three interaction terms are positive and significant, which suggests that a CEO's power to influence decisions does affect performance in industries in which managers face fewer environmental constraints. Finally, “high-discretion industry” is no longer significant, which indicates that variations in industry discretion matter less

if a CEO's power is low. Columns III and IV replicate the results for the within-firm variability test. The results are consistent with our previous results, although they are less significant due to the reduced degrees of freedom.

In Table 5, we replicate the regressions in Table 4 using *ROA* and *Q* as alternative measures of performance. For the sake of brevity, we report only the regressions that include both the high-discretion dummy and its interactions with our measures of CEO power. The results are very similar to those in Table 4: consistent with our main hypothesis, all three of our measures of CEO power have a stronger positive effect on performance variability when CEOs are in industries where they can have a larger impact on corporate performance.<sup>25</sup>

**Table 5**  
**Variability in Tobin's *Q* and *ROA* as a function of CEO power interacted with industry ratings of managerial discretion**

| Dependent variable   | Absolute value of <i>ROA</i> residuals (I) | Absolute value of Tobin's <i>Q</i> residuals (II) | Standard deviation of <i>ROA</i> (III) | Standard deviation of Tobin's <i>Q</i> (IV) |
|--|--|---|--|---|
| High discretion industry   | 0.771***<br>(2.77)                         | 0.523***<br>(7.64)                                | -1.020*<br>(-1.79)                     | 0.152<br>(1.01)                             |
| CEO = founder  | -0.141<br>(-0.29)                          | 0.115<br>(0.97)                                   | -1.045<br>(-1.17)                      | 0.188<br>(0.89)                             |
| CEO only insider   | -0.563***<br>(-2.72)                       | -0.132***<br>(-3.65)                              | 0.303<br>(0.49)                        | -0.131<br>(-1.18)                           |
| CEO's concentration of titles  | -0.152<br>(-0.79)                          | -0.049<br>(-1.43)                                 | 0.040<br>(0.10)                        | 0.050<br>(0.65)                             |
| CEO = founder*high-discretion industry                                   | 0.559<br>(0.80)                            | 0.356*<br>(1.81)                                  | 2.637*<br>(1.96)                       | 0.688*<br>(1.68)                            |
| CEO only insider*high-discretion industry                                | 0.817<br>(1.47)                            | 0.241*<br>(1.64)                                  | 2.697*<br>(1.77)                       | -0.031<br>(-0.12)                           |
| CEO's concentration of titles* high-discretion industry                  | 0.823*<br>(1.86)                           | -0.003<br>(-0.03)                                 | 1.684*<br>(1.87)                       | 0.214<br>(0.74)                             |
| Type of test   | Glejser                                    | Glejser   | Variability over time                  | Variability over time                       |
| Number of observations   | 1367                                       | 1367  | 209                                    | 209   |
| <i>F</i> -statistic of joint significance test for the interaction terms | 2.20*                                      | 1.89  | 4.01***                                | 0.95  |
| <i>R</i> <sup>2</sup>  | 0.09                                       | 0.24  | 0.24                                   | 0.31  |

In Table 5, we replicate the tests reported in Table 4 using Tobin's *Q* and *ROA* as alternative performance measures. We construct our measure of managerial discretion using Hambrick and Abrahamson's (1995) ratings of managerial discretion, as described in Table 4. Columns I and II show the results of the Glejser tests, where the residuals of *ROA* and Tobin's *Q* are constructed as in Table 2. Columns III and IV show the results of cross-sectional OLS regressions of the standard deviation in *ROA* and Tobin's *Q*, computed for each firm over the 1992–1999 period, on our measures of power and the same controls we use in Tables 2 and 3 averaged over the 1992–1999 period. The coefficients and *t*-statistics on the controls are omitted for the sake of brevity. The regressions do not include two-digit SIC industry dummies because they are collinear with the industry ratings. Robust *t*-statistics are shown in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10% levels.

<sup>25</sup> We find a significant negative effect of “CEO only insider” on performance variability of firms operating in low-discretion industries (columns I and II). As will become more clear in Section 5, this finding may be due to a negative effect of past volatility on the likelihood that CEOs are the only insiders on the board.



#### 4.4 CEO involvement in director selection and performance variability

Shivdasani and Yermack (1997) argue that CEOs are more powerful when they are involved in nominating directors, because directors appointed by the CEO are less likely to monitor him.<sup>26</sup> Thus, when the CEO is involved in the board-nominating process, he might have more power to influence decisions. On the other hand, because of the board's limited day-to-day involvement, it is not clear to what extent changes in board structure will significantly change the number of people who effectively participate in decision-making together with the CEO. For example, changes in the number of independent outside directors may not have a large impact on the power of the CEO to influence decisions, because outside directors ultimately depend on the CEO for the provision of firm-specific information.

In this section, we examine whether a CEO's involvement in the selection of new directors is also related to performance variability. As in Shivdasani and Yermack (1997), the CEO is defined to be involved in director selection either when the board has a nominating committee and the CEO sits on it, or when the board does not have a nominating committee. We extend Shivdasani and Yermack's data on the 1994 Fortune 500 firms over the period from 1994 to 1996 by collecting data from proxies for the remaining firm-years in our sample.<sup>27</sup> Our summary statistics are very similar to those in Shivdasani and Yermack (1997). The board has a nominating committee which includes the CEO in 22% of firm-years and has no nominating committee in 18% of firm-years, resulting in a total of 40% of firm-years in which the CEO is involved in director selection.

In Table 6, we include a dummy variable indicating whether the CEO is involved in director selection in our regression analysis and test whether this variable is positively related to performance variability. We only report the stock-return results, but the results are the same for the other performance measures: there is no correlation between a CEO's involvement in director selection and performance variability. This is true both when we include the CEO's involvement dummy together with the other variables in the analysis (columns II and IV), or when we include the CEO's involvement dummy by itself (columns I and III). This is also true

<sup>26</sup> A related idea is explored by Westphal and Zajac (1995), who suggest that CEOs who have power to nominate directors will choose directors who are demographically similar to them and thus less likely to disagree with them.

<sup>27</sup> We thank David Yermack for providing us with their data. In our data collection process, we first collected data every other year from 1992 to 1999 (taking into account the firm-years we already had in Shivdasani and Yermack's data). Then we checked all the cases where the CEO's involvement status changed from year  $t$  to year  $t+2$ . If the CEO's involvement status was constant in years  $t$  and  $t+2$ , we assumed it was also the same in year  $t+1$ . For the firms for which we have three successive years of data, it was never the case that we observed reverse changes in the CEO's involvement status in two consecutive years. Thus, we believe our data contain only minimal measurement error.

**Table 6**  
**Tests using a variable indicating whether the CEO is involved in the selection of directors**

| Dependent variable                 | Absolute value of excess stock returns (I) | Absolute value of excess stock returns (II) | Standard deviation of stock returns (III) | Standard deviation of stock returns (IV) |
|------------------------------------|--|---|---|--|
| CEO involved in director selection | -0.041<br>(-0.37)                          | -0.010<br>(-0.09)                           | -0.244<br>(-0.66)                         | -0.101<br>(-0.28)                        |
| CEO = founder                      | -  | 0.013***<br>(4.67)                          | -   | 0.021***<br>(2.70)                       |
| CEO only insider                   | -  | 0.003**<br>(2.20)                           | -   | 0.007<br>(1.32)                          |
| CEO's concentration of titles      | -  | 0.007<br>(0.63)                             | -   | 0.047<br>(1.16)                          |
| CEO ownership                      | 0.175***<br>(5.42)                         | 0.155***<br>(4.94)                          | 0.235**<br>(2.26)                         | 0.207**<br>(2.01)                        |
| CEO ownership squared              | -0.368***<br>(-3.9)                        | -0.368***<br>(-3.97)                        | -0.458<br>(-1.53)                         | -0.490<br>(-1.64)                        |
| CEO tenure                         | -0.001<br>(-0.8)                           | -0.001<br>(-0.73)                           | -0.001<br>(-1.04)                         | -0.007<br>(-0.97)                        |
| CEO tenure squared                 | -0.005<br>(-0.95)                          | -0.010*<br>(-1.67)                          | 0.003<br>(0.16)                           | -0.006<br>(-0.33)                        |
| Leverage                           | 0.028***<br>(5.48)                         | 0.027***<br>(5.36)                          | 0.040***<br>(2.74)                        | 0.035***<br>(2.69)                       |
| Firm size                          | -0.004***<br>(-6.76)                       | -0.004***<br>(-6.34)                        | -0.009***<br>(-5.03)                      | -0.009***<br>(-4.95)                     |
| Firm age                           | -0.001***<br>(-7.86)                       | -0.001***<br>(-6.48)                        | -0.002***<br>(-4.3)                       | -0.002***<br>(-3.34)                     |
| Number of segments                 | -0.008**<br>(-2.3)                         | -0.008**<br>(-2.31)                         | -0.001<br>(-0.09)                         | -0.002<br>(-0.14)                        |
| Capex/sales                        | 0.008<br>(0.53)                            | 0.007<br>(0.44)                             | 0.077<br>(1.14)                           | 0.072<br>(1.05)                          |
| Constant                           | 0.093***<br>(17.93)                        | 0.088***<br>(16.19)                         | 0.171***<br>(11.58)                       | 0.162***<br>(11.20)                      |
| Type of test                       | Glejser                                    | Glejser                                     | Variability over time                     | Variability over time                    |
| Number of observations             | 24,190                                     | 24,190                                      | 320                                       | 320                                      |
| R <sup>2</sup>                     | 0.11                                       | 0.11  | 0.56                                      | 0.58                                     |

Columns I and II show the results of using the Glejser test to test whether the variance in performance is greater in firms in which the CEO is involved in the selection of directors. To perform the tests for stock returns, we construct excess stock returns  $\hat{u}_i$  for firm  $i$  from the market model:  $SR_{it} = \beta_i MR_t + u_{it}$ , where  $SR$  denotes monthly stock returns,  $MR$  the monthly value-weighted market return and  $t$  ranges from 1992 to 1999. We regress the absolute value of the residuals on a dummy indicating whether the CEO is involved in director selection and controls including CEO = founder, CEO only insider, and CEO's concentration of titles. Following Shivdasani and Yermack (1997), the CEO is defined to be involved in director selection if the firm does not have a nominating committee, or if the firm has a nominating committee and the CEO sits on the committee. Columns III and IV show cross-sectional OLS regressions of the standard deviation in stock returns, computed for each firm over the 1992–1999 period, on the same variables. The regressions in all columns include two-digit SIC code dummies. Robust  $t$ -statistics are shown in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10% levels. The coefficient on CEO involved in director selection is multiplied by 100. The coefficients on CEO's concentration of titles, CEO tenure, firm age and number of segments are multiplied by 10. The coefficient on CEO tenure squared is multiplied by 1000.

both for the Glejser tests (columns I and II) and for the over-time variability tests (columns III and IV).

One possible reason why we find no relation between a CEO's involvement in director selection and performance variability is that this variable may not be a good measure of the board's power to influence decisions.

For example, many nominating committees may still solicit advice from a CEO who is not a member, as discussed in Shivdasani and Yermack (1997). Another possibility is that the board delegates decision-making authority to the top management team, so that the power of the CEO over the board matters less for performance variability than the power of the CEO over other inside executives. Some evidence consistent with this idea is that “CEO only insider” is positively related to performance variability. While our other measures of CEO power combine both aspects of power, “CEO only insider” is more directly related to the distribution of power within the top-management team.

## 5. Endogeneity and Causality Issues

There appears to be a robust positive correlation between our proxies for a CEO’s power to influence decisions and performance variability. While the theoretical arguments discussed in Section 1 suggest a causal relationship from CEO power to variability, the evidence could also be consistent with alternative stories which emphasize the reverse causation: more variability in performance may lead to increases in CEO power to influence decisions. In this section, we address the potential endogeneity problem in two different but complementary ways. We describe the results below but omit the tables (these are available upon request).

### 5.1 Does performance predict CEO power?

Most reverse causality stories that have been suggested to us are very similar and can be summarized as follows. On the one hand, if firms have performed well in the past, it might be easier for CEOs to implement changes which increase their power. On the other hand, following poor performance, firms may want to purposefully concentrate decision-making power in the hands of the CEO in order to make faster decisions. This argument could explain our findings, since the best and the worst performers tend to be in the sample of volatile firms.

We explore the explicit temporal dimension of this story to assess its empirical relevance. Specifically, we evaluate whether lagged extreme performances predict increases in CEO power and also perform the reverse experiment: we evaluate whether changes in CEO power help predict either very high or very low performances in the near future. In order to do this, we create a dummy variable called *extreme* that equals one for either very high or very low values of stock returns and is zero otherwise.<sup>28</sup>

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<sup>28</sup> We define high performance to be stock returns in the top 15% of the sample-return distribution. Similarly, we define low performance to be stock returns in the bottom 15% of the sample return distribution. Our dummy variable equals zero for all intermediate values (70% of the sample). Results are qualitatively similar when we use other cutoffs to define extreme performances.

Our results indicate that lagged changes in the “CEO only insider” variable help predict future extreme performances: the first two lags of changes in “CEO only insider” are positively and significantly related to the *extreme* variable. In contrast, lagged extreme performances do not predict increases in “CEO only insider”: if anything, the effect of the second lag of *extreme* is negative (and marginally significant), suggesting that past extreme performances, either good or bad, might actually tend to *reduce* a CEO’s power to influence decisions.<sup>29</sup> This finding casts doubt on theories that try to explain the positive correlation between power and variability by postulating causation from variability to CEO power, and it provides further evidence that “CEO only insider” captures a dimension of CEO power that helps explain performance.

## 5.2 Two-stage least squares

We also use instrumental variables methods to try to isolate the effects of CEO power on performance variability from other sources of variation. We focus here on cross-sectional regressions of performance variability on measures of CEO power similar to those in section 4.2, because instrumental variable techniques are most directly applicable to them. Our main task was to identify instruments for the (empirically) most significant measure of power in those regressions, which is “CEO = founder.”

The first variable we use as an instrument (“dead founders”) is a dummy variable that takes the value of one if the founder died before the start of our sample period and zero otherwise.<sup>30</sup> The motivation for the use of this instrument is simple: dead founders cannot be CEOs. Furthermore, the death of a founder should be a fairly exogenous event which will affect the likelihood that the current CEO is one of the founders but does not have a plausible direct effect on performance, except when the founder happens to be the CEO. Our second instrument is the number of founders of each firm. We believe that this variable also satisfies the necessary conditions for a valid instrument for two reasons. First, the probability that the current CEO is one of the founders is mechanically increasing in the number of founders. Second, the number of founders is unlikely to have any direct effect on the variability of firm performance years after the founding event.

<sup>29</sup> There is no significant result for the other two measures of CEO power. However, “CEO only insider” is the only measure of power that displays significant variability over time for a single firm. This variable changes in 16% of firm-years. In comparison, “CEO’s concentration of titles” changes in only 7% of firm-years, and there are almost no changes in “CEO = founder” (1% of firm-years). Thus, it is hard to tell whether our findings are due to the fact that “CEO only insider” is a more important predictor of extreme performances or to the fact that it changes more over time in our sample.

<sup>30</sup> When there are multiple founders, we use the firm-level average of this variable.

We replicate the regressions of Table 3 using a 2SLS procedure where “CEO = founder” is instrumented with “dead founders” and the number of founders.<sup>31</sup> The second-stage coefficients on “CEO = founder” remain positive and statistically significant. Furthermore, in *all* regressions we ran, the estimated effect of “CEO = founder” on performance variability was larger than the one obtained through OLS. For example, when we use the standard deviation of stock returns as the dependent variable, the coefficient on “CEO = founder” increases from 0.021 (*t*-statistic of 2.65) to 0.089 (*t*-statistic of 3.07). This finding and the results in Section 5.1 suggest that reverse causation may be biasing us *against* finding a positive correlation between CEO power and performance variability in simple OLS regressions. We conclude that the positive correlation between CEO power and performance variability is not only robust, but is also consistent with causation running from a CEO’s power to influence decisions to performance variability.

## 6. Concluding Remarks

In this article, we provide evidence that firm performance will be more variable as decision-making power becomes more centralized in the hands of the CEO. We focus primarily on the power the CEO has over the board and other top executives as a consequence of his formal position and titles, status as a founder, and status as the sole insider on the board. Of the three different measures of CEO power that we use, the retention of the CEO title by one of the firm’s founders seems to have the most robust effect on stock return variability. However, once we control for Hambrick and Abrahamson’s industry ratings of managerial discretion, we find that all three of our measures of CEO power are positively associated with stock-return variability. In contrast, we find no evidence that a variable measuring the CEO’s involvement in the selection of directors influences performance variability.

It is important to stress that our interpretation of these results does not depend on the existence of an agency problem. Even if managers are benevolent, corporate decisions may be good or bad because managers have different opinions. This raises the question of whether centralization of power in the hands of the CEO is good. The governance literature argues that it is not and advocates the separation of the CEO and chairman of the board positions. Although this is not the main focus of the article, we find no evidence that firms with powerful CEOs have on average worse performances than other firms. Instead, our results suggest that firms with

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<sup>31</sup> The first-stage regressions show that the proposed instruments are strongly correlated with “CEO = founder.” The coefficients on “dead founders” and the number of founders are both significant at greater than the 5% level and have the expected signs (negative for “dead founders,” positive for the number of founders).

powerful CEOs are not only those with the worst performances, but also those with the best performances. Thus, one important implication of our findings is that any policy recommendations for the design of governance structures should not be based on the consideration of isolated cases of extreme performances. In addition, our results point out one potential cost of diluting CEO power: although performance will be less variable, the probability of spectacular performance will also be lower.

Our findings also have implications for the literature on group decision-making. They suggest that the centralization of power directly affects group decision-making, consistent with Sah and Stiglitz's (1986, 1991) theories on decision-making and also with the managerial discretion literature (Hambrick and Finkelstein, 1987).

Finally, as Campbell *et al.* (2001) point out, there is little empirical research to try to explain volatility at the firm level. Our article suggests that to understand volatility, it may be important to consider managerial characteristics and the structure of decision-making.

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