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

Minwen Li, Yao Lu and Gordon Phillips*

March 15, 2014

Abstract

We examine whether CEO power combines with the product market environment to differentially impact firm value. We find that in more competitive, high demand product markets that are changing rapidly, CEO power has a positive impact on the value of the firm as measured by Tobin's q. Examining the sources of CEO power, we find that appointments of CFOs and CTOs and board member members to key committees during the CEO's tenure have a positive impact on Tobin's q in highly fluid and competitive product market environments. Our findings imply that the product market plays an important role in affecting the benefits and costs of CEO power.

* Comments are welcome. Minwen Li and Yao Lu are from Tsinghua University and can be contacted at liminwen@sem.tsinghua.edu.cn and Luyao@sem.tsinghua.edu.cn respectively. Gordon Phillips is from the University of Southern California and can be reached at Gordon.Phillips@marshall.usc.edu. We have benefited from helpful comments and suggestions from E. Han Kim. All errors and omissions are the authors' responsibility.

I. Introduction

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] Recently, Graham, Harvey, and Puri (2013) show CEOs' behavioral traits such as optimism, risk-aversion, and time preference are related to corporate financial policies and managerial compensation, while Bertrand and Shoar (2003) find CEO characteristics matter for a wide range of firm policies.[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. As Heralin and Weisbach (1998) model, CEO power in many situations is likely to be endogenous. Boards of directors are likely to give the CEO more power when CEOs have performed well, as more power will enable the CEO to influence more decisions. However, recent evidence on CEO power suggests powerful CEOs may be bad news for shareholders (e.g., Bebchuk, Cremers, and Peyer, 2011; Landier, Sauvagnat, Sraer, and Thesmar, 2013). Bebchuk and Fried (2004) argue that powerful CEOs reduce the linkage between CEO compensation and firm performance. Morse, Nanda, and Seru (2011) show that powerful CEOs may rig incentive contracts. Khanna, Kim, and Lu (2013) show that CEO power arising from personal decisions can enhance the likelihood of corporate fraud and also reduce the detection of fraud.

With all these negative outcomes associated with CEO power, why are there

[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 (2011) 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.

still powerful CEOs? 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 condition in which it operates. This amount of power would change over time. There are potential benefits of CEO power. For some firms, concentration of power in the CEO office helps expedite decision-making processes, resulting in more timely and efficient reaction to internal and external problems or pro-action to anticipated changes in market conditions. Such benefits are evident 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 Stigliz, 1986, 1991).

However, the central factors that influence how powerful CEOs add value and how the benefits and costs of CEO power change over time remain unknown. We explicitly consider that giving CEOs more power may create value for the firm when they need to respond quickly to a rapidly changing product market. In this paper, we focus on how the external product market influences the trade-off between the benefits and costs of CEO power. Specifically we investigate how CEO power interacts with product market conditions to affect firm performance. Our results show that the product market combines with CEO power to influence a firm's market value. We find that in more competitive, high demand product markets that are changing rapidly, CEO power has a positive impact on firm value as measured by Tobin's q.

Our central idea is that when product markets become more challenging and complicated, the management should rapidly undertake efficiency-enhancing measures and value-increasing business decisions to stay abreast, or get ahead, of the

competition or catch hold of growth opportunities. Efficiently implementing such corporate activities normally requires the CEO to have sufficient power to lead the firm and management team. In these circumstances, whether a CEO can efficiently lead the management team to react to the changes in product market conditions is crucial for firm performance.

We consider three key measures of a firm's product market environment to capture changes in the external product market. The first one is a text-based measure of product market fluidity from Hoberg, Phillips and Prabhala (2014). It captures product space dynamics and changes in 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) and is available on the Hoberg-Phillips industry data website. It captures changes in each year of a firm's competitors and thus of the competition it faces in the product market.

Our measures of CEO power have both "soft" and explicit measures that capture the CEO's ability to influence and direct corporate behavior. We capture "soft" influence by the CEO's internal connections to other corporate leaders or his/her official positions in the firm. Thus, following Khanna, Kim, and Lu (2013), we construct several key measures of CEO power that arise from the fraction of top four non-CEO executives and non-CEO directors appointed during the current CEO's tenure. We also 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. Consistent with a recent previous study (Landier, Sauvagnat, Sraer, and Thesmar, 2013), we find that CEO power standalone variables show a negative (insignificant) relation with firm value. However, the interaction terms between CEO power variables and our proxies for the competitiveness of product market condition are significantly positive, suggesting that the product markets with high fluidity, demand shocks or competition make CEO power more beneficial in enhancing firm value.

We recognize that CEO power and ownership are endogenous as Hermalin and Weisbach (1998) model and show that our results are robust to instrumenting CEO power and CEO ownership with exogenous CEO and director deaths and changes in state-level marginal personal income tax rates. Our results are also robust to alternative specifications including CEO-firm pair between regressions and industry fixed regressions, alternative measures of key variables including alternative firm performance variables and product market environment variables (e.g., industry life cycle) and alternative ways of constructing our sample of firms.

Given that corporate investment decisions play very important roles in affecting firm value, we also investigate the role of CEO power in firm investment decisions. We find that having a more powerful CEO is strongly related to capital expenditures in product markets with higher fluidity, demand shocks or competition. These findings imply that the impact of CEO power on corporate investments also

depends on product market conditions.

To further understand how CEO power interacts with product market conditions to affect firm value, we examine the three components of product market conditions: product market fluidity, demand shocks and competition. We find that among these product market factors, product market fluidity has the largest influence on the effect of giving the CEO more power. We also show that high competition on its own has an insignificant negative effect on firm Tobin's *q*, giving the CEO more power mitigates this negative effect.

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 examine the potential sources of CEO soft power and the relationship between the CEO and the chief financial officer (CFO), the chief technology officer (CTO), and the chief operating officer (COO) by whether the CFO, the CTO and the COO are appointed during the current CEO's tenure. We find that when the CFO and the CTO are appointed during the CEO's tenure, there is a positive relation between the product market fluidity and competition and firm value. Similarly, we find that having greater fractions of directors appointed during the CEO's tenure on key committees, including the audit, compensation and advising committees, has a positive relation to firm value in product market environments with higher product fluidity.

Our results contribute to the literature studying CEOs by helping understand the two-sided nature of CEO power. They add to our understanding of the dynamic nature of assigning power to CEOs. In environments that are more stable with less competition, CEO power decreases Tobin's *q*; while in rapidly changing 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 optimal 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 most attentions 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, 2008). Most studies in the corporate governance literature focus on how product market competition interacts with other aspects of corporate governance. 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. Kang, Kim and Lu (2013) shows that firms can benefit more from independent directors who have CEO and industry combined experience in more competitive product markets. In this paper, we incorporate more dimensions of product market environment and show how the product market environment interacts with multiple components of CEO power to influence firm

value.

Our paper proceeds as follows. Section II describes our data and key variables, including our measure of firm's product market environment and CEO power, the outcome variables and control variables we use. Section III presents summary statistics. Section IV presents our results and Section V concludes.

II. Data and Key Variables

A. Sample

We construct our sample by matching several different databases. Our initial sample consists of S&P 1,500 firms over the time period of 1996 to 2010. In particular, we construct three CEO power indexes from ExecuComp, Riskmetrics' Directors, and BoardEx datasets. Our product market environment variables are taken from the Hoberg-Phillips Data Library and Bureau of Economic Analysis (BEA) website. Financial and accounting data are taken from Compustat. Stock return data are taken from CRSP. The sample begins in 1996 because ExecuComp coverage is quite limited prior to 1996. The number of observations varies across regressions due to data availability of required variables.

We calculate two main independent variables, firm level Tobin's q and *Capx/TA*, based on the financial data in Compustat. In addition, we access Compustat to construct control variables such as *LNS, PPE/TA* and *Ebitda/TA*. We compute firm age by obtaining information on a firm's IPO year or the year when the firm first appeared in CRSP. CEO ownership data is from the ExecuComp database. In section E, we elaborate on how we construct the above control variables. In constructing our

sample, we drop observations with missing values *either* for both CEO power measures, *or* for all the above product market environment variables. The procedure leads to a sample of 20,658 firm-year observations. Table 1 illustrates the distribution of this sample by fiscal year.

B. Product Market Environment Variables

We use three key measures of a firm's product market environment to capture changes in the external product market. First, we use a text-based measure of product market fluidity from Hoberg, Phillips and Prabhala (2014).[3] 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 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 current product offerings.

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.

[3] This measure of fluidity can be downloaded from the Hoberg-Phillips industry data web page at: http://alex2.umd.edu/industrydata/index.html

Second we use a measure of the changes to demand that a firm faces in its external product market. We capture these changes to a firm's demand using the changes in product shipments for *downstream* industries. The changes in shipments are based on product shipments from the BEA website[4] and are for a firm's downstream industries. 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 available on the Hoberg-Phillips industry data website. We use the Herfindahl 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.

Given 10-Ks are updated annually, the product market fluidity and TNIC Herfindahl 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.

To normalize these three factors and construct a composite index, we consider whether a firm operates in industries that are above the median in terms of fluidity, demand, and competition, thus capturing if the firm is operating in a rapidly changing product market environment. Specifically, our measure of fluidity, *H_Fluid,* is equal to one if fluidity is above the sample median and zero otherwise. Our demand shock

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

variable, *H_Vdshock*, is equal to one if the vertical demand change is above the sample median and zero otherwise. Lastly, our text-based concentration measure, *L_HHI*, is equal to one if text-based herfindahl, *HHI*, is below the sample median to capture increased 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_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.

We start with estimating the results with this composite measure of the product market environment. To further understand how CEO power helps respond to different aspects of product market conditions, we also examine each product market environment factor separately. In addition, we test whether the benefits of CEO power depend on the industry life cycle. To examine the influence of the industry life cycle, we obtain firm-level IPO data from Securities Data Company (SDC) Thompson Platinum database. We then compute the total number of IPOs for the competitors of each firm over the full sample period to proxy for industry life cycle.

C. CEO Power

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 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 activities to 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 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, 2013).

Unlike the connections through appointment decisions, the connections through prior network ties may have little 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, 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.

Thus, our first measure, *CEO_Power1,* is defined based on *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_Power1* is defined as the sum of *FTA* and *FDA* divided by two.

The second measure follows previous studies 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 six years or more (the sample median) 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 first date when the firm appears in CRSP or Compustat, 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 independent variables 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 internal connections perspective and the CEO's official 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 *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 condition, we also test each component of these three CEO power measures in the later section.

Besides the above components, CEO equity ownership is another important factor which may influence CEO 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 do include CEO ownership in all regressions throughout the paper as an additional separate variable.

D. 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 firm performance under different product market conditions, we also examine the interaction effects between CEO power and product market conditions on firm investment activities. Firm investment activities are measured as capital expenditures divided by total assets, *Capx/TA*.

E. Other control variables

In all regressions with Tobin's q as the dependent variable, 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 as reported in CRSP or the number of years since its first appearance in CRSP, *Ln(FirmAge)*, profitability measured by earnings before interest, tax, depreciation and amortization (EBITDA) divided by total assets, *Ebitda/TA*, and CEO ownership measured by the percentage of outstanding common shares held by a CEO, *CEO_OWN* and CEO ownership square, CEO_OWN^2.

In the investment regressions we control for two additional variables, leverage measured as long term debt divided by total assets, *Leverage* and asset tangibility measured as gross property, plant, and equipment divided by total assets, *PPE/TA*. Although we still control for CEO ownership, CEO ownership square is not included in the investment regressions, since unlike Tobin's q regressions, previous studies do not find a non-linear relation between CEO ownership and capital expenditures. We provide detailed variable definitions in Appendix 1.

III. 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 (e.g., fluidity, demand shock, and Herfindahl index), our sample covers 20,658 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.[5] Since *Prod_Env* is available only after 1999, given the demand shock is based on NAICS industries which are 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 lower demand shocks and less fluidity.

Table 2 reports summary statistics for the key variables in our study. Panel A 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 equal to and below one (sample median) and above 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.

Inspection of Table 2, and in particular Column (9), shows that all of our CEO

[5] 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.

power variables and also Tobin's q are statistically different across the high and low product change, competition product environments. CEOs have more power in the high change, high competition product market environment for all CEP power measures with the exception of CEO chair. One can also see that Tobin's q is also higher in the high change, high competition product market environment subsample. Thus before analyzing the data in regressions, we can see that both CEO power and Tobin's q are higher in high product change, high competition product market environments. With respect to the control variables, one can also see that in the high product change, high competition product market environments, firms are smaller and younger with more capital expenditures.

IV. CEO Power and the Product Market Environment

Our main hypothesis is that a firm benefits more from a more powerful CEO when it conducts business in a product market with high fluidity or similarity, or when it faces a high industry demand shock. We consider this hypothesis interacting multiple measures of CEO power with different measures of the changes and competitiveness of the firm's product environment. We also examine the influence of long run changes to a firm's industry through measures of an industry's life cycle. We examine the influence of these variables on both a firm's value, as measured by its Tobin's q, and on its investment decisions.

A. Multivariate Evidence: CEO Power and the Product Market Environment

Table 3 examines the interaction of CEO power with the firm's product market

environment. We interact the three CEO power measures with our composite product market environment index. We include firm and year fixed effects. Since the focus of interest is CEO power and the autocorrelation among observations associated with one CEO is of the most concern, we cluster the standard errors at the CEO-firm pair level.

Insert Table 3 here

Inspection of Table 3 shows that while CEO power and a more challenging product market environment both have negative, insignificant effects on Tobin's *q*, the interaction between CEO power and the product market environment has a positive associate with value. Tobin's *q* is higher as the product market environment becomes more competitive and the CEO has more power. We find this result for all different measures of CEO power. All control variables show consistent evidence with previous studies. Smaller, younger and more profitable firms tend to have higher firm value. We can also see that CEO ownership has a inverse U-shape relation with firm value.

Table 4 presents the economic significance of the results. This table shows the predicted Tobin's *q* at different levels of CEO power and different levels of the product environment based on different discrete values – ranging from 0 to 3 – of the variable *Prod_Env*. *Prod_Env* is defined as the sum of *H_Fluid*, *H_Vdshock* and *L_HHI,* which are indicator variables described earlier. Throughout, all other variables are held at their sample medians.

The predicted Tobin's *q*s in Panel A-C are computed using the coefficients from the regressions reported in Columns (1)-(3) of Table 3, respectively. In Panel A, the estimated Tobin's *qs* at *CEO_Power1* equal to 10 percentile, 25 percentile, 50

percentile, 75 percentile, and 90 percentile are reported in Columns (1)-(5), respectively. In Panel B, the estimated Tobin's *qs* at *CEO_Power2* equal to 0, 1, 2, and 3 are reported in Columns (1)-(4), respectively. In Panel C, the estimated Tobin's *qs* at *CEO_Power_All* equal to 0, 1, 2, 3, 4 and 5 are reported in Columns (1)-(6), respectively.

All three panels show that there is an economically significant relation between CEO power and a firm's product market environment on the predicted or estimated Tobin's *q*. This relation is positive and particularly strong at the highest levels of CEO power. In Panel A, Column (5) shows that as you move from the least challenging product market environment (Prod_Env.=0: low fluidity, low competition, low demand shocks) to the most challenging product market environment (Prod_Env.=3: high fluidity, high competition, high demand shocks), the predicted Tobin's *q* goes from 1.61 to 1.84. Analogously, when you consider the most challenging, highly fluid product market the highest estimated Tobin's *q* of 1.84 occurs for high CEO power at the 90th percentile.

This effect is even more pronounced as shown in Panel B when you consider our second more 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). In Panel B, Column (4) shows that as you move from the least challenging product market environment (Prod_Env.=0: low fluidity, low demand, low competition) to the most challenging product market environment (Prod_Env.=3: high fluidity, high competition, high demand shocks), the predicted Tobin's *q* goes from 1.74 to 1.99. Analogously, when you consider the most

challenging product market the highest estimated Tobin's q of 1.99 occurs for high CEO power with the value of 3.

B. Cross-sectional Between Regressions and Industry Fixed Effect Regressions

We now examine alternative specification results. Since CEO power is CEO manager-specific, it is important for us to consider cross-sectional difference among different CEOs in a given firm. Thus, our first alternative specification reports CEO-firm pair level between estimation results. The results are reported in Panel A of Table 5. Since the product market environment often reflects industry characteristics, it is important for us to consider industry fixed effects. Thus, our second alternative specification shows the results controlling for industry and year fixed effects. The results are reported in Panel B of Table 5. All control variables are the same as in Table 3 and not reported.

Insert Table 5 here

The results in Panel A show that more challenging, fluid industries, high demand shocks or high competition have higher valuations in cross-section. Panel A also shows that there is a significant negative effect of appointment based CEO power in cross-section. This is consistent with the findings from Landier et al. (2013). Interacting these two variables we see that there is a strong positive effect of CEO power in industries with high fluidity/high demand shocks and high competition, as more firms enter these industries with high demand shocks and the products thus change rapidly. Panel B shows similarly strong results. We see again that there is a positive effect of the high product market environment index and CEO_Power

interacted with this variable on Tobin's q

C. CEO Power and the Industry Life Cycle

Given that high competition is a component of our product market environment index, we now examine industry growth and competition with an alternative measure of the product market environment and examine the relation of CEO power to firm value when there is significant new entry in industries. We compute the number of IPOs into each industry over the full sample period. This variable thus capture 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 the number of industry IPOs with our measures of CEO power. Since the industry IPO variable is not a time-varying variable, the CEO-firm pair between regressions are estimated in this section.

Insert Table 6 here

The results in Table 6 show that the number of industry IPOs is indeed significantly and positively related to firm Tobin's q, and the interaction between CEO power and the number of industry IPOs also has a positive relation to Tobin's q. The results support the previous findings that having powerful CEOs in rapidly changing product markets has value as it gives the CEO greater ability to respond to product market challenges and new conditions.

D. The Product Market Environment, CEO power and Corporate Investment

If a powerful CEO helps improve firm value under more challenging, competitive product market conditions, how does it work? A potential channel is through corporate investment decisions. Reacting to the threat of competition from product markets frequently involves the introduction of new products which may require new investments. Catching positive industry demand shocks may also require new investments. A powerful CEO may more easily make investment decisions in reaction to the rapid changes in product market conditions.

In this section, we explore this channel by estimating the interaction effects of CEO power and product market conditions on firm investment. The dependent variable is capital expenditure divided by total assets, *Capx/TA*. The control variables include tangibility of assets measured as property, plant, and equipment divided by total assets, *PPE/TA*, firm size measured as the logged value of sales, *LNS*, leverage measured as long-term debt divided by total assets, *Leverage*, firm accounting performance measured by EBITDA divided by total assets, *Ebitda/TA* and CEO ownership, *CEO_OWN*. All regressions control for firm and year fixed effects. Robust standard errors are clustered at the CEO-firm pair level. Estimation results are reported in Table 7.

Insert Table 7 here

In Column (1) of Table 7, we estimate the standalone impact of the product market condition index on capital expenditure. Consistent with the prediction, we find that firms tend to invest more in product markets with higher fluidity, demand shocks

or competition. In Columns (2)-(4), we estimate the interaction effects for the three CEO power variables, respectively. We find consistent results showing that that when a firm that operates in a more challenging product market due to high fluidity, demand shocks or competition, having a more powerful CEO is strongly related to higher capital expenditures. In contrast, having a powerful CEO does not lead to larger capital expenditures for a firm operating in a less challenging product market. These findings imply that the relation of firm investment to CEO power also depends on product market conditions.

E. **Components of CEO Power**

We break down our CEO power indexes into each different component and compare the role of each component in response to the challenges from the product market environment.

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. The results are reported in Table 8.

Insert Table 8 here

The results presented in Table 8 show that a CEO's internal connections to other corporate leaders have significant positive interaction effects with the more fluid, competitive product market condition on Tobin's *q*. In particular, the coefficients of the *Prod_Env* interaction terms with *FTA* and *FDA* are both significantly positive, suggesting that when firms operate in a more challenging and complicated product market, having CEOs who appoint a higher fraction of the top executives or board of directors add 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. These findings suggest that when firms operate in a more challenging and complicated 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).

F. Detailed Product Market Environment Analyses

We also break down our product market environment index into each different component and compare how CEO power interacts with each aspect of product market environment.

As we mentioned before, our product market environment index is constructed based on three factors: product fluidity, industry demand shock and product market competition. We examine how CEO power interacts with each of these three different

product market aspects to affect firm value. The results are reported in Table 9. Product market environment is measured by fluidity (*Fluid*) in Columns (1)-(3) and vertical demand shock (*Vdshock*) in Columns (4)-(6). Since a higher Herfihdahl-Hierschmann index means less competitive product markets, to make the regression coefficient interpretation consistent, we measure the product market environment by a reversed Herfihdahl-Hierschmann index (*R_HHI*), in Columns (7)-(9). Specifically, *R-HHI* is defined as one minus *HHI*.

Insert Table 9 here

Inspection of the results presented in Table 9 shows that among these three product market environment factors, CEO power is the most helpful for responding to product market fluidity. All the coefficients for the interaction variables of fluidity and CEO power are positive and statistically significant. 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 are consistent with the previous results that CEO power is associated with higher firm value in more fluid and highly competitive product markets. CEO power is especially useful for responding to product market threats from the firm's rivals.

G. Different Sources of CEO Power in the Executive Suite

We have shown that in more challenging product markets, CEO power arising from the appointments of key corporate leaders has a positive impact on firm valuation. The relationship between the CEO and corporate leaders with certain positions can strengthen or weaken the CEO's power in different aspects. Thus, in this

section, we analyze which types of corporate leaders in the executive suite appointed during the CEO's tenure are more useful for response to product market fluidity, demand shocks and competition, respectively. Particularly, 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 crucially affect product market environments.

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. 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.

Table 10 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 competitiveness in Panel A, B, and C, respectively. In each panel, Column (1) presents results regarding appointments of COOs, while Column (2) and (3) present results regarding appointments of CFOs and CTOs, respctively. In all columns, we control for firm and year fixed effects and the same control variables as in Table 3

(i.e., 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 10 here

Inspection of Table 10, Panels A and C reveal that for a firm operating in industries with high fluidity and competition, it is beneficial to have a "powerful" CEO who has more influence over the appointment decisions of the CFO or CTO. On the other hand, CEO power gained through appointment decisions of the COO does not add value to such a firm. As shown in Panel A of Table 10, having a "powerful" CEO who has more influence over the appointment decision of the CFO in general destroys firm value. However, for firms operating in a dynamically changing product market, having such a CEO with closer relationship with CFO significantly increases firm value. We find similar evidence for firms operating in a competitive product market, and also regarding the appointment relationship between CEO and CTO.

Panel B of Table 10 displays results for the impact of CEO power on firm value in high demand product markets. Consistent with our results in Table 9, we find 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 high demand product market.

Overall, our results imply that a CEO's connection to the CFO or CTO via appointment decisions helps a firm react more efficiently to product market threats

and dynamic changes in product spaces. However, such types of CEO connections do not necessarily help a firm adjust to demand shocks from downstream industries.

H. 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.

Information on the audit and compensation committees is collected 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. Information on the battery of advising committees is collected 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 11 presents the results. The first column presents results regarding director appointments of audit committee, while the second and third column present

results regarding director appointments of compensation committee and advisory committees. As controls, we include firm and year fixed effects and the same control variables as in our baseline model.

Insert Table 11 here

In Panel A of Table 11, we examine whether the impact of CEO power in each committee on firm valuation depends on product market fluidity. We find that CEO power arising from the appointments of all three key board committees has a negative impact on firm value. However, these negative effects becomes significantly weaker when the firm operates in a highly fluid product market.

We find similar results for CEO power arising from different board committees in competitive product markets. As shown in Panel C, the interaction effect between CEO power arising from the appointment decisions in auditing and compensation committees and product market concentration is positive and significant. However, there is an insignificant estimate for CEO power arising from the appointment decisions in advisory committees. Our results imply that in competitive product markets, firms benefit from having a "powerful" CEO with more influence in selecting monitoring committees such as audit and compensation committee than advisory committees.

We analyze how CEO power in the board room affects firm valuation in high demand product markets in Panel B. We find the that impact of CEO power through appointment decisions of key board committees does not depend on whether the firm operates in a high demand market. This result is similar to our previous results in Tables 9 and 10. We conclude that CEO connections to corporate leaders via

appointment decisions are not very helpful for reacting to industry demand shocks.

I. Accounting for the Endogeneity of CEO Power

We recognize that CEO power is endogenous for multiple reasons. First, our CEO power variable may also be reversely affected by firm performance as Hermalin and Weisbach (1998) model. 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.

In this section, we focus on the overall CEO power variable, *Ln(CEO_Power_All+1)*. We construct several instrumental variables (IVs) which are related to *Ln(CEO_Power_All+1)* but unlikely to directly affect firm value. Our IVs are CEO deaths, top four non-CEO executive deaths and director turnovers due to death. *CEO_Death* is an indicator equal to one if the previous CEO leaves the position due to death and zero otherwise. It is defined over the current CEO's entire tenure. *Exe_Death* and *Dir_Death* are the number of top four non-CEO executives and directors who left their positions due to death during the current CEO's tenure up to the current year. These deaths automatically change *Ln(CEO_Power_All+1)* but unlikely directly affect firm value. To check whether the deaths are related to pressures from firm performance, we search media articles from Factiva on the cause of deaths. None can be attributed to suicide. In our main regression, both *Ln(CEO_Power_All+1)* and *Ln(CEO_Power_All+1)*Prod_Env* are endogenous, so we also use *CEO_Death*Prod_Env* as an IV as well.

Among all 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.[6]

We use the sum of maximum marginal state and federal personal income tax rates, *Tax,* as an additional instrumental variable. Maximum rates are used 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.[7] For state personal income tax rates, we assume a CEO is taxed by the state of her company's

[6] 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.

[7] 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.

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. These IV regression results are reported 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.

Insert Table 12 here

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, fluid product markets is positive. The results are economically significant as well. Using the coefficients of the variables and holding the other variables themselves at their medians, we find that in the most challenging, fluid product market environment, the estimated Tobin's q is 2.059 at the 90th percentile of the instrumented CEO power. This economic effect is higher than 1.620 estimated Tobin's q with the instrumented CEO power at its 10 percentile. In contrast, in the product market environment with low fluidity, low competition and low demand shocks, the estimated Tobin's q at the 90 percentile instrumented CEO overall power is 1.554, which is lower than 1.630 estimated Tobin's q at the 10 percentile instrumented CEO power.

J. Robustness Tests

We also conduct a battery of robustness checks to alternative measures of key variables and to alternative samples. The robustness check results are discussed below with the estimated results reported in Appendix 2.

I.1 Alternative Measures of Key Variables

I.1.1 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. The re-estimation results using these measures of performance are reported in Columns (1)-(3) of Appendix 2. All three regressions control for the same control variables and firm and year fixed effects as our main regression, with the exception that the regression with ROA as dependent variable does not control for Ebitda/TA. All results are robust, showing that CEO power becomes more beneficial in more challenging, fluid product markets. More interesting, this result seems to be stronger for growth related performance measures than the accounting performance measure.

I.1.2 Alternative measures of the product market environment

In the main results, we define the product market conditions based on three components: product market fluidity, industry demand shocks and product market competition. However, these three factors may not be able to completely describe a firm's product market conditions. For example, Hoberg and Phillips (2010a, 2010b)

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 replacing competition with similarity and adding similarity as an additional component in the index. The results are shown in Columns (4) and (5), Appendix 2. The reported results are similar to those reported in the main tables.

H.2 Alternative samples

We also re-estimate the regressions with several alternative samples. First, since firms in the financial and utility industries are highly regulated, we exclude these firms. Second, to avoid potential noise due to bankruptcy, delisting, and IPOs, we re-estimate the regression by using a balanced sample which 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 condition index, instead of the interaction term between product market condition index and the CEO power variable. The robust results are overall very similar and are reported in Columns (6)-(9) of Appendix 2, respectively.

V. Conclusions

Given well documented negative outcomes associated with CEO power, why do firms grant power to CEOs? We explicitly consider that giving CEOs more power may create value for the firm when they need to respond quickly to rapidly changing product markets. We focus on how the external product market influences the trade-off between the costs and benefits of CEO power. Our results show how CEO power affects firm value under different product market conditions. We find that in more competitive, high demand product markets that are changing rapidly with high fluidity, CEO power can enhance firm value.

We show that the positive effects of CEO power in rapidly changing product markets are not just limited to explicit measures of CEO power, such as whether the CEO is also the board chairman, but also 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. This soft power of the CEO also benefits the firm in rapidly changing, high demand product markets. Lastly, we show that investment may be one of the sources of the positive effect of CEO power as we show that powerful CEOs invest more in these rapidly changing product markets.

References

Adams, Renee B., Heitor Almeida, and Daniel Ferreira, 2005, Powerful CEOs and their impact on corporate performance, *Review of Financial Studies* 18: 1403-143.

Allen, William T., Reinier H. Kraakman, and Guhan Subramanian, 2012, *Commentaries and Cases on the Law of Business Organization* (4th edition) (Aspen Publishers, Wolters Kluwer, NY).

Bennedsen, Morten, Francisco Perez-Gonzalez, and Daniel Wolfenzon, 2006, Do CEOs matter? Working Paper, New York University.

Bertrand, Marianne, and Antoinette Schoar, 2003, Managing with style: The effect of managers on firm policies, *The Quarterly Journal of Economics* 118, 1169-1208.

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

Bebchuk, Lucian A., Martin Cremers, and Urs Peyer, 2011, The CEO pay slice, *Journal of Financial Economics* 102, 199-221.

Cho, Myeong-Hyeon, 1998, Ownership structure, investment, and the corporate value: an empirical analysis, *Journal of Financial Economics* 47, 103–121.

Cialdini, Robert B., 1984, Principles of automatic influence, in J. Jacoby & S. Craig, eds.: *Personal Influence: Theory, research, and practice* (Lexington, MA: Heath).

Coles, Jeffrey L., Naveen D. Daniel, and Lalitha Naveen, 2013, Co-opted boards, *Review of Financial Studies* (Forthcoming).

Cronqvist, Henrik, Anil K. Makhija, and Scott E. Yonker, 2012, Behavioral consistency in corporate finance: CEO personal and corporate leverage? *Journal of Financial Economics* 103, 20-40.

Giroud, Xavier, and Holger M. Mueller, 2010, Does corporate governance matter in competitive industries? *Journal of Financial Economics* 95, 312–331.

Graham, John R., Campbell R. Harvey, and Manju Puri, 2013, Managerial attitudes and corporate actions, *Journal of Financial Economics* (forthcoming).

Guadalupe, Maria, and Julie Wulf, 2008, The flattening firm and product market competition: The effect of trade liberalization, NBER Working Paper No. 14491.

Hermalin, Benjamin E., and Michael S. Weisbach, 1998, Endogenously chosen boards of directors and their monitoring of the CEO, *American Economic Review* 88,

96-118.

Himmelberg, Charles P., R. Glenn Hubbard, and Darius Palia, 1999, Understanding the determinants of managerial ownership and the link between ownership and performance, Journal of Financial Economics 53, 353–384.

Hoberg, Gerard, and Gordon Phillips, 2011, Text-Based network industries and endogenous product differentiation, Working Paper, University of Maryland.

Hoberg, Gerard, Gordon Phillips, and Nagpurnanand Prabhala, 2014, Product market threats, payouts, and financial flexibility, *Journal of Finance* (Forthcoming).

Kang, Shinwoo, E. Han Kim, and Yao Lu, 2013, The value of independent directors, Working Paper, University of Michigan.

Khanna, Vikramaditya, E. Han Kim, and Yao Lu, 2013, CEO connectedness and corporate frauds, Working paper, University of Michigan.

Kim, E. Han, 1982, Miller's equilibrium, shareholder leverage clienteles, and optimal capital structure, *Journal of Finance* 37, 301–319.

Kim, E. Han, and Yao Lu, 2011, CEO ownership, external governance, and risk-taking, *Journal of Financial Economics* 102, 272-292.

Kole, Stacey, 1996, Managerial ownership and firm performance: incentives or rewards? In M. Hirschey, M.W. Marr, Eds.: *Advances in Financial Economics* (JAI Press Inc., Greenwich, CT).

Jenter, Dirk and Katharina Lewellen, 2011, CEO preferences and acquisitions, NBER Working Paper No. 17663.

Landier, Augustin, Julien Sauvagnat, David Sraer, and David Thesmar, 2013, Bottom-up corporate governance, *Review of Finance* 17, 161-201.

Miller, Merton H., 1977, Debt and taxes, *Journal of Finance* 32, 261–275.

Morse, Adair, Vikram Nanda, and Amit Seru, 2011, Are incentive contracts rigged by powerful CEOs? *Journal of Finance* 66, 1779–1821.

Sah, Raaj K., and Joseph E. Stiglitz, 1986, The architecture of economic systems: Hierarchies and polyarchies, *American Economic Review* 76, 716-727.

Sah, Raaj K. and Joseph E. Stiglitz, 1991, The quality of managers in centralized versus decentralized organizations, *The Quarterly Journal of Economics* 106, 289-295.

Shivdasani, Anil, and David, Yermack, 1999, CEO involvement in the selection of new board members: An empirical analysis, *Journal of Finance* 54, 1829-1853.

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_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 change (Vdshock) is above the sample median; and zero otherwise. L_HHI is equal to one if text-based herfindahl (HHI) is below the sample median; and zero otherwise. The full sample covers S&P 1,500 firms during the period 1996 through 2010. 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	1,152				
1997	1,251				
1998	1,308				
1999	1,419	189	414	417	298
2000	1,419	102	421	470	334
2001	1,342	387	470	367	49
2002	1,334	380	412	389	95
2003	1,372	326	384	382	109
2004	1,383	186	598	384	145
2005	1,364	71	554	453	213
2006	1,434	179	511	482	171
2007	1,558	224	591	366	233
2008	1,500	480	515	277	106
2009	1,446	468	562	334	8
2010	1,376	131	488	421	265
Total	**20,658**	**3,123**	**5,920**	**4,742**	**2,026**

Table 2. Summary Statistics for the Full Sample, and High and Low Product Market Environment Subsamples.

This table reports summary statistics for key variables. 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) one (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. The definitions of all variables are provided 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	0.939	0.000	3.000				
Fluid	6.403	5.809	3.294	0.000	24.668				
Vdshock	0.031	0.041	0.105	-0.442	0.726				
HHI	0.162	0.097	0.176	0.009	1.000				
CEO Power Variables									
CEO_Power1	0.512	0.500	0.337	0.000	1.000	0.540	0.492	0.048	(0.000)
CEO_Power2	1.308	1.000	0.998	0.000	3.000	1.329	1.237	0.091	(0.000)
CEO_Power_All	2.398	2.000	1.670	0.000	5.000	2.505	2.310	0.195	(0.000)
FTA	0.532	0.500	0.396	0.000	1.000	0.555	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	7.939	6.000	7.305	1.000	60.000	8.248	7.771	0.477	(0.000)
CEO_Chair	0.565	1.000	0.496	0.000	1.000	0.529	0.561	-0.031	(0.000)
CEO_Founder	0.237	0.000	0.425	0.000	1.000	0.265	0.179	0.086	(0.000)
CEO_OWN	0.026	0.004	0.065	0.000	0.811	0.026	0.023	0.003	(0.002)
Other Variables									
Tobin's *q*	2.097	1.626	1.502	0.373	10.853	2.303	1.875	0.428	(0.000)
Capx/TA	0.057	0.040	0.058	0.000	1.205	0.064	0.045	0.019	(0.000)
LNS	7.009	7.005	1.547	-3.411	10.386	6.912	7.120	-0.208	(0.000)
FirmAge	22.814	17.000	18.600	1.000	86.000	19.893	25.262	-5.369	(0.000)
PPE/TA	0.533	0.442	0.387	0.000	5.876	0.529	0.511	0.018	(0.004)
Ebitda/TA	0.128	0.134	0.262	-28.400	1.389	0.127	0.127	0.000	(0.929)
CEO_Death	0.003	0.000	0.055	0.000	1.000	0.002	0.003	-0.001	(0.262)
Exe_Death	0.018	0.000	0.161	0.000	2.000	0.018	0.019	-0.001	(0.773)
Dir_Death	0.054	0.000	0.248	0.000	4.000	0.055	0.070	-0.015	(0.000)
Tax	0.426	0.427	0.040	0.350	0.770	0.424	0.420	0.004	(0.000)

Table 3: The Product Market Environment, CEO Power and Firm Value.

This table reports the results for the interaction of CEO power and the product market environment on Tobin's *q*. The key independent variables are Prod_Env and CEO_Power. CEO_Power1 in Column (1) 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 Column (2) is the sum of CEO_Founder, CEO_Chair and a tenure variable which equals one when the CEO has served longer than six years (sample median). CEO_Power_All is the sum of CEO_Power1 and CEO_Power2. The sample covers S&P 1,500 firms during the period 1999 through 2010. Definitions of all variables are provided in Appendix 1. All regressions include firm fixed and year fixed effects. Robust standard errors clustered at the CEO-firm pair level are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1%, respectively.

	Tobin's q		
VARIABLES	**(1)**	**(2)**	**(3)**
Prod_Env	-0.025	-0.035	-0.036
	(0.027)	(0.026)	(0.027)
CEO_Power1	-0.060		
	(0.059)		
CEO_Power1*Prod_Env	0.100**		
	(0.046)		
Ln(CEO_Power2+1)		-0.012	
		(0.039)	
Ln(CEO_Power2+1)*Prod_Env		0.086***	
		(0.030)	
Ln(CEO_Power_All+1)			-0.016
			(0.029)
Ln(CEO_Power_All+1)*Prod_Env			0.058***
			(0.023)
Ln(FirmAge)	-0.506***	-0.491***	-0.499***
	(0.133)	(0.132)	(0.133)
LNS	-0.574***	-0.579***	-0.576***
	(0.070)	(0.070)	(0.070)
Ebitda/TA	4.686***	4.677***	4.684***
	(0.366)	(0.367)	(0.366)
CEO_OWN	1.481	1.006	1.236
	(0.931)	(0.937)	(0.932)
CEO_OWN^2	-4.183*	-3.450	-3.822*
	(2.172)	(2.164)	(2.158)
Constant	6.774***	6.752***	6.758***
	(0.635)	(0.635)	(0.634)
Firm FE & Year FE	Y	Y	Y
Observations	10,359	10,359	10,359
R-squared	0.718	0.718	0.718

Table 4: Economic Significance: The Product Market Environment, CEO Power and Firm Value.

This table shows the estimated Tobin's *q* for different levels of CEO power and different levels of Prod_Env. Prod_Env is defined as the sum of H_Fluid, H_Vdshock and L_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 change (Vdshock) is above the sample median; and zero otherwise. L_HHI is equal to one if text-based herfindahl (HHI) is below the sample median; and zero otherwise. The predicted Tobin's *q*s in Panel A-C are calculated using the coefficient estimates from the regressions reported in Columns (1)-(3) of Table 3, respectively and the medians of all the variables except for CEO power and Prod_Env. In Panel A, the estimated Tobin's qs at CEO_Power1 equal to 10 percentile, 25 percentile, 50 percentile, 75 percentile, and 90 percentile are reported in Columns (1)-(5), respectively. In Panel B, the estimated Tobin's *q*s at CEO_Power2 equal to 0, 1, 2, or 3 are reported in Columns (1)-(4), respectively. In Panel C, the estimated Tobin's *q*s at CEO_Power_All equal to 0, 1, 2, 3, 4, or 5 are reported in Columns (1)-(6), respectively. Throughout, all other variables are held at the sample median.

Panel A: Regression with CEO Power measured as CEO_Power1

	Tobin's q				
	CEO_Power1 =p10%	**CEO_Power1 =p25%**	**CEO_Power1 =p50%**	**CEO_Power1 =p75%**	**CEO_Power1 =p90%**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Prod_Env=0	1.700	1.660	1.642	1.623	1.612
Prod_Env=1	1.648	1.655	1.667	1.680	1.687
Prod_Env=2	1.627	1.651	1.692	1.737	1.762
Prod_Env=3	1.606	1.646	1.716	1.793	1.837

Panel B: Regression with CEO Power measured as Ln(CEO_Power2+1)

	Tobin's q			
	CEO_Power2=0	**CEO_Power2=1**	**CEO_Power2=2**	**CEO_Power2=3**
	(1)	**(2)**	**(3)**	**(4)**
Prod_Env=0	1.759	1.751	1.746	1.743
Prod_Env=1	1.724	1.775	1.805	1.826
Prod_Env=2	1.689	1.799	1.864	1.91
Prod_Env=3	1.653	1.823	1.923	1.993

Panel C: Regression with CEO Power is measured as Ln(CEO_Power_All+1)

	Tobin's q					
	CEO_Power_All =0	**CEO_Power_All =1**	**CEO_Power_All =2**	**CEO_Power_All =3**	**CEO_Power_All =4**	**CEO_Power_All =5**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Prod_Env=0	1.662	1.652	1.645	1.641	1.637	1.635
Prod_Env=1	1.627	1.656	1.673	1.686	1.695	1.703
Prod_Env=2	1.591	1.661	1.702	1.731	1.753	1.771
Prod_Env=3	1.556	1.666	1.730	1.775	1.811	1.840

Table 5: The Product Market Environment, CEO Power and Firm Value: Cross-Sectional Between Regressions and Industry Fixed Effects Regressions.

This table reports alternative estimation results using cross-sectional between regressions and industry fixed effects regressions of the product market environment and CEO power on firm value. Panel A reports the CEO firm-pair level between estimation results. Panel B reports the regression results after controlling for industry fixed effects and year fixed effects. All control variables are the same as the control variables in Table 3 and are not reported. The sample covers S&P 1,500 firms during the period 1999 through 2010. Definitions of all variables are provided in Appendix 1. Robust standard errors are clustered at the CEO-firm pair level and are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1%, respectively.

Panel A: CEO-Firm Pair Level Between Regressions

	Tobin's *q*		
	CEO_Power1	**Ln(CEO_Power2+1)**	**Ln(CEO_Power_All+1)**
VARIABLES	**(1)**	**(2)**	**(3)**
Prod_Env	0.115**	0.117**	0.086*
	(0.048)	(0.046)	(0.052)
CEO_Power	-0.297**	-0.079	-0.099
	(0.137)	(0.097)	(0.075)
CEO_Power*Prod_Env	0.257***	0.194***	0.159***
	(0.081)	(0.057)	(0.045)
Observations	10,359	10,359	10,359
Number of CEO Firm Pairs	2,730	2,730	2,730
R-squared	0.165	0.169	0.168

Panel B: Controlling for Industry Fixed Effects

	Tobin's *q*		
	CEO_Power1	**Ln(CEO_Power2+1)**	**Ln(CEO_Power_All+1)**
VARIABLES	**(1)**	**(2)**	**(3)**
Prod_Env	0.137***	0.148***	0.135***
	(0.033)	(0.032)	(0.034)
CEO_Power	-0.123	-0.042	-0.041
	(0.085)	(0.056)	(0.043)
CEO_Power*Prod_Env	0.122**	0.074*	0.061**
	(0.058)	(0.039)	(0.029)
Industry FE & Year FE	Y	Y	Y
Observations	10,359	10,359	10,359
R-squared	0.282	0.282	0.282

Table 6: Industry Life Cycle, CEO Power and Firm Value.

This table reports the estimation results of the effect of the interaction of the number of IPOs into each industry and CEO power on Tobin's q. 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 S&P 1,500 firms during the period 1999 through 2010. Definitions of all variables are provided in Appendix 1. All regressions are estimated at CEO-firm pair level. Robust standard errors are clustered at the CEO-firm pair level and are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1%, respectively.

	Tobin's *q*		
VARIABLES	**(1)**	**(2)**	**(3)**
Num_IPO	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
CEO_Power1	-0.307***		
	(0.080)		
CEO_Power1*Num_IPO	0.002***		
	(0.000)		
Ln(CEO_Power2+1)		-0.135**	
		(0.056)	
Ln(CEO_Power2+1)*Num_IPO		0.001***	
		(0.000)	
Ln(CEO_Power_All+1)			-0.125***
			(0.045)
Ln(CEO_Power_All+1)*Num_IPO			0.001***
			(0.000)
Ln(FirmAge)	-0.123***	-0.105***	-0.110***
	(0.025)	(0.024)	(0.024)
LNS	-0.092***	-0.096***	-0.092***
	(0.014)	(0.014)	(0.014)
Ebitda/TA	5.547***	5.536***	5.543***
	(0.181)	(0.180)	(0.180)
CEO_OWN	0.124	-0.635	-0.420
	(0.923)	(0.927)	(0.920)
CEO_OWN^2	2.382	4.070	3.574
	(2.764)	(2.762)	(2.754)
Constant	1.946***	1.880***	1.907***
	(0.186)	(0.182)	(0.185)
Observations	14,148	14,148	14,148
R-squared	0.288	0.292	0.292
Number of CEO Firm Pairs	3,587	3,587	3,587

Table 7: The Product Market Environment, CEO Power and Corporate Investment.

This table reports the results of the influence of CEO power on corporate investment. The dependent variable is capital expenditures divided by total assets. The key independent variables include CEO_Power1 in Column (2); logged value of one plus CEO_Power2 in Column (3); and logged value of one plus CEO_Power_All in column (4). The sample covers S&P 1,500 firms during the period 1999 through 2010. Definitions of all variables are provided in Appendix 1. All regressions include firm fixed and year fixed effects. Robust standard errors are clustered at the CEO-firm pair level and are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1%, respectively.

	Capx/TA			
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
Prod_Env	0.002***	0.000	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
CEO_Power1		-0.000		
		(0.002)		
CEO_Power1*Prod_Env		0.003**		
		(0.001)		
Ln(CEO_Power2+1)			-0.001	
			(0.001)	
Ln(CEO_Power2+1)*Prod_Env			0.003***	
			(0.001)	
Ln(CEO_Power_All+1)				-0.001
				(0.001)
Ln(CEO_Power_All+1)*Prod_Env				0.002***
				(0.001)
Ln(FirmAge)	-0.022***	-0.021***	-0.020***	-0.020***
	(0.004)	(0.004)	(0.004)	(0.004)
PPE/TA	0.026***	0.026***	0.025***	0.026***
	(0.006)	(0.006)	(0.006)	(0.006)
LNS	0.005**	0.005**	0.005**	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
Leverage	-0.016***	-0.016***	-0.016***	-0.016***
	(0.005)	(0.005)	(0.005)	(0.005)
$Ebitda/TA_{t-1}$	0.069***	0.068***	0.068***	0.068***
	(0.017)	(0.017)	(0.017)	(0.017)
CEO_OWN	0.038**	0.032**	0.029*	0.030*
	(0.016)	(0.016)	(0.016)	(0.016)
Constant	0.060***	0.059***	0.059***	0.059***
	(0.017)	(0.017)	(0.017)	(0.017)
Firm FE & Year FE	Y	Y	Y	Y
Observations	10,158	10,158	10,158	10,158
R-squared	0.775	0.776	0.776	0.776

Table 8: Components of CEO Power.

This table reports the results of 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 Columns (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 S&P 1,500 firms during the period 1999 through 2010. Definitions of all variables are provided in Appendix 1. All regressions include firm fixed and year fixed effects. Robust standard errors are clustered at the CEO-firm pair level and are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1%, respectively.

	Tobin's q				
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Prod_Env	0.012	-0.021	0.033	0.007	0.064***
	(0.025)	(0.025)	(0.025)	(0.017)	(0.023)
FTA	-0.067				
	(0.050)				
FTA*Prod_Env	0.104***				
	(0.040)				
FDA		-0.080			
		(0.055)			
FDA*Prod_Env		0.094**			
		(0.041)			
CEO_Chair			0.030		
			(0.039)		
CEO_Chair*Prod_Env			0.065**		
			(0.030)		
CEO_Founder				-0.268***	
				(0.104)	
CEO_Founder*Prod_Env				0.337***	
				(0.051)	
CEO_Tenure					0.003
					(0.003)
CEO_Tenure*Prod_Env					0.000
					(0.002)
Ln(FirmAge)	-0.983***	-0.528***	-0.979***	-0.883***	-1.000***
	(0.140)	(0.128)	(0.132)	(0.129)	(0.135)
LNS	-0.509***	-0.565***	-0.515***	-0.506***	-0.496***
	(0.067)	(0.066)	(0.064)	(0.063)	(0.063)
Ebitda/TA	3.087***	4.646***	3.008***	3.012***	3.059***
	(0.573)	(0.346)	(0.526)	(0.525)	(0.537)
CEO_OWN	1.394*	1.095	0.403	0.205	1.013
	(0.791)	(0.844)	(0.722)	(0.715)	(0.770)
CEO_OWN^2	-3.941**	-3.007	-2.079	-1.614	-3.106**
	(1.541)	(1.943)	(1.491)	(1.496)	(1.556)
Constant	8.117***	7.093***	8.193***	7.894***	8.081***
	(0.528)	(0.553)	(0.560)	(0.552)	(0.559)
Firm FE & Year FE	Y	Y	Y	Y	Y
Observations	13,149	10,967	14,279	14,279	14,026
R-squared	0.669	0.718	0.663	0.666	0.662

Table 9: Detailed Product Market Environment Analysis.

This table reports the results of 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 Herfihdahl-Hierschmann index (R_HHI) in Columns (7)-(9). The sample covers S&P 1,500 firms duing the period 1996 through 2010 in Columns (1)-(3) and (7)-(9); and 1999 through 2010 in Columns (4)-(6). Definitions of all variables are provided in Appendix 1. All regressions include firm fixed and year fixed effects. Robust standard errors are clustered at the CEO-firm pair level and 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)**	**(7)**	**(8)**	**(9)**
CEO_Power1*Fluid	0.021**								
	(0.011)								
Ln(CEO_Power2+1)*Fluid		0.018**							
		(0.007)							
Ln(CEO_Power_All+1)*Fluid			0.011**						
			(0.005)						
CEO_Power1*Vdshock				0.358					
				(0.251)					
Ln(CEO_Power2+1)*Vdshock					0.301*				
					(0.178)				
Ln(CEO_Power_All+1)*Vdshock						0.239*			
						(0.134)			
CEO_Power1*R_HHI							0.335**		
							(0.163)		
Ln(CEO_Power2+1)*R_HHI								0.124	
								(0.105)	
Ln(CEO_Power_All+1)*R_HHI									0.127
									(0.081)
Fluid	-0.006	-0.009	-0.008						
	(0.007)	(0.006)	(0.007)						
Vdshock				-0.022	-0.060	-0.098			
				(0.155)	(0.159)	(0.167)			
R_HHI							-0.302***	-0.221**	-0.267***
							(0.102)	(0.093)	(0.103)
CEO_Power1	-0.072			0.071			-0.227		
	(0.068)			(0.049)			(0.139)		
Ln(CEO_Power2+1)		-0.026			0.095***			-0.016	
		(0.045)			(0.032)			(0.088)	
Ln(CEO_Power_All+1)			-0.021			0.056**			-0.058
			(0.032)			(0.024)			(0.069)
Ln(FirmAge)	-0.473***	-0.466***	-0.470***	-0.515***	-0.508***	-0.512***	-0.487***	-0.484***	-0.486***
	(0.100)	(0.100)	(0.100)	(0.128)	(0.128)	(0.128)	(0.103)	(0.103)	(0.103)
LNS	-0.512***	-0.516***	-0.513***	-0.567***	-0.573***	-0.570***	-0.497***	-0.503***	-0.500***
	(0.056)	(0.056)	(0.056)	(0.070)	(0.070)	(0.070)	(0.056)	(0.056)	(0.056)
Ebitda/TA	4.976***	4.968***	4.976***	4.759***	4.760***	4.760***	4.800***	4.798***	4.800***
	(0.363)	(0.364)	(0.364)	(0.376)	(0.377)	(0.376)	(0.356)	(0.357)	(0.357)
CEO_OWN	1.636**	1.221	1.420*	1.334	0.884	1.091	1.647**	1.228	1.438*
	(0.779)	(0.783)	(0.782)	(0.909)	(0.919)	(0.913)	(0.780)	(0.785)	(0.783)
CEO_OWN^2	-3.489**	-2.743	-3.091*	-3.782*	-3.044	-3.391	-3.482**	-2.738	-3.115*
	(1.750)	(1.755)	(1.753)	(2.124)	(2.128)	(2.118)	(1.750)	(1.762)	(1.755)
Constant	6.292***	6.284***	6.279***	7.044***	7.043***	7.037***	6.476***	6.408***	6.439***
	(0.462)	(0.462)	(0.462)	(0.571)	(0.572)	(0.571)	(0.466)	(0.462)	(0.464)
Firm FE & Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	13,929	13,929	13,929	10,709	10,709	10,709	13,966	13,966	13,966
R-squared	0.736	0.736	0.736	0.723	0.723	0.723	0.732	0.732	0.732

Table 10: Different Sources of CEO Power in the Executive Suite.

This table reports the results analyzing the effect of different sources of CEO power in the executive suite interacted 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 3 and not reported. The sample covers S&P 1,500 firms during the period 1996 through 2010 in Panel A and C; and 1999 through 2010 in Panel B. All regressions include firm fixed and year fixed effects. Robust standard errors are clustered at the CEO-firm pair level are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1%, 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	0.018	-0.053	-0.476
	(0.059)	(0.042)	(0.328)
FTA_Exe*Fluid	0.000	0.016**	0.084*
	(0.009)	(0.007)	(0.051)
Miss_Exe	0.021	-0.193***	0.015
	(0.049)	(0.067)	(0.198)
Miss_Exe*Fluid	-0.010	0.035***	0.034
	(0.007)	(0.011)	(0.031)
Fluid	0.015**	-0.001	-0.025
	(0.007)	(0.006)	(0.031)
Firm FE & Year FE	Y	Y	Y
Observations	18,550	18,550	18,550
R-squared	0.680	0.680	0.680

Panel B: Different Sources of CEO Power in Executive Suite and Vdshock

	Tobin's *q*		
	FTA_COO	**FTA_CFO**	**FTA_CTO**
FTA_Exe	0.023	0.058**	0.094
	(0.042)	(0.029)	(0.155)
FTA_Exe*Vdshock	0.271	0.157	-0.849
	(0.215)	(0.167)	(1.069)
Miss_Exe	-0.065*	0.040	0.267**
	(0.035)	(0.040)	(0.118)
Miss_Exe*Vdshock	0.397**	-0.030	-2.045***
	(0.193)	(0.268)	(0.662)
Vdshock	0.356**	0.565***	2.623***
	(0.163)	(0.164)	(0.670)
Firm FE & Year FE	Y	Y	Y
Observations	14,534	14,534	14,534
R-squared	0.668	0.668	0.668

Panel C: Different Sources of CEO Power in Executive Suite and HHI

	Tobin's *q*		
	FTA_COO	**FTA_CFO**	**FTA_CTO**
FTA_Exe	-0.171	-0.083	-0.506
	(0.143)	(0.073)	(0.337)
FTA_Exe*R_HHI	0.240	0.155*	0.784*
	(0.165)	(0.088)	(0.451)
Miss_Exe	-0.178	-0.261***	-0.053
	(0.120)	(0.100)	(0.231)
Miss_Exe*R_HHI	0.163	0.344***	0.406
	(0.136)	(0.118)	(0.318)
R_HHI	-0.152	-0.126	-0.407
	(0.132)	(0.076)	(0.313)
Firm FE & Year FE	Y	Y	Y
Observations	18,537	18,537	18,537
R-squared	0.676	0.676	0.677

Table 11: Different Sources of CEO Power in the Board Room.

This table reports the results of analyzing the effect of different sources of CEO power in the board room on Tobin's *q*. In Panel A, B, and C, 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 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 compensation committee and advisory committees. All control variables are the same as the control variables in Table 3 and not reported. The sample covers S&P 1,500 firms during the period 1996 through 2010 in Panel A and C; and 1999 through 2010 in Panel B. Definitions of all variables are provided in Appendix 1. All regressions include firm fixed and year fixed effects. Robust standard errors clustered at the CEO-firm pair level are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1%, 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	-0.097*	-0.149*	-0.160*
	(0.053)	(0.089)	(0.090)
FDA_Committee*Fluid	0.015*	0.025**	0.034**
	(0.008)	(0.011)	(0.015)
Fluid	0.000	0.001	-0.022
	(0.004)	(0.007)	(0.013)
Firm FE & Year FE	Y	Y	Y
Observations	14,645	14,645	18,753
R-squared	0.735	0.611	0.416

Panel B: Different Sources of CEO Power in the Board and Vdshock

	Tobin's *q*		
	FDA_Audit	**FDA_Compensation**	**FDA_Advice**
FDA_Committee	0.024	-0.013	0.096**
	(0.047)	(0.051)	(0.039)
FDA_Committee*Vdshock	0.147	0.123	-0.304
	(0.272)	(0.245)	(0.253)
Vdshock	0.156	0.169	0.677***
	(0.142)	(0.134)	(0.241)
Firm FE & Year FE	Y	Y	Y
Observations	11,326	11,326	14,652
R-squared	0.722	0.722	0.666

Panel C: Different Sources of CEO Power in the Board and HHI

	Tobin's q		
	FDA_Audit	**FDA_Compensation**	**FDA_Advice**
FDA_Committee	-0.298**	-0.471***	-0.040
	(0.140)	(0.150)	(0.135)
FDA_Committee*R_HHI	0.330**	0.510***	0.124
	(0.164)	(0.176)	(0.156)
R_HHI	-0.264***	-0.311***	-0.098
	(0.088)	(0.086)	(0.138)
Firm FE & Year FE	Y	Y	Y
Observations	14,682	14,682	18,744
R-squared	0.731	0.731	0.675

Table 12: IV Regression Results.

This table reports the instrumental variable regression results for the regression specifications of Table 3. 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 CEO_Death, CEO_Death*Prod_Env, Exe_Death, Dir_Death, Tax and Tax2. The 1st stage instrumental regression results are found in Columns (1)-(4) and 2nd Stage regression results are reported in Column (5). The sample covers S&P 1,500 firms during the period 1999 through 2010. Definitions of all variables are provided in Appendix 1. Robust standard errors are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, and 1%, 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	0.008	1.069***	0.002***	0.001***	-0.189
	(0.009)	(0.017)	(0.001)	(0.000)	(0.158)
(Ln(CEO_Power_All+1)_Hat					-0.099
					(0.184)
(Ln(CEO_Power_All+1)*Prod_Env)_Hat					0.252*
					(0.150)
Ln(FirmAge)	-0.332***	-0.557***	-0.011***	-0.002*	-0.466***
	(0.046)	(0.078)	(0.003)	(0.001)	(0.108)
LNS	0.098***	0.094**	-0.002	-0.000	-0.595***
	(0.020)	(0.038)	(0.001)	(0.000)	(0.058)
Ebitda/TA	0.007	0.049	-0.002	-0.002	4.553***
	(0.094)	(0.171)	(0.006)	(0.002)	(0.280)
CEO_OWN_Hat					16.459
					(14.270)
CEO_OWN^2_Hat					-108.133**
					(44.358)
CEO_Death	-0.769***	-0.100	-0.027	-0.008	
	(0.190)	(0.197)	(0.019)	(0.005)	
CEO_Death*Prod_Env	-0.070	-0.805***	-0.008	-0.002	
	(0.147)	(0.277)	(0.012)	(0.003)	
Exe_Death	0.261***	0.301***	0.001	-0.000	
	(0.039)	(0.071)	(0.002)	(0.000)	
Dir_Death	0.413***	0.495***	0.003*	0.000	
	(0.026)	(0.046)	(0.002)	(0.001)	
Tax	-5.899*	-6.920	0.068	0.025	
	(3.520)	(5.975)	(0.241)	(0.100)	
Tax^2	5.219	5.417	-0.026	-0.037	
	(3.467)	(5.604)	(0.225)	(0.084)	
Constant	2.879***	2.893*	0.042	0.008	7.263***
	(0.919)	(1.618)	(0.063)	(0.028)	(0.582)
Firm FE & Year FE	Y	Y	Y	Y	Y
Observations	10,339	10,339	10,339	10,339	10,339
R-squared	0.491	0.742	0.770	0.702	0.718

Appendix 1: Variable Definitions

Variable	Definition
Product Market Environment Variables	
Prod_Env	The sum of H_Fluid, L_HHI and H_Vdshock. H_Fluid is equal to one if Fluid is above the sample median; zero otherwise. L_HHI is equal to one if HHI is below the sample median; zero otherwise. H_Vdshock is equal to one if Vdshock is above the sample median; zero otherwise.
Fluid	10-K text based product market fluidity measure developed in Hoberg, Phillips and Prabhala (2012). It assesses the degree of competitive threat and product market change surrounding a firm.
Vdshock	Annual percentage change in product shipments for *downstream* industries. The changes in product shipments are from the BEA website and are for a firm's downstream industries. Downstream industries are identified using the BEA input-output matrix based on the NAICS two-digit industries.
HHI	Herfihdahl-Hierschmann index: The squared sum of the market share of the four biggest firms in sales among competitor firms in the same year. Competitor firms are identified using the 10-K based product market similarity measure in Hoberg and Phillips (2011). The similarity measure assesses the degree of similarity in product market descriptions in the 10-K filings for all firm pairs in Compustat databse..
Num_IPO	Number of IPOs into each industry during the full sample period.
CEO Power Variables	
CEO_Power1	CEO_Power1 is the sum of FTA and FDA divided by 2.
CEO_Power2	CEO_Power2 is the sum of CEO_Founder, CEO_Chair and L_CEO_Tenure. L_CEO_Tenure is equal to one if the CEO's current tenure is longer than six years (sample median), and zero otherwise.
CEO_Power_All	CEO_Power_All is the sum of CEO_Power1, H_FTA and H_FDA. H_FTA is equal to one if FTA is greater than 0.5 (sample median), and zero otherwise. H_FDA is equal to one if FDA is greater than 0.5 (sample median), and zero otherwise.
FTA	Fraction of top four non-CEO executives appointed during the current CEO's tenure.
FDA	Fraction of directors appointed during the current CEO's tenure, excluding the CEO from both the numerator and denominator if the CEO is on the board.
CEO_Tenure	The number of years a CEO has been CEO.
CEO_Chair	Indicator equal to one when a CEO also chairs the board, and zero otherwise.
CEO_Founder	Indicator equal to one, if a CEO was the CEO five years prior to the first date when the firm appears in CRSP or Compustat, and zero otherwise.
FTA_COO(CFO,CTO)	An indicator equal to one if the COO (CFO,CTO) of the firm in a given year is appointed during the current CEO tenure; zero otherwise.
FDA_Audit	Fraction of directors appointed during the current CEO's tenure in audit committee, excluding the CEO from both the numerator and denominator if the CEO is on the board.
FDA_Compensation	Fraction of directors appointed during the current CEO's tenure in compensation committee, excluding the CEO from both the numerator and denominator if the CEO is on the board.
FDA_Advice	Fraction of directors appointed during the current CEO's tenure in advising committee, excluding the CEO from both the numerator and denominator if the CEO is on the board. Advising committee is a set of committees that may assist the CEO in making crucial investment and other corporate strategy decisions. Advising committees include: (1) finance, investment and budgeting committee (2) corporate strategy, M&A, and business committees (3) science and technology development committees (4) executive committees. Advising committees do not include auditing, corporate governance, nomination, or compensation committee.
Other Variables	
Tobin's *q*	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.
Capx/TA	Capital expenditure divided by the value of total assets.
LNS	Logged value of sales.
Ln(FirmAge)	Logged value of one plus the number of years from the firm's IPO as reported in CRSP or the number of years since its first appearance in CRSP.
PPE/TA	Property, plant, and equipment divided by total assets.
Ebitda/TA	Earnings before interest, taxes, depreciation, and amortization divided by the book value of total assets.
CEO_OWN	Percentage of outstanding common shares held by a CEO.
CEO_OWN^2	CEO ownership square.
CEO_Death	Indicator equal to one if the previous CEO leaves the CEO position due to death, and zero otherwise.
Exe_Death	The number of top four non-CEO executives who left the position due to death during the current CEO's tenure up to the current year.
Dir_Death	The number of non-CEO directors who left the director position due to death during the current CEO's tenure up to the current year.
Tax	Sum of maximum marginal federal and state personal income tax rates.
Miss_COO (CFO,CTO)	An indicator equal to one if the company does not have a COO, (CFO,CTO respectively), or has missing information on the COO, (CFO,CTO respectively), in ExecuComp; zero otherwise.

Appendix 2: Robustness Checks

This table reports the results for robustness checks for the specification reported in Table 3. Columns (1)-(3) report the robustness checks to alternative measures of firm performance. Dependent variable is ROA in Column (1), buy-and-hold stock returns in Column (2) and three-year sales growth rate in Column (3). Columns (4)-(5) report the robustness checks to alternative measures of product market environments. In Column (4), Prod_Env_All is measured as the sum of H_Fluid, H_Vdshock and H_Simm. In Column (5), Prod_Env_A2 is measured as the sum of H_Fluid, H_Vdshock, L_HHI and H_Simm. Columns (6)-(7) report the robustness results to alternative samples. In Column (6), the sample excludes firms in financial and utility industries. In Column (7) the sample is balanced panel data. Columns (8) and (9) report the results estimated with high and low Prod_Env subsamples. CEO power variable is measured as the logged value of one plus CEO_Power_All. The sample covers the period 1999 through 2010. Definitions of all variables are provided in Appendix 1. All regressions include firm fixed and year fixed effects. Robust standard errors clustered at the CEO-firm pair level are reported in parentheses. Coefficients marked with *, **, and *** are significant at 10%, 5%, 1%, respectively.

	Alternative Performance Variables			**Alternative Product Market Variables**		**Exclude Financial and Utility Industries**	**Balanced Panel Data**	**High Prod_Env**	**Low Prod_Env**
VARIABLES	**ROA**	**Buy-Hold Return**	**Sales_Gr**	**Tobin's *q***					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Ln(CEO_Power_All+1)	-0.003	-0.044	-0.728	-0.032	-0.020	-0.014	-0.015	0.119**	-0.000
	(0.002)	(0.028)	(0.561)	(0.028)	(0.029)	(0.029)	(0.033)	(0.053)	(0.022)
Ln(CEO_Power_All+1)									
*Prod_Env	0.003*	0.054**	1.635***			0.057**	0.050*		
	(0.002)	(0.024)	(0.386)			(0.023)	(0.027)		
Prod_Env	-0.002	0.014	-1.467***			-0.032	-0.029	0.161**	-0.001
	(0.002)	(0.027)	(0.511)			(0.028)	(0.031)	(0.074)	(0.019)
Ln(CEO_Power_All+1)									
*Prod_Env_A1				0.070***					
				(0.022)					
Prod_Env_A1				-0.034					
				(0.027)					
Ln(CEO_Power_All+1)									
*Prod_Env_A2					0.047***				
					(0.017)				
Prod_Env_A2					-0.039*				
					(0.023)				
Ln(FirmAge)	-0.023***	-0.451***	-38.756***	-0.488***	-0.502***	-0.489***	-0.321**	-0.762***	-0.247*
	(0.006)	(0.170)	(5.763)	(0.133)	(0.133)	(0.134)	(0.153)	(0.288)	(0.136)
LNS	0.047***	-0.411***	14.963***	-0.576***	-0.573***	-0.608***	-0.551***	-0.609***	-0.431***
	(0.004)	(0.068)	(1.690)	(0.070)	(0.070)	(0.072)	(0.081)	(0.126)	(0.068)
Ebitda/TA		3.859***	28.237***	4.681***	4.687***	4.724***	5.125***	4.075***	5.337***
		(0.287)	(10.034)	(0.366)	(0.366)	(0.368)	(0.458)	(0.596)	(0.453)
CEO_OWN	-0.018	0.027	26.641*	1.211	1.229	1.077	1.531*	-0.258	2.320**
	(0.056)	(0.810)	(15.678)	(0.931)	(0.934)	(0.928)	(0.917)	(2.064)	(0.962)
CEO_OWN^2	-0.102	-0.515	-55.761	-3.764*	-3.803*	-3.615*	-4.169**	-2.325	-5.209**
	(0.108)	(1.891)	(40.438)	(2.157)	(2.165)	(2.164)	(2.112)	(4.857)	(2.535)
Constant	-0.262***	3.684***	13.409	6.731***	6.763***	6.960***	6.193***	7.994***	5.156***
	(0.031)	(0.771)	(22.270)	(0.634)	(0.634)	(0.643)	(0.757)	(1.028)	(0.704)
Firm FE & Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,233	10,308	10,378	10,359	10,359	10,221	7,139	4,243	6,116
R-squared	0.542	0.381	0.621	0.718	0.718	0.719	0.698	0.700	0.816