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

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Abstract

We find that in rapidly changing, competitive product markets, CEO power has a positive impact on the value of the firm. Additionally, firms with powerful CEOs tend to invest and advertise more in these markets. In addition to whether the CEO also chairs the board and is the company founder, CEO "soft" power, as captured by the CEO's connections to executives and the board of directors through appointment decisions, helps a firm react more efficiently to product market changes and threats. Our findings imply that product markets play an important role in affecting the benefits and costs of CEO power.

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It is without doubt that CEOs exert a large influence over firms. CEOs have substantial "soft" influence along with explicit legal authority within the firm to direct corporate behavior.[1] Bertrand and Schoar (2003) find CEO characteristics matter for a wide range of firm policies. Recently, Graham, Harvey, and Puri (2013) also show CEOs' behavioral traits such as optimism, risk-aversion, and time preference are related to corporate financial policies and managerial compensation[2].

Given that CEOs have direct impact on the firm and its policies, it is still unsettled whether more CEO power has a positive or negative influence on the firm. Recent evidence on CEO power suggests powerful CEOs may be bad news for shareholders. Bebchuk and Fried (2004) and Bebchuck, Cremers and Peyer (2011) argue that powerful CEOs reduce the linkage between CEO compensation and firm performance. Morse, Nanda, and Seru (2011) provide evidence that powerful CEOs may rig incentive contracts. Bebchuck, Cremers and Peyer (2011) and Landier, Sauvagnat, Sraer, and Thesmar (2013) show that powerful CEOs are more likely to engage in value-destroying mergers and acquisitions. Khanna, Kim, and Lu (forthcoming) show that CEO power arising from appointment decisions can increase the likelihood of corporate fraud and also reduce the detection of fraud. Overall, the literature finds that firms with powerful CEOs are associated with lower profitability and firm value (Bebchuk, Cremers, and Peyer 2011; Morse, Nanda, and Seru 2011; Landier, Sauvagnat, Sraer, and Thesmar 2013).

With all these negative outcomes associated with CEO power, why are there still powerful CEOs? There are potential benefits of CEO power. As Hermalin and Weisbach (1998) model, boards

[1] See Allen, Kraakman, and Subramanian (2012) for a discussion of CEOs' legal authority to contractually bind the firm for ordinary transactions.

[2] See also Cronqvist, Makhija, and Yonker (2012) who show differences in corporate financial leverage can be traced to CEOs' personal leverage and Jenter and Lewellen (forthcoming) who find CEO age approaching retirement has an important impact on the likelihood of their firms being taken over and the takeover premiums their shareholders receive.

may optimally give CEOs more power when CEO power has more potential value. Concentration of power in the CEO office may help overcome bureaucratic constraints and expedite decision-making processes, resulting in more timely and efficient reactions to internal and external problems or proactive responses to anticipated changes in market conditions. Such benefits are consistent with the evidence in Adams, Almeida, and Ferreira (2005) who find that powerful CEOs are associated with the best and the worst performing firms. Therefore, increases in CEO power may have both beneficial and deleterious effects (Sah and Stiglitz, 1986, 1991).

In this paper, we explore what are the central factors that influence when and how powerful CEOs may add value and whether the benefits and costs of CEO power vary with industry conditions. In an ideal world, shareholders would grant an optimal level of power, weighing various costs and benefits specific to the firm's characteristics and the business conditions in which it operates. We hypothesize that the optimal amount of power changes based on product market conditions. Specifically, CEO power may be more valuable when a firm's success is more dependent on how quickly managerial decisions can be made and implemented. Consistent with such hypothesis, our results show that in product markets with rapidly changing products, higher demand shocks and competition, CEO power has a more positive impact on firm value as measured by Tobin's q.

The central idea we examine is whether management undertakes efficiency-enhancing measures and value-increasing business decisions to stay abreast, or get ahead, of the competition when product markets are rapidly changing and more competitive. Thus, efficient reactions to product market conditions are important necessary conditions for being successful in challenging and rapidly changing product markets. Thus, the benefit of CEO power through the capability of overcoming bureaucracy is

enhanced when product markets are more rapidly changing and competitive. Furthermore, the cost of CEO power through the abuse of CEO power due to agency conflicts is likely to be reduced in these circumstances since competitive product markets are better at disciplining CEOs.[3] In contrast, when a firm operates in a more stable product market with higher predictable cash flows, the benefits of CEO power through less managerial discretion may not be as large, while the potential abuse of CEO power becomes a larger concern.

We consider three key measures of a firm's product market environment. The first one is "fluidity" which is a text-based measure of product market fluidity from Hoberg, Phillips and Prabhala (2014). It captures changes in the products of rival firms and how these changes relate to a firm's current product offerings. The second one is a measure of the changes to demand that a firm faces in its external product market. We use the changes in product shipments for downstream industries to capture demand shocks for the upstream industry. The third one is a text-based measure of product market concentration following Hoberg and Phillips (2011). It captures changes in the competition a firm faces in the product market in each year.

Our measures of CEO power have both "soft" and explicit components that capture the CEO's ability to influence and direct corporate behavior. We capture "soft" influence by the CEO's internal connections to non-CEO executives and directors in the firm, following previous studies (e.g., Morse, Nanda, and Seru 2011; Khanna, Kim, and Lu forthcoming). We use the fraction of top four non-CEO executives and non-CEO directors appointed during the current CEO's tenure. Following previous

[3] Product market competition has been widely documented as an important external governance mechanism to mitigate agency problems (e.g., Guadalupe and Wulf 2010; Giroud and Mueller 2010; and Kim and Lu 2011).

studies (e.g., Adams, Almeida, and Ferreira 2005; Hermalin and Weisbach 1988; Morse, Nanda, and Seru 2011), we use as indicators for explicit influence whether the CEO chairs the board, is a founder, and has served for longer than six years (sample median) as a CEO.

Our results show that the impact of CEO power on firm value measured by Tobin's q depends on product market conditions. We find that the interaction terms between CEO power variables and our measures of product market conditions are significantly positive, suggesting that the product markets with high fluidity, demand shocks and competition make CEO power more beneficial in enhancing firm value. We document the benefits of CEO power in changing and competitive industries, both within-firm after controlling for firm fixed effects and cross-firm and industry after using CEO-firm pair between regressions or controlling for industry fixed effects. We find the economic effect of CEO power in these situations is also large. In the rapidly changing, challenging product markets, having a CEO with the overall highest power index versus the overall lowest power index results in an increase of 24.5% in Tobin's q.

Given that corporate investment decisions and marketing expenditures play very important roles in affecting firm value, we examine the role of CEO power in influencing firm capital expenditures and advertising. We find that CEO power is strongly positively related to capital expenditures and advertising expenditures in product markets that are rapidly changing and more competitive. These findings imply that the impact of CEO power on corporate operational decisions also depends on product market conditions.

To investigate how product market conditions interact with CEO power in depth, we break down the CEO overall power index into five different components and examine each component

separately. We find that except for CEO tenure, all other components of CEO power become more beneficial in enhancing firm value in more rapidly changing, competitive product markets. We further examine the potential sources of CEO "soft" power. We find that having the chief financial officer (CFO) appointed during the CEO's tenure can enhance firm value in product markets with high fluidity. Having the CFO, COO, and CTO as well as greater fractions of directors appointed during the CEO's tenure on the audit and compensation committees are also associated with higher firm value in competitive product markets. Since the CFO as well as audit and compensation committees are best known for their monitoring roles (compared with the advising committee), our finding is consistent with the idea that CEOs' connections to these corporate leaders may help circumvent bureaucracy when the CEO initiates corporate actions in response to changing and competitive product markets.

We recognize that CEO power may be endogenous as Hermalin and Weisbach (1998) model and show that our results are robust to instrumenting CEO power with exogenous non-CEO executive and director deaths during the CEO tenure, excluding deaths that happened in the concurrent year. In addition, our results are robust to controlling for other corporate governance factors, alternative measures of product market environment variables including industry life cycle indicators, a Principle Component Analysis based product market index, product market concentration defined by SIC codes, and firm performance variables, as well as alternative ways of constructing our sample of firms.

An alternative possibility that we consider is that powerful CEOs could be more capable individuals or have relevant industry experience. CEOs with high capability or relevant industry experience may be able to better react to the challenges from product markets. Thus, the higher value of firms managed by powerful CEOs in rapidly changing and more competitive product markets could be

due to a CEO's capability or experience rather than CEO power. We show that our results are robust to the inclusion of variables that measure CEO capability and experience, suggesting a CEO's ability and experience, while important, do not explain our findings.

Our results contribute to the literature studying CEOs by helping understand the two-sided nature of CEO power. In rapidly changing product markets that have high competition, CEO power has a positive relation to firm value. We thus add to Adams, Almeida, and Ferreira (2005) who find that powerful CEOs are associated with the best and the worst performing firms. Our results are consistent with a firm's product market being a central factor that influences the amount of power that should be delegated to the CEO.

Our results also demonstrate how product market conditions interact with corporate governance mechanisms to affect firm performance. Among all different product market characteristics, product market competition has drawn the most attention in the corporate governance literature. It has been widely documented as an important external governance mechanism to increase efficiency and control agency problems (e.g., Guadalupe and Wulf 2010). Most studies in the corporate governance literature focus only on how product market competition plays a disciplinary role by reducing the potential for the CEO to destroy value. In particular, Giroud and Mueller (2010) and Kim and Lu (2011) show that product market competition may mitigate the influence of anti-takeover provisions and managerial ownership on firm value. In this paper, we incorporate additional dimensions of the product market environment and show how the product market environment may make delegating more power to the CEO a proactive positive effect for firm value.

1. Data and Key Variables

1.1 Sample

Our initial sample consists of publicly listed firms in ExecuComp over the time period of 1996 to 2010. More specifically, the sample includes S&P1500 firms and firms that were once part of the index. The sample begins in 1996 given ExecuComp coverage is quite limited prior to 1996. We match several different databases to construct the variables used in our study. We construct CEO power and CEO characteristics variables using ExecuComp, Riskmetrics, and BoardEx. Our product market environment variables are from the Hoberg-Phillips Data Library[4] and Bureau of Economic Analysis (BEA) website. Financial and accounting data are from Compustat. Stock return data are from CRSP.

1.2 Product market environment variables

We use three key measures to capture a firm's external product market environment. First, we use a text-based measure of product market fluidity from Hoberg, Phillips and Prabhala (2014). Product market fluidity measures the change in a firm's product space due to moves made by competitors in a firm's product markets. The measure of fluidity 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 captures how rival firms are changing their product words that overlap with the firm's product market vocabulary. It focuses on product space dynamics and changes in products of rival firms and how these changes relate to a firm's

[4] The Hoberg-Phillips industry data web page is at: http://alex2.umd.edu/industrydata/index.html.

current product offerings.[5]

For example, consider Apple Inc. After it introduced the iPad, it would have words including "tablet" that would appear in its 10-K. As rivals followed and introduced tablet computers themselves, the usage of "tablet" by rival firms would increase. This would result in a higher fluidity score for Apple as rival firms enter the tablet market themselves.

Second, we use a measure of the changes to demand that a firm faces in its external product market. Specifically, we use the change in product shipments for a firm's *downstream* industries from the BEA website.[6] 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 in the upstream industry.

Third, we use a text-based measure of product market concentration following Hoberg and Phillips (2011). These data are also available on the Hoberg-Phillips industry data website. We use the Herfindahl index for a firm's market that is constructed using the Hoberg and Phillips 10-K text-based network industries (TNIC). In their method, each firm has its own set of distinct competitors based on word similarity scores of each firm's product description with each other firm's product description.[7] Given 10-Ks are updated annually, the product market fluidity and TNIC Herfindahl index are able to capture changes in each year of a firm's competitors and thus the threat and competition the firm faces in the product market.

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[6] The BEA industry shipments data are available from their website at: https://www.bea.gov/industry/gdpbyind_data.htm

[7] As a robustness check, we also measure product market concentration by using the 3-digit SIC code industry classification. The results are robust.

We begin by examining CEO power interactions with each of these three different aspects of product market conditions separately. However, given that no one measure captures all dimensions of a firm's external product market, for most of our tests, we construct a composite index of a firm's external product market conditions. Specifically, we consider whether a firm operates in industries that are above the median in terms of fluidity, demand shocks, and competition, thus capturing if the firm is operating in a rapidly changing and competitive product market environment. Our measure of fluidity, *H_Fluid,* (demand shock, *H_Vdshock*) is equal to one if fluidity (the vertical demand change) is above the sample median and zero otherwise. Our text-based concentration measure, *L_TNIC_HHI*, is equal to one if text-based Herfindahl index, *TNIC_HHI*, is below the sample median to capture high competition and zero otherwise. The overall measure of the product market environment, *Prod_Env*, is then defined as the sum of *H_Fluid, H_Vdshock and L_TNIC_HHI* with equal weight. By definition, *Prod_Env* takes on the value of 0, 1, 2, or 3. It captures the overall complexity of the product market environment. Higher values of *Prod_Env* mean a more rapidly changing, competitive product market environment. As a robustness check, we also construct the product market environment index by combining the above three factors with the Principle Component Analysis approach.

In addition, we test whether the benefits of CEO power depend on the industry life cycle in the later section. We measure the industry life cycle as the growth of product shipments based on 2-digit NAICS industries during the period of 1999 to 2010. As a robustness test, we also examine the number of IPOs in each industry as an additional measure of an industry that is growing and changing rapidly.

1.3 CEO power variables

CEO power is defined as the capacity to exert one's own will on corporate decisions. It can be considered as "soft" influence along with explicit legal authority within the firm to direct corporate behavior. This "soft" influence is likely to be strengthened by the CEO's internal connections to other corporate leaders or his/her official positions in the firm. Thus, we construct three key CEO composite power variables to measure CEO power within a firm from these two perspectives.

The first variable, *CEO_Power1*, measures CEO power obtained from the CEO internal connections to other key corporate leaders. We consider two sources of CEO connectedness to top executives and directors: appointment decisions and prior network ties. 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 and react efficiently to the changes in product markets. When more top executives are appointed during a CEO's tenure, the CEO's social influence increases because CEOs are heavily involved in recruiting, nominating, and appointing top executives and also 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 to current positions than executives appointed during a previous CEO's tenure (Landier, Sauvagnat, Sraer, and Thesmar 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); thus, directors appointed during a CEO's tenure may similarly be beholden to the CEO (Morse, Nanda, and Seru 2011; Coles, Daniel, and Naveen 2014).

Unlike the connections through appointment decisions, the connections through prior network ties may have less of an impact on enhancing a CEO's internal power. The rationale for using internal connections is that when an individual is appointed to a top executive position or recommended to the board by a CEO, he or 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 sharing similar education or work experiences can breed a sense of competition that may not fit as comfortably with loyalty (Khanna, Kim, and Lu forthcoming).

Our first measure, *CEO_Power1,* is defined as the average of *FTA*, the fraction of top four non-CEO executives appointed during the current CEO's tenure, and *FDA,* the fraction of non-CEO directors appointed during the current CEO's tenure. According to ExecuComp, top four non-CEO executives are defined based on the sum of executives' salaries and bonuses. *CEO_Power1* is defined as the sum of *FTA* and *FDA* divided by two.

The second measure follows previous studies (Adams, Almeida, and Ferreira 2005; Morse, Nanda, and Seru 2011; Fracassi and Tate 2012) and captures more explicit sources of CEO power that arise from a CEO's official position. It contains three components: whether the CEO chairs the board, is a founder, and has served for a long time as the CEO. Thus, our second measure, *CEO_Power2* is defined as the sum of *CEO_Founder*, *CEO_Chair* and *L_CEO_Tenure*. Following Bebchuk, Cremers, and Peyer (2011), *CEO_Founder* is an indicator equal to one if a CEO was the CEO five years prior to the IPO date reported by Compustat or the first date when the firm appears in CRSP, and zero otherwise. *CEO_Chair* is an indicator equal to one when a CEO also chairs the board, and zero otherwise. *L_CEO_Tenure* is equal to one if the CEO's current tenure is longer than six years (sample median), and

zero otherwise. Since *CEO_Founder*, *CEO_Chair* and *L_CEO_Tenure* are all indicator variables, *CEO_Power2* will be the integral values of zero, one, two or three. To make the distribution of the variable more normal, we use the logged value of *CEO_Power2* plus one as the independent variable in the regressions.

The last measure of CEO power we consider is the combination of the first two measures reflecting CEO power, both from the CEO's internal connection perspective and from the CEO's explicit power perspective. This third measure, *CEO_Power_All* is defined as the sum of *H_FTA, H_FDA* and *CEO_Power2*, where *H_FTA (H_FDA)* is equal to one if *FTA (FDA)* is greater than 0.5 (0.5) (sample median), and zero otherwise. Again, since *CEO_Power_All* will take the integral values of 0 to 5, to make the distribution of the variable more normal, we use the logged value of *CEO_Power_All* plus one as our final measure in the regressions.

We use these three measures as the key CEO power variables. Each measure covers several components. To further understand how each source of CEO power matters for reacting to product market environment conditions, we also test each component of these three CEO power measures in the later section.

Besides the above components, a CEO's equity ownership is another important factor which may influence the CEO's internal power. CEOs with more equity ownership tend to have greater voting power in the firm. However, since CEO ownership also reflects incentive received by the CEO, we do not include this factor for constructing our CEO power measures. We include CEO ownership in all regressions throughout the paper as an additional separate variable. The CEO ownership and product market environment interaction terms are also included in the regressions when we test whether our key

results are driven by other CEO characteristics.

1.4 Dependent variables

Because the fiduciary responsibility of the management executives is to promote shareholder value, our key dependent variable is firm performance primarily measured by Tobin's q. Tobin's q is defined as the market value of common equity plus the book value of total liabilities divided by the book value of total assets. The value is winsorized by top 0.5 percentile.

To investigate how CEO power affects corporate decisions under different product market conditions, we also examine the interaction effects between CEO power and product market conditions on firm investment and marketing expenditures. Firm investment is measured as capital expenditures divided by total assets, *Capx/TA*. Firm marketing expenditures are measured as advertising expenditures divided by total assets, *AD/TA*.

1.5 Other control variables

In our regressions estimating firm value, we control for firm size measured as the logged value of net sales, *LNS*, firm age measured as the logged value of the number of years from the firm's IPO date as reported in Compustat or since its first appearance in CRSP, *Ln(FirmAge)*, and CEO ownership measured by the percentage of outstanding common equity shares held by a CEO, *CEO_OWN* and CEO ownership square, CEO_OWN^2.

We also examine capital expenditures and advertising expenditures as dependent variables and in these regressions, we control for one additional variable: asset tangibility measured as gross property, plant, and equipment divided by total assets. The rationale for this additional control variable is that

firms with more tangible assets tend to be able to borrow and invest more and spend more on marketing. Although we still control for CEO ownership, CEO ownership square is not included in these regressions, since unlike Tobin's *q* regressions, previous studies do not find a non-linear relation between CEO ownership and corporate investment or advertising expenditures. We provide detailed variable definitions in Appendix 1.

2. Summary Statistics

Table 1 presents the sample distribution by year and the product market environment. The full sample covers the period 1996 through 2010. After dropping the observations with missing values for either all CEO power measures *or* for all three product market environment component variables, our sample covers *26,374* firm-year observations. Column (2) reports the number of observations in each year. Columns (3)-(6) report the number of observations in the subsamples with *Prod_Env* equal to 0, 1, 2, or 3 in each year, respectively.[8] Since BEA started to provide product shipment data based on NAICS industries in 1998 and computing industry demand shock requires the value in the previous period, our time series of the demand shock variable and thus *Prod_Env* are only available after 1999. Columns (3)-(6) report the subsamples covering the period 1999 through 2010. One can see from the table that the number of firms at the extremes is lower than the other groups, with most firms occupying stable industries with less fluidity, lower demand shocks or competition.

Insert Table 1 here

Table 2 reports summary statistics for the variables used in the main body of the paper. Panel A

[8] The sample with *Prod_Env* equal to 3 in 2009 has only 8 observations. This low number is a result of the negative demand shock from the financial crisis in 2008-2009.

contains the statistics for the full sample. In Panel B, Columns (6) and (7) report the mean of each variable separately for the high and low product market environment index subsamples – for product market environment index above one (sample median) and equal to and below one, respectively. Columns (8) and (9) show for each variable the difference between the high and the low product market environment subsamples and the P-value of the difference, respectively.

Insert Table 2 here

Inspection of Table 2, and in particular Column (9), shows that all of our CEO power variables are statistically significantly higher in high product market environment subsample than low product market environment subsample with the exception of CEO chair and the percentage of non-CEO directors appointed during the CEO tenure in advising committees. One can also see that Tobin's q is also higher in the high product market environment subsample. With respect to the other variables, one can also see that in more challenging product markets with high product change, demand shock and competition, firms are smaller and younger with more tangible assets, more capital expenditures, low advertising expenditures and younger CEOs.

3. CEO Power, the Product Market Environment and Firm Value

Our main hypothesis is that a firm benefits more from a more powerful CEO when it conducts business in a more challenging and rapidly changing product market with high fluidity or competition, or when it faces a high industry demand shock. We consider this hypothesis by interacting multiple measures of CEO power with different measures of the changes and competitiveness of the firm's product market environment. We also examine the influence of long run changes to a firm's industry through the

measure of an industry's life cycle. We examine the influence of these variables on a firm's value, as measured by its Tobin's *q*.

3.1 Detailed product market environment analyses

We begin by examining how CEO power interacts with each of our three different product market environment variables to affect firm value. Following this analysis, we examine how firm value is affected by our composite index of the product market environment. To control for firm level omitted time-invariant factors, we firstly include firm and year fixed effects. Since the focus of interest is firm value and the autocorrelation among observations associated with one firm is of the most concern, we cluster the standard errors at the firm level.

We present our initial results in Table 3. We measure the product market using fluidity (*Fluid*) in Columns (1)-(3), vertical demand shock (*VdShock*) in Columns (4)-(6) and competition in Columns (7)-(9). Since a higher TNIC Herfindahl-Hirschman index means less competitive product markets, to make the regression coefficient interpretation consistent, we measure the product market environment by a reversed TNIC Herfindahl-Hirschman index (*R_TNIC_HHI*) defined as one minus *TNIC_HHI*.

Insert Table 3 here

Inspection of the results presented in Table 3 shows that among these three product market environment factors, Tobin's *q* is consistently significantly related to the interaction of CEO power and fluidity. All the coefficients for the interaction variables of fluidity and CEO power are positive and statistically significant at least at the 5% level. The coefficients of all other interactions between CEO power variables and demand shocks and product market competition are also positive but their

significance level is lower. Overall, the results suggest that CEO power is especially useful for responding to rapid changes in product market threats from the firm's rivals.

In Table 4 we now examine the effect of CEO power interacted with our composite measure of product market environments on Tobin's *q*. We use this composite measure given no single variable can capture all different aspects of the nature of a firm's product market. As before we also include firm and year fixed effects as well as cluster the standard errors at the firm level when we conduct firm-level OLS regressions in Columns (1)-(3)

Insert Table 4 here

Inspection of Columns (1)-(3) at Table 4 shows that the interaction between CEO power and the product market environment index has a positive association with value. Tobin's *q* is higher as the CEO has more power and the product market environment becomes more challenging in terms of higher fluidity, demand shocks or competition. We find this result for all different measures of CEO power. All control variables show consistent evidence with previous studies. Smaller and younger firms tend to have higher firm value. We can also see that CEO ownership has an inverse U-shape relation with firm value.

The economic size of this product market interaction effect is significant. We compute predicted Tobin's *q*s for different product market environments. Using the coefficients from Column (1) we find that moving from the least challenging product market environment, (*Prod_Env* = 0), to the most challenging product market environment, (*Prod_Env* = 3), the predicted Tobin's *q* goes from 1.55 to 1.801. This movement is for CEO power measured as high percentage of top four non-CEO top executives and directors appointed during the CEO tenure at the 90th percentile and holding all other

variables at their sample medians. Analogously, when we consider the most challenging product market, the estimated Tobin's *q* goes from 1.581 for low CEO power at the 10th percentile to 1.801 for high CEO power at the 90th percentile, resulting in an increase of 13.92% in Tobin's *q*.

This effect is even more pronounced when we consider our explicit measure of CEO power, which occurs when the CEO is also the founder, the chairperson of the board, and when his(her) tenure is longer than six years (the sample median). Using the estimated coefficients in Column (2) of Table 4, predicted Tobin's *q* goes from 1.58 to 1.88 as you move from the least challenging product market environment (*Prod_Env* = 0) to the most challenging product market environment (*Prod_Env* = 3). We compute this predicted effect for CEO power with a value of 3 and holding all other variables at their sample medians. Analogously, when we consider the most challenging product market the estimated Tobin's *q* goes from 1.51 for low CEO power with the value of 0 to 1.88 for high CEO power with the value of 3, resulting in an increase of 24.5% in Tobin's *q*.

Since CEO power is CEO-firm pair specific, we consider cross-sectional difference among different CEOs in a given firm. Thus, we estimate CEO-firm pair level between estimation regressions as an alternative specification. The results reported in Columns (4)-(6) of Table 4 show that in more challenging and rapidly changing industries, firms have higher valuations in cross-section.

3.2 Industry Life Cycle

Our product market environment index and its three components are all measured year by year. Thus they can only capture a firm's short-term product market environment. A firm's long-term product market environment, which critically depends on its industry life cycle, may also affect the tradeoff

between benefits and costs of CEO power. We now examine how CEO power and a firm's industry life cycle jointly affect firm value. The first industry life cycle measure, *LTIndustryGrowth,* is based on the long-run growth of industry product shipments at the two-digit NAICS level during the period 1998 – 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. Similar to the industry demand shock variable, computing the change in product shipments requires the value in the previous period, so the sample used in this test covers the period 1999 - 2010. The second industry life cycle measure, *Num_IPO*, focuses on competition and growth faced by the firm. We compute the number of IPOs into each industry over the full sample period. This variable thus captures whether the industry is in a growth period, as the number of IPOs should be related to industry demand shocks and also changing industry fluidity – as fluidity captures changes to industry products and Hoberg, Phillips and Prabhala (2014) show that fluidity is related to the product text of IPO firms. We interact these two industry life cycle variables with our measures of CEO power. Since both industry life cycle variables are not time-varying, the CEO-firm pair between regressions are estimated in this section.

Insert Table 5 here

The results in Table 5 show that the interaction between CEO power and the long-term industry growth also has a positive relation to Tobin's *q* regardless of the measure of industry life cycle. This result supports the previous findings that having powerful CEOs in rapidly changing product markets has value as CEO power gives the CEO greater ability to respond to product market challenges and growth.

4. CEO Power, Product Market Environment and Corporate Activities

4.1. Corporate Investment Analyses

In this section, we explore how CEO power and the product environment interactively affect real corporate decisions. We estimate the impact of CEO power and product market conditions on firm investment and marketing expenditures. We examine investment and marketing expenditures as potential reactions to the threat of competition from product markets frequently involves the introduction of new products which may require new investment and engaging in higher marketing expenditures. Additionally, responding to positive industry demand shocks may also involve new investment and higher marketing expenditures. A powerful CEO may more easily make investment decisions in reaction to the rapid changes in product market conditions. These investments can be capital expenditures on tangible assets such as plants, assembly lines or intangible assets through advertising.

Estimation results are reported in Table 6. The dependent variable is capital expenditures divided by total assets, *Capx/TA* in Columns (1)-(3); advertising expenditures divided by total assets, *AD/TA* in Columns (4)-(6). All regressions control for firm and year fixed effects. Robust standard errors are clustered at the firm level.

Insert Table 6 here

We find consistent results showing that when a firm operates in rapidly changing, competitive product markets, having a more powerful CEO is strongly related to higher capital expenditures and advertising expenditures. In contrast, having a powerful CEO does not lead to larger capital expenditures

and even leads to lower advertising expenditures for a firm operating in a less challenging product market. These findings imply that the relation of firm investment and marketing expenditures to CEO power also depends on product market conditions.

4.2. CEO power and Reduction in Rureaucracy

The above findings imply that firms without powerful CEOs are subject to decision-making frictions that cause them to slow down the decision-making processes. The impact of this decision-making friction is *amplified* when there exist constant changes in firms' product market environment. Thus, CEO power can enhance efficiency by reducing bureaucratic constraints. In this section, we examine the impacts of CEO power on the number of board meetings to test the benefit of CEO power in relaxing bureaucratic constraints. We hypothesize that too many board meetings may slow down the decision making process since the board needs to coordinate the schedules of inside and outside directors.

Insert Table 7 here

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. The results reported in Table 7 show that all three measures of CEO power are significantly negatively related to the number of board meetings at the 1% level. These findings suggest that CEOs with stronger power are capable of making corporate decisions with less interference from the board.

5. Detailed Analysis of CEO Power

5.1 Components of CEO Power

To compare the role of each component in response to the challenges from the product market environment, we break down our CEO power indexes into each different component. As we mentioned before, our CEO power index is constructed based on two dimensions: the CEO's internal connections to other corporate leaders and his/her official positions in the firm. The CEO's internal connections to other corporate leaders are measured as the fraction of top four non-CEO executives and the fraction of non-CEO directors appointed during the CEO tenure. CEO's official positions in the firm are proxied as: whether the CEO chairs the board, is a founder, and/or has served for longer than six years (sample median) as a CEO. We examine how each of these five different factors interacts with product market conditions to affect firm value.

Insert Table 8 here

The results presented in Table 8 show that the coefficients of the *Prod_Env* interaction terms with *FTA* and *FDA* are both significantly positive. These results suggest that when firms operate in a more challenging product market, having CEOs with a higher fraction of the top executives or board of directors appointed during their tenure adds more value to the firm.

Examining the variables that capture the CEO's official positions in the firm, the coefficients of the *Prod_Env* interaction terms with *CEO_Chair* and *CEO_Founder* are also significantly positive and the coefficient of the *Prod_Env* interaction term with *CEO_Tenure* is positive but statistically

insignificant[9]. These findings suggest that when firms operate in a more challenging product market, having founder-CEOs or CEOs who also chair the board adds more to firm value; however, this is not true for entrenched CEOs (i.e., CEOs with long tenure).

5.2 Different sources of CEO power in the executive suite

In this section, we analyze which types of top executives appointed during the CEO's tenure are more useful in increasing the CEO's responsiveness to the product market environment. We examine three types of non-CEO executives: Chief Operating Officer (COO), Chief Financial Officer (CFO), and Chief Technology Officer (CTO). Although CTOs are not as common as CFOs or COOs in the executive suite, we include them because CTOs play a unique role in technology advancement and innovation which are crucial for rising to the challenges from product markets. According to the annual descriptions of executive titles (data item: TITLEANN), we manually identify the COOs, CFOs, and CTOs from the universe of executives in the ExecuComp database.[10]

Table 9 reports the results. We estimate how CEO power gained through appointment decisions of COOs, CFOs and CTOs interacts with product market conditions to affect firm value. We construct three dummy variables (*FTA_COO, FTA_CFO,* and *FTA_CTO)*, indicating whether the COO, CFO or CTO of the firm in a given year is appointed during the current CEO's tenure. We measure product market condition by fluidity, downstream demand shock, and industry competition in Panel A, B, and C,

[9] Although the first order effect of CEO_Founder appears to be negative and significant in Column 4 of Table 8, we find that unconditionally CEO founder has significantly positive impact on firm value in untabulated analysis. This is consistent with the previous findings (see, for example, Adams, Almeida, and Ferreira (2005)) that founder CEOs on average have positive impacts on firm performance.

[10]These three types of executives together account for 19.2% of all executive-year observations in ExecuComp. Among them, COO, CFO and CTOs account for 6.41%, 12.52%, and 0.49% respectively.

respectively. In each panel, Columns (1)-(3) present results regarding appointments of COOs, CFOs and CTOs, respectively. In all columns, we control for firm and year fixed effects and the same control variables as in Table 4 (our baseline model). In addition, we add dummy variables (*Miss_COO, Miss_CFO, Miss_CTO*) as controls to account for the fact that some companies either do not have a COO, CFO or CTO, or have missing information on these executives in ExecuComp. The control variables are unreported, except the missing information indicator variables.

Insert Table 9 here

Inspection of Table 9, Panel A reveals that for a firm operating in industries with high fluidity, it is beneficial to have a powerful CEO who has more influence over the appointment decisions of the CFO. On the other hand, CEO power gained through appointment decisions of the COO or CTO does not add value to such a firm. As shown in Panel C of Table 9, having a powerful CEO who has more influence over the appointment decision of the COO, CFO and CTO in general destroys firm value. However, for firms operating in a competitive product market, having such a CEO with closer relationship with COO, CFO and CTO significantly increases firm value. Unlike Panel A and C, Panel B of Table 8 displays results showing that the impact of CEO power gained from the appointment decisions of COO, CFO or CTO does not depend on whether the firm operates in a product market with high demand shocks.

Overall, our results imply that a CEO's connection to the CFO via appointment decisions helps a firm react more efficiently to product market threats and dynamic changes in product spaces and also a CEO's connection to the COO, CFO and CTO all helps a firm react more efficiently to product market

competition. However, such types of CEO connections do not necessarily help a firm adjust to demand shocks from downstream industries.

5.3 Different Sources of CEO Power in the Board Room.

Having studied CEO power arising from the appointments of key executives, we next analyze how CEOs exert influence in selecting directors serving on a variety of board committees. Since corporate boards perform the dual role of monitoring and advising the management, we examine director appointments on three categories of board committees: the audit committee, compensation committee and advisory committees.

We collect information on the audit and compensation committees from Riskmetrics. We define advisory committees as a set of committees that may assist the CEO in making crucial investment and other corporate strategy decisions. More specifically, in our sample, advisory committees include the finance, investment, and budgeting committees, the corporate strategy, M&A, and business committees, the science and technology development committees, and the executive committees. We collect information on the battery of advising committees from Boardex.

In order to proxy for CEO power in different committees, we create three measures: *FDA_Audit, FDA_Compensattion, and FDA_Advising,* by computing the fraction of non-CEO directors appointed during the current CEO's tenure in the audit, compensation, and advising committees, respectively.

Table 10 presents the results. Columns (1)-(3) present results regarding director appointments of audit committee, compensation committee and advisory committees, respectively. As controls, we

include firm and year fixed effects and the same control variables as in our baseline model.

Insert Table 10 here

In Panel A of Table 10, we show that the interaction term between product market fluidity and CEO power in the audit, compensation and advisory committees is insignificant, suggesting that CEOs' connections to the CFO matters more in product markets with high fluidity.

As shown in Panel C, the interaction effect between CEO power in the auditing and compensation committees and product market competition is positive and significant. However, there is an insignificant estimate for CEO power arising from the appointment decisions in advisory committees. Since audit and compensation committees are known for their disciplinary (rather than advising) role, our finding is consistent with the idea that CEOs' connections to these corporate leaders help circumvent potential decision-making frictions when the CEO initiates corporate actions in response to dynamic product markets.

We analyze how CEO power in the board room affects firm valuation in high demand shock product markets in Panel B. We find that the impact of CEO power through appointment decisions of key board committees does not depend on whether the firm operates in a high demand shock market. This result is similar to our previous results in Table 8. We conclude that CEO connections to corporate leaders via appointment decisions are not very helpful for reacting to industry demand shocks.

6. Alternative Potential Explanations and Robustness Tests

In this section, we consider if the positive relation between firm value and the interaction of CEO power with rapidly changing, competitive product markets is driven by other CEO characteristics. We also

present tests where we take into account the endogeneity of CEO power. Lastly we describe the various other robustness tests we have conducted, including estimation with different proxies for the product market environment and firm performance as well as different specifications and samples.

6.1 Are the results driven by other CEO characteristics?

Our results suggest that powerful CEOs respond better to rapidly changing, competitive product markets. However, an alternative hypothesis is that these results may be driven by other CEO characteristics. Specifically, we consider whether CEO ability may explain our results. Powerful CEOs could be very capable people or people with relevant industry experience. Such CEOs may be able to better react to the challenges from product markets. Thus, the higher value of firms managed by powerful CEOs in rapidly changing, competitive product markets could be driven by a CEO's capability or experience rather than CEO power.

To check this possibility, we re-estimate the main results by controlling for the effects of CEOs' capability and their experience. Following previous studies (e.g., Chevalier and Ellison 1999), we measure a CEO's capability by his/her education: an indicator of whether a CEO obtains a bachelor's degree from an Ivy League university, *Ivybachlr* and an indicator of whether a CEO obtains a MBA degree from a Top ten program ranked by US News&World Report (2010), *MBATop10*. People who are more capable are more likely to join top universities. Second, we measure a CEO's experience by the number of years of working experience in the same industry (defined based on 2-digit NASIC code) as the firm[11], *IndExp* and CEO age, *CEOAge*. Although CEO age is not a direct measure of working

[11]As robustness checks, we also test the number of years of working experience in the same industry as a CEO and obtain similar results.

experience, older people tend to be more experienced than young people. To test whether our results are driven by CEO capability and experience, we control for these variables and their interaction terms with the product market index in the regressions.

In addition to a CEO's capability and experience, our findings could also be driven by CEO ownership, since normally powerful CEOs may be granted by or self-select contracts with higher incentives and given these incentives may work thus harder and do a better job in challenging product markets. Although CEO ownership has been included in all regressions throughout the paper, to control for its differential impacts on firm value under different product market conditions, we also include the interaction term between CEO ownership and the product market index as an additional control variable in the regressions.

Insert Table 11 here

Table 11 presents these expanded results. The results show that our previous results on the interaction effects of CEO power and the product market environment still hold, suggesting that the positive impact of CEO power on reacting to the challenges from rapidly changing, competitive product markets is not driven by a CEO's capability, experience or ownership.

Among these additional product market interaction terms added in the regressions, we find that the coefficients of the interactions with CEO age are significantly negative and those of the interactions with CEO ownership are significantly positive. These suggest that younger CEOs and CEOs with more equity ownership tend to perform better in challenging product markets.

6.2 Accounting for the Endogeneity of CEO Power

We recognize that CEO power is endogenous for multiple reasons. First, our CEO power variable may be reversely affected by firm performance as the Hermalin and Weisbach (1998) model as boards may give successful CEOs more power. Second, there may be some omitted time-varying variables which may affect both firm performance and our CEO power variables. To address this potential endogeneity of CEO power, we employ an instrumental variable approach.

We construct several instrumental variables (IVs) which are related to CEO power but unlikely to directly affect firm value. Following Khanna, Kim, and Lu (forthcoming), our main IVs are top four non-CEO executive deaths and director turnovers due to death[12]. Our IVs, *Exe_Death* and *Dir_Death,* are the number of top four non-CEO executives and directors who left their positions due to sudden death during the current CEO's tenure up to the previous year (i.e., year t-1). Our IV regression test is based on the hypothesis that executive and director deaths automatically change *Ln(CEO_Power_All+1)* but unlikely directly affect firm value.

We believe that our instrument after these exclusions satisfies the exclusion restriction for several economic reasons. First, we first exclude executive and director deaths that are related to pressures from firm performance or suicide by searching media articles from Factiva on the cause of deaths. Second, to address the concern that executive and director deaths may lead to an immediate drop in firm value, we exclude executive and director deaths that happened in the concurrent year when

[12] Unlike executive death and director death, CEO death may have direct impacts on firm value, so we did not use CEO death as an IV.

constructing our IVs.[13] In addition, in order to give some suggestive evidence that the exclusion restriction may be satisfied in this case, we directly test the relation between Exe_Death (Dir_Death) and Tobin's Q in the subsequent year in our sample and find insignificant coefficient estimates for both instrumental variables.

Among all other control variables, *CEO_OWN* and CEO_OWN^2 are also considered as potential endogenous variables. Because firm fixed effects control only for time-invariant characteristics, we are concerned with endogeneity issues due to time-variant omitted variables and reverse causality from firm value to CEO ownership (Kole 1996; Cho 1998; Himmelberg, Hubbard, Palia 1999). Finding good instrumental variables for CEO ownership is difficult because firm variables related to the level of CEO ownership may also affect firm value.

Following Kim and Lu (2011), we use state and federal marginal personal income tax rates as instrumental variables for *CEO_OWN* and CEO_OWN^2. Personal income taxes may affect a CEO's ownership by influencing the composition of personal portfolios and the timing of stock transactions and option exercises, but they are unlikely to directly affect firm value. CEOs located in a high income tax state may prefer tax exempt securities to stocks more than CEOs in a low income tax state, leading to lower share ownership, all else equal.[14]

We use the sum of maximum marginal state and federal personal income tax rates, *Tax,* as an

[13] See, for example, Nguyen and Nielsen (2010), who find an average four-day (-1,+2) accumulated abnormal return of 0.85% surrounding the unexpected death of an independent director. We note that different than Nguyen and Nielsen (2010), our hypothesis is based on the long-term effect of sudden director deaths on firm value. We argue that overall, sudden director deaths are unlikely to cause long-term drop in firm value since in most cases the deceased directors will be replaced within a year.

[14] See Miller (1977) and Kim (1982) for an illustration of the important role personal taxes play in investors' choice between tax-exempt and taxable securities.

additional instrumental variable. We use maximum rates because most firms covered by ExecuComp are relatively large and their CEOs' marginal income tax rates are likely to be subject to the maximum rate.[15] For state personal income tax rates, we assume a CEO is taxed by the state of her company's headquarters location. Inclusion of state personal income tax rates makes the IV especially useful, because state tax rates vary across states with changes occurring at different points in time. Since *CEO_OWN* and CEO_OWN^2 are both endogenous, we use *Tax* and Tax^2 as instrumental variables in the regressions. We report these IV regression results in Table 12. In the first stage regressions, we regress all four endogenous variables on all the instrumental variables and the control variables with firm and year fixed effects and obtain their predicted values, respectively. The regression results are reported in Columns (1)-(4). Then, in the second stage, we re-estimate the main results with the predicted variables of all endogenous variables.

We use another instrumental variable for CEO ownership previously used by Palia (2001)—CEO tenure. Gibbons and Murphy (1992) and Edmans, Gabaix, Sadzik, and Sannikov (2010) show theoretically that equity ownership should rise with tenure, and Gibbons and Murphy (1992) and Cremers and Palia (2010) provide supporting evidence. However, it is not clear CEO tenure will be directly related to *Q*, which is consistent with our findings in Table 8.

Insert Table 12 here

We report these IV regression results in Table 12. In this section, we focus on the overall CEO

[15] We use the rates applicable to married couples filing joint returns. The Tax Foundation's Web site (http://www.taxfoundation.org/publications/show/151.html) provides federal marginal individual income tax rates. For state taxes, Web site http://www.taxfoundation.org/taxdata/show/228.html provides maximum marginal state income tax rates for 2000–2010; for 1999, we rely on the Book of the States available online at www.csg.org/policy/publications/bookofthestates.aspx.

power variable, *Ln(CEO_Power_All+1)*. In the first stage regressions, we regress all four endogenous variables on all the instrumental variables and the control variables with firm and year fixed effects and obtain their predicted values, respectively. The regression results are reported in Columns (1)-(4). The F-statistics of joint significance of the instrumental variables are all above 10, which suggests the validness of our IVs. Then, in the second stage, we re-estimate the main results with the predicted variables of all endogenous variables. Our IV estimation results show that our previously reported results are robust. Throughout we see that the effect of CEO power in the most challenging and rapidly changing product markets is positive.

6.3 Other robustness tests

We also conduct a battery of robustness checks to alternative measures of the key variables and to alternative samples. We discuss these robustness checks below with the estimated results reported in the Appendix 2. We estimate all regressions with firm and year fixed effects except the regression in Column (5), Table A.2.1 and unreported same control variables in the baseline regressions in Table 4.

6.3.1 Alternative measures of key variables

6.3.1.1 Alternative measures of the product market environment.

First, in the main results, we define the composite product market index based on linear combination of product market fluidity, industry demand shocks and competition with equal weight. However, these factors may be correlated or not equally affect product market environments. To address this concern, we re-define the composite product market index based on the Principle Component Analysis and

re-estimate the baseline regressions.

Second, in the baseline regression, we use a text-based measure of product market concentration following Hoberg and Phillips (2011). It is constructed using the Hoberg and Phillips 10-K text-based network industries (TNIC). In their method, each firm has its own set of distinct competitors based on word similarity scores of each firm's product description with each other firm's product description. To test the sensitivity to the definition of product market competition, we also measure product market concentration by using the conventional Herfindahl index based on the 3-digit SIC code industry classification, which typically focuses on a firm's main business sector to define competitors and does not change overtime.

Third, in the baseline regression, the value of demand shock variable could be positive or negative. Negative demand shocks also mean challenges to firms. To efficiently react to negative demand shocks, firms need to cut assembly lines, close unprofitable plants etc. CEO power may also help implement these corporate decisions. To capture the effects of negative demand shocks, we re-estimate the results by using the absolute value of demand shocks to measure the product market environment.

Fourth, we examine other variables that can capture product market conditions. Hoberg and Phillips (2010, 2011) show that product market similarity is also a very important perspective to describe product market conditions. A firm tends to face more competition when its products are more similar to other firms' products. Thus, the measure of product market similarity has some overlapping features with the measure of product market competition, but they are still not completely identical. To examine the sensitivity of our results to alternative measures to product market conditions, we redefine

the product market condition index by adding similarity as an additional component in the index.

6.3.1.2 Alternative performance measures.

We examine how sensitive are our main findings to measures of firm performance other than Tobin's *q*. We explore three alternative firm performance measures: return on assets (ROA), buy-and-hold stock returns during the fiscal year, and firm growth opportunities, measured as the 3-year least squares annual growth rate of sales in percentage. We report these estimation results using these additional measures of performance in Appendix 2.2. All results are robust, showing that CEO power becomes more beneficial in more challenging and complicated product markets. More interestingly, this result seems to be stronger for growth related performance measures than the accounting performance measure.

6.3.2 Alternative specifications

First, our CEO power measure could be correlated with other corporate governance variables. Thus, our results could be driven by these corporate governance measures, since firms with better governance may do a better job in reacting to challenges from external product market conditions. To address this concern, we consider three widely used governance factors: the percentage of independent directors on board, *%_Ind_Dir*, institutional investor concentration, *IOC*, and entrenchment index, *Eindex*. Since higher entrenchment index means weaker governance, we use the reversed entrenchment index, *Rev_Eindex* (i.e., Rev_Eindex = 6 - Eindex) in the regression. We re-estimate the baseline model by adding interaction terms between product market index and three corporate governance factors in the regression as additional control variables.

Second, since the product market environment often reflects industry characteristics, it is

important for us to consider industry fixed effects. Thus, we also estimate alternative specification controlling for industry and year fixed effects. We report these estimation results using these new specifications in Appendix 2.3. All of our previous results are robust.

6.3.3 Survivorship and alternative samples

An additional alternative explanation for our results is that competitive product markets play an effective role in disciplining underperforming firms by forcing them either out of business or being acquired by other companies. Thus, it is not powerful CEOs themselves are beneficial per se in competitive industries. Rather, firms with powerful CEOs in competitive industries tend to have higher values because underperforming ones are more likely to drop out of the sample in more competitive industries. Thus, survivorship bias could be a concern in our sample. To avoid potential noise due to bankruptcy, delisting, and IPOs, we re-estimate the regression by using a balanced sample that includes only firms that exist throughout the entire 12-year sample period.

Finally, we re-estimate the regression by using the subsamples with high and low product market conditions index, instead of the interaction term between product market condition index and the CEO power variable. The robustness results are overall very similar and are reported in Appendix 2.4.

7. Conclusions

We examine how the external product market influences the trade-off between the costs and benefits of CEO power. We ask why firms grant power to CEOs given well-documented negative outcomes associated with CEO power? We explicitly consider that giving CEOs more power may create value for the firm when they need to respond quickly to rapidly changing and competitive product markets. We find that in rapidly changing, more competitive product markets, CEO power can enhance firm value. We investigate why CEO may add value and show that powerful CEOs invest and advertise more in these rapidly changing product markets. We show that the beneficial effects of CEO power on firm value in challenging product markets are not explained by CEOs' capability and experience. Given the endogeneity of CEO power, we also instrument CEO power with non-CEO executive and director deaths and find that our results remain.

We show that the positive effects of CEO power in rapidly changing product markets are not limited to explicit measures of CEO power, such as whether the CEO is also the board chairman. The positive effects of CEO power in rapidly changing and competitive product markets extend to "soft" sources of CEO power that may be present when key officers of the company and board members are appointed during a CEOs tenure. Overall, our findings imply that the product market environment plays an important role in affecting the benefits and costs of CEO power.

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Table 1
Sample description

This table describes the sample firm-year observations. Column (2) reports the number of observations in each year. Columns (3)-(6) report the number of observations in the subsamples with Prod_Env equal to 0, 1, 2, or 3 in each year, respectively. Prod_Env is defined as the sum of H_Fluid, H_Vdshock and L_TNIC_HHI. H_Fluid is equal to one if fluidity (Fluid) is above the sample median; and zero otherwise. H_Vdshock is equal to one if vertical demand shock (Vdshock) is above the sample median; and zero otherwise. L_TNIC_HHI is equal to one if text-based herfindahl (TNIC_HHI) is below the sample median; and zero otherwise. The full sample covers the period 1996 through 2010 and consists of S&P 1500 firms plus those that were once part of the index. Since Prod_Env is available only after 1999, Columns (3)-(6) report the subsamples covering the period 1999 through 2010.

Year	Full	Prod_Env=0	Prod_Env=1	Prod_Env=2	Prod_Env=3
(1)	(2)	(3)	(4)	(5)	(6)
1996	1,643				
1997	1,667				
1998	1,722				
1999	1,799	203	442	433	306
2000	1,783	103	438	484	344
2001	1,662	392	478	374	50
2002	1,664	385	419	393	98
2003	1,733	331	390	390	107
2004	1,743	187	610	390	146
2005	1,744	71	560	463	218
2006	1,854	180	518	490	173
2007	2,034	226	605	370	232
2008	1,956	484	525	278	106
2009	1,893	472	570	339	8
2010	1,836	133	499	434	272
Total	26,733	3,167	6,054	4,838	2,060

Table 2
Summary statistics for the full sample and high and low product market environment subsamples

This table reports summary statistics for the variables used in the main body of the paper. Panel A contains the summary statistics for the full sample. Panel B reports the mean of each variable separately for the high and low product market environment subsamples. The high (low) product market environment subsample is when product market index is above (equal to and below) the sample median. Columns (8) and (9) show the difference in the mean of each variable between the high and low product market environment subsample, and the P-value of the difference, respectively. We provide definitions of all variables in Appendix 1.

	Panel A: Full Sample					Panel B: High and Low Product Market Environment Samples			
Variable	**Mean**	**Median**	**S.D.**	**Min**	**Max**	**H_Prod_Env**	**L_Prod_End**	**(8)=(6)-(7)**	**P-value**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Product Market Environment Variables									
Prod_Env	1.359	1.000	0.937	0.000	3.000				
Fluid	6.930	6.283	3.685	0.000	35.236				
TNIC_HHI	0.144	0.082	0.171	0.007	1.000				
Vdshock	0.031	0.041	0.104	-0.442	0.726				
LTIndustryGrowth	0.358	0.271	0.677	-0.239	2.263				
Num_IPO	161.063		172.438	0.000	1119.000				
CEO Power Variables									
CEO_Power1	0.510	0.500	0.336	0.000	1.000	0.540	0.492	0.049	(0.000)
CEO_Power2	1.310	1.000	0.988	0.000	3.000	1.329	1.237	0.091	(0.000)
CEO_Power_All	2.395	2.000	1.656	0.000	5.000	2.506	2.308	0.197	(0.000)
FTA	0.532	0.500	0.397	0.000	1.000	0.554	0.512	0.043	(0.000)
FDA	0.507	0.500	0.355	0.000	1.000	0.540	0.486	0.054	(0.000)
CEO_Tenure	7.903	6.000	7.155	1.000	60.000	8.250	7.770	0.480	(0.000)
CEO_Chair	0.576	1.000	0.494	0.000	1.000	0.531	0.563	-0.032	(0.000)
CEO_Founder	0.221	0.000	0.415	0.000	1.000	0.261	0.176	0.085	(0.000)
FTA_COO	0.209	0.000	0.407	0.000	1.000	0.220	0.188	0.033	(0.000)
FTA_CFO	0.444	0.000	0.497	0.000	1.000	0.490	0.454	0.035	(0.000)
FTA_CTO	0.018	0.000	0.133	0.000	1.000	0.028	0.021	0.007	(0.002)
FDA_Audit	0.373	0.333	0.295	0.000	0.875	0.390	0.361	0.030	(0.000)
FDA_Compensation	0.339	0.333	0.300	0.000	0.917	0.362	0.328	0.034	(0.000)
FDA_Advice	0.637	1.000	0.423	0.000	1.000	0.640	0.622	0.018	(0.157)
Other Variables									
Tobin's Q	1.950	1.476	1.429	0.373	10.863	2.313	1.877	0.435	(0.000)
Capx/TA	0.053	0.037	0.057	0.000	1.205	0.064	0.045	0.019	(0.000)
AD/TA	0.034	0.013	0.065	0.000	2.097	0.030	0.041	-0.011	(0.000)
Num_of_Board_Meeting	7.787	95.000	3.780	0.000	67.000	8.077	7.429	0.648	(0.000)
Ivybachlr	0.085	0.000	0.279	0.000	1.000	0.074	0.082	-0.008	(0.097)
MBATop10	0.167	0.000	0.373	0.000	1.000	0.145	0.172	-0.027	(0.000)
IndExp	10.033	8.000	9.345	0.000	54.000	9.022	10.916	-1.894	(0.000)
LNS	7.054	7.033	1.522	-3.411	10.386	6.905	7.109	-0.204	(0.000)
FirmAge	23.104	17.000	18.314	1.000	86.000	19.748	25.274	-5.526	(0.000)
PPE/TA	0.531	0.440	0.398	0.000	5.876	0.528	0.510	0.018	(0.003)
CEO_OWN	0.025	0.003	0.062	0.000	0.811	0.027	0.024	0.003	(0.001)
CEOAge	55.372	55.000	7.525	29.000	94.000	54.546	55.431	-0.886	(0.000)
%_Ind_Dir	0.691	7.000	0.168	0.000	1.000	0.689	0.710	-0.021	(0.000)
Ln(BoardSize)	2.216	0.714	0.284	1.099	3.664	2.140	2.174	-0.034	(0.000)
Exe_Death	0.018	0.000	0.161	0.000	2.000	0.017	0.020	-0.003	(0.370)
Dir_Death	0.061	0.000	0.262	0.000	4.000	0.049	0.063	-0.014	(0.005)
Tax	0.426	0.427	0.040	0.350	0.770	0.424	0.420	0.005	(0.000)

Table 3
The product market environment, CEO power and firm value

This table reports the impact of different product market variables and CEO power on Tobin's q. The dependent variable is Tobin's q. The product market environment is measured by fluidity (Fluid) in Columns (1)-(3); vertical demand shock (Vdshock) in Columns (4)-(6); and a reversed text-based Herfindahl-Hirschman index (R_ HHI) in Columns (7)-(9). The sample covers the period 1996 through 2010 in Columns (1)-(3) and (7)-(9); and 1999 through 2010 in Columns (4)-(6). We provide the definitions of all variables in Appendix 1. All regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level and are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Tobin's q								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CEO_Power1*Fluid	0.023**								
	(0.011)								
Ln(CEO_Power2+1)*Fluid		0.029***							
		(0.007)							
Ln(CEO_Power_All+1)*Fluid			0.012**						
			(0.006)						
CEO_Power1*Vdshock				0.515*					
				(0.269)					
Ln(CEO_Power2+1)*Vdshock					0.387**				
					(0.185)				
Ln(CEO_Power_All+1)*Vdshock						0.293*			
						(0.151)			
CEO_Power1*R_HHI							0.352*		
							(0.181)		
Ln(CEO_Power2+1)*R_HHI								0.238**	
								(0.113)	
Ln(CEO_Power_All+1)*R_HHI									0.120
									(0.087)
Fluid	-0.016**	-0.022***	-0.018**						
	(0.008)	(0.007)	(0.008)						
Vdshock				0.365**	0.578***	0.313			
				(0.178)	(0.175)	(0.200)			
R_HHI							-0.307**	-0.165	-0.257**
							(0.122)	(0.109)	(0.114)
CEO_Power1	-0.106			0.043			-0.258		
	(0.075)			(0.058)			(0.158)		
Ln(CEO_Power2+1)		-0.095*			0.106***			-0.105	
		(0.050)			(0.036)			(0.098)	
Ln(CEO_Power_All+1)			-0.032			0.046*			-0.055
			(0.037)			(0.027)			(0.076)
Ln(FirmAge)	-0.623***	-0.844***	-0.619***	-0.650***	-0.992***	-0.645***	-0.625***	-0.819***	-0.624***
	(0.131)	(0.103)	(0.131)	(0.167)	(0.143)	(0.167)	(0.133)	(0.097)	(0.133)
LNS	-0.214***	-0.239***	-0.215***	-0.254***	-0.290***	-0.257***	-0.209***	-0.231***	-0.212***
	(0.059)	(0.045)	(0.059)	(0.074)	(0.054)	(0.074)	(0.059)	(0.041)	(0.059)
CEO_OWN	1.802*	1.790**	1.537	1.465	0.504	1.204	1.807*	2.194***	1.549
	(1.028)	(0.796)	(1.027)	(1.143)	(0.826)	(1.144)	(1.023)	(0.808)	(1.025)
CEO_OWN^2	-3.660	-3.151*	-3.160	-4.279*	-1.781	-3.852	-3.689*	-3.819**	-3.216
	(2.227)	(1.626)	(2.209)	(2.581)	(1.683)	(2.564)	(2.217)	(1.667)	(2.210)
Constant	5.433***	6.232***	5.415***	5.378***	6.937***	5.365***	5.559***	6.104***	5.506***
	(0.543)	(0.477)	(0.542)	(0.719)	(0.590)	(0.719)	(0.550)	(0.455)	(0.548)
Firm FE & Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	14,396	20,460	14,391	10,736	14,541	10,731	14,444	21,643	14,439
Adjusted R-squared	0.645	0.609	0.645	0.631	0.593	0.632	0.643	0.604	0.643

Table 4
The product market environment index, CEO power and firm value

This table reports the results for the interaction of CEO power and a composite product market environment index (Prod_Env) on Tobin's q. The key independent variables are Prod_Env and CEO power. Prod_Env is defined as the sum of H_Fluid, H_Vdshock and L_TNIC_HHI. H_Fluid is equal to one if fluidity (Fluid) is above the sample median; and zero otherwise. H_Vdshock is equal to one if vertical demand shock (Vdshock) is above the sample median; and zero otherwise. L_TNIC_HHI is equal to one if text-based herfindahl (TNIC_HHI) is below the sample median; and zero otherwise. CEO_Power1 in Columns (1) and (4) is the sum of FTA, the fraction of top four non-CEO executives appointed during the current CEO's tenure and FDA, the fraction of non-CEO directors appointed during the current CEO's tenure. CEO_Power2 in Columns (2) and (5) is the sum of CEO_Founder, CEO_Chair, and L_CEO_Tenure, which equals one when the CEO has served longer than six years (sample median). CEO_Power_All in Columns (3) and (6) is defined as the sum of H_FTA, H_FDA, and CEO_Power2, where H_FTA (H_FDA) is equal to one if FTA (FDA) is greater than 0.5 (0.5) (sample median), and zero otherwise. The sample covers the period 1999 through 2010 and consists of S&P 1500 firms plus those that were once part of the index. We provide the definitions of all variables in Appendix 1. Regressions in Columns (1)-(3) include firm and year fixed effects. Regressions in Columns (4)-(6) are the CEO firm-pair level between estimation. Robust standard errors clustered at the firm level in Columns (1)-(3) are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% level, respectively.

	Tobin's q					
	OLS			**CEO-Firm Pair Level Between Regressions**		
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Prod_Env	-0.019	-0.038	-0.031	0.099*	0.111**	0.070
	(0.033)	(0.031)	(0.033)	(0.051)	(0.047)	(0.055)
CEO_Power1	-0.078			-0.231		
	(0.070)			(0.145)		
CEO_Power1*Prod_Env	0.100**			0.256***		
	(0.051)			(0.085)		
Ln(CEO_Power2+1)		-0.080*			-0.008	
		(0.047)			(0.102)	
Ln(CEO_Power2+1)*Prod_Env		0.146***			0.232***	
		(0.032)			(0.059)	
Ln(CEO_Power_All+1)			-0.023			-0.053
			(0.034)			(0.080)
Ln(CEO_Power_All+1)*Prod_Env			0.060**			0.159***
			(0.025)			(0.048)
Ln(FirmAge)	-0.655***	-0.997***	-0.646***	-0.130***	-0.144***	-0.120***
	(0.172)	(0.147)	(0.172)	(0.034)	(0.030)	(0.034)
LNS	-0.253***	-0.290***	-0.255***	-0.052***	-0.147***	-0.056***
	(0.074)	(0.055)	(0.074)	(0.019)	(0.017)	(0.019)
CEO_OWN	1.650	0.607	1.375	-0.036	-0.600	-0.723
	(1.175)	(0.832)	(1.172)	(1.212)	(1.136)	(1.216)
CEO_OWN^2	-4.753*	-2.097	-4.331	2.751	1.622	4.051
	(2.667)	(1.673)	(2.637)	(3.553)	(3.250)	(3.553)
Constant	5.428***	7.049***	5.410***	2.896***	3.054***	2.823***
	(0.741)	(0.611)	(0.740)	(0.260)	(0.238)	(0.259)
Firm FE & Year FE	Y	Y	Y	N	N	N
Observations	10,386	14,053	10,381	10,386	14,053	10,381
Adjusted R-squared	0.623	0.586	0.624	0.056	0.105	0.061
Number of CEO Firm Pairs				2,738	3,228	2,735

Table 5
Industry life cycle, CEO power and firm value

This table reports the effect of the interaction between industry life cycle and CEO power on Tobin's q. The key independent variables include industry life cycle and CEO power. Industry life cycle is measured by long-term industry growth (LTIndustryGrowth) in Columns (1) to (3), and number of IPOs (Num_IPO) in Columns (4) to (6). LTIndustryGrowth is the long-run growth of industry product shipments deflated by industry price deflators using BEA data during the period of 1998 to 2010. Num_IPO is the number of IPOs in each industry over the full sample period. CEO power is measured by CEO_Power1 in Columns (1) and (4), logged value of one plus CEO_Power2 in Columns (2) and (5), and logged value of one plus CEO_Power_All in columns (3) and (6). The sample covers the period 1999 through 2010 and consists of S&P 1500 firms plus those that were once part of the index. We provide the definitions of all variables in Appendix 1. All regressions are estimated by CEO-firm pair level between regressions. Robust standard errors are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1%, respectively.

	Tobin's q					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
LTIndustryGrowth	0.088	0.034	0.052			
	(0.058)	(0.046)	(0.064)			
Num_IPO				0.000**	0.001***	0.000
				(0.000)	(0.000)	(0.000)
CEO_Power1	-0.001			-0.299***		
	(0.143)			(0.088)		
Ln(CEO_Power2+1)		0.029			-0.016	
		(0.093)			(0.053)	
Ln(CEO_Power_All+1)			0.055			-0.106**
			(0.083)			(0.049)
CEO_Power1*LTIndustryGrowth	0.276***					
	(0.100)					
Ln(CEO_Power2+1)*						
LTIndustryGrowth		0.266***				
		(0.059)				
Ln(CEO_Power_All+1)*						
LTIndustryGrowth			0.178***			
			(0.057)			
CEO_Power1*Num_IPO				0.002***		
				(0.000)		
Ln(CEO_Power2+1)*Num_IPO					0.001***	
					(0.000)	
Ln(CEO_Power_All+1)*Num_IPO						0.001***
						(0.000)
Ln(FirmAge)	-0.129***	-0.067*	-0.127***	-0.156***	-0.149***	-0.143***
	(0.047)	(0.036)	(0.046)	(0.027)	(0.020)	(0.026)
LNS	0.007	-0.083***	0.004	-0.017	-0.116***	-0.019
	(0.027)	(0.022)	(0.027)	(0.015)	(0.012)	(0.015)
CEO_OWN	-1.605	0.308	-2.431	1.307	2.252***	0.831
	(2.164)	(1.655)	(2.176)	(1.020)	(0.803)	(1.021)
CEO_OWN^2	12.214*	3.996	13.902**	1.966	-3.173	2.971
	(6.394)	(4.708)	(6.402)	(3.062)	(2.318)	(3.061)
Constant	2.655***	2.294***	2.610***	2.115***	3.726***	2.550***
	(0.390)	(0.429)	(0.389)	(0.203)	(0.284)	(0.215)
Firm FE & Year FE	Y	Y	Y	Y	Y	Y
Observations	5,460	8,524	5,458	14,696	25,377	14,691
Number of co_per_rol	1,193	1,495	1,192	3,718	5,065	3,715
Adjusted R-squared	0.080	0.097	0.085	0.094	0.155	0.097

Table 6
The product market environment, CEO power and corporate investment

This table reports the results of the influence of CEO power on corporate investment decisions. The dependent variable is capital expenditures divided by total assets in Columns (1)-(3), and advertising expenditures divided by total assets in Columns (4)-(6). The key independent variables include CEO_Power1 in Columns (1) and (4); logged value of one plus CEO_Power2 in Columns (2) and (5); and logged value of one plus CEO_Power_All in columns (3) and (6). The sample covers the period 1999 through 2010 and consists of S&P 1500 firms plus those that were once part of the index. We provide the definitions of all variables in Appendix 1. All regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level and are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Capx/TA			AD/TA		
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Prod_Env	0.000	0.000	-0.001	-0.002**	-0.002	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
CEO_Power1	0.000			-0.007**		
	(0.002)			(0.003)		
CEO_Power1*Prod_Env	0.003**			0.003**		
	(0.001)			(0.001)		
Ln(CEO_Power2+1)		-0.000			-0.002	
		(0.001)			(0.003)	
Ln(CEO_Power2+1)*Prod_Env		0.002***			0.002	
		(0.001)			(0.002)	
Ln(CEO_Power_All+1)			-0.001			-0.004**
			(0.001)			(0.002)
Ln(CEO_Power_All+1)*Prod_Env			0.002***			0.002**
			(0.001)			(0.001)
Ln(FirmAge)	-0.020***	-0.015***	-0.020***	0.003	0.003	0.003
	(0.004)	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)
PPE/TA	0.023***	0.023***	0.023***	0.026***	0.024**	0.026***
	(0.007)	(0.006)	(0.008)	(0.006)	(0.010)	(0.006)
LNS	0.008***	0.006***	0.008***	0.000	-0.006	0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.008)	(0.003)
CEO_OWN	0.031*	0.026*	0.029*	0.005	-0.002	0.006
	(0.018)	(0.013)	(0.017)	(0.013)	(0.011)	(0.014)
Constant	0.041**	0.028*	0.041**	0.015	0.071	0.015
	(0.020)	(0.016)	(0.020)	(0.024)	(0.046)	(0.024)
Firm FE & Year FE	Y	Y	Y	Y	Y	Y
Observations	10,312	14,300	10,307	4,153	5,876	4,150
Adjusted R-squared	0.720	0.687	0.720	0.928	0.816	0.928

Table 7
CEO power and the number of board meetings

This table reports the results of the influence of CEO power on the number of board meetings. The dependent variable is the logged value of the number of board meetings. The key independent variables include CEO_Power1 in Column (1), logged value of one plus CEO_Power2 in Column (2), and logged value of one plus CEO_Power_All in column (3). The sample covers the period 1999 through 2010 and consists of S&P 1500 firms plus those that were once part of the index. We provide the definitions of all variables in Appendix 1. All regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level and are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Num_of_Board_Meeting		
VARIABLES	**(1)**	**(2)**	**(3)**
CEO_Power1	-0.049***		
	(0.015)		
Ln(CEO_Power2+1)		-0.037***	
		(0.009)	
Ln(CEO_Power_All+1)			-0.025***
			(0.007)
Ln(FirmAge)	0.050	0.067**	0.051
	(0.033)	(0.027)	(0.033)
PPE/TA	0.002	0.003	0.002
	(0.038)	(0.033)	(0.038)
LNS	0.004	0.010	0.004
	(0.015)	(0.012)	(0.015)
CEO_OWN	-0.093	-0.209*	-0.079
	(0.105)	(0.117)	(0.107)
%_Ind_Dir	0.096**	0.096***	0.096**
	(0.041)	(0.036)	(0.041)
Ln(BoardSize)	-0.037	-0.025	-0.041
	(0.032)	(0.029)	(0.032)
Constant	1.935***	1.670***	1.934***
	(0.132)	(0.114)	(0.132)
Firm FE & Year FE	Y	Y	Y
Observations	11,890	14,543	11,890
Adjusted R-squared	0.485	0.481	0.485

Table 8
Components of CEO power

This table reports the impact of different components of CEO power on Tobin's q. The key independent variables include the fraction of top four non-CEO executives appointed during the current CEO's tenure (FTA) in Column (1), the fraction of non-CEO directors appointed during the current CEO's tenure (FDA) in Column (2), CEO_Chair in Column (3), CEO_Founder in Column (4), and CEO_Tenure in Column (5). The sample covers the period 1999 through 2010 and consists of S&P 1500 firms plus those that were once part of the index. We provide the definitions of all variables in Appendix 1. All regressions include firm and year fixed effects. Robust standard errors are clustered at the firm level and are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

	Tobin's q				
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Prod_Env	0.013	-0.016	0.028	0.006	0.059**
	(0.030)	(0.031)	(0.030)	(0.021)	(0.027)
FTA	-0.080				
	(0.057)				
FTA*Prod_Env	0.107**				
	(0.044)				
FDA		-0.087			
		(0.066)			
FDA*Prod_Env		0.094**			
		(0.047)			
CEO_Chair			0.019		
			(0.047)		
CEO_Chair*Prod_Env			0.075**		
			(0.034)		
CEO_Founder				-0.307***	
				(0.118)	
CEO_Founder*Prod_Env				0.349***	
				(0.057)	
CEO_Tenure					0.001
					(0.003)
CEO_Tenure*Prod_Env					0.001
					(0.002)
Ln(FirmAge)	-1.009***	-0.691***	-1.009***	-0.916***	-1.027***
	(0.156)	(0.166)	(0.146)	(0.141)	(0.150)
LNS	-0.303***	-0.244***	-0.309***	-0.298***	-0.289***
	(0.060)	(0.070)	(0.059)	(0.059)	(0.055)
CEO_OWN	1.592*	1.149	0.468	0.351	1.220
	(0.885)	(1.098)	(0.830)	(0.822)	(0.872)
CEO_OWN^2	-3.975**	-3.091	-1.796	-1.463	-3.044*
	(1.699)	(2.551)	(1.692)	(1.683)	(1.753)
Constant	7.172***	5.444***	7.160***	6.860***	7.050***
	(0.661)	(0.699)	(0.627)	(0.609)	(0.619)
Firm FE & Year FE	Y	Y	Y	Y	Y
Observations	13,178	10,987	14,308	14,308	14,053
Adjusted R-squared	0.590	0.624	0.587	0.590	0.584

Table 9
Different Sources of CEO power in the Executive Suite

This table analyzes the effect of different sources of CEO power in the executive suite interacting with the product market environment on Tobin's q. In Panel A, B, and C, the product market environment variable is measured by Fluidity, Vdshock, and R_ HHI, respectively. In Columns (1)-(3), the key independent variables are FTA_COO, FTA_CFO, and FTA_CTO, respectively. FTA_COO is an indicator variable equal to one if the COO of the firm in a given year is appointed during the current CEO tenure. FTA_CFO and FTA_CTO are defined similarly regarding the appointments of CFO and CTO. All control variables are the same as the control variables in Table 4 and are not reported. The sample covers the period 1996 through 2010 in Panel A and C; and 1999 through 2010 in Panel B. All regressions include firm and year fixed effects. Robust standard errors clustered at the firm level are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Panel A: Different Sources of CEO Power in Executive Suite and Fluidity			
	Tobin's q		
VARIABLES	**(1)**	**(2)**	**(3)**
	FTA_COO	**FTA_CFO**	**FTA_CTO**
FTA_Exe	0.017	-0.061	-0.559
	(0.064)	(0.048)	(0.419)
FTA_Exe*Fluid	-0.006	0.018**	0.087
	(0.009)	(0.007)	(0.064)
Fluid	0.005	-0.013*	-0.036
	(0.008)	(0.007)	(0.037)
Firm FE & Year FE	Y	Y	Y
Observations	19,307	19,307	19,307
Adjusted R-squared	0.613	0.613	0.613
Panel B: Different Sources of CEO Power in Executive Suite and Vdshock			
	Tobin's q		
	FTA_COO	**FTA_CFO**	**FTA_CTO**
FTA_Exe	-0.002	0.060*	-0.017
	(0.050)	(0.035)	(0.185)
FTA_Exe*Vdshock	0.348	0.248	-1.356
	(0.227)	(0.164)	(1.015)
Vdshock	0.595***	0.758***	3.651***
	(0.180)	(0.142)	(0.673)
Firm FE & Year FE	Y	Y	Y
Observations	13,648	13,648	13,648
Adjusted R-squared	0.597	0.597	0.598
Panel C: Different Sources of CEO Power in Executive Suite and R_ HHI			
	Tobin's Q		
	FTA_COO	**FTA_CFO**	**FTA_CTO**
FTA_Exe	-0.249**	-0.133*	-0.766**
	(0.112)	(0.069)	(0.360)
FTA_Exe*R_HHI	0.282**	0.217***	1.046**
	(0.130)	(0.083)	(0.478)
R_HHI	-0.183*	-0.165**	-0.624*
	(0.105)	(0.076)	(0.337)
Firm FE & Year FE	Y	Y	Y
Observations	20,428	20,428	20,428
Adjusted R-squared	0.608	0.608	0.608

Table 10
Different Sources of CEO Power in the Board Room

This table analyzes the effect of different sources of CEO power in the board room interacting with the product market environment on Tobin's q. In Panel A, B, and C, the product market environment variable is measured by Fluidity, Vdshock, and R_ HHI, respectively. In Columns (1), (2) and (3), the key independent variables are FDA_Audit, FDA_Compensation and FDA_Advice, respectively. FDA_Audit is the fraction of directors appointed during the current CEO's tenure in the audit committee, excluding the CEO from both the numerator and denominator if the CEO is on the board. FDA_Compensation and FDA_Advice are defined similarly regarding the appointments of the compensation committee and advisory committees. All control variables are the same as the control variables in Table 4 and are not reported. The sample covers the period 1996 through 2010 in Panel A and C; and 1999 through 2010 in Panel B. We provide the definitions of all variables in Appendix 1. All regressions include firm and year fixed effects. Robust standard errors clustered at the firm level are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1% level, respectively.

Panel A: Different Sources of CEO Power in the Board and Fluidity			
		Tobin's q	
VARIABLES	**(1)**	**(2)**	**(3)**
	FDA_Audit	**FDA_Compensation**	**FDA_Advice**
FDA_Committee	-0.116	-0.175	-0.106
	(0.076)	(0.120)	(0.078)
FDA_Committee*Fluid	0.019	0.025	0.021
	(0.011)	(0.022)	(0.013)
Fluid	-0.010	-0.010	-0.034***
	(0.007)	(0.008)	(0.013)
Firm FE & Year FE	Y	Y	Y
Observations	15,152	15,152	6,929
Adjusted R-squared	0.646	0.513	0.549
Panel B: Different Sources of CEO Power in the Board and Vdshock			
		Tobin's q	
	FDA_Audit	**FDA_Compensation**	**FDA_Advice**
FDA_Committee	0.031	-0.032	0.060
	(0.058)	(0.062)	(0.057)
FDA_Committee*Vdshock	0.171	0.211	0.236
	(0.295)	(0.272)	(0.323)
Vdshock	0.573***	0.563***	0.627**
	(0.168)	(0.159)	(0.310)
Firm FE & Year FE	Y	Y	Y
Observations	11,346	11,346	4,508
Adjusted R-squared	0.632	0.632	0.612
Panel C: Different Sources of CEO Power in the Board and R_HHI			
		Tobin's q	
	FDA_Audit	**FDA_Compensation**	**FDA_Advice**
FDA_Committee	-0.315*	-0.469***	0.088
	(0.173)	(0.180)	(0.170)
FDA_Committee*R_HHI	0.355*	0.493**	-0.079
	(0.198)	(0.206)	(0.190)
R_HHI	-0.273**	-0.307***	-0.023
	(0.110)	(0.108)	(0.168)
Firm FE & Year FE	Y	Y	Y
Observations	15,202	15,202	7,307
Adjusted R-squared	0.644	0.644	0.629

Table 11
Controlling for other CEO characteristics

This table reports results for the interaction of CEO power and the product market environment on Tobin's q, controlling for other CEO characteristics. These CEO characteristics include an indicator for whether a CEO received a bachelor's degree from an Ivy League university (Ivybachlr), an indicator for whether a CEO obtained a MBA degree from Top 10 programs ranked by US News & World Report (2010) (MBATop10), the number of years of working experience in the same industry as the firm (Indexp_Exe), CEO age (CEOAge), and CEO ownership (CEO_OWN and CEO_OWN^2). The key independent variables are Prod_Env and CEO power. CEO power is measured by CEO_Power1 in Column (1), logged value of one plus CEO_Power2 in Column (2), and logged value of one plus CEO_Power_All in column (3). The sample covers the period 1999 through 2010 and consists of S&P 1500 firms plus those that were once part of the index. We provide the definitions of all variables in Appendix 1. All regressions include firm and year fixed effects. Robust standard errors clustered at the firm level are reported in parentheses. Coefficients marked with *, **, and *** are significant at the 10%, 5%, and 1% level, respectively.

	Tobin's q		
VARIABLES	**(1)**	**(2)**	**(3)**
Prod_Env	0.438**	0.779***	0.457**
	(0.191)	(0.168)	(0.191)
CEO_Power1	-0.038		
	(0.097)		
CEO_Power1*Prod_Env	0.131**		
	(0.064)		
Ln(CEO_Power2+1)		-0.101*	
		(0.060)	
Ln(CEO_Power2+1)*Prod_Env		0.192***	
		(0.039)	
Ln(CEO_Power_All+1)			-0.009
			(0.046)
Ln(CEO_Power_All+1)*Prod_Env			0.078**
			(0.031)
Ivybachlr	-0.054	-0.066	-0.059
	(0.136)	(0.124)	(0.136)
Ivybachlr*Prod_Env	-0.097	-0.060	-0.093
	(0.096)	(0.085)	(0.095)
MBATop10	-0.145	-0.073	-0.141
	(0.091)	(0.087)	(0.091)
MBATop10*Prod_Env	0.055	0.053	0.050
	(0.059)	(0.057)	(0.059)
Indexp_Exe	0.004	0.004	0.004
	(0.004)	(0.004)	(0.004)
Indexp_Exe*Prod_Env	-0.002	-0.004*	-0.002
	(0.002)	(0.002)	(0.002)
CEOAge	0.008	0.012**	0.007
	(0.005)	(0.005)	(0.005)
CEOAge*Prod_Env	-0.008**	-0.015***	-0.009**
	(0.004)	(0.003)	(0.004)
Ln(FirmAge)	-0.596***	-0.867***	-0.587***
	(0.194)	(0.153)	(0.194)
LNS	-0.255***	-0.300***	-0.257***
	(0.085)	(0.063)	(0.085)
CEO_OWN*Prod_Env	0.824*	0.425	0.816*
	(0.498)	(0.338)	(0.490)
CEO_OWN	-0.593	-0.150	-0.762
	(1.519)	(1.035)	(1.527)
CEO_OWN^2	-2.468	-2.296	-2.269
	(3.088)	(2.151)	(3.081)
Constant	4.887***	6.374***	4.896***
	(0.901)	(0.601)	(0.900)
Firm FE & Year FE	Y	Y	Y
Observations	8,818	11,584	8,813
Adjusted R-squared	0.622	0.595	0.623

Table 12
IV regression results

This table reports instrumental variable regression results for the regression specification of Table 4. The endogenous variables are Ln(CEO_Power_All+1), Ln(CEO_Power_All+1)*Prod_Env, CEO_OWN and CEO_OWN^2. The instrumental variables are Exe_Death, Dir_Death, Tax, and Tax^2. The 1st stage instrumental regression results are reported in Columns (1)-(4) and 2nd Stage regression results are reported in Column (5). The sample covers the period 1999 through 2010 and consists of S&P 1500 firms plus those that were once part of the index. We provide the definitions of all variables in Appendix 1. All regressions include firm and year fixed effects. Robust standard errors are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1% level, respectively.

	1st Stage				2nd Stage
	Ln(CEO_Power_All+1)	Ln(CEO_Power_All+1) *Prod_Env	CEO_OWN	CEO_OWN^2	Tobin's q
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Prod_Env	-0.002	1.053***	0.002***	0.001***	-15.441***
	(0.007)	(0.015)	(0.001)	(0.000)	(4.527)
Ln(CEO_Power_All+1)_Hat					-18.530***
					(5.410)
(Ln(CEO_Power_All+1)*Prod_Env)_Hat					15.135***
					(4.411)
Ln(FirmAge)	-0.416***	-0.664***	-0.013***	-0.002**	0.726*
	(0.033)	(0.064)	(0.003)	(0.001)	(0.425)
LNS	0.003	-0.028	-0.004***	-0.001*	-0.138**
	(0.014)	(0.029)	(0.001)	(0.000)	(0.067)
CEO_OWN_Hat					59.127***
					(17.097)
CEO_OWN^2_Hat					-752.186***
					(188.765)
Exe_Death	0.050*	0.012	-0.005**	-0.001***	
	(0.030)	(0.070)	(0.002)	(0.000)	
Dir_Death	0.184***	0.192***	-0.003*	-0.001**	
	(0.025)	(0.043)	(0.002)	(0.001)	
Tax	-2.713	-2.754	0.138	0.038	
	(2.378)	(4.815)	(0.233)	(0.099)	
Tax^2	2.719	2.137	-0.080	-0.047	
	(2.310)	(4.494)	(0.215)	(0.084)	
CEO_Tenure	0.080***	0.106***	0.002***	0.000***	
	(0.002)	(0.003)	(0.000)	(0.000)	
Constant	2.304***	2.203*	0.028	0.005	19.862***
	(0.610)	(1.270)	(0.059)	(0.026)	(4.209)
Firm FE & Year FE	Y	Y	Y	Y	Y
Observations	10,361	10,361	10,361	10,361	10,361
Adjusted R-squared	0.694	0.786	0.742	0.648	0.623
F-statistics (IVs)	593.67	293.06	47.69	11.98	
Prob4F (IVs)	0.0000	0.0000	0.0000	0.0000	