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CEOs and the Product Market: When Are Powerful CEOs Beneficial?

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Abstract

We examine whether industry product market conditions are important in assessing the benefits and costs of chief executive officer (CEO) power. We find that firms are more likely to have powerful CEOs in high demand product markets where firms are facing entry threats. In these markets, investors react favorably to announcements granting more power to CEOs, and CEO power is associated with higher market value, sales growth, investment, advertising, and the introduction of more new products. Our results remain significant when addressing the endogeneity of CEO power by instrumenting CEO power with past non-CEO executive and director sudden deaths.

I. Introduction

Chief executive officers (CEOs) exert a large influence over firms, as they have both explicit legal authority within the firm and "soft" influence to direct corporate behavior. Recent empirical studies document that powerful CEOs reduce managerial compensation efficiency, increase corporate fraud, and are associated with lower firm profitability and shareholder value (see Bebchuk and Fried (2004), Faulkender and Yang (2010), Bebchuk, Cremers, and Peyer (2011),

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Morse, Nanda, and Seru (2011), Landier, Sauvagnat, Sraer, and Thesmar (2013), and Khanna, Kim, and Lu (2015)).[1] With all these negative effects of CEO power, why do firms grant power to CEOs? In an ideal world, the board would grant an optimal level of power to the CEO, weighing costs and benefits specific to the firm characteristics and the business conditions in which it operates, as the model of Hermalin and Weisbach (1998) suggests. Thus, despite the various costs of CEO power documented in the literature, it is important to understand when and under what conditions CEO power becomes beneficial to firms.

In this article, we explore how the potential benefits and costs of CEO power vary with product market conditions. We first present an illustrative model to motivate our empirical tests and results, which are our main contributions. The model illustrates how potentially valuable investment opportunities with possible entrants into a firm's product market may make it optimal to delegate decision-making to the CEO, giving her more power. The model is a reduced-form version of a real option model based on the intuition of the strategic real option model of Grenadier (2002). In Grenadier's model, delay can be costly if the firm faces competition for new projects. We apply this intuition to a CEO making a large project decision such as a large-scale investment or an acquisition. The project has potential value and the firm faces potential competition. However, there is uncertainty about the potential benefits to the firm as there are also private benefits to the investment that accrue to the CEO as is common in many agency models. The granting of CEO power thus involves trading off the benefits of exercising a good project earlier versus the cost of exercising a low-quality project with private benefits for the CEO. Costly delay may occur from competitors entering the market if the CEO does not have sufficient power to exercise the project without gathering new data to formally justify the project. Thus, the benefit of CEO power is that the CEO can move quickly and take proactive investments to increase market value without consulting the board.

The model predicts that CEO power is beneficial for a firm operating in product markets where there are positive investment opportunities and the firm faces high potential entry threats. This prediction is consistent with the strategy advice given by Boston Consulting Group on time-based competition where a quick response to new opportunities enables firms to gain and retain market shares (see Lesser, Reeves, and Goulet (2013)). Granting the CEO sufficient power to efficiently lead the management team thus becomes important for staying abreast, or getting ahead, of the changes and threats from rivals in product markets. In contrast, when a firm operates in a stable product market with highly predictable cash flows, such benefits of CEO power through managerial autonomy may be lower and dominated by the potential agency costs of exercising low-quality projects.

Empirically, we consider two key variables to measure the degree of entry threats and positive investment opportunities in product markets. The first variable, product market fluidity from Hoberg, Phillips, and Prabhala (2014), captures competitive threats from new entrants into a firm's existing product markets. By analyzing the text of product descriptions from corporate 10-K filings and the relation to competitors entering the firm's product markets, the fluidity variable

[1] Section II provides a full discussion of the related literature.

captures the degree to which the changes in rival and new firms' product offerings are similar to a given firm. In other words, it captures competitors entering into a firm's product market.[2] The second variable, vertical demand shocks, measures the changes to demand in a firm's product market. We use the change in product shipments for a firm's downstream industries to capture exogenous demand shocks for the firm.

Our measures of CEO power have both explicit and "soft" components that capture the CEO's ability to influence and direct corporate policies. We measure explicit influence by whether the CEO chairs the board or is a founder. We capture soft influence by the CEO's internal connections to other executives and directors in the firm. Following previous studies, we use the fraction of top 4 non-CEO executives and directors appointed during the current CEO's tenure. We construct indices of CEO power using both explicit and soft measures.

We begin our empirical analysis with an event study on the announcement of the current CEO being appointed as the chair of the board, thus expanding the explicit source of power for the current CEO but holding CEO capability constant. We find the announcement returns are significantly higher when a firm operates in a product market with higher demand and more entry threats, suggesting this form of CEO power is valued more when there are more investment opportunities and more potential entrant competitors in the product market.

After presenting event study evidence, we examine the determinants of CEO power. We explore the determinants of CEO power granted through the dual role as board chair and through both explicit power and soft influence. Consistent with the prediction of the model, we find CEOs have more power in product markets where competitors are entering a firm's product market and there are positive demand shocks.

We then examine how CEO power influences firm outcomes, including the number of board meetings, firm investment, advertising, new product introductions, sales growth, and firm value. When examining the outcomes associated with high CEO power, we address the endogeneity issues of CEO power using an instrument based on past sudden non-CEO director and executive deaths during CEO tenure. We use sudden deaths because they are outside of the CEO's or board's control. Sudden death of a board member or an executive allows the CEO to appoint a new director/executive, thus increasing her appointment-based soft power, which may also lead to an increase in her explicit influence.

The use of this instrument assumes that at any point in time, the CEO power situation may not be optimal as there is a cost of firing an existing CEO and hiring a new CEO. Thus, the sudden death may allow the firm to move back toward an optimum in situations where the product market is changing rapidly and more CEO power is beneficial. Although it is not possible to directly test for the exclusion restriction, we postulate that the direct channel of sudden deaths affects firm value and outcomes through CEO power. Most important, our results

[2]Compared with the traditional competition measure (e.g., the Herfindahl–Hirschman index), fluidity captures the dynamics of competition (time-based competition) as it is time varying based on annual 10-K reports. Furthermore, it focuses on products sold by firms that arise from underlying consumer preferences and demand.

do not rely on this instrument. Both the instrumented and ordinary least squares (OLS) results show that CEO power is negatively related to the number of board meetings after considering differences in firm performance, board dependence, and other CEO characteristics. This result suggests that CEOs with high power are capable of expediting corporate decisions by reducing communication and coordination costs among corporate leaders within the firm.

Our results also show that the influence of CEO power on firm growth and firm value depends on product market conditions. The interactions between CEO power variables and our key measures of product market conditions are positively and significantly related to firms' 3-year sales growth and Tobin's q, after controlling for firm fixed effects. The economic magnitude is large. Tobin's q increases 26.86% when moving from the lowest to highest measure of instrumented CEO power in markets with the highest demand and entry threats. When examining potential channels for the higher firm value, we find that firms with powerful CEOs introduce more new products, and invest and advertise more in product markets when their firms face higher demand and more entry threats.

Our focus is on the actual proactive actions (e.g., invest, advertise, and introduce new products) CEOs may take versus monitoring CEOs so as to mitigate the incentives to seek private benefits of control (e.g., excessive compensation or perquisite consumption). There can still be a cost of CEO power in monopolistic industries, where CEOs can take perquisites or engage in other activities that may decrease shareholder value. Product market competition has been documented as an important external governance mechanism to help mitigate these problems (see Giroud and Mueller (2010), (2011), Kim and Lu (2011), Guadalupe and Wulf (2010), and Chhaochharia, Grinstein, Grullon, and Michaely (2017)). Given this literature, we examine how CEO power affects compensation efficiency measured by CEO pay-for-performance sensitivity as an additional mechanism that powerful CEOs may influence.[3] We find, similar to the literature, that the impact of CEO power on pay-for-performance sensitivity is negative, consistent with powerful CEOs having agency problems and reducing their compensation sensitivity to shareholder wealth.

On the benefits side, we find a significant positive interaction effect for CEO power and product market fluidity on CEO pay-for-performance sensitivity. This suggests that the negative impact of CEO power on CEO pay-for-performance sensitivity is offset in product markets with high fluidity and thus higher future competition. This result combined with our earlier results on the positive impact of CEO power on firm value in highly competitive, high demand product market, and the results on proactive actions (investment, advertising, and new product introductions) by the firm in these markets, provide comprehensive evidence for the benefits of CEO power.

We are aware that powerful CEOs may be more capable, and have more relevant experience, and may be more aligned with shareholder value through ownership and ability. These CEOs, regardless of their power, may react better to the challenges from product markets, resulting in higher firm values. Our results

[3]Bebchuk and Fried (2004) and Morse et al. (2011) show that powerful CEOs are more likely to rig their incentive contracts and reduce the sensitivity of their pay to performance.

are robust to controlling for a comprehensive list of variables for CEO capability, industry experience, and equity ownership, suggesting that these CEO characteristics, though important, do not explain our findings. Our results are robust to alternative measures of product market conditions and CEO power. Finally, we examine a firm's industry life cycle and find that CEO power is more beneficial in industries with higher long-term growth.

Overall, we contribute to the literature on CEO power by providing a balanced view of their power. Unlike previous studies that focus on the agency costs arising from CEO power, we show how and when CEO power may have a bright side. Adams and Ferreira (2007) and Duchin, Matsusaka, and Ozbas (2010) suggest that when outsiders' cost of acquiring firm information is high, granting CEOs more autonomy promotes better information sharing between the board and CEO, which may lead to higher firm performance. We offer another important reason for why CEO power may be beneficial: investment opportunities with entry threats in product markets. When product entry threats are greater and demand is positive, CEO power allows more timely and efficient reactions or proactive responses to changes in market conditions. Our empirical analyses show that product market conditions are an important factor influencing the trade-offs between the benefits and costs of CEO power.

The rest of the article is organized as follows: In Section II, we review the related literature and develop our theoretical framework. Section III presents the data and descriptive statistics. Section IV presents event study results associated with announcements of appointing the current CEO to the dual role of board chair. Section V presents evidence on the determinants of CEO power. Section VI examines the association between CEO power and subsequent firm outcomes. Section VII discusses the relation between CEO power and CEO pay-for-performance sensitivity. Section VIII describes robustness tests. Section IX concludes.

II. Related Literature and Theoretical Framework

In this section, we provide a discussion of the related literature and develop a simple model to illustrate how changes in the industry environment and new competition may make it optimal to delegate decision-making power to the CEO.

A. Related Literature

Recent empirical studies show that powerful CEOs are subject to various agency problems. As a result, they may be bad news for shareholders. For example, Bebchuk and Fried (2004), Faulkender and Yang (2010), Bebchuk et al. (2011), and Morse et al. (2011) show that powerful CEOs reduce managerial compensation efficiency. Khanna et al. (2015) show that CEO power arising from appointment decisions increases the likelihood of corporate fraud and reduces the detection of fraud. Grinstein and Hribar (2003) find that CEOs with more power tend to engage in larger deals relative to the size of their own firms, and the market responds more negatively to their acquisition announcements. Additionally, Bebchuk et al. (2011) and Landier et al. (2013) show that firms with powerful CEOs are associated with lower profitability and firm value.

Different from the well-documented negative effects of CEO power, Adams, Almeida, and Ferreira (2005) find evidence potentially consistent with the costs and benefits approach to CEO power as they document that powerful CEOs are associated with the best and worst performing firms.[4]

Existing theoretical literature has focused on trading off information acquisition costs and monitoring the CEO in determining CEO power. This is particularly true when the CEO has the incentive to strategically release private information to the board (Adams and Ferreira (2007), Duchin et al. (2010), Harris and Raviv (2008), and Song and Thakor (2006)). Adams and Ferreira (2007) show that there are benefits in allowing the CEO more power by relaxing monitoring to induce the CEO to share information with the board and make board advising more valuable. In their model, the CEO faces a trade-off in disclosing information to the board: If she reveals her private information, she receives better advice; however, an informed board also monitors her more intensively. Under such circumstances, having a less controlling board (in other words, a CEO with more autonomy) becomes a way of partially committing to how information will be used and thereby helps information transmission between the board and CEO. Duchin et al. (2010) theoretically and empirically show that the effectiveness of outside directors depends on the cost of acquiring information.

B. Model

We extend the cost and benefit analysis of directors ceding power to the CEO by examining how the benefits of CEO power depend on industry conditions and the amount of new entrant competition the firm faces. Our model illustrates a new strategic benefit of delegating power to the CEO: More powerful CEOs are able to respond more quickly to product market opportunities and competitive threats. We focus on the potential delay in project execution that may arise if the CEO has to consult with the board and the board has to also gather information about the project. This delay may lead to a strategic cost of allowing competitors to exploit new opportunities. Boards thus will trade off the benefit of more powerful CEOs being able to respond more quickly to new opportunities versus the cost of increased CEO power that may arise from selecting projects with potentially high private benefits to the CEO and negative net present value to shareholders.[5]

We consider a CEO who has the opportunity to invest in a new project, such as a large-scale investment or merger, that has the potential to increase firm value but also faces potential competition. The new project can be of either high quality ($I = H$ with probability π_H) or low quality ($I = L$ with probability π_L). Only high-quality projects have positive value for the firm such that $V_t(I|I = H) > 0 > V_t(I|I = L)$, where V_t is the value to shareholders. Low-quality projects have negative value to shareholders but can have positive value to the CEO given private benefits. We thus assume $U_{m,t}(I|I = H) > U_{m,t}(I|I = L) > 0$, where $U_{m,t}$ is the value of the project to the manager including its net impact on

[4] Sah and Stigliz (1986), (1991) also show that managerial power may be associated with both beneficial and deleterious effects.

[5] These costs can include the tendency of CEOs to invest the firm's assets in projects that maximize their own human capital and build empires that maximize their utility rather than firm value as in Jensen and Meckling (1976).

the value of CEO shareholdings and options, as well as other private benefits. We assume the project has positive expected value, $EV(I) > 0$, without any additional information.

We consider a simple 3-date model to illustrate the strategic trade-off.

Date 0. The board decides how much power to delegate to the CEO. Let PWR be a variable that indicates whether decision-making power is delegated to the CEO. PWR equals either 0 or 1, where PWR = 1 indicates the CEO has the ability to make a project investment decision without board approval, and PWR = 0 indicates the CEO has to get board approval and convince the board through gathering data that the project is of high quality.

Date 1. Before deciding whether to exercise the project, the CEO receives an early private signal, S_m, about the project's value. The signal indicates with more precision whether the project is of high quality, $S_m = H$, such that $P(S_m = H | I = H) = a$, or low quality, $S_m = L$, such that $P(S_m = L | I = L) = a$, with $1 \geq a \geq 1/2$. We assume the CEO's private benefits are such that she will exercise the project even if the signal is low when the CEO has power (PWR = 1). We also assume that the private benefits are significant enough that no incentive contract can be written with the CEO to mitigate this problem. Neither the board nor outsiders can observe this signal. Thus, no contract can be written contingent on this signal. If PWR = 1, the CEO can implement the project and invest without the board's approval at date 1. If PWR = 0, the CEO has to gather data about the project and the project exercise date is delayed to date 2. Note that the CEO's signal is not perfectly informative so that the information the board gathers after date 1 will also be used in making the investment decision if the investment decision is delayed.[6]

Date 2. If PWR = 0, the project has not been exercised. In this case, the CEO will make a presentation to the board and present data on the project. The board of directors also provides information on the project value based on its advisory role. We let IC be equal to the cost of gathering the information by both the CEO and the board. For simplicity, we assume that this information in aggregate, which incorporates the signal, indicates with certainty whether the project is high value.[7] We can also let the date 2 probability of the high/low project not be known with certainty. If the information and signal are less informative (smaller a), it is more likely the board will grant power to the CEO. We solve for this case but exclude it for expositional ease.

At date 2, the board has veto power over projects such that only high-value projects are accepted. At this time, competitors can also enter. We assume potential entrants enter at this time and take Δ share of the profits, versus the incumbent

[6] In this case, π'_H and π'_L will be the ex post probabilities after the signal is incorporated and the board information is used. The ex post probabilities will be given by Bayes Rule.

[7] With more precise signals, a, subsequently used, and more valuable information gathered by the board, the board will be less willing to delegate power to the CEO. In our simple solution, we have $a = 1$; thus, the board is less willing to delegate, all else equal. In reality, the information cost will probably increase with precision, so there is an intermediate solution with lower information cost and less precise signals if the board does not delegate.

firm exercising the investment at date 1.[8] The Δ share of profits to competitors captures the lost profits the firm would have had given a first-mover advantage. The possibility of potential entrants varies by industry and is captured by f_i, the industry competitive fluidity in industry i.

The delay in project exercise has two types of costs: a strategic cost and an information-gathering cost (IC). Our focus is on the strategic cost, which arises as competitors may exercise the project in the next period, causing the project's value to decrease as its rents are shared with potential entrants. This cost corresponds to the strategic loss in real options that causes firms to exercise projects early in the face of competition, as modeled by Grenadier (2002). The idea is that a monopolist will wait to exercise a real option given continued uncertainty, whereas a firm in a competitive industry will exercise the option much earlier given that competitors may exercise and capture part of the value. We assume that other firms can only exercise the new project with a delay after one period, as they are potential entrants to the product market of the focal incumbent firm.

The investment opportunity, I, thus can be summarized as follows:

$$
\begin{aligned}
&(1) && \mathrm{EV}_t(I) > 0, \\
&(2) && V_t(I|S_m = H) > 0 > V_t(I|S_m = L), \\
&(3) && U_{m,t}(I|S_m = H) > U_{m,t}(I|S_m = L) > 0, \\
&(4) && V_{t+1}(I|S_m = H) = V_t(I|S_m = H) - f_i\Delta; \quad f_i\Delta > 0.
\end{aligned}
$$

All of these project values are net of any costs of private benefits of control consumed by the CEO. Equation (1) indicates that the new project has a positive expected value to the firm, even after the costs of private benefits of control consumed by the CEO are taken into account. Equation (2) specifies the new project has positive value to the firm only if the signal indicates it is high quality. Equation (3) states the project has positive utility for the CEO even if the CEO receives a signal of low quality. This captures the idea that the CEO will exercise the project, given her private benefits, even if the signal indicates the project is low quality. Equation (4) specifies there is a loss of value from waiting to exercise the project. We assume the project still has a positive value if it is high quality but the loss from waiting is $f_i\Delta > 0$, where f_i is the industry competitive fluidity facing firm i and Δ is the share of profits from the project that other firms undertaking the investment will gain. The loss to competitors is increasing in fluidity and demand, as new opportunities mean more firms may enter the market.

From the prior equations, the expected value from exercising the project at date 1 if the signal is low quality is $(1-\pi_H)V_t(I|S_m=L)$, which is the expected loss to shareholders, as given private benefits, the CEO will still exercise the project if the signal is low. The gain from giving the CEO the power to exercise the project is avoiding the cost of delay, $f_{i*}\Delta$, in exercising the project if it is high quality and the cost of gathering information, IC, by the CEO and the board. The project delay cost is incurred only if the high-quality project is exercised later,

[8] We assume competitors only enter at this point for simplicity. The impact on profits can be thought of as the impact from additional entrants and thus the net loss of profits to competitors.

whereas the information cost is incurred even if the project is not exercised.[9] We thus have the probability the project is high quality, π_H, on the left-hand side and $(1-\pi_H)$ on the right-hand side.

Thus, the overall decision facing the board in granting power to the CEO can be expressed as: Set PWR = 1 if the expected cost of delay of the high-quality project + the information cost (IC) is greater than expected loss to shareholders from the low-quality project. In equation form:

$$\text{(5)} \quad \text{Set PWR} = \begin{array}{l} 1 \text{ if } \pi_H(f_i\Delta) + IC > -1(1-\pi_H)V_t(I|S_m = L); \\ \text{otherwise, set PWR} = 0. \end{array}$$

This framework can be extended to take into account differences in the cost of gathering information for the board, different number of current competitors, different numbers of entrants, extent of value lost due to competitors entering, and varying degree of CEO power. We leave these extensions to future work to keep the model simple, as we view our main contribution is to empirically identify whether the additional real option cost of competitors entering the firm's product market, $f_{i*}\Delta$, is significant.

Note that the real option cost of competitors entering the firm's product market depends on two necessary product market conditions: entry threats proxied by competitive fluidity and positive investment opportunities proxied by positive demand shocks, which differentiates our study from the literature that focuses on how product market competition affects agency costs.

The benefit of this final condition of our framework is that empirically we can measure and test the key components of equation (5). We measure the cost of delay, $f_i\Delta$, using a firm's competitive fluidity from Hoberg, Phillips, and Prabhala (2014), for f_i, which measures the extent to which competitors are entering into the firm's product market. We use demand shocks to capture the extent to which there are positive investment opportunities (π_H) and the attractiveness of the market.

Our key empirical predictions are the following:

Prediction 1. Firms will have CEOs that are more powerful in markets with positive investment opportunities and entry threats.

Prediction 2. Powerful CEOs will be associated with higher firm growth and value in markets with positive investment opportunities and entry threats.

We thus focus both on granting power to CEOs and the subsequent implications of having a more powerful CEO under different industry conditions. Given that the model explicitly shows CEO power is endogenous, when we examine subsequent implications of having a powerful CEO, we instrument CEO power with past sudden non-CEO executive and director deaths as described later in Section VI. The use of this instrument assumes that at any particular point of time, the CEO power situation may not be optimal as there is a cost of firing and

[9] As before, we assume all low-quality projects can be avoided at date 2. If some low-quality projects are still probabilistically accepted at date 2, this increases the incentives for the board to grant more power to the CEO.

hiring a new director in normal times. Thus, a sudden death has the potential for moving the firm back toward an optimum in situations where the product market has high investment opportunities and potential entrant threats, and more CEO power is beneficial.

III. Data and Descriptive Statistics

A. Sample

Our sample consists of Standard & Poor's (S&P) 1500 firms in ExecuComp during 1999–2010.[10] We exclude banks and regulated utilities from our sample. We match several databases to construct the key variables used in our study. We construct the CEO power and CEO characteristics variables using ExecuComp, RiskMetrics, and BoardEx. Our product market variables, fluidity, vertical demand shock, and industry life cycle, are based on the Hoberg–Phillips Data Library[11] and information from the Bureau of Economic Analysis (BEA) Web site. Financial and accounting data are from Compustat. Stock return data are from the Center for Research in Security Prices (CRSP). We read news articles in the Factiva and Capital IQ database to construct variables based on the announcement returns of a CEO's dual appointment as board chair and of executive deaths. Detailed descriptions of our variables are provided in Appendix A. The sample begins in 1999 because the product shipment data based on the North American Industry Classification System (NAICS) industry classifications are available from the BEA starting in 1999.

B. CEO Power Variables

CEO power is defined as the capacity to influence and make corporate decisions. This influence is likely to be strengthened by the CEO's official positions in the firm or her internal connections to other corporate leaders. Thus, we measure CEO power from both perspectives.

The first measure, CEO_HARD_POWER, follows previous studies (Adams et al. (2005), Morse et al. (2011), and Fracassi and Tate (2012)) and captures the explicit sources of CEO power that arise from a CEO's official positions. It is defined as the logged value of 1 plus the sum of two components: whether the CEO chairs the board (CEO_CHAIR) or is a founder (CEO_FOUNDER). Following Bebchuk et al. (2011), CEO_FOUNDER is an indicator equal to 1 if a CEO was the CEO 5 years before the initial public offering (IPO) date reported by Compustat or 5 years before the first date the firm appears in CRSP, and 0 otherwise.

The second variable, CEO_SOFT_POWER, is constructed closely following the approach used in Khanna et al. (2015). It measures the CEO's internal connections to other top executives and directors through appointment decisions. It is defined as the average of the fraction of top 4 non-CEO executives (FTA) and directors (FDA) appointed during the current CEO's tenure. The general idea is that new directors are more likely to agree with those that appointed them or are

[10] The number of firms covered in the sample is more than 1,500 because of firm entry and exit.

[11] The Hoberg–Phillips industry data Web site can be found at http://hobergphillips.tuck.dartmouth.edu.

selected for candidacy based on their likelihood of agreeing with the CEO's proposed direction for the firm. Connectedness built through appointment decisions increases what social psychologists refer to as social influence. It relies on norms of reciprocity, liking, and social consensus to shape group decision-making processes (Cialdini (1984)) and, hence, facilitates the acquiescence or coordination required to engage in corporate decisions. CEOs are heavily involved in recruiting, nominating, and appointing top executives, and in deciding their compensation and relative positions. Thus, top executives are more likely to share similar beliefs and visions with, and may be beholden to, the CEO who hired or promoted them (Landier et al. (2013)). CEOs also tend to be involved in appointing board members either directly or indirectly through consultation with the nominating committee (Shivdasani and Yermack (1999), Fracassi and Tate (2012)); thus, directors appointed during a CEO's tenure may similarly be beholden to the CEO (Morse et al. (2011), Coles, Daniel, and Naveen (2014)).[12]

The overall CEO power index, CEO_ALL_POWER, is defined as the logged value of 1 plus the sum of CEO_CHAIR, CEO_FOUNDER, H_FTA, and H_FDA, where H_FTA (H_FDA) is equal to 1 if FTA (FDA) is greater than 0.5 (0.5) (sample median), and 0 otherwise.[13] CEO_ALL_POWER captures the CEO's overall influence in the firm through both her explicit positions and her soft influence. Note that we do not include CEO ownership as part of CEO power, as CEO ownership also reflects incentives received by the CEO (Kim and Lu (2011)). Our results are robust to controlling for CEO ownership and its interaction with the product market index.

C. Product Market Environment Variables

We use two primary measures to capture a firm's product market conditions. First, we use a text-based measure of product market fluidity from Hoberg et al. (2014), FLUIDITY. It measures the change in a firm's product space due to moves made by competitors. This measure is constructed using words in a firm's product description section in its 10-K and how they are similar to the change in rival firms' product words from rival firms' 10-Ks. Specifically, fluidity is the cosine similarity between a firm's own word usage vector and the aggregate rival firms' word change vector. Fluidity thus focuses on product space dynamics and changes in products of rival firms, and how these changes relate to a firm's current product offerings. Apple Inc. is a company that illustrates the benefits of the text-based method. After Apple introduced the iPad, words including "tablet" appear in its 10-K. As rivals followed and introduced tablet computers themselves, the usage of "tablet" by rival firms increased, resulting in a higher fluidity score for Apple.

[12] We do not consider connections built through prior network ties because such connections may have a less effect on a CEO's internal power than those through appointment decisions. When an individual is appointed to a top executive position or recommended to the board by the CEO, she may feel a greater sense of loyalty to the CEO. Such a loyalty factor is likely to be weaker when the connection is through prior network ties. One may even argue that sharing similar education or work experiences can breed a sense of competition that may not fit as comfortably with loyalty (Khanna et al. (2015)).

[13] As a robustness check, we also construct the index using a principal component analysis approach.

Second, we use a measure of the changes to demand that a firm faces in its external product market, VD_SHOCK. Specifically, VD_SHOCK measures the change in product shipments for a firm's downstream industries from the BEA Web site.[14] We identify the downstream industries using the BEA input–output matrix. These downstream changes in industry shipments are thus used to capture demand shocks for the upstream industry that are exogenous to the firm. Higher VD_SHOCK thus means greater positive demand shocks facing the firm's industry.

We construct two indicator variables, H_FLUID and H_VD_SHOCK, each equal to 1 if fluidity or vertical demand shock, respectively, is above the sample median. The composite index of a firm's product market condition, PROD_MKT_DYNAMICS, is thus defined as the sum of the preceding indicators. The idea for using positive shocks is that positive shocks imply more investment opportunities and greater profits from investment. With these shocks, the CEO has to take actions that involve spending money, which may have to be raised externally, but also generally, as in the case of mergers and large investments, involve board approval. Cutting spending or decreasing capital expenditures does not involve board approval.

D. Summary Statistics

Table 1 presents the sample distribution by year for different levels of the product market environment. After dropping observations with missing values for all CEO power variables or product market variables, our sample comprises 16,445 firm-year observations. Column 2 reports the number of observations in each year. Columns 3–5 report the number of observations with PROD_MKT_DYNAMICS equal to 0, 1, or 2 in each year, respectively.[15] As reported in Table 1, the number of firms at the extremes (i.e., the groups with the highest and lowest product market index) is smaller relative to the group in the middle.

Table 2 reports summary statistics for the variables used in this article. The median of PROD_MKT_DYNAMICS is 1, suggesting that for the median firm in the sample, at least one of the two product market environment measures has a value larger than the sample median. The median of CEO_HARD_POWER is 0.693, suggesting that the median value of the sum of CEO_FOUNDER and CEO_CHAIR is 1.[16] Thus, the median CEO in our sample is either the founder or the board chair. The median of both measures of CEO soft power (i.e., FTA and FDA) is 0.5, suggesting that 50% of non-CEO top 4 executives and board of directors are appointed during the CEO tenure.

[14]The BEA industry shipments data are available at https://www.bea.gov/industry/gdpbyind_data.htm.

[15]The sample with PROD_MKT_DYNAMICS equal to 2 in 2009 has only 13 observations. This low number is the result of negative demand shocks from the financial crisis in 2008–2009.

[16]CEO_HARD_POWER is defined as the logged value of 1 plus the sum of two components: whether the CEO also chairs the board (CEO_CHAIR) or is a founder (CEO_FOUNDER). Because $\ln(2) = 0.693$, the median value of the sum of CEO_FOUNDER and CEO_CHAIR is 1.

TABLE 1

Sample Description

Table 1 describes the sample. Column 2 reports the number of observations by year. Columns 3–5 report the number of observations when product market environment index (PROD_MKT_DYNAMICS) equals 0, 1, and 2, respectively. PROD_MKT_DYNAMICS is defined as the sum of H_FLUID and H_VD_SHOCK. H_FLUID and H_VD_SHOCK are indicator variables equal to 1 if fluidity (FLUIDITY) or vertical demand shock (VD_SHOCK) is above the sample median, respectively, and 0 otherwise. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index.

Year	Full	PROD_MKT_ DYNAMICS = 0	PROD_MKT_ DYNAMICS = 1	PROD_MKT_ DYNAMICS = 2
1	2	3	4	5
1999	1,401	342	601	458
2000	1,385	185	632	568
2001	1,313	606	598	109
2002	1,311	512	641	158
2003	1,348	419	633	296
2004	1,349	241	855	253
2005	1,326	146	682	498
2006	1,385	241	786	358
2007	1,471	373	676	422
2008	1,428	704	515	209
2009	1,390	640	737	13
2010	1,338	169	672	497
Total	16,445	4,578	8,028	3,839

TABLE 2

Summary Statistics

Table 2 reports summary statistics for key variables. Columns 1–5 report the sample mean, median, standard deviation, and minimum and maximum values for each variable, respectively. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. Variables are defined in Appendix A.

Variable	Mean	Median	Std. Dev.	Min.	Max.
	1	2	3	4	5
Product Market Environment Variables					
PROD_MKT_DYNAMICS	0.955	1.000	0.714	0.000	2.000
FLUIDITY	6.451	5.868	3.313	0.000	24.668
VD_SHOCK	0.031	0.041	0.104	−0.442	0.726
LT_INDUSTRY_GROWTH	0.342	0.104	0.749	−0.239	2.263
CEO Power Variables					
CEO_HARD_POWER	0.488	0.693	0.403	0.000	1.099
CEO_SOFT_POWER	0.511	0.500	0.336	0.000	1.000
CEO_ALL_POWER	0.930	1.099	0.530	0.000	1.609
Other Variables					
NUM_BOARD_MEETING	7.711	7.000	3.680	0.000	49.000
SALES_GROWTH	13.677	8.252	58.585	−87.529	3,559.292
LN_TOBINS_Q	0.570	0.475	0.520	−0.986	2.385
CAPX_TA	5.323	3.624	5.455	0.000	74.402
AD_TA	3.544	1.610	5.400	0.000	67.940
$PRODUCT\_GROWTH_{t,t+2}$	−0.032	0.012	0.448	−5.102	2.947
LN_S	7.025	7.016	1.514	−3.124	10.386
LEVERAGE	0.182	0.157	0.173	0.000	0.999
CEO_AGE	55.056	55.000	7.518	29.000	94.000
CEO_PAST_PERFORM	0.027	0.026	0.061	−0.310	0.380
CEO_IVY_LEAGUE	0.079	0.000	0.270	0.000	1.000
CEO_MBA_TOP10	0.163	0.000	0.369	0.000	1.000
CEO_OWN	0.025	0.004	0.064	0.000	0.811
CEO_FEMALE	0.024	0.000	0.152	0.000	1.000
CEO_DELTA	0.090	0.007	1.445	0.000	113.869

IV. Announcement Returns on the Appointment of CEOs as the Board Chair

We begin our analyses by examining how changes in CEO power affect shareholder wealth under different product market conditions. We estimate

abnormal returns on the announcement date of the appointment of the current CEO to the dual role of board chair. We focus on these announcements because they contain information about expanding the CEO's scope of power while keeping all other CEO characteristics constant (as the CEO is the same person before and after changing the scope of her power).[17]

To identify the events, we search for changes in the existing CEO title in the ExecuComp database.[18] Then, we extract the announcement dates by reading relevant news articles and company public announcements from the Factiva and Capital IQ databases. We exclude announcements that also contain information on appointing other executives or directors, corporate earnings, or mergers and acquisitions, and cases in which an earnings report is released during the same month. Our final sample is composed of 260 appointment announcements with nonmissing product market environment information.[19] Announcement-day abnormal returns are estimated using the market model with the equal- or value-weighted market index (Brown and Warner (1985)). The estimation window for the market beta covers $(-256, -6)$ trading days relative to the announcement date.

Panel A of Table 3 reports the mean abnormal returns for subsamples with different levels of the product market index. First, the mean abnormal returns monotonically increase with the product market index regardless of whether the abnormal returns are estimated based on the equal- or value-weighed stock market index. In addition, the differences in the magnitude of announcement returns between the high and low product market environment sample are striking. The mean announcement-day abnormal return estimated using the equal-weighted (value-weighted) market index is 0.66 (0.68) for firms with the highest product market environment index and -0.14 (-0.14) for firms with the lowest product market environment index.

Because firms under different product markets may be associated with different characteristics, in Panel B of Table 3 we control for various firm characteristics (firm size, age, leverage, and sales growth before the announcement date), CEO characteristics (CEO age, gender, past performance, education, and ownership), and industry and year fixed effects in regression analyses.[20] Our results are robust to these controls. Taken together, the event study results suggest that granting the

[17] These announcements might also convey information about the board's perception of the CEO's ability. This is particularly true during the succession process when the new CEO completes the probationary period and is thereby promoted to chair. We address this concern by controlling for a variety of CEO and firm characteristics (e.g., CEO education and past performance as proxies for CEO capability, and firm size as a proxy for information asymmetry) in a later regression analysis.

[18] There are a significant number of data errors regarding the description of executive titles in the ExecuComp database. We verify such information by reading related news articles and public announcements in Factiva and Capital IQ.

[19] The final sample is relatively small mainly because Factiva and Capital IQ do not provide complete information about CEO dual appointments. In particular, CEO appointment announcements of smaller companies are less likely to be published in the news. Our event study results, therefore, apply mostly to larger listed companies. Because these companies are less subject to information asymmetry, it helps alleviate the concern that significant positive announcement returns associated with CEO dual appointments in dynamic, competitive product markets are driven by new information on CEO perceived ability.

[20] We control for these firm and CEO characteristics in the remaining regression analyses in our article.

TABLE 3

Announcement Effects for CEO's Dual Appointment as the Board Chair

Table 3 examines announcement returns when the incumbent CEO was also appointed the chair of the board. Panel A reports the mean abnormal return (AR) on the announcement date for subsamples with different levels of the product market environment index. The table reports the abnormal return estimated using the market model with equal- and value-weighted market index, respectively, for an estimation period of (−256, −6) trading days following Brown and Warner (1985). In Panel A, *p*-values of *t*-tests examining whether the mean is significantly different from 0 and whether the means of two subsamples are significantly different are reported in parentheses. Panel B reports the regression estimation results on the impact of the product market environment on appointment announcement returns. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. All regressions control for year fixed effects and industry fixed effects based on the 2-digit North American Industry Classification System (NAICS) code. In Panel B, robust standard errors are reported in parentheses. Variables are defined in Appendix A. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Descriptive Statistics

Subsample	AR (equal-weighted market index)	AR (value-weighted market index)
PROD_MKT_DYNAMICS = 0	−0.138 (0.759)	−0.141 (0.760)
PROD_MKT_DYNAMICS = 1	0.428* (0.090)	0.392 (0.110)
PROD_MKT_DYNAMICS = 2	0.656* (0.087)	0.684* (0.071)
(PROD_MKT_DYNAMICS = 2) − (PROD_MKT_DYNAMICS = 0)	0.794* (0.067)	0.825* (0.055)
No. of obs.	260	260

Panel B. Regression Analyses

	AR (equal-weighted market index)		AR (value-weighted market index)	
Variable	1	2	3	4
PROD_MKT_DYNAMICS	0.590* (0.286)	0.715* (0.357)	0.569* (0.269)	0.669* (0.361)
LN_FIRM_AGE		−0.172 (0.430)		−0.158 (0.415)
LN_S		−0.159 (0.217)		−0.166 (0.220)
LEVERAGE		0.774 (1.327)		0.868 (1.312)
SALES_GROWTH		0.014 (0.010)		0.018* (0.009)
CEO_AGE		0.002 (0.037)		0.000 (0.034)
CEO_PAST_PERFORM		0.621 (2.363)		1.363 (1.801)
CEO_IVY_LEAGUE		−0.290 (1.000)		−0.545 (0.940)
CEO_MBA_TOP10		0.684 (0.710)		0.614 (0.694)
CEO_OWN		−1.426 (2.940)		−0.763 (3.210)
CEO_FEMALE		1.094 (1.179)		1.395 (1.087)
Constant	−0.691 (1.145)	1.137 (2.515)	−0.275 (1.018)	1.637 (2.454)
Year and industry fixed effects	Yes	Yes	Yes	Yes
No. of obs.	260	213	260	213
Adj. R^2	0.010	−0.068	0.023	−0.043

CEO more power through a dual appointment as board chair is associated with greater shareholder value only when the firm operates in a product market with high positive demand shocks and more entry threats.

V. Determinants of CEO Power

In this section, we examine the determinants of granting CEO power inside the firm. We specifically test whether firms allocate more power to CEOs in higher demand product markets where firms face more entry threats (Prediction 1). Table 4 presents the results. All firm-level independent variables are lagged 1 year to alleviate reverse causality. We include both firm and year fixed effects in remaining analyses to control for time-invariant firm and year factors. To address concerns about within-firm autocorrelation, we cluster standard errors at the firm level.

TABLE 4
Determinants of CEO Power

Table 4 examines the determinants of CEO power. The dependent variable is CEO_ALL_POWER in column 1, CEO_SOFT_POWER in column 2, CEO_HARD_POWER in column 3, and CEO_CHAIR in column 4. CEO_ALL_POWER is defined as the logged value of 1 plus the sum of CEO_FOUNDER, CEO_CHAIR, H_FTA, and H_FDA, where H_FTA (H_FDA) equals 1 if the fraction of top 4 non-CEO executives (non-CEO directors) appointed during the current CEO's tenure is greater than 0.5 (0.5), and 0 otherwise. CEO_SOFT_POWER is the average of the fraction of top 4 non-CEO executives and non-CEO directors appointed during the current CEO's tenure. CEO_HARD_POWER is the logged value of 1 plus the sum of CEO_FOUNDER and CEO_CHAIR. PROD_MKT_DYNAMICS is defined as the sum of H_FLUID and H_VD_SHOCK. H_FLUID and H_VD_SHOCK are indicator variables equal to 1 if fluidity (FLUIDITY) or demand shock (VD_SHOCK) is above the sample median, respectively, and 0 otherwise. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. Variables are defined in Appendix A. Ordinary least squares regressions including firm and year fixed effects and logit regressions including firm and year dummies are presented in columns 1–3 and 4, respectively. Robust standard errors clustered at the firm level are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	CEO_ALL_POWER 1	CEO_SOFT_POWER 2	CEO_HARD_POWER 3	CEO_CHAIR 4
$PROD\_MKT\_DYNAMICS_{t-1}$	0.022** (0.011)	0.014** (0.006)	0.014** (0.007)	0.164* (0.097)
LN_FIRM_AGE	−0.250*** (0.089)	−0.182*** (0.059)	−0.243*** (0.050)	−1.068** (0.534)
LN_S_{t-1}	0.021 (0.032)	0.010 (0.019)	0.029* (0.017)	0.546*** (0.184)
$SALES\_GROWTH_{t-1}$	0.001** (0.001)	0.001*** (0.000)	0.000 (0.000)	0.002 (0.003)
$LEVERAGE_{t-1}$	−0.139* (0.081)	−0.032 (0.048)	−0.050 (0.049)	−0.869 (0.564)
CEO_AGE	0.044*** (0.003)	0.026*** (0.002)	0.025*** (0.002)	0.305*** (0.015)
CEO_PAST_PERFORM	0.237 (0.331)	−0.038 (0.210)	0.250 (0.231)	4.387*** (1.400)
CEO_IVY_LEAGUE	0.056 (0.109)	0.011 (0.072)	0.064 (0.053)	1.033*** (0.354)
CEO_MBA_TOP10	0.066 (0.062)	0.023 (0.039)	0.024 (0.034)	−0.057 (0.273)
CEO_OWN	1.943*** (0.502)	0.964*** (0.298)	1.249*** (0.269)	30.019*** (3.886)
CEO_FEMALE	0.128 (0.150)	0.021 (0.087)	0.089 (0.100)	0.764 (0.574)
Constant	−0.914*** (0.350)	−0.431** (0.218)	−0.499** (0.210)	−17.254*** (2.443)
Firm and year fixed effects (dummies)	Yes	Yes	Yes	Yes
No. of obs. Adj. (pseudo) R^2	7,304 0.593	7,305 0.673	8,462 0.708	3,960 (0.406)

The results in Table 4 confirm our first empirical prediction. The results in column 1 show that firms in general allocate more power to CEOs in product markets with more entry threats and increasing demand. We then separate the CEO power index into soft power and hard power, and examine the determinants of each component. The results in columns 2 and 3 confirm the finding in column 1, showing significant impacts of product market variables on the decision to give a CEO both more soft and hard power.

Given our previous finding that granting the CEO the dual role of board chair increases shareholder wealth in rapidly changing product markets, we examine the impact of product market condition on such appointment decisions. The results reported in column 4 of Table 4 show that firms are more likely to name the current CEO as board chair in product markets with more entry threats and increasing demand.

We find that firms with higher past sales growth are likely to grant the CEO more power in influencing the appointment decisions of directors and top executives, consistent with the Hermalin and Weisbach (1998) model that CEOs with better performance possess higher bargaining power when negotiating with the board. Older firms have a tendency of allocating less power to the CEO, as they have more mature (sophisticated) organizational structures and predictable cash flows, thereby demanding less managerial discretion. Older CEOs are associated with a higher level of power, which could be explained by either their higher level of experience or their higher tendency for managerial entrenchment. CEOs with higher equity incentives tend to have higher levels of hard and soft power, which could be explained by the fact that their interests are more aligned with shareholders, making the board more comfortable with granting more power to the CEO, or simply by the fact that greater voting power provides more control rights.

VI. CEO Power and Subsequent Outcomes

In this section, we examine the association among CEO power, board meetings, and subsequent firm sales growth rate, firm value, and economic actions. We present both OLS results and instrumental variable results, where our instruments are past sudden executive and director deaths.

Given that the model and empirical results discussed earlier explicitly show that CEO power is endogenous, we instrument CEO power with past sudden executive and director deaths when we examine subsequent implications of outcomes associated with having a powerful CEO. The instrumental variables are PAST_DIR_DEATH and PAST_EXE_DEATH. PAST_DIR_DEATH (PAST_EXE_DEATH) is the number of non-CEO directors (top 4 non-CEO executives) who left their positions due to sudden deaths during the current CEO's tenure up to the previous year (i.e., year $t-1$).

Sudden executive or director deaths can directly increase soft power as the CEO can influence the appointment decisions of the incoming executive or director. In addition, higher soft power can also help the CEO obtain more explicit influence. We use sudden deaths because these events are outside of the CEO's or board's control. To further increase the possibility that these events are exogenous, we exclude suicides or deaths that may be related to pressures from firm

performance by searching media articles from Factiva on the cause of death. In addition, we focus on deaths in the earlier years of a CEO's tenure, as such events are less likely to have a long-term impact on firm value other than through CEO power.[21] The use of this instrument assumes that at any particular point of time, the CEO power situation may not be optimal as there is a cost of firing and hiring a new executive or director in normal times. Thus, sudden death has the potential of moving the firm back toward an optimum in situations where the product market is changing rapidly and more CEO power is beneficial.

We use the full sample of firm-year panel data rather than focusing on CEOs that take the dual role of board chair in Section IV.

A. CEO Power and Board Meetings

An implication of our study is that CEOs are subject to frictions from board oversight that may slow down the decision-making process, but that powerful CEOs are less subject to these frictions. Thus, CEO power can enhance efficiency by reducing these constraints. In particular, differing opinions among directors may delay decisions. To test this hypothesis, we examine the impact of CEO power on the number of board meetings.[22]

Column 1 of Table 5 reports the OLS results, and columns 2 and 3 report instrumental variable regression estimation results. Column 2 reports the first-stage regression results. Specifically, we include past sudden executive or director deaths during the CEO's tenure as the instrumental variables predicting CEO power. The results show that CEO overall power is positively related to past sudden deaths of executives or directors. The F-statistics of the joint test of these lagged sudden deaths is well above 10, suggesting that these variables are valid instruments for CEO power. Column 3 reports the second-stage regression results.

Both OLS and instrumental variable results in Table 5 show that CEO power is negatively and significantly related to the number of board meetings. The OLS results are subject to the alternative explanations that a weak or disinterested board, rather than a powerful CEO, leads to fewer board meetings. However, the instrumental variable results suggest that increases in CEO power following sudden executive and director deaths helps reduce decision-making oversight from the board.

Other control variables show that underperforming firms and firms with high leverage tend to have more board meetings, which is consistent with the notion that the board plays an important role in dealing with firms' financial troubles (Jensen (1993), Vefeas (1999)). For example, financially distressed firms are likely to call for more special board meetings. Firms with better educated CEOs

[21] We exclude sudden executive or director deaths that happen in the concurrent year to ensure that the information asymmetry and search costs for the new candidate have already been resolved. Nguyen and Nielsen (2010) find an average 4-day $(-1, +2)$ accumulated abnormal return of 0.85% surrounding the unexpected death of an independent director. They attribute this effect to the information asymmetry and searching costs regarding the new candidate. Different from Nguyen and Nielsen (2010), our hypothesis is based on the long-term impact of sudden director deaths on firm value, which can be mitigated through position replacement.

[22] Information on the number of board meetings is available in ExecuComp only through 2005 with missing observations in 2006, as S&P stopped collecting the data in 2007. We hand collect the number of board meetings data after 2005 from proxy statements.

TABLE 5

CEO Power and the Number of Board Meetings

Table 5 examines the impact of CEO power on the number of annual board meetings. The dependent variable is LN(1 + NUM_BOARD_MEETING), the logged value of 1 plus the number of annual board meetings in columns 1 and 3, and is CEO_ALL_POWER in column 2. CEO_ALL_POWER is defined as the logged value of 1 plus the sum of CEO_FOUNDER, CEO_CHAIR, H_FTA, and H_FDA, where H_FTA (H_FDA) equals 1 if the fraction of top 4 non-CEO executives (non-CEO directors) appointed during the current CEO's tenure is greater than 0.5 (0.5), and 0 otherwise. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. Variables are defined in Appendix A. Column 1 reports the ordinary least squares (OLS) estimation results, column 2 reports the first-stage instrumental variable (IV) regression, and column 3 reports the second-stage IV regression results. The IVs are PAST_DIR_DEATH and PAST_EXE_DEATH. PAST_DIR_DEATH (PAST_EXE_DEATH) is the number of non-CEO directors (top 4 non-CEO executives) who left their positions due to sudden death during the current CEO's tenure up to the previous year (i.e., year $t-1$). Deaths related to pressures from firm performance or suicides are excluded. All regressions include firm and year fixed effects. Robust standard errors clustered at the firm level and bootstrap standard errors are reported in parentheses in columns 1–2 and 3, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	OLS: LN(1 + NUM_BOARD_MEETING) 1	1st-Stage Results: CEO_ALL_POWER 2	2nd-Stage Results: LN(1 + NUM_BOARD_MEETING) 3
CEO_ALL_POWER	−0.035***		−0.118*
	(0.012)		(0.063)
PROD_MKT_DYNAMICS	−0.007	0.025***	−0.005
	(0.007)	(0.008)	(0.006)
EBITDA_TA	−0.407***	0.053	−0.405***
	(0.072)	(0.073)	(0.053)
LN_FIRM_AGE	0.029	−0.339***	0.000
	(0.037)	(0.034)	(0.033)
LN_S	0.009	0.060***	0.015
	(0.018)	(0.016)	(0.012)
LEVERAGE	0.126***	−0.085*	0.118***
	(0.048)	(0.047)	(0.035)
CEO_AGE	0.001	0.042***	0.004
	(0.001)	(0.001)	(0.003)
CEO_PAST_PERFORM	−0.022	0.204	−0.003
	(0.124)	(0.127)	(0.093)
CEO_IVY_LEAGUE	0.048	0.078**	0.054**
	(0.036)	(0.032)	(0.024)
CEO_MBA_TOP10	0.026	0.054**	0.029*
	(0.023)	(0.022)	(0.016)
CEO_OWN	−0.021	1.948***	0.145
	(0.151)	(0.162)	(0.173)
CEO_FEMALE	−0.027	0.136**	−0.018
	(0.054)	(0.054)	(0.040)
PAST_EXE_DEATH		0.103***	
		(0.036)	
PAST_DIR_DEATH		0.241***	
		(0.022)	
Constant	1.941***	−0.965***	1.855***
	(0.146)	(0.134)	(0.117)
Firm and year fixed effects	Yes	Yes	Yes
No. of obs.	8,166	8,311	8,166
Adj. R^2	0.481	0.593	
F-statistics (IV)		70.690	
Prob > F		0.000	

also tend to have more board meetings. Overall, the negative relation we find between CEO power and board meetings is not driven by past firm performance or CEO capability.

B. CEO Power, Product Market Conditions, and Firm Performance

In this section, we test our second empirical prediction about firm performance by estimating the interaction effect of CEO power and the product

market environment index. Firm performance is measured by sales growth and Tobin's q. Tobin's q is proxied by the market value of common equity plus the book value of total liabilities divided by the book value of total assets. Given the two endogenous variables, CEO_ALL_POWER and CEO_ALL_POWER × PROD_MKT_DYNAMICS, in this analysis, we follow Wooldridge ((2002), pp. 623–625) and obtain a second instrument for the endogenous interaction variable using the predicted value of CEO_ALL_POWER interacted with the exogenous variable PROD_MKT_DYNAMICS. Table 6 presents the results.

Table 6 reveals that the interaction between CEO power and the product market environment index has a positive association with both firm growth and firm value regardless of whether OLS or instrumental variables estimation is used. In Table 7, we compute the economic effects of the product market interaction for both sales growth and Tobin's q for different product market environments using the estimated coefficients of the instrumental variables regression results in Table 6.

We find that the predicted Tobin's q increases 21.14% as we move from the least demand and entry threat product market environment (PROD_MKT_DYNAMICS = 0) to the highest demand and entry threat product market environment (PROD_MKT_DYNAMICS = 2), with instrumented CEO overall power at the highest level and all other variables at their sample medians. Analogously, when we consider product markets with high demand and entry threat, moving from lowest overall CEO power to highest overall CEO power, the predicted Tobin's q increases 26.86%.

C. CEO Power, Product Market Conditions, and Performance-Related Activities

Given that CEO power is more beneficial in product markets with high demand and entry threats, we ask what are the potential channels though which powerful CEOs can stimulate growth and hence create value. We answer this question by examining CEO power and product market environment interaction variables on investment, marketing, and new product introductions. These three activities are closely interrelated, reflecting how aggressive a firm seeks to improve performance. We measure corporate investment by capital expenditures divided by total assets. Marketing activity is measured by advertising expenditures divided by total assets. We measure new product introductions by following Hoberg and Phillips (2010) and use the logarithmic growth in the number of words in the product description section of a firm's 10-K in subsequent years to capture future new product introductions, PRODUCT_GROWTH. Given that it takes time to introduce new products, we construct this variable over a 2-year horizon (years t to $t+2$). Table 8 reports the results.

Both the OLS results and the instrumented regression results reported in column 3 of Table 6 show that all three measures of performance-related activities are significantly higher when firms operating in product markets with higher demand shocks and entry threats have more powerful CEOs. It is thus consistent with firms pursuing more proactive investment and growth in the face of high demand and entry threats when the CEO has more power.

TABLE 6

CEO Power and Firm Growth and Value

Table 6 reports the results for the interaction of the product market environment index and CEO power on firm sales growth rate and Tobin's *q*. The dependent variable is 3-year sales growth rate in columns 1 and 4 and Tobin's *q* in columns 2 and 5. CEO_ALL_POWER is defined as the logged value of 1 plus the sum of CEO_FOUNDER, CEO_CHAIR, H_FTA, and H_FDA, where H_FTA (H_FDA) equals 1 if the fraction of top 4 non-CEO executives (non-CEO directors) appointed during the current CEO's tenure is greater than 0.5 (0.5), and 0 otherwise. PROD_MKT_DYNAMICS is defined as the sum of H_FLUID and H_VD_SHOCK. H_FLUID and H_VD_SHOCK are indicator variables equal to 1 if fluidity (FLUIDITY) or demand shock (VD_SHOCK) is above the sample median, respectively, and 0 otherwise. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. Variables are defined in Appendix A. Columns 1 and 2 report the ordinary least squares (OLS) estimation results, column 3 reports the first-stage instrumental variable (IV) regression results, and columns 4–5 report the second-stage IV regression results. The IVs are PAST_DIR_DEATH and PAST_EXE_DEATH. PAST_DIR_DEATH (PAST_EXE_DEATH) is the number of non-CEO directors (top 4 non-CEO executives) who left their positions due to sudden death during the current CEO's tenure up to the previous year (i.e., year $t-1$). Deaths related to pressures from firm performance or suicides are excluded. All regressions include firm and year fixed effects. Robust standard errors clustered at the firm level and bootstrap standard errors are reported in parentheses in columns 1–3 and 4–5, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	OLS		1st-Stage Results	2nd-Stage Results	
	SALES_ GROWTH	LN_ TOBINS_Q	CEO_ALL_ POWER	SALES_ GROWTH	LN_ TOBINS_Q
Variable	1	2	3	4	5
CEO_ALL_POWER	0.859	−0.002		−0.111	0.002
	(0.913)	(0.011)		(3.525)	(0.059)
CEO_ALL_POWER × PROD_MKT_DYNAMICS	1.534*	0.019**		2.988**	0.045**
	(0.821)	(0.010)		(1.294)	(0.022)
PROD_MKT_DYNAMICS	−0.482	0.013	0.025***	−1.826	−0.011
	(0.903)	(0.011)	(0.008)	(1.240)	(0.021)
LN_FIRM_AGE	−35.974***	−0.146***	−0.347***	−35.723***	−0.134***
	(6.565)	(0.035)	(0.033)	(1.862)	(0.031)
LN_S	16.991***	−0.063***	0.067***	16.976***	−0.065***
	(2.059)	(0.015)	(0.014)	(0.689)	(0.012)
LEVERAGE	8.578	−0.561***	−0.111**	8.603***	−0.558***
	(5.934)	(0.042)	(0.045)	(2.098)	(0.035)
CEO_AGE	−0.118	−0.001	0.041***	−0.136	−0.002
	(0.087)	(0.001)	(0.001)	(0.145)	(0.002)
CEO_PAST_PERFORM	−5.156	0.389***	0.109	−4.917	0.391***
	(11.509)	(0.118)	(0.119)	(5.425)	(0.091)
CEO_IVY_LEAGUE	−3.433*	−0.028	0.064**	−3.289**	−0.027
	(1.892)	(0.025)	(0.030)	(1.368)	(0.023)
CEO_MBA_TOP10	0.687	−0.035**	0.048**	0.664	−0.036**
	(2.322)	(0.018)	(0.021)	(0.972)	(0.016)
CEO_OWN	6.096	−0.005	2.006***	5.211	−0.063
	(7.831)	(0.140)	(0.153)	(9.463)	(0.158)
CEO_FEMALE	2.309	−0.031	0.140**	2.163	−0.036
	(3.177)	(0.051)	(0.055)	(2.508)	(0.042)
PAST_EXE_DEATH			0.146***		
			(0.034)		
PAST_DIR_DEATH			0.257***		
			(0.021)		
Constant	−10.254	1.566***	−0.854***	−9.049	1.607***
	(27.206)	(0.152)	(0.145)	(7.293)	(0.122)
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes
No. of obs.	8,954	8,930	8,954	8,954	8,930
Adj. R^2	0.547	0.722	0.584		
F-statistics (IV)			97.440		
Prob > F			0.000		

D. Industry Life Cycle

Our product market environment index and its two components are all measured year by year. Thus, they capture only a firm's short-term product market environment. A firm's long-term product market environment, which critically

TABLE 7

Economic Significance: Varying CEO Power and Firm Growth and Value

Table 7 reports the estimated values of SALES_GROWTH and TOBINS_Q at different levels of CEO_POWER_ALL and different levels of PROD_MKT_DYNAMICS. PROD_MKT_DYNAMICS is defined as the sum of H_FLUID and H_VD_SHOCK, where H_FLUID (H_VD_SHOCK) is equal to 1 if FLUIDITY (VD_SHOCK) is above the sample median, and 0 otherwise. CEO_ALL_POWER is defined as the logged value of 1 plus the sum of CEO_FOUNDER, CEO_CHAIR, H_FTA, and H_FDA, where H_FTA (H_FDA) equals 1 if the fraction of top 4 non-CEO executives (non-CEO directors) appointed during the current CEO's tenure is greater than 0.5 (0.5), and 0 otherwise. The estimated SALES_GROWTH (TOBINS_Q) in Panel A (Panel B) are computed using the coefficients from the regressions reported in column 4 (column 5) of Table 6 respectively. The estimated SALES_GROWTH and TOBINS_Q at CEO_POWER_ALL equal to the lowest (0) and highest value (1.609) are reported in columns 1 and 2, respectively. Throughout, all other variables except CEO_POWER_ALL and PROD_MKT_DYNAMICS are held at the sample median.

Panel A. Economic Significance for Sales Growth

	SALES_GROWTH	
	CEO_POWER_ALL = 0	CEO_POWER_ALL = 1.609
Variable	1	2
PROD_MKT_DYNAMICS = 0	0.802	0.624
PROD_MKT_DYNAMICS = 2	−2.850	6.588

Panel B. Economic Significance for Tobin's q

	TOBINS_Q	
	CEO_POWER_ALL = 0	CEO_POWER_ALL = 1.609
Variable	1	2
PROD_MKT_DYNAMICS = 0	0.574	0.577
PROD_MKT_DYNAMICS = 2	0.551	0.699

depends on its industry life cycle, may also affect the trade-off between the benefits and costs of CEO power. In particular, firms operating in a growing industry are likely to face more investment opportunities and higher entry threats than those operating in a declining industry. We thus examine how CEO power and a firm's industry life cycle jointly affect firm value.

Our industry life cycle measure, LT_INDUSTRY_GROWTH, is based on the long-term growth of industry product shipments during 1999–2010. Product shipment data taken from BEA are expressed in 2011 dollars using industry price deflators. We calculate the change in product shipments in real dollars. Because the industry life cycle measure is time invariant, we estimate CEO–firm pair between regressions, in which we obtain one observation for each CEO–firm pair by averaging the variables across times series to examine the cross-sectional effects of CEO power.

The results in Table 9 show that the interaction between CEO power and industry life cycle has a positive relation to Tobin's q, after accounting for the endogeneity of CEO power. This result supports the previous findings that having powerful CEOs in product markets with higher investment opportunities and entry threats can enhance firm value. Thus, we provide evidence that the results continue to hold for long-term product market environments.

VII. Product Market Conditions and Agency Costs of CEO Power

Up to this point, our focus is on the actual proactive actions (e.g., invest, advertise, and introduce new products) CEOs may take versus disciplining

TABLE 8

CEO Power and Firm Investment, Advertising, and New Product Introductions

Table 8 reports the results for the interaction of the product market environment index and CEO power on firm capital expenditures, advertising expenses, and new product introductions. The dependent variable is capital expenditures divided by total assets times 100 (CAPX_TA) in columns 1 and 4, advertising expenses divided by total assets times 100 (AD_TA) in columns 2 and 5, and new product introductions (PRODUCT_GROWTH) for years t to $t+2$ in columns 3 and 6. CEO_ALL_POWER is defined as the logged value of 1 plus the sum of CEO_FOUNDER, CEO_CHAIR, H_FTA, and H_FDA, where H_FTA (H_FDA) equals 1 if the fraction of top 4 non-CEO executives (non-CEO directors) appointed during the current CEO's tenure is greater than 0.5 (0.5), and 0 otherwise. PROD_MKT_DYNAMICS is defined as the sum of H_FLUID and H_VD_SHOCK. H_FLUID and H_VD_SHOCK are indicator variables equal to 1 if fluidity (FLUIDITY) or demand shock (VD_SHOCK) is above the sample median, respectively, and 0 otherwise. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. Variables are defined in Appendix A. Columns 1–3 report the ordinary least squares (OLS) estimation results and columns 4–6 report the second-stage instrumental variable regression using the first-stage results reported in column 3 of Table 6. All regressions include firm and year fixed effects. Robust standard errors clustered at the firm level and bootstrap standard errors are reported in parentheses in columns 1–3 and 4–6, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	OLS			2nd-Stage Results		
	CAPX_TA	AD_TA	PRODUCT_GROWTH$_{t,t+2}$	CAPX_TA	AD_TA	PRODUCT_GROWTH$_{t,t+2}$
Variable	1	2	3	4	5	6
CEO_ALL_POWER	0.026	−0.389**	−0.009	−1.285**	0.129	−0.051
	(0.145)	(0.158)	(0.023)	(0.603)	(0.671)	(0.118)
CEO_ALL_POWER × PROD_MKT_DYNAMICS	0.315**	0.184**	0.028*	0.463**	0.476**	0.068*
	(0.129)	(0.091)	(0.017)	(0.226)	(0.201)	(0.039)
PROD_MKT_DYNAMICS	−0.031	−0.273***	−0.104***	−0.139	−0.534***	−0.140***
	(0.143)	(0.103)	(0.019)	(0.217)	(0.200)	(0.037)
LN_FIRM_AGE	−1.448***	0.410	0.016	−1.845***	0.726**	0.018
	(0.480)	(0.264)	(0.062)	(0.325)	(0.317)	(0.063)
LN_S	0.683***	−0.027	0.009	0.765***	−0.091	0.010
	(0.230)	(0.112)	(0.021)	(0.119)	(0.121)	(0.023)
LEVERAGE	−2.683***	−1.201***	−0.083	−2.829***	−1.099***	−0.083
	(0.558)	(0.401)	(0.066)	(0.366)	(0.322)	(0.063)
CEO_AGE	−0.020*	0.013	−0.001	0.030	−0.020	−0.001
	(0.012)	(0.009)	(0.002)	(0.025)	(0.027)	(0.005)
CEO_PAST_PERFORM	0.884	1.029	0.133	1.060	1.411*	0.141
	(1.462)	(0.765)	(0.193)	(0.944)	(0.736)	(0.171)
CEO_IVY_LEAGUE	0.213	0.201	−0.013	0.301	0.112	−0.009
	(0.296)	(0.300)	(0.053)	(0.239)	(0.218)	(0.044)
CEO_MBA_TOP10	0.070	−0.077	0.001	0.122	−0.052	0.002
	(0.202)	(0.171)	(0.028)	(0.169)	(0.141)	(0.031)
CEO_OWN	3.295*	1.907	−0.166	5.626***	0.417	−0.160
	(1.901)	(1.283)	(0.241)	(1.637)	(1.371)	(0.312)
CEO_FEMALE	0.520	−1.694***	0.035	0.645	−2.026***	0.033
	(0.665)	(0.602)	(0.067)	(0.439)	(0.436)	(0.088)
Constant	4.519**	1.941*	0.126	3.554***	2.782**	0.137
	(2.113)	(1.141)	(0.217)	(1.258)	(1.147)	(0.224)
Firm and year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	8,907	3,558	6,819	8,907	3,558	6,819
Adj. R^2	0.731	0.925	0.136			

CEOs from seeking private benefits of control (e.g., excessive compensation or perquisite consumption). There can still be a cost of CEO power in monopolistic industries, where the CEO can take perquisites or engage in other activities that may decrease shareholder value. Product market competition is documented as an important external governance mechanism to help mitigate these problems (see Giroud and Mueller (2010), Guadalupe and Wulf (2010)). Given this literature, we examine CEO compensation efficiency measured by CEO pay-for-performance

TABLE 9
CEO Power and the Industry Life Cycle

Table 9 reports the effect of the interaction between industry life cycle and CEO power on Tobin's *q*. Industry life cycle, LT_INDUSTRY_GROWTH, is the long-term growth of industry product shipments deflated by industry price deflators using Bureau of Economic Analysis data during 1999–2010. Columns 1 and 2 report the first- and second-stage regression results, respectively. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. Variables are defined in Appendix A. All regressions are CEO–firm pair level between regressions, in which we obtain 1 observation for each CEO–firm pair by averaging each variable across the times series. Robust standard errors and bootstrap standard errors are reported in parentheses in columns 1 and 2, respectively. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	1st Stage: CEO_ALL_POWER	2nd Stage: LN_TOBINS_Q
Variable	1	2
LT_INDUSTRY_GROWTH	0.020**	−0.120**
	(0.009)	(0.055)
CEO_ALL_POWER		−0.961*
		(0.543)
CEO_ALL_POWER × LT_INDUSTRY_GROWTH		0.190***
		(0.066)
LN_FIRM_AGE	−0.141***	−0.173**
	(0.011)	(0.070)
LN_S	0.006	0.016*
	(0.007)	(0.010)
LEVERAGE	0.161***	−0.473***
	(0.055)	(0.107)
CEO_AGE	0.018***	0.011
	(0.001)	(0.009)
CEO_PAST_PERFORM	0.117	1.580***
	(0.136)	(0.187)
CEO_IVY_LEAGUE	0.060*	0.091*
	(0.033)	(0.055)
CEO_MBA_TOP10	0.063***	0.124***
	(0.023)	(0.045)
CEO_OWN	2.477***	2.738**
	(0.195)	(1.282)
CEO_FEMALE	−0.010	−0.104
	(0.058)	(0.076)
PAST_EXE_DEATH	0.018	
	(0.070)	
PAST_DIR_DEATH	0.092**	
	(0.039)	
Constant	0.108	1.042***
	(0.079)	(0.134)
No. of obs.	12,194	12,150
Adj. R^2	0.178	

sensitivity as an additional mechanism that powerful CEOs may influence.[23] We focus on fluidity as our measure of competitive threats for this test, as the demand shock does not capture competition. We thus examine the impact of CEO power and its interaction with industry fluidity and CEO pay for performance (CEO_DELTA). We measure CEO_DELTA as the dollar change in wealth for a percentage change in firm value scaled by compensation, as suggested by Edmans, Gabaix, and Landier (2009).[24]

[23] Bebchuk and Fried (2004) and Morse et al. (2011) show that powerful CEOs are more likely to rig their incentive contracts and reduce their compensation efficiency.

[24] Previous studies suggest two other ways to measure pay-for-performance sensitivity: a dollar change in wealth for a dollar change in firm value (Jensen and Murphy (1990)) or a dollar change in wealth for a percentage change in firm value (Hall and Liebman (1998)). We use Edmans et al.'s (2009) compensation-scaled wealth–performance sensitivity measure because, as they point out, it is

Table 10 presents the results. Similar to the literature, we find that the impact of CEO power on CEO_DELTA is negative. Thus, powerful CEOs are associated with future reductions in sensitivity to shareholder value, a result consistent with agency problems generated by CEO power; namely, powerful CEOs may capture their compensation committees. We also include an interaction term between CEO power and product market fluidity. We find that this interaction term has a significant positive coefficient in column 2, thus offsetting the negative overall effect. This result indicates that in product markets with high levels of fluidity and thus future competition, CEO pay is more sensitive to shareholder wealth, suggesting CEO compensation is less captured by the CEO. This finding implies that product markets with high levels of fluidity can reduce the agency costs associated with CEO power, consistent with giving CEOs incentives to take proactive actions on investment, advertising, and new product introductions as we document earlier.

These results combined with our earlier results on the positive impact of CEO power on firm value in high-fluidity/high-demand markets, and the results on proactive actions (investment, advertising, and new product introductions) by the firm in these markets, provide comprehensive evidence of the costs and benefits of CEO power.

VIII. Robustness Tests

We conduct multiple robustness tests as described in this section. All results are provided in Tables B1 and B2 in Appendix B.

A. Alternative Measures of CEO Power

To address the concern that each component of our CEO power variable may be correlated or may not equally affect the CEO's overall influence in the firm, we first construct an alternative CEO power index based on principal component analysis. Second, because all components of our CEO power measure are correlated with CEO tenure,[25] to partial out CEO tenure effects, we regress the overall CEO power index on CEO tenure and use the residuals as a measure of CEO power. We present these results in Table B1 of Appendix B. The results are robust to all of these alternative measures of CEO power.

Different from the other sources of CEO power (i.e., founder status or connections to other leaders through appointment decisions) that accumulate over time, receiving a dual appointment as board chair involves a discrete change in CEO power that allows us to compare firm performance before and after such an appointment. Thus, we examine the separate impact of CEO_CHAIR on firm performance. We use the same instrumental variables, as past executive and director deaths can automatically increase CEO soft power, which may also make the CEO more likely to be appointed as board chair (hard power). Our results show that appointing the current CEO as board chair leads to an increase in firm value in product markets with high demand and entry threat.

independent of firm size and thus comparable across firms and over time. It is available at Edman's Web site (http://alexedmans.com/data/).

[25] Additionally, Graham, Harvey, and Puri (2015) show that CEOs with longer tenure tend to hold more power and delegate fewer financial decisions to others.

TABLE 10

CEO Power and CEO Pay-for-Performance Sensitivity

Table 10 reports the results for the interaction of the product market fluidity and CEO power on CEO pay-for-performance sensitivity. The dependent variable, CEO_DELTA, is scaled wealth–performance sensitivity of CEOs measured as the dollar change in CEO wealth for a 100-percentage-point change in firm value, divided by annual flow compensation. CEO_ALL_POWER is defined as the logged value of 1 plus the sum of CEO_FOUNDER, CEO_CHAIR, H_FTA, and H_FDA, where H_FTA (H_FDA) equals 1 if the fraction of top 4 non-CEO executives (non-CEO directors) appointed during the current CEO's tenure is greater than 0.5 (0.5), and 0 otherwise. H_FLUID is an indicator variable equal to 1 if fluidity (FLUIDITY) is above the sample median, and 0 otherwise. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. Variables are defined in Appendix A. Column 1 reports the first-stage instrumental variable regression results, and column 2 reports the second-stage instrumental variable regression results. The instrumental variables are PAST_DIR_DEATH and PAST_EXE_DEATH. PAST_DIR_DEATH (PAST_EXE_DEATH) is the number of non-CEO directors (top 4 non-CEO executives) who left their positions due to sudden death during the current CEO's tenure up to the previous year (i.e., year $t-1$). Deaths related to pressures from firm performance or suicides are excluded. All regressions include firm and year fixed effects. Robust standard errors clustered at the firm level and bootstrap standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	1st Stage: CEO_ALL_POWER 1	2nd Stage: CEO_DELTA 2
CEO_ALL_POWER		−0.039* (0.023)
H_FLUID	0.027* (0.016)	−0.015 (0.011)
CEO_ALL_POWER × H_FLUID		0.026** (0.011)
LN_FIRM_AGE	−0.327*** (0.051)	−0.033*** (0.011)
LN_S	0.036* (0.020)	0.004 (0.004)
LEVERAGE	−0.092 (0.066)	−0.027** (0.012)
CEO_AGE	0.044*** (0.002)	0.003*** (0.001)
CEO_PAST_PERFORM	−0.035 (0.280)	−0.111*** (0.032)
CEO_IVY_LEAGUE	0.051 (0.073)	0.009 (0.007)
CEO_MBA_TOP10	0.024 (0.046)	0.004 (0.005)
CEO_FEMALE	0.112 (0.122)	0.018 (0.014)
PAST_EXE_DEATH	0.153*** (0.056)	
PAST_DIR_DEATH	0.195*** (0.034)	
Constant	−0.766*** (0.230)	−0.040 (0.040)
Firm and year fixed effects	Yes	Yes
No. of obs. Adj. R^2	10,289 0.578	10,278

B. Alternative Measure of Product Market Entry Threats

An alternative way of measuring product market entry threat is the Herfindahl–Hirschman index (HHI). We replace the current product market fluidity measure with LOW_HHI, where LOW_HHI is defined as an indicator if the Herfindahl–Hirschman index is below the sample median, suggesting a more competitive product market, which has more potential entrants. HHI is defined as

the sum of the squared market shares of firms in each industry based on 3-digit Standard Industrial Classification (SIC) codes or based on Hoberg–Phillips (2016) text-based HHI. We present these results in Table B2 of Appendix B. The results are robust to these alternative measures of product market conditions.

IX. Conclusions

We examine under what conditions powerful CEOs may be beneficial to firms and show that the external product market influences the trade-off between the benefits and costs of CEO power. Using a simple model, we illustrate how having more powerful CEOs may be valuable to firms when they need to respond quickly to investment opportunities and face entry threats.

Empirically, we find that the announcement that the CEO has been granted more power by appointing her to the additional position of board chair is associated with significantly higher abnormal returns when a firm operates in markets with high demand and entry threats. Firms in these markets also have higher sales growth and Tobin's q when the CEO has more power. We investigate why powerful CEOs increase sales growth and add value, and find that new product introductions, investment, and advertising all increase with CEO power in high demand markets where firms face entry threats. We also find that CEO power is negatively related to the number of board meetings, suggesting that powerful CEOs make corporate decisions with lower communication and coordination costs. Furthermore, our results show that CEO pay is more sensitive to shareholder wealth in markets with high fluidity and potential competitors. Our results remain significant when addressing the endogeneity of CEO power by instrumenting CEO power with past non-CEO executive and director sudden deaths.

Overall, our findings suggest that CEO power is beneficial in markets with increased demand and entry threats by enabling CEOs to react promptly to changing product markets. We show that the positive effects of CEO power are not limited to explicit sources of CEO power, such as whether the CEO is board chair or founder, but also extend to soft sources arising from the CEO's connections to key officers and board members through appointment decisions. Overall, our findings imply that the product market environment plays an important role in influencing whether CEO power is beneficial for the firm.

Appendix A. Variable Definitions

Variable	Definition
Product Market Environment Variables	
PROD_MKT_DYNAMICS	Sum of H_FLUID and H_VD_SHOCK. H_FLUID and H_VD_SHOCK are indicator variables equal to 1 if fluidity (FLUID) or vertical demand shock (VD_SHOCK) is above the sample median, respectively, and 0 otherwise.
FLUIDITY	10-K text-based product market fluidity measure developed in Hoberg et al. (2014) and Hoberg and Phillips (2016). It assesses the degree of competitive threat and product market changes surrounding a firm.
VD_SHOCK	Annual percentage change in product shipments for downstream industries. The changes in product shipments are from the Bureau of Economic Analysis (BEA) Web site. Downstream industries are identified using the BEA input–output matrix based on the North American Industry Classification System (NAICS) 2-digit industries.

(continued on next page)

APPENDIX (continued)

Variable	Definition
LT_INDUSTRY_GROWTH	Long-term growth of industry product shipments at the 2-digit NAICS level during 1999–2010. Data on product shipments are obtained from the BEA Web site and are deflated by industry price deflators.
CEO Power Variables	
CEO_HARD_POWER	Logged value of 1 plus the sum of CEO_FOUNDER and CEO_CHAIR.
CEO_CHAIR	Indicator variable equal to 1 if a chief executive officer (CEO) also chairs the board, and 0 otherwise.
CEO_FOUNDER	Indicator variable equal to 1 if a CEO was the CEO 5 years before the IPO date reported by Compustat or the first date the firm appears in the Center for Research in Security Prices (CRSP), and 0 otherwise.
CEO_SOFT_POWER	Average of FTA and FDA.
FTA	Fraction of top 4 non-CEO executives appointed during the current CEO's tenure.
FDA	Fraction of directors appointed during the current CEO's tenure, excluding the CEO from both the numerator and denominator if the CEO is on the board.
CEO_ALL_POWER	Logged value of 1 plus the sum of CEO_FOUNDER, CEO_CHAIR, H_FTA, and H_FDA. H_FTA (H_FDA) is equal to 1 if FTA (FDA) is greater than 0.5 (0.5), and 0 otherwise.
Other Variables	
TOBINS_Q	Market value of common equity plus the book value of total liabilities divided by the book value of total assets.
SALES_GROWTH	3-year growth rate of net sales.
NUM_BOARD_MEETING	Number of board meetings during the fiscal year. Data after 2005 are hand collected from proxy filings.
CAPX_TA	Capital expenditures divided by the value of total assets times 100.
AD_TA	Advertising expenses divided by the value of total assets times 100.
PRODUCT_GROWTH	Logarithmic growth in the number of words used in the product description section of a firm's 10-K following Hoberg and Phillips (2010).
LN_FIRM_AGE	Logged value of 1 plus the number of years from the firm's IPO as reported in Compustat or the number of years since its first appearance in CRSP.
LN_S	Logged value of sales.
LEVERAGE	Total liabilities divided by total assets.
EBITDA_TA	Earnings before interest, tax, depreciation, and amortization (EBITDA) divided by total assets.
CEO_OWN	Percentage of outstanding common shares held by a CEO.
CEO_IVY_LEAGUE	Indicator variable equal to 1 if a CEO obtains a bachelor's degree from an Ivy League university, and 0 otherwise.
CEO_MBA_TOP10	Indicator variable equal to 1 if a CEO obtains an MBA degree from the top 10 programs ranked by *U.S. News & World Report* (2010), and 0 otherwise.
CEO_PAST_PERFORM	Last-year industry-adjusted performance (EBITDA/total assets) of the firm where the CEO worked as a top executive before joining the firm. Industries are defined based on NAICS 2-digit industries. Missing values are replaced with the sample median.
CEO_AGE	CEO age.
CEO_FEMALE	Indicator variable that equals 1 if the CEO is a female.
CEO_TENURE	Number of years since the CEO was appointed.
CEO_DELTA	Scaled wealth–performance sensitivity of CEOs measured as the dollar change in CEO wealth for a 100-percentage-point change in firm value, divided by annual flow compensation, obtained from Edmans et al. (2009).
PAST_DIR(EXE)_DEATH	Number of non-CEO directors (executives) who left their positions due to sudden death during the current CEO's tenure up to the previous year (i.e., year $t-1$). Deaths related to pressures from firm performance or suicides are excluded.

Appendix B. Robustness Checks

TABLE B1

Alternative Measures of CEO Power

Table B1 reports the estimation results from column 5 of Table 6 using alternative measures of CEO power. CEO_ALL_POWER is measured using the overall CEO power index constructed based on principal component analysis (PCA) in columns 1 and 2, and the residuals of the regression of CEO_ALL_POWER on CEO_TENURE in columns 3 and 4. CEO power is measured using the CEO_CHAIR indicator in columns 5 and 6. Columns 1, 3, and 5 report first-stage regression results, and columns 2, 4, and 6 report second-stage instrumental variable regression results. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. All regressions include firm and year fixed effects, except the regression in column 5. The regression in column 5 is estimated using the conditional logistics regressions at the firm level with year dummies. Robust standard errors clustered at the firm level are reported in parentheses in columns 1, 3, and 5, and bootstrap standard errors are reported in columns 2, 4, and 6. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	PCA Index		Control for CEO Tenure		CEO–Chairman	
Variable	1st Stage: CEO_ALL_POWER	2nd Stage: LN_TOBINS_Q	1st Stage: CEO_ALL_POWER	2nd Stage: LN_TOBINS_Q	1st Stage: CEO_CHAIR	2nd Stage: LN_TOBINS_Q
	1	2	3	4	5	6
PROD_MKT_DYNAMICS	0.085***	0.030***	0.031**	0.035***	0.041	−0.008
	(0.018)	(0.006)	(0.014)	(0.007)	(0.079)	(0.023)
CEO_POWER		−0.001		−0.058		−0.169
		(0.028)		(0.053)		(0.164)
CEO_POWER × PROD_MKT_DYNAMICS		0.021***		0.119***		0.089**
		(0.007)		(0.023)		(0.041)
LN_FIRM_AGE	−1.177***	−0.126***	−0.963***	−0.073	−0.053	−0.175***
	(0.074)	(0.039)	(0.059)	(0.052)	(0.349)	(0.023)
LN_S	0.177***	−0.065***	0.039	−0.055***	0.361**	−0.062***
	(0.032)	(0.012)	(0.026)	(0.012)	(0.170)	(0.015)
LEVERAGE	−0.163	−0.558***	−0.161**	−0.562***	−0.307	−0.579***
	(0.103)	(0.035)	(0.081)	(0.037)	(0.518)	(0.042)
CEO_AGE	0.108***	−0.002	0.033***	−0.002	0.223***	0.002
	(0.002)	(0.003)	(0.002)	(0.002)	(0.022)	(0.005)
CEO_PAST_PERFORM	−0.139	0.399***	0.422**	0.387***	2.247	0.540***
	(0.269)	(0.090)	(0.213)	(0.096)	(1.897)	(0.116)
CEO_IVY_LEAGUE	0.101	−0.025	−0.033	−0.010	1.204**	0.038
	(0.067)	(0.023)	(0.053)	(0.024)	(0.591)	(0.031)
CEO_MBA_TOP10	0.081*	−0.036**	0.093**	−0.047***	−0.100	0.005
	(0.048)	(0.016)	(0.038)	(0.017)	(0.355)	(0.019)
CEO_OWN	5.353***	−0.076	1.666***	−0.142	21.810***	0.425
	(0.344)	(0.181)	(0.273)	(0.142)	(7.649)	(0.295)
CEO_FEMALE	0.193	−0.033	0.316***	−0.039	0.239	0.100**
	(0.123)	(0.042)	(0.098)	(0.045)	(1.106)	(0.048)
PAST_EXE_DEATH	0.367***		0.084		2.012***	
	(0.076)		(0.060)		(0.635)	
PAST_DIR_DEATH	0.511***		0.336***		1.543***	
	(0.048)		(0.038)		(0.360)	
Constant	−3.883***	1.594***	0.742***	1.339***		1.517***
	(0.328)	(0.155)	(0.260)	(0.122)		(0.250)
Firm and year fixed effects (dummies)	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	8,954	8,930	8,954	8,930	6,229	6,185
Adj. (pseudo) R^2	0.730		0.559		0.275	

TABLE B2

Alternative Measures of the Product Market Environment

Table B2 reports the estimation results from column 5 of Table 6 using alternative measures of product market environment. PROD_MKT_DYNAMICS_LOW_HHI is defined as the sum of L_HHI and H_VD_SHOCK. L_HHI is an indicator equal to 1 if the Herfindahl–Hirschman index (HHI) is below the sample median. HHI is calculated as the sum of the squares of the market shares of firms in each industry based on the 3-digit Standard Industrial Classification (SIC) code in columns 1 and 2 and Hoberg and Phillips (2016) in columns 3 and 4. H_VD_SHOCK is an indicator variable equal to 1 if demand shock (VD_SHOCK) is above the sample median, and 0 otherwise. Columns 1 and 3 report first-stage regression results, and columns 2 and 4 report second-stage instrumental variable regression results. The sample spans 1999–2010 and consists of S&P 1500 firms plus those firms that were once part of the index. All regressions include firm and year fixed effects. Robust standard errors clustered at the firm level are reported in parentheses in columns 1 and 3, and bootstrap standard errors are reported in parentheses in columns 2 and 4. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	1st Stage: CEO_ALL_POWER 1	2nd Stage: LN_TOBINS_Q 2	1st Stage: CEO_ALL_POWER 3	2nd Stage: LN_TOBINS_Q 4
PROD_MKT_DYNAMICS_LOW_HHI	0.017** (0.009)	−0.018 (0.022)	0.009 (0.008)	−0.025 (0.022)
CEO_ALL_POWER		−0.027 (0.061)		0.006 (0.060)
CEO_ALL_POWER × PROD_MKT_DYNAMICS_LOW_HHI		0.073*** (0.023)		0.047** (0.023)
LN_FIRM_AGE	−0.347*** (0.033)	−0.144*** (0.031)	−0.351*** (0.033)	−0.150*** (0.031)
LN_S	0.067*** (0.014)	−0.065*** (0.011)	0.069*** (0.014)	−0.064*** (0.012)
LEVERAGE	−0.106** (0.045)	−0.550*** (0.035)	−0.103** (0.045)	−0.546*** (0.035)
CEO_AGE	0.041*** (0.001)	−0.002 (0.002)	0.041*** (0.001)	−0.002 (0.002)
CEO_PAST_PERFORM	0.103 (0.119)	0.377*** (0.090)	0.103 (0.119)	0.382*** (0.091)
CEO_IVY_LEAGUE	0.077*** (0.029)	−0.013 (0.023)	0.066** (0.029)	−0.027 (0.023)
CEO_MBA_TOP10	0.042** (0.021)	−0.037** (0.016)	0.041* (0.021)	−0.037** (0.016)
CEO_OWN	2.010*** (0.150)	−0.073 (0.157)	2.046*** (0.152)	−0.088 (0.159)
CEO_FEMALE	0.139** (0.055)	−0.037 (0.042)	0.160*** (0.055)	−0.040 (0.043)
PAST_EXE_DEATH	0.145*** (0.033)		0.146*** (0.033)	
PAST_DIR_DEATH	0.256*** (0.021)		0.255*** (0.021)	
Constant	−0.831*** (0.144)	1.646*** (0.120)	−0.840*** (0.144)	1.676*** (0.122)
Firm and year fixed effects	Yes	Yes	Yes	Yes
No. of obs. Adj. R^2	9,075 0.582	9,050	9,033 0.583	9,009

References

Adams, R. B.; H. Almeida; and D. Ferreira. "Powerful CEOs and Their Impact on Corporate Performance." *Review of Financial Studies*, 18 (2005), 1403–1432.

Adams, R. B., and D. Ferreira. "A Theory of Friendly Boards." *Journal of Finance*, 62 (2007), 217–250.

Bebchuk, L. A.; M. Cremers; and U. Peyer. "The CEO Pay Slice." *Journal of Financial Economics*, 102 (2011), 199–221.

Bebchuk, L. A., and J. M. Fried. *Pay Without Performance: The Unfulfilled Promise of Executive Compensation*. Cambridge, MA: Harvard University Press (2004).

Brown, S. J., and J. B. Warner. "Using Daily Stock Returns: The Case of Event Studies." *Journal of Financial Economics*, 14 (1985), 3–31.
Chhaochharia, V.; Y. Grinstein; G. Grullon; and R. Michaely. "Product Market Competition and Internal Governance: Evidence from the Sarbanes–Oxley Act." *Management Science*, 63 (2017), 1405–1424.
Cialdini, R. B. *Personal Influence: Theory, Research, and Practice*, J. Jacoby and S. Craig, eds. Lexington, MA: Heath (1984).
Coles, J. L.; N. D. Daniel; and L. Naveen. "Co-Opted Boards." *Review of Financial Studies*, 27 (2014), 1751–1796.
Duchin, R.; J. G. Matsusaka; and O. Ozbas. "When Are Outside Directors Effective?" *Journal of Financial Economics*, 96 (2010), 195–214.
Edmans, A.; X. Gabaix; and A. Landier. "A Multiplicative Model of Optimal CEO Incentives in Market Equilibrium." *Review of Financial Studies*, 22 (2009), 4881–4917.
Faulkender, M., and J. Yang. "Inside the Black Box: The Role and Composition of Compensation Peer Groups." *Journal of Financial Economics*, 96 (2010), 257–270.
Fracassi, C., and G. Tate. "External Networking and Internal Firm Governance." *Journal of Finance*, 67 (2012), 153–194.
Giroud, X., and H. M. Mueller. "Does Corporate Governance Matter in Competitive Industries?" *Journal of Financial Economics*, 95 (2010), 312–331.
Giroud, X., and H. M. Mueller. "Corporate Governance, Product Market Competition, and Equity Prices." *Journal of Finance*, 66 (2011), 563–600.
Graham, J. R.; C. R. Harvey; and M. Puri. "Capital Allocation and Delegation of Decision-Making Authority." *Journal of Financial Economics*, 115 (2015), 449–470.
Grenadier, S. R. "Option Exercise Games: An Application to the Equilibrium Investment Strategy of Firms." *Review of Financial Studies*, 15 (2002), 691–721.
Grinstein, Y., and P. Hribar. "CEO Compensation and Incentives: Evidence from M&A Bonuses." *Journal of Financial Economics*, 73 (2003), 119–143.
Guadalupe, M., and J. Wulf. "The Flattening Firm and Product Market Competition: The Effect of Trade Liberalization." *American Economic Journal: Applied Economics*, 2 (2010), 105–127.
Hall, B., and J. B. Liebman. "Are CEOs Really Paid Like Bureaucrats?" *Quarterly Journal of Economics*, 113 (1998), 653–691.
Harris, M., and A. Raviv. "A Theory of Board Control and Size." *Review of Financial Studies*, 21 (2008), 1797–1832.
Hermalin, B. E., and M. S. Weisbach. "Endogenously Chosen Boards of Directors and Their Monitoring of the CEO." *American Economic Review*, 88 (1998), 96–118.
Hoberg, G., and G. Phillips. "Product Market Synergies and Competition in Mergers and Acquisitions: A Text-Based Analysis." *Review of Financial Studies*, 23 (2010), 3773–3811.
Hoberg, G., and G. Phillips. "Text-Based Network Industries and Endogenous Product Differentiation." *Journal of Political Economy*, 124 (2016), 1423–1465.
Hoberg, G.; G. Phillips; and N. Prabhala. "Product Market Threats, Payouts, and Financial Flexibility." *Journal of Finance*, 69 (2014), 293–324.
Jensen, M. C. "The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems." *Journal of Finance*, 48 (1993), 831–880.
Jensen, M. C., and W. H. Meckling. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics*, 3 (1976), 305–360.
Jensen, M. C., and K. J. Murphy. "Performance Pay and Top-Management Incentives." *Journal of Political Economy*, 98 (1990), 225–264.
Khanna, V.; E. H. Kim; and Y. Lu. "CEO Connectedness and Corporate Frauds." *Journal of Finance*, 70 (2015), 1203–1252.
Kim, E. H., and Y. Lu. "CEO Ownership, External Governance, and Risk-Taking." *Journal of Financial Economics*, 102 (2011), 272–292.
Landier, A.; J. Sauvagnat; D. Sraer; and D. Thesmar. "Bottom-Up Corporate Governance." *Review of Finance*, 17 (2013), 161–201.
Lesser, R.; M. Reeves; and K. Goulet. "BCG Classics Revisited: Time-Based Competition." Boston Consulting Group. Available at https://www.bcg.com/publications/2013/bcg-classics-revisited-time-based-competition.aspx (Dec. 23, 2013).
Morse, A.; V. Nanda; and A. Seru. "Are Incentive Contracts Rigged by Powerful CEOs?" *Journal of Finance*, 66 (2011), 1779–1821.
Nguyen, B. D., and K. M. Nielsen. "The Value of Independent Directors: Evidence from Sudden Deaths." *Journal of Financial Economics*, 98 (2010), 550–567.
Sah, R. K., and J. E. Stiglitz. "The Architecture of Economic Systems: Hierarchies and Polyarchies." *American Economic Review*, 76 (1986), 716–727.

Sah, R. K., and J. E. Stiglitz. "The Quality of Managers in Centralized versus Decentralized Organizations." *Quarterly Journal of Economics*, 106 (1991), 289–295.
Shivdasani, A., and D. Yermack. "CEO Involvement in the Selection of New Board Members: An Empirical Analysis." *Journal of Finance*, 54 (1999), 1829–1853.
Song, F., and A. V. Thakor. "Information Control, Career Concerns, and Corporate Governance." *Journal of Finance*, 61 (2006), 1845–1896.
Vefeas, N. "Board Meeting Frequency and Firm Performance." *Journal of Financial Economics*, 53 (1999), 113–142.
Wooldridge, J. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press (2002).