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**DO CEOs MATTER?  
CORPORATE PERFORMANCE AND THE CEO  
LIFE CYCLE**

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# Do CEOs Matter?

## Corporate Performance and the CEO Life Cycle\*

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### Abstract

We examine how CEOs' impact on firm value varies over time. We document a hump-shaped relation between CEO tenure and firm value which is subject to meaningful variation depending on industry dynamics, the business cycle, and CEOs' adaptability to changes. Semi-parametric estimations, stock returns to sudden deaths and to takeover announcements, as well as tests for extrapolation, survivorship, and endogenous CEO-firm matching and turnover confirm our results. They suggest that a considerable fraction of high-tenure CEOs is no longer the optimal match for their firms which seem to have difficulties, due to governance rather than labor market frictions, replacing incumbent CEOs.

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## 1. Introduction

Starting with Bertrand and Schoar (2003), a vast literature suggests that differences across CEOs explain differences in firm policies and value. A similarly important, but so far largely neglected, question is whether CEOs' impact on the firms they run varies over time. Specifically, are CEO fit and performance conditional on the tenure at the firm? And which factors render CEOs more or less valuable over time? This study addresses these questions by analyzing the relation between CEO tenure, firm value, and environmental dynamics. We provide novel evidence on how CEOs matter for firm value and present insights that add to the ongoing debate about CEO term limits.<sup>1</sup> Our results help explain why even very successful CEOs can be associated with declining firm value over the later course of their tenure.

In theory, the board of directors hires the best available CEO whose skill set is expected to maximize firm value given its estimated fit with the managerial skill needs of the firm which depend on the firm's industry and technology (e.g., Eisfeldt and Kuhnen, 2013). While uncertainty about the CEO's skills resolves over her tenure as the board learns about the CEO, the likelihood that the firm's skill needs change (as its environment evolves), rendering the CEO's skill set less optimal, increases (Miller, 1991; Garrett and Pavan, 2012). Each period the board decides whether to fire or keep the incumbent CEO following a simple decision rule: it fires the CEO if future firm value under the CEO is expected to be lower than under the best alternative CEO less adjustment costs (e.g., search costs, severance pay). However, due to horizontal and vertical differentiation across managers and competition for talent, each period only a limited number of CEO candidates, if any, represent appropriate matches for a firm. Thus, even absent adjustment costs or labor market frictions a candidate

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<sup>1</sup> See, e.g., "The case for CEO term limits" (*Fortune*, June 23, 2014), "How long is too long to be CEO?" (*The Washington Post*, April 16, 2014), "CEO term limits" (*The Washington Post*, May 26, 2009), and "Been a CEO for ten years? Your time's about up?" (*Business Insider*, April 16, 2007). For the discussion about CEO term limits among legal scholars, we refer the reader to Whitehead (2011).

under whom the firm would be worth more may not always be available. In fact, CEOs may remain in office although they are associated with declining firm value.

According to this general framework, the relation between CEO tenure and firm value will be either positive or hump shaped. Yet, as industries and technologies evolve over time leading to changes in firms' skill needs and the CEO-firm fit, a hump-shaped relation appears more plausible unless the average CEO has a broad skill set that enables her to adapt to different, partly unforeseeable changes or can easily be replaced in each period.<sup>2</sup> The more dynamic a firm's environment, the more likely and pronounced is the hump-shaped tenure-firm value relation as incumbent CEOs will more likely and faster lose their fit with the firm. Labor market and corporate governance frictions will further make the hump-shaped relation more likely as they increase adjustment costs – due to, e.g., local CEO-firm matching bias (Yonker, 2016) or CEO entrenchment (e.g., Shleifer and Vishny, 1989; Hermalin and Weisbach, 1998) – which make CEO replacements more costly.<sup>3</sup> Nevertheless, how the tenure-firm value relation looks like remains an empirical question.

We document that for the average S&P 1500 company the relation between CEO tenure and firm value is hump shaped. We use both parametric and semi-parametric estimations, which include CEO, firm, and governance characteristics, and account for concerns of extrapolation and sample selection. The life cycle is economically meaningful: holding controls at their means, we estimate a 4.5% increase in firm value over the early years of tenure and a 4.2% decrease over the same number of years in the later period of tenure. Our evidence suggests that a considerable fraction of high-tenure CEOs are no longer the optimal match for their firms and that these firms have difficulties replacing CEOs with candidates of better fit.

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<sup>2</sup> In Appendix A, we provide anecdotal evidence on a decreasing CEO-firm fit and value over time which supports the existence of a hump-shaped tenure-firm value relation.

<sup>3</sup> Governance frictions likely reinforce a negative relation between high CEO tenure and firm value as CEOs gain power over their tenure and influence board composition to distort monitoring and avoid turnover (e.g., Coles, Daniel, and Naveen 2014; Fracassi and Tate, 2012; Taylor, 2010), which explains why some CEOs stay even if they destroy value. *Figure 1* depicts the relation between CEO tenure, power, and forced turnover.

Because hiring and firing CEOs are non-random decisions, we perform several tests to address concerns related to initial and contemporary endogenous CEO-firm match which might bias or even explain our results. As our main test, we analyze the stock market reaction to announcements of sudden, unexpected CEO deaths. Because sudden deaths occur randomly and are likely to be exogenous to current firm and market conditions, this approach mitigates endogeneity concerns. As the stock market reaction reflects CEOs' future net contribution to shareholder value, this analysis also constitutes a test of whether the tenure-firm value relation is hump shaped. If so, CEOs' net contribution to shareholder value will decline over their tenure and we can expect to find a positive relation between CEO tenure and abnormal stock returns upon announcement of CEOs' death. Our results are in line with this expectation. The relation between CEO tenure and abnormal returns is significantly positive and low (high) tenure values are associated with significantly negative (positive) stock returns, underpinning that a considerable fraction of high-tenure CEOs is no longer the optimal match for their firms. Importantly, the positive stock market reaction found for high-tenure CEOs suggests that corporate governance rather than labor market frictions – i.e., entrenchment rather than a lack of CEO candidates – seem to distort the optimal CEO-firm match, as only the former is consistent with positive stock returns upon sudden deaths.

We provide several additional tests to further account for endogenous CEO-firm matching and turnover as well as unobserved CEO heterogeneity. To address endogenous matching and CEO heterogeneity, we exclude the first years of tenure for each CEO and reestimate our regressions with additional controls for CEOs' abilities, education, and work experience. Alternatively, we use CEO-firm fixed effects. We further measure tenure as a fraction of the CEO's maximum realized tenure to allow life cycles to differ across CEOs. To address endogenous CEO turnover, we estimate hazard rates for different types of turnover and include them as additional controls to account for the endogeneity of most turnovers and to

capture effects of expected turnover on firm value. Second, we exclude a five-year event window around CEO turnover as performance patterns around these events might explain our results. Third, we address concerns of CEO or firm survivorship bias. For example, CEOs with good performance may get recruited to run bigger companies (Fee and Hadlock, 2003), while poorly performing CEOs may stay with their firms (due to entrenchment). The hump-shaped relation between CEO tenure and firm value is robust to all aforementioned tests.

We run further tests to sort out several alternative explanations, including non-linear relationships between firm value and CEOs' age, compensation, ownership, power, wealth sensitivity, or (dis)investment decisions which might all be captured by CEO tenure. We also use residuals of CEO tenure which account for hard-to-disentangle variables, such as CEO and firm age, CEO founder status and power, or past performance. Finally, we use return on assets as an alternative measure of firm performance. All these tests confirm our results.

To better understand the relation between CEO tenure and firm value, we provide an additional analysis of corporate (dis)investment behavior over the CEO's time in office. Specifically, we examine the stock market reaction to takeover announcements, which constitute major investments associated with significant value effects, and document a similar hump-shaped pattern between CEO tenure and abnormal stock returns. To understand how CEOs' ability and willingness to change is related to their tenure, we further examine corporate disinvestments. Consistent with decreasing ability and increasing reluctance to change and to reverse earlier investment decisions (Miller, 1991; Boot, 1992; Prendergast and Stole, 1996), we find that the likelihood of disinvestments decreases with CEO tenure.

Our last set of tests is concerned with heterogeneity across industries, CEOs, and the business cycle. In a first step, we examine the role that firms' industry dynamics play for the relation between CEO tenure and firm value. According to our general theoretical framework, firms' managerial skill needs are more (less) likely to change if firms operate in more (less)

dynamic industries. Firms in dynamic industries may also find it harder to identify and attract new CEO candidates with better suited skills sets. As a consequence, the more (less) dynamic a firm's industry, the more (less) likely and the faster (slower) will a CEO's skill set become less optimal for the firm. This setting leads to testable empirical predictions. In particular, relative to the average firm we expect to find that CEO tenure is associated with declining firm value at relatively lower (higher) tenure levels if the firm's industry is more (less) dynamic. Put differently, the relation between CEO tenure and firm value is less (more) likely to be hump shaped and more (less) likely to be positive if firms are subject to low (high) dynamism. Using the industry dynamism index proposed by Coles, Daniel, and Naveen (2015), we find empirical support for our predictions. While on average firm value peaks (i.e., starts to decline) after about 10-12 years of CEO tenure, we find that firm value peaks much earlier (after 8.6 years) for firms with above median industry dynamism and much later (after 13.8 years) for firms with below median dynamism. The overall difference in the peak point of firm value amounts to an economically meaningful 5.2 years, indicating that heterogeneity across firms' industries plays an important role for the tenure-firm value relation.

In a second step, we consider differences across the business cycle. Because economic activity, technological progress, and industry dynamism typically slow down during recessions, and because competition for CEOs can be expected to be lower when the economy does not do well (which makes it easier to replace incumbent CEOs with new candidates), we expect that relative to the average S&P 1500 company firm value will peak at higher levels of CEO tenure during recessions and at lower levels during non-recession years. We again find empirical support for our prediction.

Lastly, we consider CEOs' adaptability to changes. For those firms that employ CEOs who find it easier to adapt to changes in firms' economic environment, the relation between CEO tenure and firm value is more likely to be positive (instead of hump shaped), i.e., firm

value will peak at much higher levels of CEO tenure. We measure CEO adaptability using Custódio, Ferreira, and Matos's (2013) general ability index, which encompasses managerial work experience in different firms, industries, and positions, and find empirical support for our expectation. Specifically, while the tenure-firm value relation is hump shaped and firm value peaks after 10 years of CEO tenure for less adaptable CEOs, we find that the tenure-firm value relation is significantly positive for more adaptable generalist CEOs.

The evidence presented in this study has important policy implications. While it suggests that regular CEO turnover can be valuable for shareholders as even successful CEOs may be associated with declining firm value over the later course of their tenure, it does not support a one-size-fits-all policy of CEO term limits given that the tenure-firm value relation differs considerably across firms and CEOs. However, it might make sense to increase the board's flexibility to react to changes in firms' skill needs and to make CEO contract extensions more dependent on actual CEO-firm fit and less on past performance. In this regard, firms should be careful with granting CEOs additional power as rewards for good performance. Finally, the board of directors should be able and incentivized to frequently monitor the CEO's fit with the firm taking industry dynamics and the CEO's skill set into account. This can require boards to have sufficient independence and industry experience.

The two studies closest to our work are Guay, Taylor, and Xiao (2014), who examine CEO turnover in reaction to industry shocks, and Pan, Wang, and Weisbach (2016) who analyze CEO power and investment behavior over the CEO's tenure. Guay, Taylor, and Xiao (2014) find that when firms are subject to industry shocks CEO turnover becomes more likely, particularly for those CEOs who possess relatively more firm-specific knowledge. They interpret their results as evidence that CEOs have problems adapting to shocks. In line with the increasing power of CEOs over their time in office, the authors find that high-tenure CEOs are less likely to leave their firm, even after industry shocks. Pan, Wang, and Weisbach



(2016) provide evidence that a firm's net investment quantity increases over the CEO's tenure, while investment quality decreases. The authors show that the latter result can be explained by the CEO's control over the board which grows over her time in office. Our study is broader in scope. In contrast to the aforementioned studies, we make clear predictions for the relation between CEO tenure and firm value and test this relation empirically, while the results in both Guay, Taylor, and Xiao (2014) and Pan, Wang, and Weisbach (2016) are consistent with a positive or hump-shaped relation between CEO tenure and firm value and even with a negative relation in the latter. Moreover, we show that the hump-shaped relation between CEO tenure and firm value as well as acquisition returns holds even when we control for CEO entrenchment and power over the board and firms' investment decisions suggesting that corporate investment quality may decline even absent governance problems (consistent with our framework), and that actions other than large observable investments taken by the CEO also seem to have value consequences that are conditional on the CEO's tenure.<sup>4</sup>

On a more general level, our study extends the literature concerned with CEOs' impact on firm value and performance (e.g., Adams, Almeida, and Ferreira, 2005; Bennesen, Pérez-González, and Wolfenzon, 2010, 2011; Bertrand and Schoar, 2003; Jenter, Matveyev, and Roth, 2016). Supporting extant work, our results suggest that CEOs matter for firm value as their skills seem to constitute an important input factor in the firm's production process.

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<sup>4</sup> We note that the management literature has also been concerned with the life cycle of leaders and their impact on organizational performance. In their seminal work, Eitzen and Yetman (1972) find evidence of a hump-shaped relation between the tenure of 58 college basketball coaches and team performance. Providing an explanation for this relation, Hambrick and Fukutomi's (1991) conceptual study on the five seasons of a CEO's tenure suggests that the benefits of tenure (e.g., on-the-job learning) outweigh the costs (e.g., commitment to a fixed paradigm) in the early years of tenure, while this relation likely reverses in later years. Henderson, Miller, and Hambrick (2006) empirically test the aforementioned CEO life cycle. The authors examine two industries, the stable food industry and the more dynamic computer industry, and find that in the former the relation between CEO tenure and firm profitability is hump shaped, while it is negative in the latter. The general theoretical framework we present in our paper provides an alternative explanation for the findings in Eitzen and Yetman (1972) as well as Henderson, Miller, and Hambrick (2006) which are limited in their scope and do not provide tests to establish causality. In contrast, our study provides comprehensive evidence for meaningful heterogeneity across various industries, the business cycle, and different CEOs as well as for corporate (dis)investments and sudden deaths.

However, while the existing literature has focused on heterogeneity across different CEOs, our study provides evidence for the importance of within-CEO and industry heterogeneity.

The remainder of the paper is organized as follows. Section 2 describes our data and variables. Section 3 presents a detailed analysis of the relation between CEO tenure and firm value and various robustness tests. Section 4 provides an analysis of the heterogeneity of the relation between CEO tenure and firm value. Section 5 concludes.

## **2. Data and variables**

### **2.1 Data**

Our initial sample consists of all S&P 1500 companies over the period 1998 to 2011 as covered by ISS (formerly RiskMetrics).<sup>5</sup> For these firms, we collect governance data from ISS' Governance segment and director-level data from the Director segment. We complement this dataset with data from several databases. First, we match our sample with ExecuComp to obtain information on several CEO characteristics including tenure, age, gender, and an annual description of titles (i.e., chairman and president). We obtain data on whether the CEO is the company's founder from Board Analyst's The Corporate Library database for the years 2001 to 2011. Data for earlier years is hand-collected from proxy statements. Accounting data and business segment information is retrieved from Compustat. Finally, stock price information stems from the Center for Research in Security Prices (CRSP). After excluding utilities and financial firms (SIC codes 4000-4999 and 6000-6999), because of differences in accounting and regulation, our final sample (with all available data) consists of 12,427 firm-year observations covering 1,782 firms and 3,054 unique CEO-firm pairs.

### **2.2 Variables**

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<sup>5</sup> ISS provides data from 1996 on. However, due to problems of data availability and consistency for the years 1996 and 1997 (see, e.g., Faleye, Hoitash, and Hoitash, 2011), we choose 1998 as our sample's starting point.

Our main variable of interest is *CEO tenure* calculated as the fiscal year minus the year the CEO became the company's CEO (ExecuComp data item "BECAMECEO"). CEOs are identified using the ExecuComp variable 'CEOANN'. Following Masulis and Mobbs (2014), we replace missing observations by the number of years the CEO has been serving on the company's board of directors (provided by ISS).<sup>6</sup>

Our main output variable is *Tobin's Q*, defined as the sum of the market value of equity and the book value of total assets minus the book value of equity, divided by the book value of total assets. Other output variables include stock returns to acquisition announcements and to announcements of unexpected CEO deaths, and a firm's return on assets (*ROA*). *ROA* is calculated as earnings before interest expenses, taxes, depreciation and amortization (EBITDA) divided by the book value of total assets at the end of the previous year and is winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Announcement returns to acquisition announcements and unexpected CEO deaths are defined in Section 3.

In our analyses, we control for several additional CEO characteristics including the age of the CEO in years (*CEO age*), a dummy variable set to one if the CEO is female (*CEO gender*), and a dummy variable set to one if the CEO is the firm's founder (*Founder CEO*).

Further, CEOs typically become more powerful as their tenure increases (see, e.g., Hermalin and Weisbach, 1998; Ryan and Wiggins, 2004). To account for effects of CEO power on firm value, and to separate CEO power from CEO tenure, we use the variable *CEO power index*. It is based on the following variables: (i) *CEO ownership*, i.e., the fraction of common shares held by the CEO, (ii) *Co-Option* which is the fraction of directors appointed

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<sup>6</sup> We identify the company's CEO in ISS by applying the methodology described in Mobbs (2013). A member of the board of directors is considered to be the CEO of the company if, first, the ISS variable „CLASSIFICATION“ states that the director's board affiliation is classified as employee/insider ("E") and, second, if the variable "EMPLOYMENT\_CEO" equals one, indicating that her primary employment title is CEO. Using this methodology, we are able to identify a firm's CEO within ISS in 99.8% of the cases in which we could not identify a CEO in ExecuComp. CEO tenure is then calculated as the fiscal year minus the year the CEO has joined the board of directors (ISS variable "DIRSINCE").

after the CEO assumed office (Coles, Daniel, and Naveen, 2014), (iii) *Duality* which is a dummy that equals one if the CEO is also the chairman of the board, (iv) *Involved CEO* which is a dummy that equals one if the board has a separate nominating committee and the CEO is a member or if such a committee does not exist (Shivdasani and Yermack, 1999), (v) *Only insider* which is a dummy that equals one if the CEO serves as the only inside (i.e., executive) director on the board of directors, and (vi) *President* which is a dummy that equals one if the CEO has the title of president of the firm. Adams, Almeida, and Ferreira (2005) use the latter four variables to measure CEO power. The *CEO power index* is the sum of the following dummy variables: *CEO ownership* above median, *Co-Option* above median, *Duality*, *Involved CEO*, *President*, and *Only insider*. We separately control for Bebchuk, Cohen, and Ferrell's (2009) E-index to further account for CEO entrenchment.

We control for a series of additional corporate governance and firm characteristics. *Appendix B* provides an overview and detailed definitions of all variables used in the paper. Except for the variables *Business segments*, *Firm age*, and *Sales growth*, all other firm characteristics (i.e., *Book leverage*, *CapEx*, *Firm risk*, *Operating CF*, *R&D*, and *Total assets*) enter the regressions with one lag. Firm value regressions additionally include Tobin's Q with one lag as an explanatory variable to capture the relation between past performance and tenure as well as unobserved value-relevant CEO and firm heterogeneity.<sup>7</sup>

### 2.3 Summary statistics

*Table 1* presents summary statistics for the previously defined variables. In terms of *CEO tenure* and *Maximum CEO tenure*, which take on values between 0 and 60 years, the cross-sectional average is about 7.7 and 10.5 years, respectively. *Maximum CEO tenure* is defined as the largest value of CEO tenure in the sample per CEO-firm pair. Based on the 3,054 CEO-firm pairs in our sample (instead of firm-year level data) average *Maximum CEO*

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<sup>7</sup> When we exclude the lag of *Tobin's Q* from the regressions, all results remain qualitatively similar.

*tenure* is 8.2 years. It increases to 10.3 years when we exclude the 22% of all CEOs who leave the firm during their first three years in office, the period often referred to as “honeymoon”. Excluding turnovers in the honeymoon period, *Maximum CEO tenure* at CEO turnover has a mean of 11.1 years. 31% of all CEOs reach a maximum tenure of at least 10 years, i.e., about a third of all S&P 1500 CEOs stay with their firm for at least a decade. This fraction increases to 39.5% when we exclude CEOs who survive their honeymoon period.

With respect to the other CEO characteristics, we find that mean CEO age is 56 years, 2% of all CEOs are female, and 12% are founders of the firm they lead. The CEO power index has a mean of 3 (relative to a minimum of 0 and a maximum of 6). As can be seen from *Figure 1*, CEO power increases significantly with CEO tenure, at least over the first 15 years. Turning to the components of the CEO power index, on average CEO ownership amounts to 3% (with a median of 1%), 38% of directors on the board were appointed after the CEO assumed office (*Co-Option*), 58% of the CEOs also hold the position of the chairman of the board, 18% are involved in director selection, 57% of the CEOs are the only insiders on the board of directors, and 58% hold the title of the firm’s president. 25% of CEOs hold both the chairman and the president title.

Overall, the summary statistics – also those for our governance or firm characteristics (not discussed here) – compare well to those in recent corporate governance studies (e.g., Adams, Ferreira, and Almeida, 2005; Bebchuk, Cohen, and Ferrell, 2009; Fahlenbrach, 2009; Huang, 2013; Li, Lu, and Phillips, 2016; Masulis and Mobbs, 2014).

### **3. The relation between CEO tenure and firm value**

In this section, we present a detailed examination of the relation between CEO tenure and firm value. In Section 3.1, we show the results from parametric and semi-parametric estimations of our baseline regression model. While Section 3.2 provides various robustness

tests to address concerns of extrapolation and sample selection, CEO heterogeneity, endogenous CEO-firm matching and turnover as well as several alternative explanations, Section 3.3 presents additional evidence from firms' (dis)investment decisions.

### 3.1 Firm value analysis

The general theoretical framework outlined at the beginning of this paper suggests that the relation between CEO tenure and firm value should be either positive or hump shaped. To analyze how the relation between CEO tenure and firm value looks like, we estimate regressions of *Tobin's Q* on different functional forms of *CEO tenure* and a large number of controls for CEO, corporate governance, and firm characteristics (presented in Section 2.2). All regressions also include year and firm fixed effects to account for unobserved variables which are either constant across firms or constant over time. Firm fixed effects constitute our baseline estimation approach as it is consistent with our theoretical framework where firms invest in and employ the production factor labor, i.e., CEOs, and where their investments in CEOs depend on their firm-specific needs for managerial skills, and likely on firm-specific hiring/firing policies. Hence, it is crucial to account for unobserved firm-specific heterogeneity. Because CEO-firm fixed effects treat each CEO-firm pair as a separate firm, although the same firm actually just changes its CEO, they do not accurately account for firm-specific heterogeneity as it is important in the context of our study. Furthermore, firm fixed effects allow for sufficient variation in CEO tenure (as changes in tenure are not limited to exactly one unit for each observation), while they allow to control for CEO age as well as for many other CEO characteristics. Still, we employ CEO-firm fixed effects in robustness tests presented in Section 3.2.

*Table 2* shows our regression results for different functional forms of CEO tenure. In regression specifications (1) and (2), we test whether the relation between CEO tenure and firm value is positive. Therefore, in specification (1) we estimate our baseline regression

model and assume a logarithmic functional form by using the natural logarithm of CEO tenure, i.e.,  $\ln(\text{CEO tenure})$ . This functional form makes the reasonable assumption that the increase in firm value decreases marginally over the CEO's tenure. In specification (2), we assume a basic linear relation and accordingly use the variable *CEO tenure*. To test whether the tenure-firm value relation is hump shaped, we use *CEO tenure* and its squared term, i.e., *CEO tenure squared*, in specification (3). Finally, in specification (4) we use a third-order polynomial of CEO tenure. Our results suggest that the relation between CEO tenure and firm value is hump shaped. In particular, in specifications (3) and (4) the coefficients of *CEO tenure* and *CEO tenure squared* are significant and their opposite signs indicate a hump shape, while all other functional forms are not statistically supported. The hump shape is also found when we additionally include (Fama French 48) industry\*year fixed effects in order to control for time-varying factors particular to an industry as shown in specification (5). In specification (6), we provide estimates that address the concern that *CEO tenure* is correlated with a set of control variables used in our regression model and might therefore capture the effects that these variables can have on firm value. In particular, a CEO's time in office (technically) increases with CEO and firm age and is expected to increase in CEO power and past firm performance, and to be higher if the CEO is the company's founder. Therefore, instead of *CEO tenure*, we use *Residual CEO tenure*, which is the residual from a regression of *CEO tenure* on *CEO age*, *CEO power index*, *Firm age*, *Founder CEO*, *Tobin's Q lagged*, and time fixed effects. The residual no longer captures the effects of the above variables on firm value. The results on *Residual CEO tenure* are qualitatively similar to those on *CEO Tenure* and again support a hump-shaped relation between CEO tenure and firm value. Further, the results of the quadratic specifications suggest that for the average S&P 1500 company firm value peaks (i.e., starts to decline) after about 10-12 years of CEO tenure.

In terms of our control variables, we find founders to be associated with a higher firm value, consistent with, e.g., Fahlenbrach (2009). Supporting previous studies, we also find both board size (e.g., Yermack, 1996) and busy boards (e.g., Fich and Shivdasani, 2006) to be negatively related to firm value. Other CEO and governance characteristics are estimated to be insignificant. Results for firm characteristics are consistent with prior studies.<sup>8</sup>

In addition to the aforementioned parametric estimation results, we provide results from semi-parametric estimations which do not impose any functional form for the tenure-firm value relation. Particularly, we perform locally weighted regressions (lowess) of residuals of *Tobin's Q* on *CEO tenure*. The residuals of *Tobin's Q* are from a regression of our baseline model, shown in specification (3) of Table 2, where we omit the variables *CEO Tenure* and *CEO tenure squared*. As can be seen from *Figure 2*, the results suggest that the relation between CEO tenure and firm value, apparent in the data, is indeed hump shaped.<sup>9</sup>

### 3.2 Tests on the robustness of the firm value analysis

We perform a battery of robustness tests on the results shown in Section 3.1. As a first test, we replicate our regressions in Table 2 with firm fixed effects replaced by random effects with Fama French 48 industry controls. The results (not reported for brevity) confirm the hump-shaped relation between CEO tenure and Tobin's Q. In the following, we present various other tests in more detail.

#### 3.2.1 Extrapolation and sample selection

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<sup>8</sup> The coefficients on the firm characteristics and all fixed effects are not reported for space reasons. The coefficients of the variables *Business segments* and *Total assets* are significantly negative, while the coefficients of *Operating CF*, *R&D*, *Sales growth* and the lag of *Tobin's Q* (coefficient of 0.222) are significantly positive. When we exclude the lag of *Tobin's Q* from the regressions, the results shown in Table 2 remain statistically significant with comparable turning points. When we use two lags of *Tobin's Q* or substitute the lag of *Tobin's Q* for the firm's stock market performance of the previous year, results remain qualitatively similar.

<sup>9</sup> We also obtain a hump-shaped relation between CEO tenure and firm value when we analyze the residuals from the same regression model using CEO-firm fixed effects instead of firm fixed effects. In addition, we follow Mudambi (1997) and run regressions of *Tobin's Q* on polynomials of order 1 to 4 of the variable *CEO tenure* (and control variables). The corresponding test statistics (i.e., adjusted R-squared, AIC and BIC information criteria) suggest the use of the second-order polynomial. Results are not reported for brevity.



A statistical concern with the hump shape we document is that the relation between *Tobin's Q* and high values of *CEO tenure* is only based on available observations, i.e., it is based on CEOs who survive until a specific year of tenure. By imposing a specific functional form, such as a second-order polynomial, we might extrapolate (based on slope and curvature parameters) information for CEOs who actually do not survive. This might lead us to find a hump-shaped relation between CEO tenure and firm value although the actual relation is not hump shaped (but, e.g., rather similar to a logarithmic function of CEO tenure).

We address this concern in two ways. First, we use semi-parametric (lowess) estimations, similar to those shown in Section 3.1, and restrict the sample to firm-year observations for which CEO tenure either takes on values of 11 years or less (the average turning point found in Table 2) or values larger than 11 years. The results are shown in Figures 3a and 3b, respectively. The figures show that residual firm value increases over the early years of tenure (*Figure 3a*), while it clearly decreases over the later years of tenure (*Figure 3b*). Second, in *Table 3* we reestimate our baseline regression model from specification (3) of Table 2 and impose different restrictions with respect to CEO tenure. In specification (1), we restrict the sample to those CEOs who have been at the top of their firm for at least 9 years and who stay no longer than 23 years (i.e.,  $8 \leq \text{Max CEO tenure} \leq 22$ )<sup>10</sup>. The thresholds equal the median and the 90<sup>th</sup> percentile of the variable *Max CEO tenure*, respectively. We further restrict the upper threshold by another 5 years (i.e.,  $8 \leq \text{Max CEO tenure} \leq 17$ ) in specification (2). Finally, consistent with the semi-parametric test described above, in specifications (3) and (4) we restrict our sample to observations with CEO tenure smaller/ equal to or larger than 11 years, respectively. To mitigate concerns of extrapolation and outliers, we further restrict the sample in specification (4) to only those CEOs who stay no longer than 18 years. While we find a hump-shaped tenure-firm value relation in specifications (1) and (2), specifications (3)

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<sup>10</sup> As the smallest value of the variable *Max CEO tenure* is 0, the restriction  $8 \leq \text{Max CEO tenure} \leq 22$  corresponds to CEOs who have been in office for at least 9 and no more than 23 years.

and (4) provide additional support for our semi-parametric results shown in Figures 3a and 3b. Overall, our findings from Section 3.1 appear robust to tests for extrapolation, sample selection, and outliers.

### **3.2.2 Sudden deaths and endogenous CEO-firm matching and turnover**

Because the decision to hire and fire CEOs is not random, the (initial and contemporary) endogenous CEO-firm match and possible unobserved CEO heterogeneity might bias our estimations (perhaps leading us to falsely conclude that the tenure-firm value relation is hump-shaped) or might even provide alternative explanations for our results.

As our main test to address endogenous CEO-firm matching, we analyze the stock market reaction to announcements of sudden and unexpected deaths of incumbent CEOs, similar to, e.g., Johnson et al. (1985), Bennedsen, Pérez-González, and Wolfenzon (2010), Nguyen and Nielsen (2014), and Jenter, Matveyev, and Roth (2016). Because sudden deaths occur randomly and are likely to be exogenous to current firm and market conditions, this approach mitigates endogeneity concerns considerably. As the stock market reaction to sudden deaths reflects CEOs' future contributions to shareholder value (net of the expected successor), this analysis also constitutes a test of whether the relation between CEO tenure and firm value is hump shaped. If so, CEOs' contributions to shareholder value will decline over their tenure and we should find a positive relation between CEO tenure and abnormal stock returns.<sup>11</sup> The sudden death setting further allows distinguishing between labor market and corporate governance frictions as the reason for CEO survival. In fact, a positive stock market reaction to deaths of incumbent high-tenure CEOs, who are still the best match for the firm although they are associated with declining firm value (as due to labor market frictions no value-enhancing replacement is available), seems unlikely and unreasonable. To the contrary,

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<sup>11</sup> A positive stock price reaction suggests a negative contribution to firm value. This reaction is consistent with the hump-shaped tenure-firm value relation which corresponds to a negative relation between a CEO's tenure and the growth rate of firm value (as the derivative function of a hump shape is monotonically decreasing).

if governance frictions (i.e., entrenchment and power) prevent the replacement of incumbent CEOs who are no longer the optimal match for their firms, we would expect a positive announcement return upon unexpected deaths of such CEOs.

We hand-collected a sample of CEO deaths between 1992 and 2012 from various sources, mainly LexisNexis, EDGAR online, Google and the Wall Street Journal, by searching for articles disclosing unexpected deaths of CEOs. We use keyword search terms such as “chief executive officer”, “CEO” and “accident”, “deceased”, “death”, “heart attack”, “passed away”, “stroke”, “sudden(ly)” and “unexpected” to identify sudden deaths. To ensure that the CEO’s death conveys new information, we restrict our sample to unexpected deaths using the definition of Nguyen and Nielsen (2014), i.e., we classify deaths as sudden when the cause of death is a heart attack, stroke, or an accident or when the specific cause is unreported, but the death is described as unexpected. We exclude murders and suicides (which might be related to firm performance) and cases of deaths if they cannot be identified as sudden or unexpected. We only consider CEOs of firms with available data in CRSP. This procedure leaves us with a sample of 80 sudden CEO deaths.<sup>12</sup> For these 80 events, we compute cumulative abnormal stock returns (CARs) over the three-day period from the day before until the day after the announcement date ( $CAR [-1,1]$ ). We use the market model with the CRSP value-weighted index as a proxy for the market return. We winsorize  $CAR [-1,1]$  and accounting data (from Compustat) at the 1<sup>st</sup> and 99<sup>th</sup> percentiles.

Our results are reported in *Table 4*. Panel A reports results from univariate difference-in-means tests for whether  $CAR [-1,1]$  differs depending on the deceased CEO’s tenure. Specifically, we compare mean CARs across three sub-samples based on whether i) CEO tenure

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<sup>12</sup> Comparable to Nguyen and Nielsen (2014), who report a mean market capitalization of US\$ 1,260 million, a mean market-to-book ratio of 2.7, a (median) CEO age of 60 years, and a CEO tenure of 9.4 years, we find that the mean market capitalization in our sample is US\$ 1,455 million, the market-to-book ratio is 2.8, the median CEO age is 60 years and the median tenure is 8.5 years (with a minimum value of zero). The cause of death is a heart attack in 44% of all cases, a stroke or accident in 25%, and in 31% it is unknown but unexpected.

is above or below (or equal to) the sample median, or ii) above or below (or equal to) 11 years, the average turning point determined in our analyses in Section 3.1, or iii) whether tenure is in the first or in the third tercile. The results for all three sub-samples show that abnormal stock returns to announcements of sudden deaths of incumbent CEOs with shorter tenure are significantly lower than announcement returns of CEOs with longer tenure. Consistent with our economic reasoning and the hump-shaped relation between CEO tenure and firm value documented above, we find that the sub-sample means of  $CAR [-1,1]$  are negative for low tenure values, while they are positive for high tenure values. The positive stock market reaction to sudden deaths of high-tenure CEOs indicates that a considerable fraction of these CEOs is no longer the optimal match for their firms and that governance rather than labor market frictions are likely to distort the CEO-firm match.

Panel B reports additional results from multivariate regressions of  $CAR [-1,1]$  on *CEO tenure* and controls for CEO and firm characteristics (not available for all observations) as well as time and industry fixed effects. We add controls successively. Specification (1) only includes *CEO tenure* and a constant, specification (2) adds *CEO age* and firm characteristics, specification (3) adds *Duality*, *Founder CEO*, and *President*, some of the most important CEO power measures (see Adams, Almeida, and Ferreira, 2005), specification (4) adds time fixed effects, and specification (5) adds industry fixed effects and a dummy for whether the firm had a succession plan (using Nguyen and Nielsen's (2014) definition). Finally, in specifications (6) and (7) we replace *CEO tenure* by two dummy variables, one for tenure values in the second or first tercile, respectively, and one for tenure values in the third tercile of the sample's distribution of *CEO tenure*. The results of all regressions are consistent with the univariate findings and suggest a positive relation between abnormal stock returns to announcements of incumbent CEOs' unexpected deaths and CEO tenure. Hence, long tenure periods are (more) negatively perceived by the stock market.

### 3.2.3 Further tests to address endogenous CEO-firm matching, turnover, and unobserved CEO heterogeneity

We provide a number of additional robustness tests – beyond CEO sudden deaths – to further address concerns of endogenous CEO-firm matching and turnover as well as unobserved CEO heterogeneity. *Table 5* shows results from regressions which take heterogeneity across CEOs and the endogenous (initial) CEO-firm match into account. In specification (1), we reestimate our baseline regression model from specification (3) of *Table 2* excluding the first two years of tenure for each CEO. Over the CEO’s first years in office, most uncertainty about CEO quality resolves (Jovanovic, 1979; Pan, Wang, and Weisbach, 2015). Hence, the skill set of CEOs who survive their first years in office is likely considered by the board of directors (and investors) to be a good match for the firm’s skill needs. Consequently, by focusing on these good matches, we mitigate concerns of endogenous CEO-firm matching, while being able to control for time-varying CEO quality (which may be important in the context of our study). In this regard, specification (1) further includes additional controls that capture important differences across CEOs. To account for CEO quality, we use the time-varying *Managerial ability score* proposed by Demerjian, Lev, and McVay (2012). Educational differences are captured by a dummy variable *Ivy league graduate*, which is set to one if a CEO graduated (at any level) from an Ivy league college, and by the variable *Education score*, which is a count variable that takes on the values 0 (no college degree), 1 (Bachelor), 2 (Master or MBA) and 3 (Ph.D.). We further control for the two dummy variables *Recession graduate* (Schoar and Zuo, 2016) and *Inside CEO* to account for early-job and firm-specific experience. The definition of the latter variable follows Bebchuk, Cremers, and Peyer (2011). In specification (2), we use the same approach as before but replace *CEO tenure* and its squared term by the variable *CEO tenure/Max CEO tenure* and its squared term, i.e., we measure tenure as a fraction of the CEO’s maximum realized tenure. This way, we allow life

cycles to differ across CEOs, which is likely to be a relevant source of CEO heterogeneity in our context. For example, CEOs might differ in their ability to learn and adapt and in the amount of time after which they run out of new ideas and become more and more obsolete. In specification (3), we reestimate specification (2) and use CEO-firm fixed effects as an alternative way of addressing unobserved (time-invariant) CEO heterogeneity and endogenous CEO-firm matching. Finally, in specification (4), we reestimate specification (1) of Table 3 replacing firm fixed effects by CEO-firm fixed effects to simultaneously address extrapolation, endogenous matching, and CEO heterogeneity. All aforementioned tests confirm the hump-shaped relation between CEO tenure and firm value.

In the next set of analyzes shown in Tables 6 and 7, we provide additional tests to address concerns of endogenous CEO turnover which might bias or even explain our results. We use CEO turnover data as provided by Peters and Wagner (2014) and Jenter and Kanaan (2015) and apply the authors' definition of forced turnovers. All non-forced turnovers of CEOs aged 63 or older are defined as planned retirements and all remaining turnovers are defined as unclassified turnovers. *Panel A of Table 6* shows summary statistics for the three types of CEO turnovers.

We first address a bias due to endogeneity of turnover and the concern that the hump-shaped relation between CEO tenure and firm value might simply reflect varying managerial incentive structures as job security of many CEOs might increase over the early years of tenure, but decrease afterwards. In this regard, Cziraki and Groen-Xu (2014) find that job security affects corporate risk-taking and investments (which could affect firm value). Therefore, in a first step we perform a survival analysis using a Cox hazard model with CEO turnover and all three types of CEO turnover as failure events. The results are shown in *Panel B of Table 6*. Turnover refers to the next year ( $t+1$ ). As can be seen from Panel B, all types of turnover are less likely if the CEO has more power or if she is the founder of the company, while turnover

probability is higher when the board is more independent. Furthermore, higher firm value and accounting performance reduce the likelihood of forced turnover. These results are in line with the literature. In a second step, we run our baseline regression model from specification (3) of Table 2 and additionally include the resulting hazard rate (for each type of turnover), or the hazard rate and its squared term, to account for the endogeneity of turnover and for CEO job security. Our results, shown in *Panel C of Table 6*, remain qualitatively similar.

*Table 7* provides further analyses to address concerns of endogenous CEO turnover. All tests use our baseline regression model shown in specification (3) of Table 2. First, the hump-shaped relation between CEO tenure and firm value might be the outcome of performance patterns around CEO turnovers, especially forced turnovers (e.g., Denis and Denis, 1995; Jenter and Kanaan, 2015) in conjunction with the use of firm fixed effects. In this regard, Huson, Malatesta, and Parrino (2004) and Taylor (2010) show that firm profitability tends to decline in the two years prior to forced CEO turnovers and increases in the two years after a new CEO took office. As *Figure 4* illustrates, we find a similar pattern for Tobin's Q around forced turnovers, while we find no pattern for planned retirements, and a decline in firm value for the group of unclassified turnovers (likely due to voluntary or health-related turnovers of CEOs with good performance). To address this concern, in specification (1) we use three dummy variables to control for CEO turnover. In specifications (2) and (3), we exclude from our sample all firm-year observations in the five-year event window starting two years prior to and ending two years after a forced or unclassified turnover, respectively. Second, the hump-shaped relation between CEO tenure and firm value might simply be attributed to CEO or firm survival. Specifically, it might reflect that CEOs with very good performance get recruited to run bigger companies (Fee and Hadlock, 2003), while CEOs with relatively poor performance remain with their firms. The latter may still survive for longer time periods through entrenchment in poorly governed firms and, probably, due to a lack of suc-

cession planning. A similar argument is that successful CEOs receive a larger compensation and accumulate more wealth resulting in higher opportunity costs of work and earlier retirement. The acquisition of a company, which is usually associated with high returns (see, e.g., Andrade, Mitchell, and Stafford, 2001) while terminating the CEO's tenure with this company through the subsequent delisting of the target firm, may also cause part of the effect. We consider different sub-samples to address these concerns. In specification (4), we restrict the sample to S&P 500 companies as CEOs of these very large companies are less likely to get recruited to run even bigger firms.<sup>13</sup> The focus on the 500 leading U.S. companies also reduces heterogeneity with respect to CEO talent and pay and mitigates concerns of succession problems. In specification (5), we exclude CEOs who have exceeded the general retirement age of 65 years. These CEOs are more likely to lead companies that lack CEO succession plans, while at the same time they have fewer, if any, career concerns. In specification (6), we focus on wealthier CEOs, i.e., those with a cumulative total CEO compensation (relative to their tenure) above the median. Finally, in specification (7) we exclude firms that have become takeover targets over the sample period. The results of all aforementioned tests confirm our main finding from Section 3.1.

### 3.2.3 Alternative explanations

As another set of robustness tests, shown in *Appendix C*, we attempt to rule out a number of alternative explanations. First, *CEO tenure* and *CEO tenure squared* may simply pick up the effect of a non-linear relation between CEO age or firm age and firm value. Hence, in specifications (1) and (2), we add *CEO age squared* and *Firm age squared* as an

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<sup>13</sup> Consistent with our general theoretical framework, we find that for the large and well-known S&P 500 companies, which are more likely to find and successfully recruit CEO candidates, firm value starts to decline after about 15 years of tenure, later than for the average S&P 1500 company. However, consistent with the results for sudden deaths, the finding that the relation between CEO tenure and firm value remains hump-shaped even for the large S&P 500 firms suggests that corporate governance rather than labor market frictions distort the optimal match between CEOs and firms, i.e., incumbent CEOs seem to overstay likely due to power and entrenchment rather than because there are no available value-enhancing CEO candidates to replace them.



additional control variable to our baseline regression model (as reported in specification (3) of Table 2), respectively. When we use a firm's foundation age (obtained from The Corporate Library) instead of its age since IPO in unreported regressions, the result remains qualitatively similar. Second, CEO tenure and its squared term may simply capture a hump-shaped relation between CEO power and firm value as power grows with longer tenure and as it may have both costs and benefits (Adams, Almeida, and Ferreira, 2005; Li, Lu, and Phillips, 2016; Sah and Stiglitz, 1986). Hence, in specification (3), we add the squared term of *CEO power index* to our standard regression. Third, in specification (4), we additionally control for *Board age* and its squared term which might correlate with a CEO's tenure and affect firm value. Fourth, Huang (2013) reports a hump-shaped relation between outside director tenure and firm value. As director tenure may correlate with CEO tenure, in specification (5), we extend our baseline model to include *Outside director tenure* and its squared term. Finally, in specification (6) we include all these additional explanatory variables simultaneously. We find the hump-shaped relation between CEO tenure and firm value to hold across all six regressions.

We investigate further alternative explanations in *Appendix D*. As shown in Pan, Wang, and Weisbach (2016), while firms' disinvestments decrease over CEO tenure, investments increase but with decreasing quality. Under the assumption that disinvestments efficiently reshape the firm, the hump-shaped relation between CEO tenure and firm value might just reflect this investment pattern. Thus, in addition to firms' capital and R&D expenditures already controlled for in all of our regressions, in specification (1), we include additional controls for firms' acquisition and divestiture activities. Specifically, we use the dummy variables *Acquisition* and *Divestiture* set to one if a firm undertakes an M&A transaction or a divestiture in a given year. In specification (2), we control for *CEO ownership* and its square to address a potential hump shape of equity ownership and firm value (e.g., McConnell and Servaes, 1990). We alternatively include the CEOs' fraction of variable to total compensation

and its squared term in specification (3). Finally, in specification (4) we control for CEOs' wealth-performance sensitivity using the data from Edmans, Gabaix, and Landier (2009). Specification (5) shows the regression results when we include all additional controls simultaneously. Again, we find our results to hold across all regression specifications with all coefficients on *CEO tenure* and *CEO tenure squared* being statistically significant.

#### **3.2.4 Further robustness tests**

As an additional test on whether the relation between CEO tenure and firm value is hump shaped, we reestimate our baseline regression model from specification (3) of Table 2 and replace *CEO tenure* and its squared term by the indicator variable *CEO tenure plateau [11-13]*, which is set to one for firm-year observations for which *CEO tenure* takes on values between 11 and 13. The regression results are shown in *Appendix E*. Consistent with our results in Section 3.1 and the hump-shaped tenure-firm value relation, we find that the coefficient for *CEO tenure plateau [11-13]* is statistically significant and positive in regression specification (1), where we use firm fixed effects, and in specification (2), where we use CEO-firm fixed effects instead.

As a final robustness test to our main results, we replace *Tobin's Q* by return on assets (*ROA*) as an accounting (i.e., non-forward looking) measure of firm performance. The results are reported in *Appendix F*. We estimate a similar regression model as in specification (5) of Table 2 (i.e., with industry\*year fixed effects) and use firm fixed effects in specification (1) and CEO-firm fixed effects in specification (2). The results are consistent with the previously documented hump-shaped relation between CEO tenure and firm value.

### **3.3 Complementary evidence from corporate investment decisions**

In this section, we provide additional complementary evidence from corporate investment and disinvestment decisions to provide the reader with a better understanding of the

relation between CEO tenure and firm value. In a first step, we investigate a major channel through which CEOs can create and destroy firm value, acquisitions. The hump-shaped relation between CEO tenure and firm value is likely to be driven and reflected by CEOs' investment decisions. Specifically, over the early years of tenure those CEOs with a non-optimal skill set and fit who are likely associated with less successful investment decisions are more likely to be fired by the board of directors. As eventually CEOs' fit with their firms deteriorates in longer tenure, and CEOs becomes increasingly entrenched and reluctant to change, we expect investment decisions to become worse. Thus, consistent with our general theoretical framework, we expect to find a hump-shaped relation between CEO tenure and abnormal stock returns in reaction to acquisition announcements. An analysis of announcement returns allows a straightforward market-based assessment of the quality of CEOs' investment decisions. In this regard, acquisitions are an ideal setting to study the quality of a CEOs' decisions as they are among the largest and most easily observable investments which tend to be directly influenced by CEOs (see, e.g., Custódio and Metzger, 2013).

We compile a dataset of acquisitions announced by our sample firms during the period 1998-2011. Data on mergers and acquisitions stem from Standard & Poor's Capital IQ database. We only include takeovers with a total transaction value of at least 5 million US dollars in which a majority stake (i.e., at least 50%) of the target firm is acquired. We further require a transaction's total value to represent at least 5% of the acquirer's market capitalization 20 days prior to deal announcement. These filters result in 2,171 acquisitions made by 1,148 distinct firms for which the basic control variables (those typically used in the M&A literature) are available. The sample is reduced to 1,526 acquisitions made by 806 distinct firms when we use the same control variables as in Section 3.1.

We measure acquirer announcement returns over a three-day event window from one day before to one day after the event date ( $CAR [-1,1]$ ), defined as the day of the acquisition

announcement in Capital IQ (or the first trading day thereafter if the announcement was made on a non-trading day). Cumulative abnormal announcement returns are calculated using the market model with the S&P 500 market index. In addition to the firm characteristics used in Section 3.1, we also control for deal characteristics following previous research (e.g., Custódio and Metzger, 2013; Moeller, Schlingemann, and Stulz, 2004). They include the payment method, target ownership status, relative deal size, industry relatedness, geographic relatedness, and whether the acquisition is hostile. We further control for the number of an acquirer's previous deals in the last five years to account for acquisition experience and the firm's acquisition set. The deal-related variables are defined in the caption of *Table 8*.<sup>14</sup>

Specifications (1) and (2) of *Table 8* report the results from regressions of  $CAR [-1,1]$  on  $CEO\ tenure$ ,  $CEO\ tenure\ squared$ , deal characteristics, a limited set of acquirer characteristics, and year fixed effects. Specification (1) uses industry fixed effects (in order to make the results more comparable to the M&A literature), while specification (2) uses firm fixed effects. In specifications (3) and (4) the extended set of control variables and firm fixed effects are used. The first three specifications report the results for the sample of acquisitions whose total transaction value represents at least 5% of the acquirer's market capitalization, while specification (4) reports the results for acquisitions with a relative size of at least 10%. Additionally, specification (5) uses  $CAR [-5,5]$  instead of  $CAR [-1,1]$  as the dependent variable to account for event uncertainty. The results across all five specifications support a hump-shaped relation between CEO tenure and acquisition announcement returns. Consistent with the results on the relation between CEO tenure and firm value, we find the turning point of CEO tenure to be located in the area of 8.5-14 years when firm fixed effects are used. This evidence is consistent with the notion that high-tenure CEOs have lost too much of their fit

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<sup>14</sup> Mean values of the control variables for deal characteristics are not reported for brevity. They are in line with previous research. For example, relative deal size is 25% and the fraction of public targets is 36%. Custódio and Metzger (2013), for example, report values of 24% and 32%, respectively.

with the company and are entrenched, and thus select non-optimal takeover targets (e.g., those with relatively low synergies or low growth prospects). Empire building (Jensen, 1986) or attempts to diversify the personal portfolio (Amihud and Lev, 1981) may aggravate this problem. Overall, the relatively lower returns to acquisition announcements associated with very short or very long CEO tenure support the CEO life cycle we posit.

In a second step, we provide an analysis of corporate disinvestments and CEO tenure. Economic theory suggests that over their tenure CEOs become reluctant to change and to reverse earlier (investment) decisions (e.g., Miller, 1991; Boot, 1992; Prendergast and Stole, 1996), which will make them less responsive and probably also less adaptable to changes. Coupled with increasing power and entrenchment, unresponsive CEO behavior can make the increasing likelihood of a mismatch between CEOs' skill sets and their firms' skill needs due to the evolution of the economy and its industries an even more severe problem. For example, high-tenure CEOs may be likely to divest less than necessary and stick to their paradigm when their industry evolves which demands changes to affected firms' technologies. We therefore test whether the probability of corporate divestitures decreases with CEO tenure. The regression results are shown in *Table 9*. Supporting Pan, Wang, and Weisbach (2016), we find that corporate divestitures become less likely over CEOs' time in office. In addition, consistent with high-tenure CEOs being reluctant to make necessary changes to their companies, we further find that the probability of divestitures is considerably higher in the first three years of a CEO's tenure.

#### **4. Heterogeneity of the relation between CEO tenure and firm value**

In this section, we examine the heterogeneity of the relation between CEO tenure and firm value. On the one hand, the analyses and results we present in the following aim at providing a better understanding of the tenure-firm value relation. On the other hand, they

constitute tests of our general theoretical framework. With regard to this framework, we study the role of industry dynamics and general economic dynamism, which alter firms' managerial skill needs, as well as CEOs' abilities to adapt to changes to their firms' business environments.

In a first step, we examine firms' industry dynamics, i.e., how fast industries evolve. We make the reasonable assumption that firms' managerial skill needs are more (less) likely to change if firms operate in more (less) dynamic industries. Further, firms in dynamic industries may also find it harder to identify new CEO candidates with better suited skills sets because predicting the optimal skill set demands can be more difficult and because CEO candidates may have preferences to work in more stable economic environments. As a consequence, the more (less) dynamic a firm's industry, the more (less) likely and the faster (slower) will a CEO's skill set become less optimal for the firm. Thus, relative to the average S&P 1500 firm we expect to find that CEO tenure is associated with declining firm value at relatively lower (higher) tenure levels if the firm's industry is more (less) dynamic. Put differently, the relation between CEO tenure and firm value is less (more) likely to be hump shaped and more (less) likely to be positive if firms are subject to low (high) dynamism.

To measure firms' industry dynamics, we use the industry dynamism index proposed by Coles, Daniel, and Naveen (2015). The index is defined as the sum of the following four indicator variables: (i) a dummy whether the average annual sales growth of all firms in the industry is above the 50<sup>th</sup> percentile, (ii) a dummy whether the average R&D expenses to total assets at the industry level are above the 75<sup>th</sup> percentile, (iii) a dummy whether the average of the fluidity scores of Hoberg, Phillips, and Prabhala (2014) is above the 50<sup>th</sup> percentile, and (iv) a dummy whether the number of mergers in the industry divided by the number of firms in the industry (e.g., Harford, 2005) is above the 50<sup>th</sup> percentile. Industries are defined based on three-digit SIC codes. The index takes on discrete values between 0 and 4

(with a median value of 2) with higher values indicating higher industry dynamism. The results from reestimating our baseline regression model from specification (3) of Table 2 for sub-samples based on whether industry dynamism is high or low are reported in *Panel A of Table 10*. Specification (1) reports the results for firm-years with a dynamism index above the median (i.e., more dynamic settings), while specification (2) reports the results for firm-years with a dynamism index below or equal to the median (i.e., less dynamic industries). We provide additional evidence in *Panel B of Table 10* where we use each component of the dynamism index to compare more to less dynamic industry settings.

The results support our expectations. While on average firm value is estimated to peak (i.e., starts to decline) after about 12.2 years of CEO tenure in our baseline regression model (Table 2), we find that firm value peaks much earlier, namely after 8.6 years (or 30% earlier), for firms with above median industry dynamism and is estimated to peak much later, after 13.8 years (or 13% later), for firms with below median dynamism. The overall difference in the turning point of firm value amounts to 5.2 years, an economically meaningful variation. When we use the components of the dynamism index, in Panel B, our results are confirmed and we find firm value to peak at even higher tenure levels for some low-dynamism firms suggesting that the relation between CEO tenure and firm value becomes less likely to resemble a hump shape (as expected). Yet, for all four low-dynamism sub-samples we test whether the relation can also be described by a positive logarithmic function of *CEO tenure* and find that this is only the case for firms operating in low-growth industries (specification 6). Overall, our results indicate that heterogeneity with respect to firms' industry dynamics plays an important role for the tenure-firm value relation.

In a second step, we examine differences across the business cycle. During recessions, economic activity, technological progress, and industry dynamism typically slow down. Further, competition for CEOs is likely to be lower when the economy does not do well, which

facilitates replacing CEOs by candidates with better fit. Accordingly, similar to the previous results shown in Table 10, we expect that relative to the average S&P 1500 company firm value will peak at higher levels of CEO tenure during recessions, when CEOs skill sets are less likely to lose their fit with firms' skill needs, and at lower levels during non-recession years. To test this prediction, we define an indicator *Recession* that equals 1 if the observation year is classified as a recession year according to the NBER Business Cycle Expansions and Contractions data (<http://www.nber.org/cycles.html>). Our results, shown in *Table 11*, provide empirical support for our expectation. We find a hump-shaped relation between CEO tenure and firm value for both non-recession and recession years. However, in specification (1), where we only consider non-recession years, we estimate the turning point of firm value to be at 10.2 years of tenure, 20% lower than for the average firm, while in specification (2), which is limited to recession years only, firm value is estimated to peak around 14.8 years of tenure, i.e., 21% later. Again, this variation is economically meaningful. Thus, heterogeneity with regard to the business cycle also seems to matter for the tenure-firm value relation.

In a last step, we consider CEOs' abilities to adapt to changes in firms' economic environment. For those firms that employ adaptable CEOs, who are less likely to lose their fit with the company, the relation between CEO tenure and firm value is more likely to be positive (instead of hump shaped), i.e., firm value will likely peak at much higher levels of CEO tenure as it needs more or more drastic changes to render an adaptable CEO's skill set non-optimal. To measure CEO adaptability, we use Custódio, Ferreira, and Matos's (2013) general ability index, which encompasses managerial work experience in different firms, industries and positions. Because of their broad managerial experience, we expect generalists to be better able to adapt to changes and to be more capable of learning new concepts and solving new problems. This expectation is consistent with Guay, Taylor, and Xiao (2014) who find that CEOs with more general managerial ability are less likely to be fired when their firms are



hit by industry shocks. Our results, shown in *Table 12*, support our expectation. We use the indicator variable *Generalist CEO*, which equals one if the general ability index is above the annual median value for the respective year, and interact it with *CEO tenure* and its squared term in specification (1). We find that non-generalist CEOs are associated with a hump-shaped relation between CEO tenure and firm value which is estimated to peak after 10.3 years. For generalist CEOs, however, we find a positive interaction term with *CEO tenure squared* which suggests that firm value starts to decline much later. Consistently, in specifications (2) and (3) we find no hump shape, but rather a positive tenure-firm value relation for generalists. These findings support our general framework and the existing literature on generalist CEOs and indicate that adaptability is an important CEO attribute.

## **5. Conclusion**

In this study, we examine whether CEOs' impact on the firms they run varies over their tenure and which factors render CEOs more or less valuable over time. Consistent with a general theoretical framework that considers environmental dynamics, we document a hump-shaped relation between CEO tenure and firm value for the average S&P 1500 company using both parametric and semi-parametric estimations. This relation is robust to a battery of robustness tests, including CEO sudden deaths, and is subject to economically meaningful variation depending on industry dynamics, the business cycle, and CEOs' adaptability to changes. We provide further results for corporate investment decisions consistent with the hump-shaped tenure-firm value relation. In all, the evidence we provide suggests that a considerable fraction of high-tenure CEOs is no longer the optimal match for their firms and that these firms seem to have difficulties, apparently due to corporate governance frictions, replacing the incumbent CEOs with candidates who have better fitting skill sets.

The results presented in this paper help explain why even very successful CEOs can be associated with declining firm value after some point in time. They suggest that firms should be careful with granting CEOs additional power as rewards for good performance as this makes it harder to replace the CEO if the fit deteriorates in the future. Results also suggest that regular CEO turnover can be valuable for shareholders, but they do not support a one-size-fits-all policy of CEO term limits. The board of directors should rather frequently monitor the CEO's fit with the firm and have the flexibility to react to changes in firms' skill needs and to make CEO contract extensions more dependent on actual CEO-firm fit and less on past performance.

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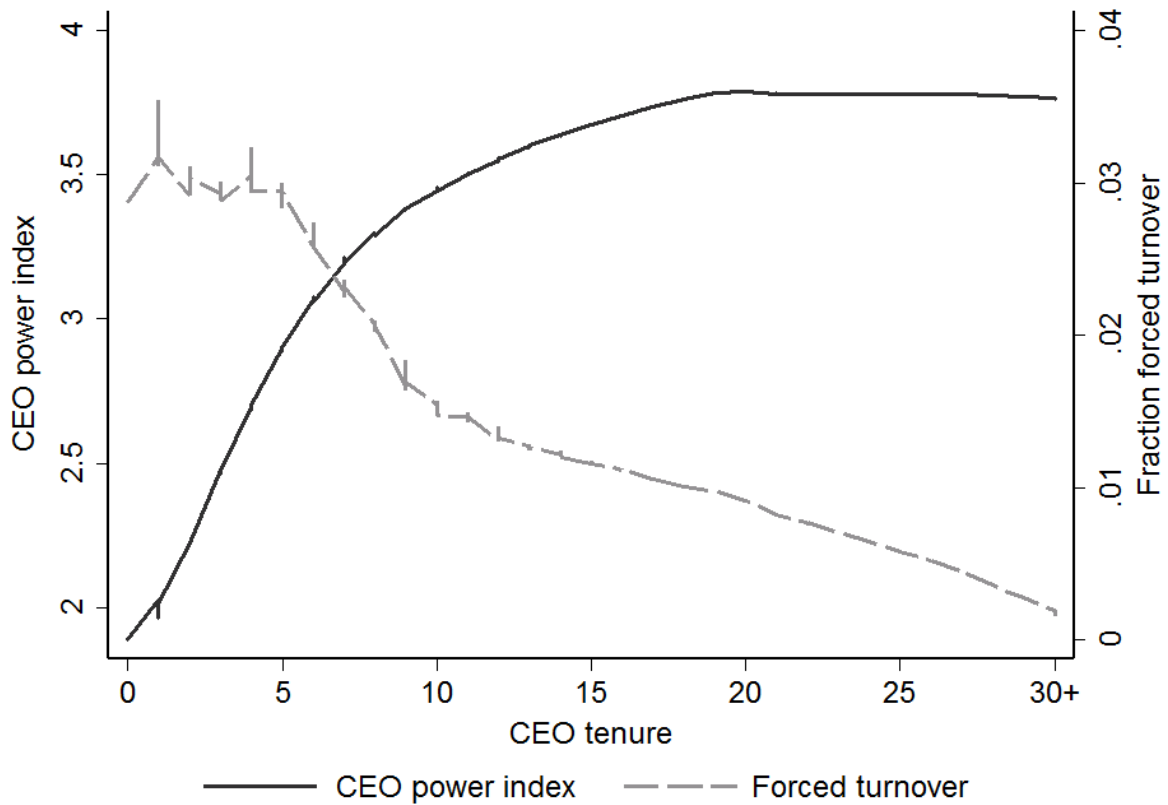
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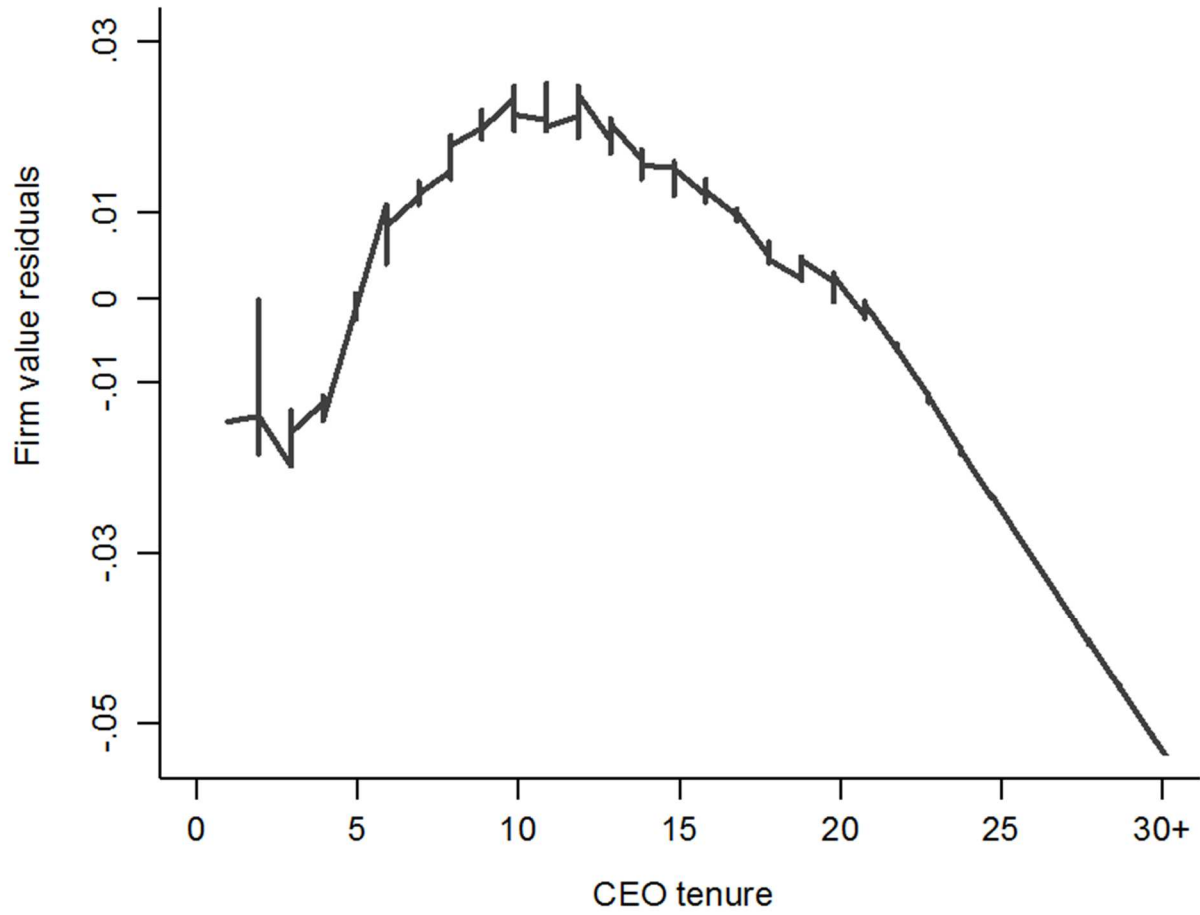
**Figure 1 – CEO power and forced turnover as functions of CEO tenure**

This figure shows results from locally weighted regressions (lowess) of the *CEO power index* and *Forced turnover* on *CEO tenure*. Lowess regressions provide a semiparametric way of estimating the relation between CEO power and CEO tenure as well as CEO forced turnover and CEO tenure. The bandwidth is 0.4. *CEO power index* is the sum of the following indicator variables: *CEO ownership* above median, *Co-Option* above median, *Duality*, *Involved CEO*, *President*, *Only insider*. *Forced turnover* is an indicator variable that takes the value of one if the turnover is classified as forced according to Peters and Wagner (2014) and Jenter and Kanaan (2015) who provided the data. *CEO tenure* is the number of years the CEO has been serving as the firm's CEO.



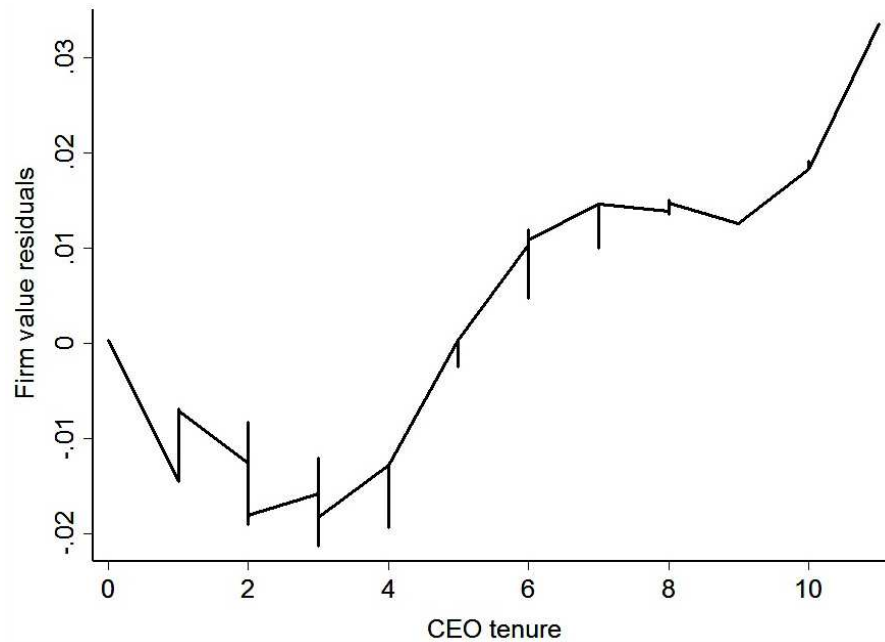
**Figure 2 – Semiparametric estimation of the relation between firm value and CEO tenure**

This figure shows the results from a locally weighted regression (lowess) of residuals of *Tobin's Q* on *CEO tenure*. Lowess regressions provide a semiparametric way of estimating the relation between firm value and CEO tenure. The bandwidth is 0.4. The residuals of *Tobin's Q* are from a regression of our baseline model shown in column (3) of Table 2 where we omit the variables *CEO tenure* and *CEO tenure squared*.



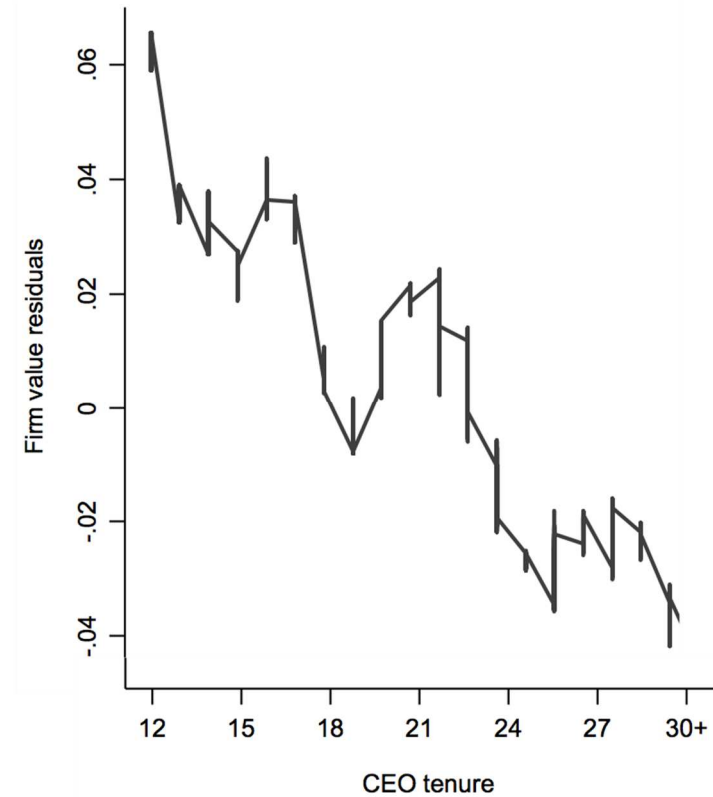
**Figure 3a – Semiparametric estimation of the relation between firm value and CEO tenure (CEO tenure  $\leq 11$  yrs)**

This figure shows the results from a locally weighted regression (lowess) of residuals of *Tobin's Q* on *CEO tenure* for all observations with tenure values  $\leq 11$  years. The bandwidth is 0.4. The residuals of *Tobin's Q* are from a regression of our baseline model shown in column (3) of Table 2 where we omit the variables *CEO tenure* and *CEO tenure squared*.



**Figure 3b – Semiparametric estimation of the relation between firm value and CEO tenure (CEO tenure  $> 11$  yrs)**

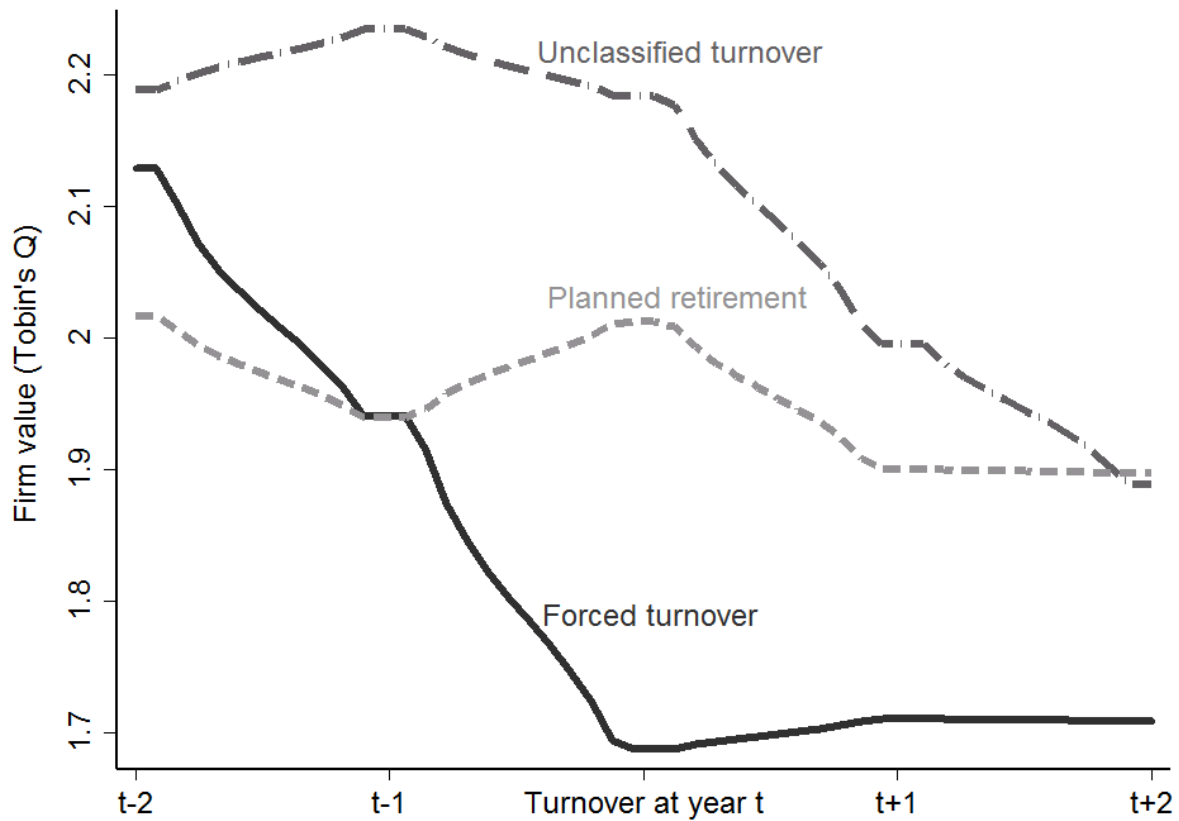
This figure shows the results from a locally weighted regression (lowess) of residuals of *Tobin's Q* on *CEO tenure* for all observations with tenure values  $> 11$  years. The bandwidth is 0.4. The residuals of *Tobin's Q* are from a regression of our baseline model shown in column (3) of Table 2 where we omit the variables *CEO tenure* and *CEO tenure squared*.





**Figure 4 – Firm value around CEO turnover**

This figure illustrates how firm value (Tobin's Q) changes in the years around CEO turnover. The event window ranges from two years prior (t-2) to two years after (t+2) CEO turnover for three different types of CEO turnovers. *Forced turnover* is defined according to Peters and Wagner (2014) and Jenter and Kanaan (2015) who provided the data. *Planned retirement* is defined as any non-forced turnover of a CEO who is 63 years or older. *Unclassified turnover* is defined as any turnover not classified as a forced turnover or as a planned retirement.



**Table 1 – Summary statistics**

This table presents summary statistics for the sample of S&P 1500 companies (excluding SIC codes 4000-4999 and 6000-6999) comprising 12,427 firm-year observations based on 1,782 unique firms and 3,054 unique CEO-firm pairs over the period 1998-2011. *CEO tenure* is the number of years the CEO has been serving as the firm's CEO. *Max CEO tenure* is the largest value of *CEO tenure* in the sample for each CEO-firm pair. Both *CEO tenure* and *Max CEO tenure* take on integer values between 0 and 60. CEOs leave in their honeymoon period if *Max CEO tenure* is smaller than three years. All other variables are defined in Appendix B.

	Obs.	Mean	Median	1. Quartile	3. Quartile	SD
<b><i>CEO tenure</i></b>						
CEO tenure (cross-sectional)	12,427	7.67	5.00	2.00	10.00	8.02
Max CEO tenure (cross-sectional)	12,427	10.51	8.00	5.00	13.00	8.42
Max CEO tenure	3,054	8.22	6.00	3.00	11.00	8.01
Max CEO tenure w/o CEOs who leave in honeymoon	2,367	10.28	8.00	5.00	13.00	7.98
CEOs who leave in honeymoon (dummy)	3,054	0.22				0.42
Max CEO tenure $\geq$ 10 yrs (dummy)	3,054	0.31				0.44
Max CEO tenure at turnover w/o CEOs who leave in honeymoon	948	11.12	8.00	5.00	14.00	8.46
<b><i>CEO characteristics</i></b>						
CEO age	12,427	55.66	56.00	51.00	60.00	7.38
CEO gender (dummy)	12,427	0.02				0.15
Founder CEO (dummy)	12,427	0.12				0.32
CEO power index	12,427	2.90	3.00	2.00	4.00	1.21
CEO ownership	12,427	0.03	0.010	0.003	0.026	0.06
Co-Option	12,427	0.38	0.33	0.11	0.63	0.30
Duality (dummy)	12,427	0.58				0.49
Involved CEO (dummy)	12,427	0.18				0.38
Only insider (dummy)	12,427	0.57				0.49
President (dummy)	12,427	0.58				0.49
<b><i>Governance characteristics</i></b>						
Board age	12,427	60.11	60.22	57.67	62.60	3.94
Board size	12,427	9.01	9.00	7.00	10.00	2.23
Busy board (dummy)	12,427	0.20				0.40
Director ownership	12,427	0.002	0.0005	0.0002	0.001	0.005
E-index	12,427	2.47	2.00	2.00	3.00	1.35
Independence ratio	12,427	0.71	0.75	0.63	0.83	0.16
Outside director tenure	12,427	8.23	7.63	5.60	10.11	3.78
<b><i>Firm characteristics</i></b>						
Book leverage	12,427	0.40	0.41	0.27	0.51	0.17
Business segments	12,427	2.81	3.00	1.00	4.00	2.29
CapEx	12,427	0.05	0.04	0.02	0.07	0.05
Firm age	12,427	25.11	19.00	11.00	35.00	19.34
Firm risk	12,427	0.46	0.41	0.31	0.55	0.21
Operating CF	12,427	0.13	0.12	0.07	0.17	0.10
R&D	12,427	0.03	0.01	0.00	0.05	0.06
ROA	12,402	0.16	0.15	0.10	0.21	0.12
Sales growth	12,427	0.10	0.08	-0.007	0.17	0.27
Tobin's Q	12,427	1.99	1.59	1.22	2.26	1.35
Total assets	12,427	6,211.67	1,355.68	556.39	3,944.00	26,765.89

**Table 2 – The relation between CEO tenure and firm value**

This table reports results from firm fixed effects regressions of *Tobin's Q* on different functional specifications of *CEO tenure* along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). Regression specification (1) uses the natural logarithm of *CEO tenure* (denoted  $\ln(\text{CEO tenure})$ ), while specification (2) uses *CEO tenure*. Specifications (3) and (4) show regression results for a second-order and a third-order polynomial of *CEO tenure*, respectively. Specification (5) shows results of reestimating regression specification (3) with interacted year and industry (based on Fama French 48 industries) fixed effects as additional controls. Specification (6) uses the variable *Residual CEO tenure* and its squared term instead of *CEO tenure* and its squared term. *Residual CEO tenure* is the residual from a regression of *CEO tenure* on the variables *CEO age*, *CEO power index*, *Firm age*, *Founder CEO*, *Tobin's Q<sub>t-1</sub>* and year-fixed effects. All other variables are defined in Appendix B. An intercept and year dummies are included in all regressions, but not reported. Robust t-statistics adjusted for clustering by firm are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<b>ln(CEO tenure)</b>	<b>0.0162</b> <b>(0.706)</b>					
<b>CEO tenure</b>		<b>-0.0021</b> <b>(-0.483)</b>	<b>0.0146**</b> <b>(2.410)</b>	<b>0.0196**</b> <b>(2.401)</b>	<b>0.0130**</b> <b>(2.162)</b>	
<b>CEO tenure squared</b>			<b>-0.0006***</b> <b>(-3.619)</b>	<b>-0.0010*</b> <b>(-1.937)</b>	<b>-0.0006***</b> <b>(-3.701)</b>	
<b>CEO tenure cubic</b>				<b>0.0000</b> <b>(0.926)</b>		
<b>Residual CEO tenure</b>						<b>0.0133**</b> <b>(2.252)</b>
<b>Residual CEO tenure squared</b>						<b>-0.0006***</b> <b>(-3.682)</b>
<i>CEO characteristics</i>						
CEO age	0.0006 (0.239)	0.0024 (0.828)	0.0019 (0.652)	0.0018 (0.613)	0.0040 (1.393)	0.0023 (0.801)
CEO gender	0.0362 (0.416)	0.0318 (0.365)	0.0411 (0.476)	0.0429 (0.495)	0.0131 (0.163)	0.0420 (0.485)
CEO power index	-0.0164 (-0.866)	-0.0080 (-0.425)	-0.0225 (-1.162)	-0.0241 (-1.243)	-0.0252 (-1.302)	-0.0205 (-1.112)
Founder CEO	0.3503** (2.169)	0.3802** (2.086)	0.4236** (2.283)	0.4295** (2.304)	0.3783** (2.073)	0.4231** (2.315)
<i>Governance characteristics</i>						
Board size	-0.2651*** (-2.758)	-0.2606*** (-2.731)	-0.2591*** (-2.729)	-0.2604*** (-2.739)	-0.2160** (-2.318)	-0.2592*** (-2.729)
Busy board	-0.0548* (-1.756)	-0.0547* (-1.756)	-0.0527* (-1.698)	-0.0523* (-1.686)	-0.0314 (-1.099)	-0.0527* (-1.700)
Director ownership	-3.0998 (-1.395)	-3.1192 (-1.406)	-3.2698 (-1.484)	-3.2242 (-1.466)	-2.6739 (-1.178)	-3.2753 (-1.488)
E-Index	0.0170 (1.036)	0.0174 (1.070)	0.0163 (1.006)	0.0159 (0.983)	0.0220 (1.335)	0.0163 (1.005)
Independence ratio	-0.0253 (-0.191)	-0.0324 (-0.240)	-0.0426 (-0.315)	-0.0436 (-0.322)	-0.0114 (-0.081)	-0.0415 (-0.307)
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry*year fixed effects	No	No	No	No	Yes	No
Observations	12,427	12,427	12,427	12,427	12,427	12,427
R-squared (within)	0.295	0.295	0.297	0.299	0.354	0.297
<b>Turning point (yrs)</b>			<b>12.2</b>	<b>9.8</b>	<b>10.8</b>	<b>11.1</b>

**Table 3 – Addressing concerns of extrapolation and sample selection**

This table reports results from firm fixed effects regressions of *Tobin's Q* on *CEO tenure* or *CEO tenure* and its squared term along with CEO, firm, and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). Regression specification (1) restricts the sample to all observations for which *Max CEO tenure* is between 8 and 22 years (the 50<sup>th</sup> and 90<sup>th</sup> percentiles of *Max CEO Tenure*, which ranges from 0 to 60 years), i.e., the respective CEOs stayed with their firm for at least 9 years, but no longer than 23 years. Specification (2) further restricts the sample to all observations for which *Max CEO tenure* is between 8 and 17 years. Specification (3) shows regression results for a subsample of CEOs who stayed with their firm for a maximum of 11 years (*Max CEO tenure* ≤ 11 yrs). Specification (4) shows regression results for a subsample of CEOs who have already been in office for more than 11 years (i.e., *CEO tenure* > 11 yrs) and who stayed with the firm for a maximum of 13 to 18 years (i.e., 12 ≤ *Max CEO tenure* ≤ 17 yrs). Control variables are identical to those used in regression (3) of Table 2. All other variables are defined in Appendix B. An intercept and year dummies are included in all regressions, but not reported. Robust t-statistics adjusted for clustering by firm are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>			
	(1)	(2)	(3)	(4)
	<i>8 ≤ Max CEO tenure ≤ 22 yrs</i>	<i>8 ≤ Max CEO tenure ≤ 17 yrs</i>	<i>Max CEO tenure ≤ 11 yrs</i>	<i>CEO tenure &gt; 11 yrs &amp; 12 ≤ Max CEO tenure ≤ 17 yrs</i>
<b>CEO tenure</b>	<b>0.0646***</b>	<b>0.0675**</b>	<b>0.0174**</b>	<b>-0.1965***</b>
	(2.952)	(2.146)	(2.029)	(-5.103)
<b>CEO tenure squared</b>	<b>-0.0021**</b>	<b>-0.0028**</b>		
	(-2.456)	(-1.982)		
<i>CEO characteristics</i>				
CEO age	-0.0171*	-0.0114	-0.0017	-0.0067
	(-1.732)	(-1.235)	(-0.502)	(-0.266)
CEO gender	0.0622	-0.2892	0.0692	–
	(0.196)	(-1.291)	(0.735)	
CEO power index	-0.0681**	-0.0718**	-0.0229	0.0582
	(-2.088)	(-2.073)	(-0.857)	(1.031)
Founder CEO	-0.0072	-0.2921	0.4034	–
	(-0.018)	(-1.079)	(0.873)	
Governance characteristics	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	5,717	4,943	8,546	817
R-squared (within)	0.295	0.280	0.283	0.271

**Table 4 – Using CEO sudden deaths to address endogenous CEO-firm match and turnover**

This table reports three-day abnormal stock returns to announcements of sudden CEO deaths between 1992 and 2012. The methodology and the definition of sudden deaths follow Nguyen and Nielsen (2014).  $CAR [-1,1]$  is the three-day cumulative abnormal announcement return calculated using the market model with a CRSP value-weighted market index as the market proxy, where the event day  $t=0$  is either the trading day on which the sudden and unexpected death of a CEO is first reported in the news or the next trading day in case a death was announced on a non-trading day. Panel A shows results of left- and two-tailed univariate difference-in-means tests allowing for unequal variances across subsamples (based on CEO tenure). Panel B reports multivariate results for regressions of  $CAR [-1,1]$  on CEO tenure and additional controls. Dummy variables for each decade (1990s, 2000s, and 2010s) are included in specifications (4) to (7). Specifications (5) to (7) additionally include industry fixed effects based on the Fama and French 12 industries. *Succession plan* is an indicator variable that takes the value of one if the firm has a succession plan in place or announces an interim successor within one week after the announcement of the sudden death.  $CAR [-1,1]$  and accounting data are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. The sample size varies across regression specifications (1) to (7) due to data availability. All variables are defined in Appendix B. Robust t-statistics are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

<b>Panel A: Difference-in-means tests for abnormal stock returns around CEO sudden deaths</b>				
<b>Expected sign</b>	<b>( - )</b>	<b>( + )</b>	<b>left-tailed test (diff &lt; 0)</b>	<b>two-tailed test (diff ≠ 0)</b>
	<b>CEO tenure ≤ median</b>	<b>CEO tenure &gt; median</b>	<b>Difference</b>	<b>Difference</b>
CAR [-1,1]	-0.0250 (N=40)	0.0104 (N=40)	-0.0354** (-1.826)	-0.0354* (-1.826)
	<b>CEO tenure ≤ 11 yrs</b>	<b>CEO tenure &gt; 11 yrs</b>	<b>Difference</b>	<b>Difference</b>
CAR [-1,1]	-0.0222 (N=50)	0.0174 (N=30)	-0.0397** (-1.987)	-0.0397* (-1.987)
	<b>CEO tenure 1<sup>st</sup> tercile</b>	<b>CEO tenure 3<sup>rd</sup> tercile</b>	<b>Difference</b>	<b>Difference</b>
CAR [-1,1]	-0.0287 (N=29)	0.0307 (N=22)	-0.0594*** (-2.574)	-0.0594** (-2.574)

**Panel B: Multivariate evidence from sudden deaths**

	<i>CAR [-1,1]</i>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>CEO tenure</b>	<b>0.002***</b> (2.773)	<b>0.002***</b> (2.667)	<b>0.002*</b> (1.776)	<b>0.002**</b> (2.241)	<b>0.003***</b> (2.857)		
<b>CEO tenure 1<sup>st</sup> tercile</b>							<b>-0.057*</b> (-1.921)
<b>CEO tenure 2<sup>nd</sup> tercile</b>						<b>0.057*</b> (1.921)	
<b>CEO tenure 3<sup>rd</sup> tercile</b>						<b>0.093***</b> (3.034)	<b>0.0353*</b> (1.722)
<i>CEO characteristics</i>							
CEO age		0.002 (1.650)	0.002 (1.650)	0.002 (1.514)	0.003* (1.735)	0.003* (1.976)	0.003* (1.976)
Duality			0.020 (1.142)	0.024 (1.374)	0.021 (1.092)	0.010 (0.521)	0.010 (0.521)
Founder CEO			0.009 (0.395)	0.004 (0.195)	0.009 (0.409)	0.001 (0.053)	0.001 (0.053)
President			0.008 (0.442)	0.010 (0.541)	0.014 (0.849)	0.022 (1.243)	0.022 (1.243)
<i>Firm characteristics</i>							
Market-to-book		0.001 (0.395)	0.000 (0.206)	0.000 (0.229)	0.001 (0.686)	0.002 (0.867)	0.002 (0.867)
ROA		-0.046 (-1.383)	-0.048 (-1.346)	-0.065* (-1.883)	-0.084** (-2.120)	-0.103** (-2.503)	-0.103** (-2.503)
Succession plan					0.015 (0.678)	0.015 (0.605)	0.015 (0.605)
Total assets		0.012*** (2.819)	0.012*** (2.690)	0.015*** (3.517)	0.016*** (3.040)	0.018*** (3.117)	0.018*** (3.117)
Constant	-0.033*** (-2.732)	-0.235*** (-2.751)	-0.254** (-2.638)	-0.239** (-2.556)	-0.228** (-2.118)	-0.329*** (-2.699)	-0.2012* (-1.826)
Decade controls	No	No	No	Yes	Yes	Yes	Yes
Industry controls	No	No	No	No	Yes	Yes	Yes
Observations	80	73	73	73	73	73	73
Adj. R-squared	0.073	0.237	0.219	0.247	0.306	0.334	0.334

### Table 5 – CEO heterogeneity and endogenous CEO-firm match: Additional robustness tests

This table reports results from multivariate regressions of *Tobin's Q* on *CEO tenure* and its squared term or *CEO tenure/Max CEO tenure* and its squared term along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). Specifications (1) and (2) show firm fixed effects regression results with additional control variables capturing differences between CEOs. These controls are: (i) *Education score* which is measured on a four-point scale reflecting the highest level of education a CEO attained (0 = no college degree or missing, 1 = bachelor's degree, 2 = master's degree or MBA, 3 = Ph.D. degree), (ii) *Inside CEO* which is an indicator variable that takes the value of one if a CEO is classified as an inside CEO according to the definition of Bebchuk, Cremers, and Peyer (2011), zero otherwise. A CEO is considered an insider if the CEO joined the company more than a year before becoming CEO, or if the CEO is classified as the founder of the company (*Founder CEO*), or if the data item "JOINED\_CO" is missing, (iii) *Ivy League graduate* which is an indicator variable that takes the value of one if the CEO graduated from an Ivy League college, zero otherwise, (iv) *Managerial ability score* which is a measure of managerial ability developed by Demerjian, Lev, and McVay (2012) (<https://community.bus.emory.edu/personal/PDEMERJ/Pages/Download-Data.aspx>), (v) *Recession graduate* which is a dummy variable that takes the value of one if the CEO entered the labor market during a recession year, zero otherwise. The definition follows Schoar and Zuo (2016). Market entry of managers is approximated by the manager's year of birth plus 24 years. Recession years are based on the business cycle dating database of the National Bureau of Economic Research (NBER). Results shown in regression specification (1) are obtained from excluding all observations with *CEO tenure* below two years (i.e.,  $CEO\ tenure > 1$ ). Specification (2) uses *CEO tenure* standardized by *Max CEO tenure* (denoted  $CEO\ tenure/Max\ CEO\ tenure$ ) and its squared term as an alternative, CEO-specific measure of CEO tenure for the sample of firm-year observations for which *CEO tenure* is  $> 1$ . Specifications (3) and (4) use CEO-firm fixed effects. Regression results in specification (3) are based on all observations for which *CEO tenure* is  $> 1$ . Specification (4) shows regression results for the sample of CEOs who stayed with their firm for at least 9 but no longer than 23 years (i.e.,  $8 \leq Max\ CEO\ tenure \leq 22$  yrs). All other control variables are identical to specification (3) of Table 2. Other variables are defined in Appendix B. An intercept is included in all regressions, but not reported. Robust t-statistics reported in parentheses in specifications (1) and (2) are adjusted for clustering by firm. Robust t-statistics reported in parentheses in specifications (3) and (4) are adjusted for clustering by CEO-firm pair. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>			
	(1)	(2)	(3)	(4)
	<i>CEO tenure &gt; 1 (i.e., w/o first two years of tenure)</i>	<i>CEO tenure &gt; 1</i>	<i>CEO tenure &gt; 1</i>	<i>8 ≤ Max CEO tenure ≤ 22 yrs</i>
<b>CEO tenure</b>	<b>0.0160*</b>			<b>0.0531***</b>
	<b>(1.699)</b>			<b>(2.846)</b>
<b>CEO tenure squared</b>	<b>-0.0008***</b>			<b>-0.0019**</b>
	<b>(-3.580)</b>			<b>(-2.476)</b>
<b>CEO tenure/Max CEO tenure</b>		<b>0.7144**</b>	<b>0.9566***</b>	
		<b>(2.323)</b>	<b>(3.309)</b>	
<b>CEO tenure/Max CEO tenure squared</b>		<b>-0.5256**</b>	<b>-0.6719***</b>	
		<b>(-2.363)</b>	<b>(-3.423)</b>	
<b>Max CEO tenure</b>		<b>-0.0107</b>		
		<b>(-1.194)</b>		
<i>Further CEO characteristics</i>				
Education score	0.0267	0.0304		
	(0.698)	(0.795)		
Inside CEO	0.0067	0.0111		
	(0.089)	(0.150)		
Ivy league graduate	-0.0494	-0.0426		
	(-0.788)	(-0.678)		
Managerial ability score	0.7397***	0.7539***	0.3985*	0.7411***
	(3.256)	(3.285)	(1.950)	(3.761)
Recession graduate	0.0026	0.0054		
	(0.074)	(0.152)		
CEO characteristics	Yes	Yes	Yes	Yes
Governance characteristics	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	No	No
CEO-firm fixed effects	No	No	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	10,114	10,114	10,144	5,652
R-squared (within)	0.302	0.300	0.250	0.287



**Table 6 – Endogenous CEO turnover: Additional robustness tests (I)**

Panel A presents summary statistics of *CEO tenure* at the event of CEO turnover for different types of CEO turnovers. Panel B presents results of a survival model analysis. Regression specification (1) to (4) report coefficients of a Cox proportional hazard model for different failure events as described at the top of each column. In regression specification (1) the failure event equals *CEO turnover*. *CEO turnover* is an indicator variable equal to one if there is a change in the CEO position in year t+1 for any reason. In regression specification (2), the failure event equals *Forced turnover* which is an indicator variable that equals one if the turnover is classified as forced according to Peters and Wagner (2014) and Jenter and Kanaan (2015) who provided the data. In specification (3), the failure event is *Planned retirement*. *Planned retirement* is an indicator variable that is set to one if the turnover is not classified as forced and the CEO is 63 years or older. Specification (4) shows results for the failure event of an *Unclassified turnover*. *Unclassified turnover* is an indicator variable that takes the value of one if the CEO turnover is not classified as a forced turnover or as a planned retirement. *CEO of retirement age* is an indicator variable that takes the value of one if the age of the CEO is between 63 and 66 years, zero otherwise. *Stock return* is the one-year buy-and-hold return calculated from monthly returns. If not stated otherwise, control variables are for year t. Year and industry-fixed effects (based on Fama-French 48 industry classification) are included in specifications (1) to (4) of Panel B. Panel C reports results of firm fixed effects regressions of *Tobin's Q* on *CEO tenure*, its squared term, and controls for the probability of different CEO turnover types, i.e., the respective hazard rates obtained from the regressions shown in Panel B. Specifications (1), (3), (5) and (7) control for the predicted hazard rate. Specifications (2), (4), (6) and (8) additionally control for the squared term of the hazard rate from Panel B. All other control variables in Panel C are identical to those used in specification (3) of Table 2. All other variables are defined in Appendix B. An intercept and year fixed effects are included in all regressions, but not reported. Robust t-statistics adjusted for clustering by firm are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

<b>Panel A: Max CEO tenure at CEO turnover</b>						
	Obs.	Mean	Median	1. Quartile	3. Quartile	SD
Forced turnover	263	4.77	4.00	1.00	6.00	4.97
Forced turnover w/o honeymoon leaver CEOs	164	6.99	5.00	4.00	8.00	5.13
Planned retirement	368	12.25	10.00	6.00	18.00	10.80
Planned retirement w/o honeymoon leaver CEOs	327	14.76	11.00	7.00	20.00	10.52
Unclassified turnover	471	8.53	7.00	4.00	12.00	6.47
Unclassified turnover w/o honeymoon leaver CEOs	402	9.82	8.00	5.00	13.00	6.14

<b>Panel B: Cox hazard models</b>				
	(1)	(2)	(3)	(4)
	<i>CEO turnover<sub>t+1</sub></i>	<i>Forced CEO turnover<sub>t+1</sub></i>	<i>Planned CEO turnover<sub>t+1</sub></i>	<i>Unclassified CEO turnover<sub>t+1</sub></i>
CEO gender	-0.0835 (-0.329)	0.1682 (0.450)	–	0.2067 (0.598)
CEO of retirement age	0.4270*** (5.596)	-1.3785*** (-4.171)	2.3260*** (19.367)	–
CEO power index	-0.6319*** (-19.504)	-0.7185*** (-11.519)	-0.6259*** (-10.403)	-0.5739*** (-11.609)
Founder CEO	-1.3609*** (-11.910)	-2.0475*** (-5.179)	-1.3340*** (-7.001)	-1.2728*** (-7.782)
<i>Governance characteristics</i>				
Board size	0.0937 (0.596)	-0.2344 (-0.717)	0.5046* (1.758)	0.0384 (0.160)
Busy board	0.1893** (2.381)	0.0793 (0.488)	0.2294* (1.659)	0.1961 (1.580)
Director ownership	6.2416 (1.008)	9.8933 (0.872)	5.7094 (0.431)	8.4524 (0.920)
E-index	0.0382 (1.443)	0.0541 (0.990)	0.0218 (0.466)	0.0605 (1.483)
Independence ratio	2.0148*** (8.221)	1.7756*** (3.617)	1.5985*** (3.656)	2.4278*** (6.327)
<i>Firm characteristics</i>				
Board meetings	0.0965*** (13.178)	0.0985*** (7.809)	0.0523*** (3.238)	0.1107*** (10.333)
Book leverage	0.5091** (2.547)	0.8812** (2.209)	0.8465** (2.392)	0.1335 (0.440)
Business segments	0.1214** (2.246)	0.1867* (1.656)	0.2243** (2.323)	0.0172 (0.206)
Firm age	-0.1836*** (-3.924)	-0.1460 (-1.601)	-0.2244*** (-2.636)	-0.1580** (-2.134)
ln(Total Assets)	-0.0706** (-2.248)	-0.1569** (-2.515)	-0.1120* (-1.941)	-0.0025 (-0.053)
ROAEbitda	-1.4325*** (-2.974)	-3.2454*** (-3.636)	0.6487 (0.761)	-1.3251* (-1.860)
ROAEbitda <sub>t-1</sub>	0.5564 (1.322)	0.9797 (1.323)	-0.1791 (-0.234)	0.5901 (0.901)
Sales growth	-0.4504*** (-2.844)	-0.7227** (-2.238)	-0.2943 (-1.011)	-0.4093** (-2.027)
Stock return	-0.1713** (-2.309)	-0.9950*** (-5.321)	-0.0601 (-0.582)	-0.0011 (-0.015)
Stock return <sub>t-1</sub>	-0.0229 (-0.384)	-0.5880*** (-3.350)	-0.0585 (-0.428)	0.0568 (1.264)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	10,514	10,514	10,514	10,514
Likelihood value	-8279.99	-1956.44	-2386.72	-3559.28

<b>Panel C: Controlling for CEO turnover probability</b>								
	<i>Tobin's Q</i>							
	<i>CEO turnover<sub>t+1</sub></i>		<i>Forced CEO turnover<sub>t+1</sub></i>		<i>Planned CEO turnover<sub>t+1</sub></i>		<i>Unclassified CEO turnover<sub>t+1</sub></i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>CEO tenure</b>	<b>0.0149**</b> (2.145)	<b>0.0147**</b> (2.115)	<b>0.0147**</b> (2.107)	<b>0.0148**</b> (2.128)	<b>0.0154**</b> (2.203)	<b>0.0161**</b> (2.293)	<b>0.0150**</b> (2.159)	<b>0.0149**</b> (2.143)
<b>CEO tenure squared</b>	<b>-0.0006***</b> (-3.378)	<b>-0.0006***</b> (-3.300)	<b>-0.0006***</b> (-3.354)	<b>-0.0006***</b> (-3.283)	<b>-0.0006***</b> (-3.470)	<b>-0.0006***</b> (-3.556)	<b>-0.0006***</b> (-3.393)	<b>-0.0006***</b> (-3.359)
Hazard rate	-0.0064** (-2.509)	-0.0193*** (-5.518)	-0.0000** (-2.102)	-0.0000*** (-6.489)	-0.0042 (-1.573)	-0.0138*** (-2.831)	-0.0000* (-1.938)	-0.0000** (-2.530)
Hazard rate squared		0.0001*** (3.883)		0.0000*** (6.579)		0.0002** (2.499)		0.0000** (2.279)
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Governance charac.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,514	10,514	10,514	10,514	10,514	10,514	10,514	10,514
R-squared (within)	0.293	0.295	0.294	0.299	0.292	0.293	0.292	0.293

**Table 7 – Endogenous CEO turnover: Additional robustness tests (II)**

This table reports results from firm fixed effects regressions of *Tobin's Q* on *CEO tenure* and its squared term along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). Regression specification (1) controls for the different types of CEO turnovers and excludes the last observation for each firm. Specification (2) excludes firm-year observations in the [-2, 2]-year window around a forced CEO turnover, while specification (3) excludes firm-year observations in the [-2, 2]-year window around an unclassified CEO turnover. Specification (4) excludes all firm-year observations for which the CEO's age exceeds the general retirement age of 65 years. Specification (5) restricts the sample to S&P 500 companies. Specification (6) restricts the sample to relatively wealthy, better compensated CEOs for which *Cumulative total CEO compensation* is above the sample median. *Cumulative total CEO compensation* is the sum of the value of total annual compensation (ExecuComp item "TDC1") the CEO has received over her tenure until the end of the fiscal year (standardized by CEO tenure). Values of total annual compensation before 2006 are adjusted following the methodology in Walker (2011). Specification (7) excludes firms that have been identified as takeover targets. All variables are defined in Appendix B. An intercept is included in all regressions, but not reported. Robust t-statistics adjusted for clustering by firm are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>						
	(1) <i>Controlling for turnover type</i>	(2) <i>w/o [-2, 2]-year window around forced CEO turnover</i>	(3) <i>w/o [-2, 2]-year window around unclassified CEO turnover</i>	(4) <i>S&amp;P 500</i>	(5) <i>CEO age ≤ 65 yrs</i>	(6) <i>Cumulative total CEO compensation &gt; Median</i>	(7) <i>w/o takeover target firms</i>
<b>CEO tenure</b>	<b>0.0156**</b> (2.032)	<b>0.0139**</b> (2.106)	<b>0.0146**</b> (2.539)	<b>0.0452***</b> (3.028)	<b>0.0165**</b> (2.052)	<b>0.0597***</b> (3.833)	<b>0.0145**</b> (2.296)
<b>CEO tenure squared</b>	<b>-0.0006***</b> (-3.513)	<b>-0.0006***</b> (-3.509)	<b>-0.0005***</b> (-2.843)	<b>-0.0015**</b> (-2.372)	<b>-0.0008***</b> (-2.885)	<b>-0.0027***</b> (-2.755)	<b>-0.0006***</b> (-3.566)
<i>Turnover controls</i>							
Forced turnover	-0.2171*** (-3.794)						
Planned retirement	0.0373 (0.780)						
Unclassified turnover	0.0332 (0.455)						
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Governance characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,644	11,369	10,477	3,994	11,462	6,238	11,690
R-squared (within)	0.293	0.316	0.294	0.411	0.292	0.331	0.296

**Table 8 – Channels (I): Evidence from acquisitions**

This table presents results from regressions of three-day cumulative abnormal returns ( $CAR [-1,1]$ ) and eleven-day cumulative abnormal returns ( $CAR [-5,5]$ ) around acquisition announcements on *CEO tenure* and its squared term along with CEO, acquirer (including corporate governance) and deal characteristics. To estimate abnormal returns, we use the market model with the S&P 500 index as a proxy for the market portfolio. *Cross-border* is a dummy variable whether a deal is cross-border, and zero for domestic deals. *Hostile* is a dummy variable that is set to one for deals defined by Capital IQ as hostile deals, zero otherwise. *Market-to-book* is the acquiring firm's market-to-book ratio defined as the acquirer's market capitalization 20 trading days prior to deal announcement divided by the acquirer's common equity as of the end of the fiscal year prior the announcement of the M&A deal. *Number previous deals* is the number of acquisitions made by the acquirer in the 5 years prior to deal announcement. *Payment includes stock* is a dummy variable that equals one if the consideration includes stock, and zero otherwise. *Public target* is dummy variable that equals one if the target firm is a listed company, and zero otherwise. *Relative size* is the deal's total transaction value divided by the acquirer's market capitalization 20 days prior to the announcement of the deal. *Same industry* is a dummy variable that equals one if the acquirer and the target belong to the same two-digit SIC industry, and zero otherwise. All other variables are defined in the Appendix B. Regression specification (1) includes year and industry fixed effects (based on Fama-French 48 industries), while specifications (2) to (5) include year and firm fixed effects. Robust t-statistics of the regression coefficients (in parentheses) are based on standard errors clustered by acquirer. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% level, respectively.

Relative size:	<i>CAR[-1,1]</i>				<i>CAR[-5,5]</i>
	$\geq 5\%$ (1)	$\geq 5\%$ (2)	$\geq 5\%$ (3)	$\geq 10\%$ (4)	$\geq 5\%$ (5)
<b>CEO tenure</b>	<b>0.0013***</b> <b>(2.895)</b>	<b>0.0019*</b> <b>(1.671)</b>	<b>0.0028*</b> <b>(1.894)</b>	<b>0.0049**</b> <b>(2.105)</b>	<b>0.00394*</b> <b>(1.796)</b>
<b>CEO tenure squared</b>	<b>-0.00004***</b> <b>(-2.652)</b>	<b>-0.00008*</b> <b>(-1.939)</b>	<b>-0.00011*</b> <b>(-1.839)</b>	<b>-0.00022**</b> <b>(-2.130)</b>	<b>-0.00023**</b> <b>(-2.343)</b>
<i>CEO characteristics</i>					
CEO age	-0.0057** (-2.185)	-0.0046 (-0.952)	-0.0004 (-0.070)	0.0004 (0.034)	0.01180 (1.484)
CEO age squared	0.00005** (2.364)	0.00005 (1.099)	0.00001 (0.124)	0.00001 (0.071)	-0.00011 (-1.531)
CEO gender			0.0091 (0.424)	-0.0164 (-0.565)	0.06840 (1.534)
CEO power index			0.0016 (0.522)	0.0010 (0.201)	0.00647 (1.498)
Founder CEO			0.0321 (1.175)	0.0996** (2.369)	0.07726** (2.246)
<i>Acquirer characteristics</i>					
Book leverage			-0.01338 (-0.529)	0.04114 (1.009)	-0.01396 (-0.305)
Business segments			-0.00465 (-0.608)	0.00008 (0.006)	-0.01524 (-1.450)
Firm age			-0.01249 (-0.821)	0.00539 (0.185)	-0.01161 (-0.571)
Firm risk			0.02363 (0.924)	0.01697 (0.459)	0.06852* (1.856)
Market-to-book	0.0009* (1.941)	0.0009 (0.563)	-0.0003 (-0.311)	-0.0054** (-2.348)	-0.00272* (-1.665)
Operating CF			-0.0522 (-1.527)	-0.0332 (-0.708)	-0.10395* (-1.951)
Total assets	-0.0022* (-1.797)	0.0045 (0.737)	0.0077 (0.988)	-0.0023 (-0.192)	-0.00132 (-0.124)
<i>Governance characteristics</i>					
Board size			-0.0366 (-1.550)	-0.0728* (-1.785)	-0.01200 (-0.402)
Busy board			0.0200*** (2.734)	0.0217 (1.418)	0.03125*** (2.781)
Director ownership			-1.3644* (-1.721)	-1.6921 (-1.320)	-1.78950 (-1.427)
E-index			0.0006 (0.132)	0.0039 (0.469)	0.00577 (1.072)
Independence ratio			0.0069 (0.253)	0.0026 (0.065)	0.01053 (0.266)
<i>Deal characteristics</i>					
Cross-border	0.0042 (1.144)	0.0042 (0.822)	0.0018 (0.320)	0.0008 (0.075)	0.00476 (0.616)
Hostile	-0.0360 (-1.075)	-0.0078 (-0.250)	-0.0149 (-0.468)	-0.0471* (-1.869)	-0.01679 (-0.667)
Number previous deals	-0.0001 (-0.356)	-0.0008 (-0.944)	-0.0006 (-0.596)	0.0011 (0.723)	-0.00135 (-0.921)
Payment includes stock	-0.0067* (-1.704)	-0.0039 (-0.723)	-0.0043 (-0.616)	0.0042 (0.373)	0.00318 (0.336)
Public target	-0.0074** (-2.032)	-0.0060 (-1.143)	-0.0057 (-0.921)	-0.0068 (-0.680)	-0.00641 (-0.746)
Relative size	-0.0068 (-1.111)	-0.0023 (-0.271)	0.0086 (0.737)	0.0094 (0.646)	0.00833 (0.600)
Same industry	-0.0034 (-0.981)	-0.0089* (-1.781)	-0.0079 (-1.478)	-0.0115 (-1.202)	-0.01894** (-2.501)
Industry fixed effects	Yes	No	No	No	No
Firm fixed effects	No	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	2,171	2,171	1,526	922	1,526

**Table 9 – Channels (II): Evidence from corporate disinvestments**

This table reports results from firm fixed effects regressions (regression specification 1) and conditional logistic firm fixed effects regressions (specifications 2 to 4) of the indicator variable *Divestiture* on *CEO tenure* along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). *CEO tenure* [0, 2] is a dummy variable that equals one for the first three years of a CEO's tenure, zero otherwise. All other variables are defined in Appendix B. An intercept and year fixed effects are included in all regressions, but not reported. For regression specification (1), robust t-statistics adjusted for clustering by firm are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Prob (Divestiture)</i>			
	(1)	(2)	(3)	<i>CEO tenure</i> <i>≤ median</i> (4)
<b>CEO tenure</b>	<b>-0.0016**</b> (-2.428)	<b>-0.0319***</b> (-2.797)	<b>-0.0237*</b> (-1.907)	
<b>CEO tenure [0, 2]</b>				<b>0.2171*</b> (1.8128)
<i>CEO characteristics</i>				
CEO age	0.0005 (0.6394)	0.0093 (0.9038)	0.0092 (0.8941)	0.0186 (1.4231)
CEO gender	-0.0448 (-1.2521)	-0.6573 (-1.4591)	-0.6297 (-1.3984)	-0.2572 (-0.5050)
CEO power index			-0.0863 (-1.631)	0.0158 (0.213)
Founder CEO	0.0379* (1.936)	0.8704** (2.341)	0.9324** (2.501)	-1.7751* (-1.674)
<i>Firm characteristics</i>				
Book leverage	0.0708*** (2.667)	1.3004*** (2.787)	1.3219*** (2.817)	1.3562** (2.088)
Business segments	-0.0000 (-0.003)	-0.0377 (-0.336)	-0.0489 (-0.434)	-0.0720 (-0.464)
Firm age	0.0059 (0.373)	-0.0487 (-0.209)	-0.1625 (-0.686)	-0.1775 (-0.580)
Firm risk	0.0304 (1.578)	0.3888 (1.042)	0.4184 (1.115)	0.7267 (1.384)
Operating CF	-0.0577* (-1.937)	-1.0891 (-1.611)	-1.0717 (-1.587)	-1.8248** (-1.990)
R&D	0.1682 (1.617)	2.2299 (1.230)	2.0699 (1.133)	3.8980 (1.237)
Sales growth	-0.0294*** (-3.081)	-0.4744** (-2.478)	-0.4870** (-2.533)	-0.5809** (-2.234)
Tobin's Q <sub>t-1</sub>	0.0023 (1.527)	0.0473 (1.052)	0.0496 (1.090)	0.0622 (0.800)
Total assets	0.1682 (1.617)	2.2299 (1.230)	2.0699 (1.133)	3.8980 (1.237)
Governance charac.	No	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	12,427	4,740	4,740	2,204
R-squared (within)/ Log likelihood	0.006	-1528.24	-1523.22	-759.99

**Table 10 – Industry dynamics and the relation between firm value and CEO tenure**

This table presents results from firm fixed effects regressions of *Tobin's Q* on *CEO tenure* and its squared term along with CEO, firm and corporate governance characteristics for different industries. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated financial and utility firms (SIC codes 4000-4999 and 6000-6999). Panel A reports regression results for samples of more versus less dynamic industries. Industry dynamism is measured via the industry dynamism index proposed by Coles, Daniel, and Naveen (2015). Industries are defined based on three-digit SIC clusters. *Dynamism index* is defined as the sum of the following four indicator variables: (i) *R&D industry* that equals one if the average R&D expenses to total assets at the industry level is above the 75<sup>th</sup> percentile, zero otherwise, (ii) *Merger industry* that is set to one if the number of mergers in the industry divided by the number of firms in the industry (e.g., Harford, 2005) is above the 50<sup>th</sup> percentile, zero otherwise, (iii) *Growth industry* that equals one if the average annual sales growth of all firms in the industry is above the 50<sup>th</sup> percentile, zero otherwise, and (iv) *Fluidity industry* which is set to one if the average of the fluidity scores of Hoberg, Philips, and Prabhala (2014) is above the 50<sup>th</sup> percentile, zero otherwise. The index takes on discrete values between 0 and 4, where higher values indicate higher industry dynamism. Panel B shows regression results for samples based on each of the four index components. The number of observations used for the analyses in Panel B can vary due to data availability. Absolute and relative changes at the bottom of each panel are calculated with respect the turning point of 12.2 years obtained from regression (3) of Table 2. All variables are defined in Appendix B. Control variables are identical to those used in specification (3) of Table 2. An intercept and year fixed effects are included in all regressions, but not reported. Robust t-statistics adjusted for clustering by Fama-French 48 industry clusters are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

<b>Panel A: <i>Dynamism index</i> (Coles, Daniel, and Naveen, 2015)</b>		
	<i>Tobin's Q</i>	
	(1)	(2)
	<i>Dynamism index &gt; median</i>	<i>Dynamism index ≤ median</i>
<b>CEO tenure</b>	<b>0.0379**</b> (2.373)	<b>0.0055*</b> (1.721)
<b>CEO tenure squared</b>	<b>-0.0022***</b> (-5.003)	<b>-0.0002*</b> (-1.954)
CEO characteristics	Yes	Yes
Governance characteristics	Yes	Yes
Firm characteristics	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	3,476	8,846
R-squared (within)	0.374	0.394
<b>Turning point</b>	<b>8.6</b>	<b>13.8</b>
<i>Absolute change (yrs)</i>	- 3.6	+ 1.6
<i>Relative change (%)</i>	- 29.5	+ 13.1



**Panel B: Dynamism index components**

	<i>Tobin's Q</i>							
	(1) <i>R&amp;D industry = 1</i>	(2) <i>R&amp;D industry = 0</i>	(3) <i>Merger industry = 1</i>	(4) <i>Merger industry = 0</i>	(5) <i>Growth industry = 1</i>	(6) <i>Growth industry = 0</i>	(7) <i>Fluidity industry = 1</i>	(8) <i>Fluidity industry = 0</i>
<b>CEO tenure</b>	<b>0.0370***</b> (2.900)	<b>0.0060**</b> (2.273)	<b>0.0184*</b> (1.865)	<b>0.0072*</b> (1.912)	<b>0.0116</b> (1.644)	<b>0.0189**</b> (2.409)	<b>0.0287**</b> (2.192)	<b>0.0026</b> (0.707)
<b>CEO tenure squared</b>	<b>-0.0018***</b> (-4.943)	<b>-0.0002**</b> (-2.255)	<b>-0.0009***</b> (-3.026)	<b>-0.0002**</b> (-2.158)	<b>-0.0007***</b> (-2.957)	<b>-0.0005**</b> (-2.419)	<b>-0.0014***</b> (-3.754)	<b>-0.0000</b> (-0.602)
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Governance charac.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,911	8,516	6,820	5,607	6,161	6,266	5,207	7,220
R-squared (within)	0.365	0.392	0.304	0.393	0.351	0.290	0.331	0.390
<b>Turning point</b>	<b>10.3</b>	<b>15.0</b>	<b>10.2</b>	<b>18.0</b>	<b>8.3</b>	<b>18.9</b>	<b>10.3</b>	<b>-</b>
<i>Absolute change (yrs)</i>	- 1.9	+ 2.8	- 2.0	+ 5.8	- 3.9	+ 6.7	- 1.9	-
<i>Relative change (%)</i>	- 15.6	+ 23.0	- 16.4	+ 47.5	- 32.0	+ 54.9	- 15.6	-

**Table 11 – The business cycle and the relation between firm value and CEO tenure**

This table reports results – for recession vs. non-recession years – from firm fixed effects regressions of *Tobin's Q* on *CEO tenure* and its squared term along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). Regression specification (1) shows results for non-recession years (i.e., the indicator variable *Recession* equals 0), while specification (2) shows results for recession years (i.e., the variable *Recession* equals 1). *Recession* is an indicator variable that equals 1 if the observation year is classified as a recession year according to the NBER Business Cycle Expansions and Contractions data (<http://www.nber.org/cycles.html>). All other years are defined as non-recession years. All other variables are defined in Appendix B. In Panel A, robust t-statistics adjusted for clustering by industry (Fama French 48 industry classification) are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>	
	Recession = 0	Recession = 1
	(1)	(2)
<b>CEO tenure</b>	<b>0.0122*</b> <b>(1.767)</b>	<b>0.0177*</b> <b>(1.931)</b>
<b>CEO tenure squared</b>	<b>-0.0006***</b> <b>(-3.022)</b>	<b>-0.0006**</b> <b>(-2.255)</b>
CEO characteristics	Yes	Yes
Governance characteristics	Yes	Yes
Firm characteristics	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	9,603	2,824
R-squared (within)	0.299	0.446
<b>Turning point (yrs)</b>	<b>10.2</b>	<b>14.8</b>
<i>Absolute change (yrs)</i>	-2.0	+ 2.6
<i>Relative change (%)</i>	-19.6	+ 21.3

**Table 12 – Adaptable CEOs and the relation between firm value and CEO tenure**

This table reports results from firm fixed effects regressions of *Tobin's Q* on *CEO tenure* and its squared term or the natural logarithm of *CEO tenure* (denoted  $\ln(\text{CEO tenure})$ ) along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). Specification (1) shows regression results with interaction effects for generalist CEOs. *Generalist CEO* is an indicator variable that takes the value of one if the General Ability Index (Custódio, Ferreira, and Matos, 2013) is above the annual median value for the respective year, zero otherwise. The data is retrieved directly from the website of the Journal of Financial Economics. The index is available until 2007. Missing index values for the years 2008 to 2011 are filled with the latest available index value of the respective CEO-firm pair. Specifications (2) and (3) show regression results for the sample of *Generalist CEOs*. Specification (2) uses *CEO tenure* and its squared term as the functional form for the relation between *CEO tenure* and *Tobin's Q*, while specification (3) uses  $\ln(\text{CEO tenure})$ . All other variables are defined in Appendix B. Control variables are identical to those used in specification (3) of Table 2. An intercept and year fixed effects are included in all regressions, but not reported. Robust t-statistics adjusted for clustering by firm are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>		
	(1)	(2)	(3)
	<i>All CEOs</i>	<i>Generalist CEOs</i>	
<b><math>\ln(\text{CEO tenure})</math></b>			<b>0.0999**</b> <b>(2.138)</b>
<b>CEO tenure</b>	<b>0.0186**</b> <b>(2.102)</b>	<b>0.0270*</b> <b>(1.812)</b>	
<b>CEO tenure squared</b>	<b>-0.0009***</b> <b>(-3.174)</b>	<b>-0.0003</b> <b>(-0.728)</b>	
<b>CEO tenure * Generalist CEO</b>	<b>-0.0088</b> <b>(-0.764)</b>		
<b>CEO tenure squared * Generalist CEO</b>	<b>0.0007*</b> <b>(1.676)</b>		
Generalist CEO	-0.0209 (-0.410)		
CEO characteristics	Yes	Yes	Yes
Governance characteristics	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	10,234	5,147	5,147
R-squared (within)	0.289	0.313	0.313

## APPENDICES

### Appendix A – Anecdotal evidence on CEO (mis)fit over time<sup>15</sup>

#### Microsoft

**“[...] Steve Ballmer was a strong fit for Microsoft’s challenges when he was promoted to CEO in 2000.**

The company’s twenty years of entrepreneurial success had positioned the company to reap greater financial rewards using a more disciplined operational focus. **Ballmer effectively led this shift and saw strong revenue growth from it.** However, by the middle of the decade, Google was growing, YouTube was forming, and “operational excellence” wasn’t a differentiating strategy in technology. **Ballmer had done his job, but the strategic needs of the organization had shifted. As CEO fit decreased, Ballmer’s performance followed** and he was pressured out of the job in late 2013.”

#### Home Depot

**“[...] In the late 1990’s, Home Depot’s rapid growth had outpaced its corporate infrastructure and was hiding serious cost management challenges. Their board hired Robert Nardelli from GE to quickly install the organizational foundation necessary to continue the company’s growth and better manage costs. Nardelli’s background and personality were a perfect fit for that challenge and he delivered some of the company’s most profitable years. But with the infrastructure and discipline in place, the company needed a leader who could drive innovation-based growth. No one should have expected Nardelli to transition to fit with the new challenge and profile needed, but the board didn’t pro-actively change CEOs and Nardelli suffered through a needlessly messy exit.”**

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<sup>15</sup> See “Assess Your CEO’s Strategic Fit Over Time”, *Harvard Business Review* Blog Network, March 2014.

## Appendix B – Variable definitions

Variable	Definition
Board age	The average age of the board of directors. <i>Source: ISS (formerly RiskMetrics)</i>
Board meetings	The number of meetings held by the board of directors over the fiscal year. <i>Source: ExecuComp (until 2006), The Corporate Library (2007-2011), missing values hand-collected (1998-2011)</i>
Board size	Natural logarithm of the number of directors on the firm's board of directors. <i>Source: ISS</i>
Book leverage	(Long-term debt + current liabilities)/Total assets, all at the end of the previous fiscal year. <i>Source: Compustat</i>
Business segments	Natural logarithm of the number of business segments. <i>Source: Compustat Segments</i>
Busy board	Indicator variable that equals one if a majority of the independent directors hold two or more additional outside directorships, zero otherwise. <i>Source: ISS</i>
CapEx	Capital expenditures/Total assets, all at the end of the previous fiscal year. <i>Source: Compustat</i>
CEO age	Age of the firm's CEO measured in years. <i>Source: ExecuComp</i>
CEO gender	Indicator variable that equals one if the CEO's gender is female, zero otherwise. <i>Source: ExecuComp</i>
CEO ownership	Percentage of shares outstanding held by the CEO, winzorized at the 1 <sup>st</sup> and 99 <sup>th</sup> percentiles. <i>Source: ExecuComp, ISS</i>
CEO power index	The index is the sum of the following indicator variables: CEO ownership above median, Co-Option above median, Duality, Involved CEO, President, Only insider. The index can take on values between zero and six.
CEO tenure	Number of years the CEO has been serving as the firm's CEO, calculated by using the ExecuComp "BECAMECEO" variable. Missing or incorrect data is replaced by the number of years the CEO has been serving on the board as reported in ISS. CEO tenure takes the value of zero for the CEO's first year in office. <i>Source: ExecuComp, ISS</i>
Co-Option	Fraction of directors on the board who have been appointed to the firm's board after the current CEO assumed office. <i>Source: ISS</i>
Director ownership	Average fraction of outstanding shares held by all independent directors on the board, winzorized at the 1 <sup>st</sup> and 99 <sup>th</sup> percentiles. <i>Source: ISS</i>
Divestiture	Indicator variable that equals one if the company is listed as the target of a deal labeled by the variable "ACQUISITION TECHNIQUE" as a "DIVESTITURE", zero otherwise. <i>Source: SDC Platinum</i>
Duality	Indicator variable that equals one if the CEO is also the chairman of the board, zero otherwise. <i>Source: ExecuComp</i>
E-Index	Entrenchment index based on six anti-takeover protection devices as proposed by Bebchuk, Cohen, and Ferrell (2009). <i>Source: ISS Governance database</i>
Firm age	Natural logarithm of the number of years the firm is listed in CRSP. <i>Source: CRSP</i>

Firm risk	Standard deviation of daily stock returns during the year, all at the end of the previous fiscal year. <i>Source: CRSP</i>
Founder CEO	Indicator variable that equals one if the CEO is the founder of the company, zero otherwise. <i>Source: The Corporate Library (2001-2011), hand-collected (1998-2000)</i>
Independence ratio	Percentage of directors on the board classified as independent directors. <i>Source: ISS</i>
Involved CEO	Indicator variable that equals one if (i) the board has established a nominating committee and the CEO serves as a member or (ii) if such a committee does not exist, zero otherwise. <i>Source: ISS</i>
MTB	Market-to-book ratio of equity, all at the end of the fiscal year. <i>Source: Compustat</i>
New CEO	Indicator variable that equals one if the firm's CEO took office in the current year, zero otherwise. <i>Source: ExecuComp</i>
Only insider	Indicator variable that equals one if the CEO is the only inside director on the board, zero otherwise. <i>Source: ISS</i>
Operating CF	Annual cash flow from operations/Total assets <sub>t-1</sub> , all at the end of the previous fiscal year. <i>Source: Compustat</i>
Outside director tenure	Average number of years the outside directors have served on the firm's board. <i>Source: ISS</i>
President	Indicator variable that equals one if the CEO also holds the title of President of the firm, zero otherwise. <i>Source: ExecuComp</i>
R&D	R&D expense/Total assets, all at the end of the previous fiscal year. <i>Source: Compustat</i>
ROA	EBITDA/Total assets <sub>t-1</sub> <i>Source: Compustat</i>
Sales growth	Annual change in net sales divided by previous year's net sales: (Sales <sub>t</sub> /Sales <sub>t-1</sub> ) - 1 <i>Source: Compustat</i>
Tobin's Q	(Total assets - Book equity + Market value of equity)/Total assets <i>Source: Compustat</i>
Total assets	Natural logarithm of total assets at the end of the previous fiscal year. <i>Source: Compustat</i>

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### Appendix C – Addressing alternative non-linear relations

This table reports results from firm fixed effects regressions of *Tobin's Q* on *CEO tenure* and its squared term along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). Regression specifications (1) to (5) each address one alternative non-linear relation with firm value. Regression specification (6) contains all control variables (to address all non-linear relations) at once. All variables are defined in Appendix B. Control variables are identical to those used in regression (3) of Table 2. Year fixed effects and an intercept are included in all regressions, but not reported. Robust t-statistics adjusted for clustering by firm are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<b>CEO tenure</b>	<b>0.0127*</b> (1.943)	<b>0.0142**</b> (2.385)	<b>0.0147**</b> (2.465)	<b>0.0143**</b> (2.370)	<b>0.0148**</b> (2.439)	<b>0.0119*</b> (1.893)
<b>CEO tenure squared</b>	<b>-0.0005***</b> (-2.925)	<b>-0.0006***</b> (-3.600)	<b>-0.0006***</b> (-3.624)	<b>-0.0006***</b> (-3.611)	<b>-0.0006***</b> (-3.621)	<b>-0.0005***</b> (-2.856)
<i>Alternative non-linear relations</i>						
CEO age squared	-0.0003 (-1.276)					-0.0004 (-1.354)
Firm age squared		-0.0843 (-1.603)				-0.0755 (-1.426)
CEO power index squared			0.0042 (0.429)			0.0035 (0.355)
Board age				-0.0099 (-0.096)		-0.0474 (-0.446)
Board age squared				-0.0000 (-0.031)		0.0003 (0.298)
Outside director tenure					0.0162 (1.362)	0.0224* (1.752)
Outside director tenure squared					-0.0010* (-1.875)	-0.0009* (-1.733)
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Governance characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,427	12,427	12,427	12,427	12,427	12,427
R-squared (within)	0.299	0.299	0.299	0.299	0.300	0.300

## Appendix D – Addressing further alternative explanations related to investments and incentives

This table presents results from firm fixed effects regressions of *Tobin's Q* on *CEO tenure* and its squared term along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). Additional control variables are included. *Acquisition* is a dummy variable that equals one, if the firm is identified as an acquirer within our M&A sample (not restricted to M&As of a minimum relative deal size) and has announced an acquisition during the year, zero otherwise. *Fraction of variable compensation* is calculated as total compensation (ExecuComp item "TDC1") minus salary, all divided by the total value of total compensation ("TDC1"). Values of total annual compensation before 2006 are adjusted following the methodology in Walker (2011). *Scaled wealth-performance sensitivity* is the dollar change in CEO wealth for a 100 percentage point change in firm value, divided by annual flow compensation (scaled by 1,000). The data is available on Alex Edmans's data website (<http://alexedmans.com/data/>). All other variables are defined in Appendix B. Control variables are identical to those used in regression (3) of Table 2. Year fixed effects and an intercept are included in all regressions, but not reported. Robust t-statistics adjusted for clustering by firm are reported in parentheses. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>				
	(1)	(2)	(3)	(4)	(5)
<b>CEO tenure</b>	<b>0.0145**</b> (2.399)	<b>0.0153**</b> (2.555)	<b>0.0154**</b> (2.572)	<b>0.0150**</b> (2.164)	<b>0.0167**</b> (2.449)
<b>CEO tenure squared</b>	<b>-0.0006***</b> (-3.604)	<b>-0.0006***</b> (-3.587)	<b>-0.0006***</b> (-3.704)	<b>-0.0006***</b> (-3.534)	<b>-0.0006***</b> (-3.586)
<i>Further explanations</i>					
Acquisition	-0.0570*** (-3.053)				-0.0581*** (-2.724)
Divestiture	0.0106 (0.480)				0.0099 (0.408)
CEO ownership		-0.5926 (-1.594)			-0.6012 (-1.263)
CEO ownership squared		0.1723 (0.779)			0.1729 (0.642)
Fraction of variable compensation			-0.4481** (-2.021)		-0.4176* (-1.897)
Fraction of variable compensation squared			0.6515*** (3.533)		0.6056*** (3.251)
Scaled wealth-performance sensitivity				0.0000 (0.905)	0.0001 (0.976)
Scaled wealth-performance sensitivity squared				-0.0000 (-0.326)	-0.0000 (-0.480)
CEO characteristics	Yes	Yes	Yes	Yes	Yes
Governance characteristics	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	12,427	12,427	12,363	10,399	10,340
R-squared (within)	0.300	0.300	0.303	0.287	0.292



## Appendix E – Firm value peak point

This table presents regression results of *Tobin's Q* on the dummy variable *CEO tenure plateau [11-13]* along with CEO, firm and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). The variable *CEO tenure plateau [11-13]* is an indicator variable that takes the value of one if CEO tenure is between 11 and 13 years, zero otherwise. Column (1) presents results from firm fixed effects estimations, while results shown in Column (2) are based on CEO-firm fixed effects estimations. Control variables are identical to those used in specification (3) of Table 2. All variables are defined in Appendix B. An intercept and year fixed effects are included in all regressions, but not reported. Robust t-statistics reported in parentheses in column (1) are adjusted for clustering by firm. Robust t-statistics reported in parentheses in column (2) are adjusted for clustering by CEO-firm pair. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>Tobin's Q</i>	
	(1)	(2)
<b>CEO tenure plateau [11-13]</b>	<b>0.0804**</b> (2.101)	<b>0.0709**</b> (2.072)
<i>CEO characteristics</i>		
CEO age	0.0011 (0.519)	-0.3119 (-0.398)
CEO gender	0.0303 (0.347)	–
CEO power index	-0.0131 (-0.884)	-0.0115 (-0.803)
Founder CEO	0.3620** (2.349)	–
<i>Governance characteristics</i>		
Board size	-0.2642*** (-2.740)	-0.1335 (-1.542)
Busy board	-0.0543* (-1.749)	-0.0253 (-0.838)
Director ownership	-3.1440 (-1.412)	-2.1946 (-0.961)
E-index	0.0170 (1.050)	0.0056 (0.343)
Independence ratio	-0.0298 (-0.226)	0.0739 (0.660)
Firm characteristics	Yes	Yes
Firm fixed effects	Yes	No
CEO-firm fixed effects	No	Yes
Year fixed effects	Yes	Yes
Observations	12,427	12,427
R-squared (within)	0.300	0.265

## Appendix F – Return on assets (ROA) as an alternative measure of firm performance

This table presents results from fixed effects regressions of return on assets (*ROA*) on *CEO tenure* and its squared term along with CEO, firm, and corporate governance characteristics. The sample includes S&P 1500 firms over the period 1998-2011 excluding regulated utility and financial firms (SIC codes 4000-4999 and 6000-6999). *ROA* is calculated as earnings before interest expense, taxes, depreciation and amortization (EBITDA) divided by the book value of total assets at the end of the previous year and is winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Results shown in specification (1) stem from a firm fixed effects regression. Results shown in specification (2) are based on a regression including CEO-firm fixed effects and the use of the natural logarithm of *CEO age* instead of *CEO age*. Control variables are identical to those used in regression (3) of Table 2. All variables are defined in Appendix B. An intercept, year fixed effects and interacted year and industry (based on Fama French 48 industries) fixed effects are included in all regressions, but not reported. Robust t-statistics reported in parentheses in specification (1) are adjusted for clustering by firm. Robust t-statistics reported in parentheses in specification (2) are adjusted for clustering by CEO-firm pair. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	<i>ROA</i>	
	(1)	(2)
<b>CEO tenure</b>	<b>0.0010**</b> (2.547)	<b>0.0019**</b> (2.438)
<b>CEO tenure squared</b>	<b>-0.00003**</b> (-2.036)	<b>-0.00007***</b> (-3.218)
<i>CEO characteristics</i>		
CEO age	-0.0002 (-0.808)	0.1246* (1.849)
CEO gender	0.0003 (0.035)	–
CEO power index	-0.0014 (-1.559)	-0.0026*** (-2.586)
Founder CEO	0.0115* (1.801)	–
<i>Governance characteristics</i>		
Board size	0.0156** (2.433)	0.0149** (1.968)
Busy board	-0.0013 (-0.618)	-0.0001 (-0.063)
Director ownership	-0.4198** (-2.026)	-0.5484*** (-2.618)
E-index	-0.0010 (-0.947)	-0.0021* (-1.736)
Independence ratio	-0.0055 (-0.594)	-0.0089 (-0.861)
Firm characteristics	Yes	Yes
Firm fixed effects	Yes	No
CEO-firm fixed effects	No	Yes
Industry*Year fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	12,400	12,400
R-squared (within)	0.457	0.451

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