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# Zombie Board: Board Tenure and Firm Performance

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# **Zombie Board: Board Tenure and Firm Performance**

## **Abstract**

We show that board tenure exhibits an inverted U-shaped relation with firm value and accounting performance. The quality of corporate decisions, such as M&A, financial reporting quality, and CEO compensation, also has a quadratic relation with board tenure. Our results are consistent with the interpretation that directors' on-the-job learning improves firm value up to a threshold, at which point entrenchment dominates and firm performance suffers. To address endogeneity concerns, we use a sample of firms in which an outside director suffered a sudden death, and find that sudden deaths that move board tenure away from (toward) the empirically observed optimum level in the cross-section are associated with negative (positive) announcement returns. The quality of corporate decisions also follows an inverted U-shaped pattern in a sample of firms affected by the death of a director.

**JEL Classification:** G30, G32, G34, G38, J33, J44, M41

**Keywords:** Board Tenure, Firm Value, Corporate Policies, Learning, Entrenchment

## 1. Introduction

The issue of director tenure has gained considerable attention both in the US and abroad. On the one hand, some governance experts and market participants express concerns about long-tenured directors. They argue that boards with many long-serving directors are entrenched and indifferent to shareholder concerns (e.g., ISS 2013-14 Policy Survey). Extended board service can create a culture of undue deference to management. On the other hand, inexperienced directors may also be ineffective in their role. A short-tenured board may face less significant governance problems than a long-tenured board, but may have a less complete understanding of the firm's business and history, which may diminish the effectiveness of its monitoring and advising (Pozen and Hamacher [2015]). Thus, the optimal tenure for directors remains an unresolved issue among practitioners.

Despite its practical importance, the academic literature on board effectiveness provides little insight into how the tenure of board members affects the board's monitoring and advising abilities. Instead, it mainly focuses on compositional differences across boards (e.g., Chhaochharia and Grinstein [2007]; Yermack [1996]). In contrast, we examine how board tenure reflects the trade-off between a board's independence and knowledge accumulation. More specifically, we examine how board tenure relates to firm performance and corporate decisions. We operationalize this tenure by considering the average number of years on the board of different outside directors. This approach allows us to examine how the knowledge-independence trade-off is integrated in group decision. As noted in the literature (e.g., Szulanski and Jensen [2006]; van Knippenberg and Schippers [2007]), the consequences of aggregation at the board level of these individual trade-offs through group dynamics are not fully understood at this point.

Our analysis consists of two main parts. First, we examine the relation between board tenure and firm value. We find evidence of an inverted U-shaped relation between board tenure

and firm value. Firm value reaches a maximum when the average tenure of outside directors is approximately 10 years. This finding is robust to the inclusion of controls for an array of 38 corporate governance, CEO, and firm characteristics previously shown as correlated with firm value, and to the inclusion of firm and year fixed effects. The economic magnitude is such that an increase in board tenure from 5 to 7 years is associated with an increase in firm value of 2.7% of the in-sample standard deviation of firm value, while a decrease in board tenure from 13 to 11 years is associated with an increase of 1.3% of this standard deviation. We find these estimates both plausible and economically significant, particularly when compared with the effects of other variables (capital expenditures, for example). We reach a similar conclusion when we use the return on assets (ROA) to measure a firm's performance. The economic magnitude is such that an increase in board tenure from 5 to 7 years is associated with an increase in ROA of 4.3% of the variable standard deviation, while a decrease in board tenure from 13 to 11 years is associated with an increase of 1.2% of the standard deviation. To mitigate the concern that our results may simply reflect the effect of tenure diversity on firm performance, we control for the dispersion in individual director tenures in our specifications. Our results remain unaffected when we consider other measures of tenure diversity, such as the range and the Herfindahl index of board tenure, instead of the dispersion, and other aspects of board diversity, such as ethnic, gender, and age diversity. In addition, we find that the tenure-performance relation is conditional on CEO power and on information complexity. Specifically, long tenure has a more severe negative effect on the board when the CEO is more entrenched, for example, when she has a long tenure as CEO, or is the board chairperson or founder of the firm. Conversely, the negative effect of a short tenure is exacerbated when the information environment is more complex. For example, with low analyst coverage, analyst forecasts are more disperse and less accurate.

Second, we examine the relation between board tenure and various corporate decisions to explain the inverted U-shaped relation between board tenure and firm value. We find that the accumulation of firm-specific knowledge is associated with improvements in the quality of acquisition decisions, corporate disclosure, and CEO compensation practices. However, these results hold only up to a certain threshold. As tenure advances beyond this point, additional years are associated with a decline in board oversight quality and an increase in value-destroying activities. These findings suggest that for each additional year of tenure, the benefits of learning dominate for “younger” boards, whereas the costs of entrenchment dominate for “older” boards. This phenomenon is reminiscent of the effect of audit tenure. Using a quadratic form similar to ours, prior studies (e.g., Chi and Huang [2005]; Davis, Soos and Trompeter [2009]; Bell, Causholli, and Knechel [2015]) find that auditor tenure is associated with an increase in audit quality in the initial years, but only up to a turning point, after which it decreases.<sup>2</sup>

Although we control for many potentially confounding effects, endogeneity problems may still obfuscate the interpretation of these results. First, causality may operate in the reverse direction: poorly performing firms may have trouble attracting new directors, and existing board members may thus stay longer than optimal. Second, if shareholders can (and do) adjust board tenure at no cost, each firm should choose the level of board tenure that maximizes its firm value. In equilibrium, a cross-sectional regression of firm value on board characteristics will not be informative if this is the case (e.g., Demsetz and Lehn [1985]; Chenhall and Moers [2007]). However, it has been argued (e.g., Larcker [2003], p. 94) that this assumption “is an extreme view of the world that is not a useful framework for structuring accounting research.” Instead, some researchers (e.g., Milgrom and Roberts [1992]) suggest that there should be cross-sectional

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<sup>2</sup> However, older studies find either consistent negative (e.g., Carey and Simmet [2006]; Mansi et al. [2004]) or positive (e.g., Myers et al. [2003]; Ghosh and Moon [2005]) effects.

variation around the optimal choice. Consistent with this view, Ittner and Larcker [2001] indicate (p. 398) that they find it “difficult to believe that the statement ‘everybody optimizes all the time’ characterizes actual managerial accounting practice.” Rather, they suggest that “all organizations may be dynamically learning and moving toward the optimal level, but a cross-sectional sample will consist of observations that are distributed around the optimal choice.” The issue of learning will be relevant in our setting if the optimal board tenure differs across firms. In addition, if the transaction costs and other frictions are significant, firms could deviate from their optimal level of board tenure. For example, it is not physically possible to immediately add new directors with company-specific experience if a director leaves. This experience can only be acquired with time. Conversely, it may not be practical, or even feasible, to terminate directors when their tenure is too long.

To further mitigate these concerns, we examine stock market reactions to announcements of the sudden death of an outside director, which represents an unexpected exogenous shock to board tenure. Sudden death announcements that move board tenure away from (closer to) the level of tenure empirically associated with the maximum Tobin’s Q are associated with a three-day abnormal announcement return of -1.4% (1%). These results support a causal interpretation of the relation between board tenure and firm value: firm value changes non-linearly in response to a change in board tenure. We obtain a similar result when we consider the effect of an outside director’s death (sudden or not) on firm value and on the quality of corporate decisions in the following year. These findings further strengthen the causal interpretation of our result, as this sample is composed of firms that suffer from a significant shock to board tenure, which is reasonably uncorrelated with firm performance itself.

Our study expands the literature on corporate governance in at least three ways. First, it complements the growing body of literature that relates board characteristics to firm performance. The study contributes to this body of literature by showing that board tenure plays a significant role in firm performance and corporate decisions. However, identifying the effect of tenure on firm valuation is empirically challenging because of the endogenous relation between governance structure and corporate outcome. We address this endogeneity concern by examining director deaths, particularly sudden deaths, which arguably represent an exogenous shock to board tenure and hence provide a more causal interpretation of our results.

Second, this study contributes to our understanding of how directors are valued. Prior studies show that directors' skills and experience are linked with firm performance and corporate decisions (e.g., Celikyurt, Sevilir, and Shivdasani [2012]; Malmendier, Tate, and Yan [2011]). This study adds to this body of literature by showing that the contribution of individual directors to firm value is assessed not only at the individual level, but also in relation to other directors. More specifically, we show that the effect of a director's contribution to firm performance depends in part on her effect on the board's average tenure. As such, the death of an outside director can increase or decrease the firm's value depending on the structure of the board.

Finally, this study contributes to the debate on whether there should be legal limits on the tenure of board members. Given that many proposals for board governance reform explicitly stress the importance of limiting board tenure, this study shows that board tenure has an inverted U-shaped relation with both corporate decisions and firm value. We also show that factors such as managerial entrenchment and the information environment influence the shape of this relation.

The remainder of the paper proceeds as follows. Section 2 provides information on the institutional background, and develops our hypotheses. Section 3 describes the sample. Section 4

presents the empirical results regarding the effect of board tenure on firm value, followed by a series of tests to address endogeneity concerns. Section 5 examines the relation between board tenure and various corporate decisions. Section 6 provides additional robustness tests for the relation between firm value and board tenure. Section 7 concludes the study.

## **2. Hypothesis Development**

### *2.1. Tenure Length and Firm Performance*

Public companies generally do not have specific term limits on director service (Spencer and Stuart [2011]), the rationale being that long-serving outside directors are valued because of their experience and organizational memory. In recent years, some governance experts and market participants have challenged this view. For example, 74% of investors indicate that long director tenure is problematic (ISS 2013-14 Policy Survey). The Council of Institutional Investors, which manages over US\$3 billion in pension assets, announced a new policy in 2013, calling for boards to evaluate director tenure when assessing director independence, and beginning in the 2014 proxy season, Institutional Shareholder Services (ISS) started to include director tenure in their company governance ratings. ISS views “*tenure of more than nine years as excessive by virtue of potentially compromising a director’s independence.*”<sup>3</sup>

Outside the US, a growing number of countries have adopted tenure-related guidelines or restrictions on outside directors. With very few exceptions, the “comply and explain” model prevails, and the recommended maximum tenure for a corporate director is between 9 and 12 years. For example, the UK corporate governance code states that a board should explain why a director who has served for more than nine years qualifies as independent. The European Commission recommends that outside directors serve a maximum of three terms, or 12 years. In Hong Kong,

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<sup>3</sup> <http://www.issgovernance.com/file/files/ISSGovernanceQuickScore2.0.pdf>

an outside director is limited to a nine-year tenure, unless voted otherwise by shareholders. In France, a director is deemed to lose independence after 12 years.<sup>4</sup>

Aside from practical interest, board tenure captures the trade-off between knowledge accumulation and board independence. A board acquires more firm-specific knowledge as board tenure increases, which is associated with an increase in firm value. However, increased familiarity between the board and management can undermine board independence (Fracassi and Tate [2012]; Hwang and Kim [2009]), which can be associated with a decrease in firm value. Although anecdotal evidence suggests that long board tenure is negatively associated with firm performance, empirical evidence on the effect of board tenure on corporate decisions and firm performance remains scarce.

It is important to note that our focus is not on the effect of the tenure of individual directors. Although this question may be important, board members make decisions jointly as a group. Even if each individual director faces the knowledge-independence trade-off, how these director-specific trade-offs aggregate at the board level through group dynamics is less clear (Szulanski and Jensen [2006]). A single long-serving director may be sufficient to share firm-specific knowledge with the rest of the board members, but communication and coordination difficulties may hinder this knowledge diffusion. For example, von Hippel [1994] and Walton [1975] find that the nature of transferred knowledge changes the effectiveness of knowledge transfers. Conversely, a single outside director may be sufficient to enforce board independence, but that director is equally likely to be captured by more senior and powerful directors or CEOs (Coles, Daniel, and Naveen [2013]; Hermalin and Weisbach [1998]).

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<sup>4</sup> <http://www.theglobeandmail.com/report-on-business/careers/management/board-games-2013/countries-set-out-rules-on-directors-tenure/article15574442/>

We use the average board tenure among all outside directors as a starting point to measure the aggregate balance needed between independence and knowledge at the board level. Arguably, there are other candidate measures, such as the standard deviation or the range of tenure. However, the choice of metric is largely an empirical question, as decision science theory provides limited guidance on the optimal judgment aggregation procedure. For example, Pauly and van Hees [2006] show that there is no non-dictatorial decision method for aggregating sets of judgments in a logically consistent way if the decision method only depends on individual judgments on the proposition under consideration. List [2005] proposes a review of the different theoretical issues associated with judgment aggregation. In the organizational behavior literature, van Knippenberg and Schippers [2007] (p. 533) note that theoretical frameworks to understand the effects of group diversity suffer from “too little development.” Given this theoretical uncertainty, we start our analysis with the first moment of the distribution. However, we revisit this issue in Section 6.1 when we consider the effect of different distributional parameters on our main findings.

We also note that our focus on the first rather than the second moment of the distribution is consistent with the findings in the organizational behavior literature. For example, in their literature review, Williams and O’Reilly [1998] show that the effect of tenure diversity on team performance is inconsistent across studies, with some positive and some negative results (and presumably some insignificant unpublished studies). Wahid [2012] uses the coefficient of dispersion as her key metric to consider the effect of tenure heterogeneity. We define this coefficient as the ratio of the standard deviation to the mean. In principle, the effect may come from either the numerator or the denominator. Our analysis complements Wahid’s [2012] by largely focusing on and establishing a non-linear pattern of the effect of the latter. Our results suggest that the effect of the former is more limited in our context.

### 3. Data and Specifications

#### 3.1 Pooled Sample

We use an initial panel of US firms from the WRDS Investor Responsibility Research Center (IRRC) database, which covers S&P 1,500 firms in the US for the 1998-2010 period. We apply two filters to the IRRC data. First, each company must have information on the starting year of the directorship (IRRC variable *dirsince*) for all board members in a given year. We supplement missing tenure information by searching the original proxy filings and 10-K filings, which are available from Capital IQ and the online Edgar data retrieval system. Second, financial information must be available from Compustat, and CEO information must be available from Execucomp. We manually match the company identifier from the IRRC database to Compustat by company name and CEO information, to ensure the correct company identification.

We define “*Board Tenure*” as the average tenure (in years) of all outside directors. We provide detailed definitions of other variables in the Appendix. Our pooled sample comprises 2,222 firms with 12,846 firm-year observations.<sup>5</sup>

Panel A of Table 1 presents the summary statistics for the sample. Board tenure ranges between 0 and 31 years. Consistent with Spencer and Stuart [2011], the average board tenure is 8.2 and the median is 7.7. The average age of a CEO is 55 years old, with an average tenure of 8 years and shareholding of 2%. We also note that the majority of our sample firms have independent boards, with an average of nine board members. We then calculate the standard deviation of board tenure for each firm and average across all firms. We find that this average is 1.73 (untabulated result), suggesting that there are significant variations in board tenure across time.

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<sup>5</sup> Our sample includes utility and financial firms, although excluding them does not affect our conclusions.

Our sample is further reduced when we consider corporate decisions, as we need additional information on M&A activity, corporate disclosure, and managerial compensation. We provide further information on these samples in the Appendix.

### *3.2 Deaths Sample*

Arguably, examining the relation between board composition and firm performance raises the issue of endogeneity. For example, despite the large body of literature on board independence, there is surprisingly little evidence of any direct link between board independence and measures of financial performance or shareholder value (Shivdasani and Zenner [2004]). One possible reason for this lack of empirical evidence is the endogeneity of board selection (Rosenstein and Wyatt [1990]). For instance, it may be difficult to estimate the marginal effect of a single board characteristic if multiple aspects are jointly selected.

We start our analysis by considering a broad sample of firms over a multi-year period using a large vector of control variables. To address endogeneity more specifically, we supplement our pooled analysis by studying stock market reactions to announcements of the sudden death of an outside director. These events represent unexpected exogenous shocks to board tenure, thus resulting announcement returns should differ depending on where the board is positioned on the distribution of board tenure. The death of a director is a significant event for the small group of individuals sitting on a board (as the median board size is nine). Consistent with this view, Nguyen and Nielsen [2011] provide evidence of a significant stock price reaction around the death of an outside director. We also show in Section 4.5 that sudden deaths have both an economically and a statistically significant effect on board tenure.

The market response to a director death provides a precise test for the direction of causality. If the observed tenure-performance relation reflects an optimal level of board tenure, then any

departure from that optimal level will lead to negative announcement returns. Accounting and finance has a long tradition of using an event study, perhaps starting with Fama et al. [1969]. We also supplement this analysis by considering the effect of director death (sudden or otherwise) over a longer period.

We compile the sample of director deaths from various sources. We manually search Factiva, Edgar, Capital IQ, and S&P Register of Corporations, Directors, and Executives by keyword for terms related to director (e.g., “director,” “board”) and death (e.g., “passed away,” “deceased”) for the 1998-2010 period. We then read news articles and on-line filings to determine the cause of death, and merge these data with the governance information from the IRRC and Boardex. Our final sample consists of 441 deaths associated with outside directors.<sup>6</sup>

Further examination of the causes of death reveals that 151 of these 441 deaths were “sudden deaths,” defined according to Nguyen and Nielsen [2011]. We exclude from the sample concurrent confounding events, such as merger and acquisition announcements and quarterly earnings announcements, or any other concurrent news events from Factiva (e.g., Chang, Dasgupta and Hilary [2010]).

Panel B of Table 1 tabulates the different causes of sudden death in our sample. Deaths described as “unanticipated” but with no specific cause account for the largest proportion (36%). The second most common cause is heart attack (30%), followed by acute illnesses, such as pneumonia (12%),<sup>7</sup> stroke (7%), and accidents (8%).

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<sup>6</sup> Table A3 in the Appendix provides a comprehensive reconciliation. The most common explanation for the missing data is our inability to obtain a proxy statement for a firm traded over-the-counter (OTC).

<sup>7</sup> Arguably, an acute illness, such as pneumonia, may develop over a short period of time, but the resulting death may be expected to some extent. However, board members meet four to five times per year on average, and the onset of acute health conditions may not be immediately discovered by the firm or the media. Thus, these deaths may still come as a surprise to the market. Another concern is that suicide may be endogenous to firm conditions. We re-run the tests excluding these two categories of death, and the results continue to hold.

## 4. Board tenure and firm performance

### 4.1 Baseline Regression

Our first set of tests involves panel data estimates relating Tobin's Q to board tenure and other corporate governance, CEO, and firm attributes. More specifically, we test the following specification:

$$Tobin_{i,t} = \alpha_i + \alpha_t + \beta_1 * Tenure_{i,t-1} + \beta_2 * Tenure_{i,t-1}^2 + \Gamma' X_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where  $i$  indexes firms,  $t$  indexes time, and  $\alpha_t$  and  $\alpha_i$  denote year and firm fixed effects, respectively.

To alleviate endogeneity concerns, we use lead-lag specifications. We measure the dependent variables at year  $t$ , and all independent variables at year  $t-1$ .<sup>8</sup>  $Tenure_{i,t-1}$  denotes the average board tenure of all outside directors,  $Tenure_{i,t-1}^2$  is the squared term of the average board tenure of all outside directors,  $X_{i,t-1}$  is a vector of controls, and  $\varepsilon_{i,t}$  is the error term.

We include control variables that capture the CEO and board characteristics known to be related to firm value (e.g., Fich and Shivdasani [2006]; Yermac [1996]). We start with a list of 23 variables. We control for a range of CEO characteristics, such as CEO age, CEO tenure, CEO share ownership, CEO founder status, and CEO-chairman duality. For board characteristics, we control for tenure diversity, classified board, board independence, busy board status, interlocked board, and board size. We also consider a set of firm-level control variables that are likely to be associated with firm valuation and performance. We control for sales growth, past accounting performance (ROA) and stock return, firm age, number of acquisitions, goodwill, leverage, operation segment, firm size, capital expenditures, return volatility, and an IPO/spin-off indicator. In addition, we control for variables found to be associated with firm value in the cross-listing

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<sup>8</sup> Our conclusions are not affected if we do not lag the “stock” control variables. A “stock” variable is measured at a given date rather than over a period. We present the results of this estimation in Panel F of Table A1 of the Online Appendix.

literature, such as the liquidity of the firm, the amount of equity issuance, and the amount of debt issuance (e.g., Lang, Raedy and Yetman [2003]). Further details on the variable definitions are available in the Appendix. Furthermore, we include firm and year fixed effects. The primary advantage of these tests is that they help alleviate concerns that our results are attributable to omitted time invariant (or slow moving) firm characteristics (e.g., industry or location), or common macroeconomic shocks and time trends. In other words, our test consists of within-group analysis that relies on comparisons within a given time period and firm.

Column (1) of Table 2 reports the panel regression results for Equation (1). The results show that an inverted U-shaped relation exists between board tenure and firm value. Both coefficients of *Tenure* and *Tenure*<sup>2</sup> are statistically significant at the conventional level. The level of tenure empirically associated with the maximum Tobin's Q is approximately 8 to 11 years (depending on the exact specification). The economic magnitude of the phenomenon is such that a 5- to 7-year increase in board tenure is associated with an average increase of 2.7% of the sample standard deviation of the firm value, and a 13- to 11-year decrease in board tenure is associated with an increase of 1.3% of this standard deviation.<sup>9</sup> We find these estimates both plausible and economically significant, particularly when compared with the effect of other variables. For example, one standard deviation in capital expenditures is associated with a 4.3% average increase in Tobin's Q compared with its standard deviation. The coefficients of control variables are generally consistent with the results of prior studies.<sup>10</sup>

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<sup>9</sup> For example, at the five-year tenure, holding all other variables at mean, the predicted Tobin's Q is 1.697, while at the seven-year tenure, the predicted Tobin's Q is 1.720. Therefore, the predicted change in Tobin's Q is 0.022 (i.e. 1.720-1.697). Given that the standard deviation of Tobin's Q is 0.83, a change of 0.022 in Tobin's Q is translated into a 2.69% (0.022/0.83) increase compared with its standard deviation. We follow a similar approach to estimate the effect of decreasing the tenure length.

<sup>10</sup> In contrast to Bebchuk and Cohen [2005], the results indicate that a classified board is positively associated with Tobin's Q. This discrepancy is driven by the post-SOX period and our use of firm fixed effects.

To provide a descriptive graphical interpretation of the results, we regress Tobin's Q on the control variables (excluding *Tenure* and *Tenure Squared*), then plot the residual using locally weighted polynomial curve (i.e. LOWESS) in Figure 1. The value of Q increases fairly quickly until board tenure reaches approximately 8 years, then more moderately until it reaches 10 years. Beyond this tipping point it starts to decrease, moderately up to approximately 11 years, then more quickly up to 20 years. At that point, the curve becomes flat. However, we note that very few firms have an average tenure above 20 years (only 1% of the observations), thus the last plateau may be an artefact of the data.

As Figure 1 presents a relatively flat zone between 8 and 11 years, we create two indicator variables:  $D(Tenure \leq 8)$  takes the value of 1 if the tenure is below eight years, and 0 otherwise, and  $D(Tenure \geq 11)$  takes the value of 1 if tenure is above 11 years, and 0 otherwise. We estimate the following model:

$$Tobin_{i,t} = \alpha_i + \alpha_t + \beta_1 * D(Tenure \leq 8)_{i,t-1} + \beta_2 * D(Tenure \geq 11)_{i,t-1} + \Gamma' X_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

Our benchmark group is firms with tenure between 8 and 11 years. The results in Column (3) indicate that both variables are significantly negative, suggesting that the optimal tenure is in the 8-11-year range. The economic magnitude is such that firms with a board tenure below 8 years (above 11 years) are associated with an average decline in firm value of 4.3% (9.7%) of one standard deviation compared with firms with tenure between 8 and 11 years.

As discussed in the introduction, a key implicit assumption required to meaningfully estimate Model (1) is that firms do not always optimize their board tenure. This can happen for different reasons. First, as noted by Itner and Larcker [2001], firms may not know what the optimal length is, and it may take some time for the different parties to learn it. This learning process may

be relevant in our setting as we show below that the optimal length varies across firms. Second, even if this optimal tenure length is known, it may not be possible to immediately reach it. For example, it is not feasible to increase tenure length if a director leaves (short of letting time pass). Conversely, it may not be practical, or even feasible, to terminate directors when their tenure is too long. Firms may have to trade off different attributes. For example, it may not be difficult to retain directors with specialized knowledge. Firms may have to tradeoff between keeping a director with this expertise and pushing board tenure beyond its optimal point, or optimizing the tenure length by forsaking this experience. Agency problems, stock ownerships, legal considerations, social norms, and other similar factors may also lead firms to retain directors beyond the optimal tenure length. Generally, relationships between board and CEO established through repeated interactions can lead to distortions in director selection (Kuhnen [2007]), CEO retention decisions (Nguyen [2008]), CEO compensation decisions (Hwang and Kim [2009]), and corporate investment decisions (Fracassi and Tate [2012]).

#### *4.2. Sensitivity*

We conduct multiple robustness tests. First, several studies (e.g., Bebchuk, Cremers and Peyer [2011]) show that industry characteristics may drive commonality in firm valuation. To address this point, we control for firm fixed effects in our main specification. As a robustness check, we control for industry (at the SIC 2-digit level) and year joint fixed effects. Industry\*year joint fixed effects should absorb any time series variations in industry characteristics that may confound our results (e.g., Gormley and Matsa [2014]). The results are presented in Panel A of Table A1 of the Online Appendix. We continue to find a quadratic relation between firm value and performance and board tenure, with coefficients statistically significant at a minimum of 5% level. To mitigate any remaining concerns, we also re-estimate Model (1) using accounting performance (ROA) as a dependent variable (instead of Tobin's Q). The results reported in Column (2) yield

the same conclusions. However, contemporaneous ROA is affected by decisions that have been supervised by boards with different characteristics, whereas Q offers a more instantaneous response to new information if markets are reasonably efficient. The economic magnitude is such that an increase in board tenure from 5 to 7 years is associated with an increase in ROA of 4.3% of the variable standard deviation, while a decrease in board tenure from 13 to 11 years is associated with an increase of 1.2%.<sup>11</sup>

The second set of robustness checks concerns our econometric specifications. To alleviate the concern that other unobservable firm-level factors may drive our results, we consider two alternative specifications. First, we consider a vector of 15 additional firm-year controls. We control for other aspects of board diversity, such as gender, ethnicity, age diversity, and director shareholding (we provide details on these variables in the Appendix). Fama [1980] argues that an efficient labor market provides implicit incentives for directors. We measure the implicit incentives associated with career concerns using the average age of directors and the percentage of directors who are close to retirement age.<sup>12</sup> Another concern is that the board tenure-performance relation may stem from differences in the experience of board members. We use the proportion of directors who have a concurrent outside executive position as a proxy for functional experience. Malmendier, Tate, and Yan [2011] use a CEO birth cohort as a proxy for life experience, and show that differences in life experience influence CEOs' corporate finance policies. Following their analysis, we use a director birth cohort as a proxy for life experience. To

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<sup>11</sup> For example, holding all other variables at mean, the predicted change in ROA when board tenure changes from 5 to 7 years is 0.298. Given that the standard deviation of ROA is 6.90, a change of 0.298 in ROA is translated into a 4.3% (0.298/6.90) increase in average ROA compared with its standard deviation. We follow a similar approach to measure the reduction of the average tenure length.

<sup>12</sup> The correlation between director age and director tenure is only 45%, which suggests that a significant proportion of the variation in director tenure is not related to director age. There is no consensus on the retirement age of directors, nor is there an age limit on director retirement. We use the retirement age of 70 as the cut-off age, which is consistent with industry practice following a survey by Spencer and Stuart [2011] and prior studies (e.g., Yermack [2004]; Gibbon and Murphy [1992]).

construct a board-level measure of directors' life experience, we calculate the percentage of directors belonging to each birth cohort. In addition, we control for the liquidity of the firm, the amount of equity issuance, and the amount of debt issuance (e.g., Fich and Shivdasani [2006]; Becker and Stromberg [2012]).

The results reported in Columns (5) and (6) of Table 2 indicate that the variables of interest remain significant at the 1% level. However, most of the additional controls are statistically insignificant. In fact, an F-test indicates that the vector of additional controls is jointly statistically insignificant with a p-value of 0.51. To further alleviate the concern that differences in firm performance may be attributable to differences in unobservable CEO qualities, we add CEO fixed effects in addition to firm and year fixed effects. Column (7) and (8) of Table 2 show that we continue to find an inverted U-shaped relation between tenure and performance, and the variables of interest remain significant at the 5% level.

#### *4.3. CEO Power*

Overall, our results in Table 2 suggest that an average tenure of approximately 10 years is associated with the highest equity valuation, while it starts to drop beyond that point. However, it is likely that this negative effect is stronger for firms in which the CEO is entrenched. To test this conjecture, we consider three alternative proxies for CEO power: CEO tenure length (Finkelstein and Hambrick [1990]), CEO status as a founder, and CEO status as the chairperson of the board (Fich and Shivdasani [2006]). We estimate Model (2) on subsamples of firms with different attributes (i.e. partitioned by CEO power), and use stacked regressions.<sup>13</sup>

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<sup>13</sup> In Table 2, we use both a quadratic specification and one based on indicator variables. In Table 3, we focus on the latter, as this allows us to estimate directly how CEO power or information complexity affects each curve segment. In contrast, estimating the former would require us to interpret the cross-partial derivatives of a non-linear function.

We present the results in Table 3. Panels A and D tabulate the results based on CEO tenure length, Panels B and E tabulate the results based on CEO duality, and Panels C and F tabulate the results based on founder status. Panels A, B, and C tabulate the results using Tobin's Q as the dependent variable, while Panels D, E, and F tabulate the results using ROA as the dependent variable. We estimate the full Model (2) but only tabulate the key statistics.

In five out of six cases,  $D(Tenure \geq 11)$  is statistically larger (in absolute value) in the sample of firms with high CEO power (the difference is insignificant in the last case). In all six cases, we observe no statistically significant difference for  $D(Tenure \leq 8)$  between firms with different levels of CEO entrenchment.  $D(Tenure \geq 11)$  is statistically different from zero in the six subsamples of firms with high CEO power, but only in five out of six subsamples of firms with low CEO power. Overall, these results are consistent with the hypothesis that long board tenure has a greater effect when CEO power is high.

#### 4.4. Information Complexity

It has long been recognized that the effectiveness of outside directors depends on their access to information (e.g., Duchin, Matsusaka and Ozbas [2010]; Adams and Ferreira [2007]). Specifically, when the cost of acquiring firm-specific information is high, outside directors are less effective at monitoring and advising management than when the cost of information is low. Our results in Table 2 suggest that an average tenure of approximately 10 years is associated with the highest equity valuation. Before this point, the equity value drops as the average tenure goes toward zero. However, it is likely that this negative effect is stronger for firms in which the economic situation is more complex. To test this conjecture, we consider three alternative proxies for information complexity: analyst coverage, forecast dispersion, and forecast accuracy (e.g.,

Duchin, Matsusaka and Ozbas [2010]).<sup>14</sup> We divide the sample based on the median values of the three proxies, and estimate Model (2) using stacked regressions in each subsample. We use both Tobin's Q and ROA as the dependent variables.

The results reported in Table 4 are largely consistent across the three partitions. Panels A and D present the results based on analyst coverage, Panels B and E present the results based on forecast dispersion, and Panels C and F present the results based on forecast errors. Panels A, B, and C tabulate the results using Tobin's Q as the dependent variable, while Panels D, E, and F tabulate the results using ROA as the dependent variable. We estimate the full Model (2) but only tabulate the key statistics.

In all six panels,  $D(\text{Board tenure} \leq 8)$  is larger (in absolute value) in subsamples of firms with high information complexity (i.e., low coverage, high dispersion, and high forecast errors) than in subsamples of firms with low complexity. The difference is statistically significant in all six cases, with p-values ranging from 0.00 to less than 0.09. In none of the six cases do we observe a statistical difference in the coefficients of  $D(\text{Board tenure} \geq 11)$  between the two types of subsamples.  $D(\text{Board tenure} \leq 8)$  is statistically different from zero in the six high information complexity subsamples, but in none of the low information complexity subsamples. Overall, these results are consistent with the hypothesis that short board tenure has a greater effect when information complexity is high.

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<sup>14</sup> Following Duchin, Matsusaka and Ozbas [2010], we use size-adjusted analyst coverage measure, which is defined as the residual of regressing analyst coverage on firm size. Our conclusions are not affected when we use non-adjusted analyst coverage measure.

#### 4.5. Sudden Deaths

To provide further evidence of a causal relation between board tenure and firm value, we consider a largely exogenous shock to the board average tenure: sudden deaths of directors. Although we cannot entirely exclude the possibility that some deaths are at least partially caused by poor firm performance, this situation is likely to be rare and we address this concern in the next section. The shock is indeed economically important. For example, the average board tenure decreases by approximately 15% after the death of an outside director (from 8.25 years before the death to 7.25 afterward). This difference is statistically significant at the 5% level. We hypothesize that when the sudden death of an outside director moves board tenure away from its value-maximizing level, it will be followed by a negative announcement return, and that when a director's death moves board tenure closer to the value-maximizing level, it will be positively received by the market. The "event-study" approach relies on the absence of systematic bias when market participants process information. Based on Figure 1 and Table 2, we initially choose 10 years as the cut-off value for board tenure.

Panel A of Table 5 reports the results for announcement returns conditional on the direction of the change in board tenure. We compare board tenure immediately before and after the sudden death of a director. We set the indicator variable "Move away from 10 years" to 1 if the sudden death of a director induces board tenure to move away from the optimal level of 10 years. We tabulate unwinsorized announcement returns in Panel A, winsorized returns at the top and bottom one percentile in Panel B, and median returns in Panel C. We obtain consistent results across different panels. The results show that sudden deaths that move board tenure toward 10 years are associated with a mean (median) abnormal announcement return of 1% (0.4%), whereas sudden deaths that move board tenure away from 10 years are associated with a negative mean (median) abnormal announcement return of 1.4% (0.9%). The difference is statistically significant at the 1%

level. In Table A5 of the Online Appendix, we consider the returns in three cases: board tenure moves away from the 8-11-year range, tenure moves closer to the 8-11-year range, and tenure remains within the 8-11-year range following a sudden death. The results indicate that the average returns are  $-1\%$  and  $0.8\%$  in the first two cases (with t-statistics of  $-2.5$  and  $1.7$ ), respectively. The average (or median) return is statistically undistinguishable from zero in the third case. The difference in announcement returns is inconsistent with a reverse causality argument that poor firm performance leads to prolonged board tenure.

#### *4.6. All Deaths*

Next, we consider the full death sample (sudden or otherwise) using a long window approach. This sample offers a setting in which the average tenure is subject to a large shock that is reasonably uncorrelated with the pre-existing firm value. The motivation for this test is that firms cannot physically add additional years of firm-specific board experience when a director dies. This increases the likelihood that frictions will lead to a temporary deviation from the optimal tenure level (at least in the case of lack of experience). It generalizes the approach that we follow in the previous section, and allows us to consider the effect of death over a longer period. We re-estimate Model (1) cross-sectionally in the year following the director's death. We report the results in Table 6. Column (1) uses Tobin's Q as the dependent variable and Column (2) uses ROA as the dependent variable. In both columns, we find the familiar quadratic relation between board tenure and firm performance. Both tenure and tenure squared are statistically significant. The economic magnitude of the phenomenon is such that a 5- to 7-year increase in board tenure is associated with an average increase of 6.9% of the sample standard deviation of the Tobin's Q, and a 13- to 11-year decrease in board tenure is associated with an increase of 10% of this standard deviation.

Overall, our results support the causal interpretation that changes in board tenure cause changes in firm valuation.

## 5. Corporate Decisions

If the relation between board tenure and firm value reflects a trade-off between knowledge and entrenchment, then corporate policies and decisions should reflect the same trade-off. In this section, we investigate whether board tenure has an inverted U-shaped relation with important corporate decisions influenced by the board: 1) M&A performance (Masulis, Wong, and Xie [2007]), 2) financial reporting quality (Farber [2005]), and 3) CEO compensation (Bebchuk, Cremers, and Peyer [2011]). For each type of decision, we analyze our pooled sample and consider the death sample for disclosure quality and managerial compensation (sample attrition prevents us from performing this analysis for the market reaction around M&A announcements).

### 5.1. M&A Performance

We obtain a sample of acquisitions from the Securities and Data Corporation's (SDC) Merger and Acquisitions database, to empirically test the relation between board tenure and M&A performance. We follow Masulis Wong and Xie [2007] and impose a few additional filters (detailed in the Appendix). Our final sample consists of 2,884 acquisitions made between 1998 and 2010. We measure bidder announcement returns over a two-day window ( $CAR [0,1]$ ), in which day 0 is the acquisition announcement date provided by the SDC. As a robustness check, we also consider  $CAR [-2,2]$ , the market reaction over a five-day announcement window.

In our baseline specification, we consider the 23 standard variables used in Model (1). In addition, we control for three deal characteristics: *Deal Size* and two indicator variables denoting

whether the target is a public company (*Public Target*) and whether the deal is executed on an all-cash basis (*All Cash Deal*).

Column (1) in Panel A of Table 7 presents the results for an ordinary least squares (OLS) regression in which two-day announcement returns is the dependent variable. Column (2) reports the results when we consider the five-day window. In both cases, we find the expected inverted U-shaped relation between acquisition announcement returns and board tenure. The results are consistent with the interpretation that boards with shorter tenure make better investment decisions that lead to higher firm valuations, whereas boards with longer tenure are more likely to engage in value destroying acquisitions.

## 5.2. *Financial Reporting Quality*

Several studies (e.g., Farber [2005]) examining the relation between board characteristics and financial reporting quality show that board structure correlates with financial reporting quality. To capture financial reporting quality, we use four alternative proxies. The first is the accrual quality measure derived from Dechow and Dichev [2002], augmented by the fundamental variables in Jones [1991], which are used extensively in the literature (e.g., McNichols [2002]). Second, we consider the amount of abnormal accruals by calculating the absolute value of the residuals in the McNichols model. We multiply both abnormal accruals and the accrual quality measure by  $-1$ , so that the values increase with financial reporting quality. Third, following Khan and Watts [2009], we use an accounting conservatism measure (*C-Score*). Watts [2003] argues that conservatism constrains opportunistic managerial behavior and offsets managerial biases with its asymmetrical verifiability requirement, and is thus likely to constitute an efficient financial reporting mechanism in the absence of complete contracting. Fourth, we consider restatements (Cheng and Farber [2008]; Armstrong et al. [2013]). However, this last proxy presents some

unique characteristics, as restatements are relatively rare and are clustered among firms with unique characteristics. To address these issues, we obtain a list of restatements from *AuditAnalytics*. We then match these observations with non-restating firms using propensity score matching method (we discuss the details of this procedure in Section V of the Online Appendix). Finally, we estimate logit regression using the matched sample.

Panel B of Table 7 reports the results of the pooled sample. In addition to the standard set of 23 control variables, we control for asset tangibility (*Tangibility*), dividend-paying status (*Dividend*), operating cycle (*Operating Cycle*), volatility of operating cash flow (*Vol(CFO)*), volatility of sales (*Vol(Sales)*), and cash-assets ratio (*Cash*), which are demonstrated to affect reporting quality (e.g., Biddle, Hilary, and Verdi [2009]). We find that financial reporting quality first increases and then decreases with board tenure using all four measures of financial reporting quality. Both the linear and the squared terms of board tenure are statistically significant at conventional levels. Table 8 reports the results of the death sample for financial reporting quality. Across the three measures of financial reporting quality, we continue to find a quadratic relation between board tenure and financial reporting quality. The results suggest that financial reporting quality is one channel through which board tenure affects firm valuation.

### 5.3. CEO Compensation

Next, we consider the effect of board tenure on compensation. We examine three aspects of compensation: the level (measured by the overall compensation), the excess compensation, and the sensitivity to performance (measured by the log of the compensation delta). We present the results of the pooled sample in Panel C of Table 7, and those for the death sample in Table 8. In both cases, we observe the familiar inverted U-shape. A level of tenure close to the optimal reduces excess compensation and increases the pay-performance sensitivity.

#### 5.4. Structural Equation Modeling

Overall, our analysis of corporate policies and decisions shows that the trade-off driving the quadratic relation between board tenure and firm value is also evident among corporate decisions determining the quality of investment, financial reporting, and executive compensation. Next, we connect the valuation result of board tenure to the channel analyses. We use a structural equation modeling (SEM) approach to capture the relations between tenure, firm value, and various corporate decisions. We focus on financial reporting quality and compensation, as the relation between M&A announcement returns and tenure is largely cross-sectional, and inclusion of this relation will lead to severe sample attrition. Specifically, we estimate the following SEM equations simultaneously:

$$FRQ_{it} = \alpha_i + \alpha_t + \beta_1 Tenure_{i,t-1} + \beta_2 Tenure_{i,t-1}^2 + \Gamma' X_{i,t-1} + \varepsilon_{i,t} \quad (3a)$$

$$Comp_{it} = \alpha_i + \alpha_t + \beta_1 Tenure_{i,t-1} + \beta_2 Tenure_{i,t-1}^2 + \Gamma' X_{i,t-1} + \varepsilon_{i,t} \quad (3b)$$

$$Tobin_{it} = \alpha_i + \alpha_t + \beta_1 Tenure_{i,t-1} + \beta_2 Tenure_{i,t-1}^2 + \beta_3 FRQ_{i,t} + \beta_2 Comp_{i,t} + \Gamma' X_{i,t-1} + \varepsilon_{i,t} \quad (3c)$$

The results in Table 9 confirm the curvilinear relationship between both tenure and policies and tenure and Tobin's Q. Panel A reports the direct effect of board tenure on firm performance, holding other endogenous variables (i.e., financial reporting quality and compensation) constant. Panel B shows the indirect effect of board tenure on firm performance, mediated through financial reporting quality and compensation measures. Panel B shows that the overall indirect effect of tenure is also curvilinear and statistically significant at the 10% level, consistent with our findings that board tenure has a quadratic relation with financial reporting quality and compensation. Consistent with the idea that the effect of *Tenure* and *Tenure*<sup>2</sup> partially flows through *FRQ* and

*Comp*, we observe that the coefficients of interest have the expected signs in Panel B. The standardized coefficients (0.020 and -0.019) indicate that the effects of *Tenure* and of its square term are economically equivalent, but in opposite directions. Finally, Panel A of Table 9 shows the direct effect of board tenure on firm performance. We find that there is a curvilinear and significant effect of tenure on Tobin's Q, after controlling for *FRQ* and *Comp*.<sup>15</sup>

## 6. Further Analysis

### 6.1. Functional Form

Our analysis so far has focused on the quadratic relation between the mean board tenure and different corporate variables. The arguments presented in Section 2 theoretically support this approach (rather than using a cubic specification, for example). Empirically, the approach is also supported by the non-parametric descriptive statistics in Figure 1, which clearly display a quadratic pattern. The use of the mean (rather than the median, for example) is less clear from a theoretical point of view, but the results in Table A1 (Panels B and C) of the Online Appendix indicate that using the median or mode (instead of the average) tenure results in similar conclusions.

However, the dispersion of tenure may be used as an alternative to the length. Wahid [2012], for example, considers the coefficient of correlation (i.e., the ratio of the volatility to the average length of tenure) as a measure of dispersion. To ensure that our analysis is meaningful, we include the standard deviation of tenure in all of our regressions, and the variables of interest remain significant at the 5% level. We consider alternative measures of tenure diversity, such as the range and the Herfindahl index of tenure. We report these results in Panels D and E of Table A1 of the Online Appendix. We continue to find an inverted U-shape relation between firm value and board

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<sup>15</sup> The different assumptions and requirement necessary for the validity of this technique can be found in Kline [2012].

tenure with these alternative measures. Similarly, including or excluding the range or the Herfindahl index does not affect our conclusion. We note that the volatility, range, and Herfindahl index are statistically insignificant in most of the specifications when controlling for the tenure length (i.e. the denominator of the coefficient of correlation). In addition, Columns (5) and (6) of Table 2 further control for other forms of board diversity that are studied in the literature, such as diversity in gender, ethnicity, and age. As reported, these additional controls do not affect our analysis. This lack of robust significance is broadly consistent with the findings in the organizational literature. For example, in their literature review, Williams and O'Reilly [1998] find that tenure diversity can be associated with both positive and negative effects on team performance, depending on the study.

Nevertheless, it is possible that dispersion conditionally affects our results. In fact, van Knippenberg and Schippers [2007], in another review of the organizational literature, call for greater attention to the interaction effect between group diversity and mediators or moderators on firm performance. To explore this, we re-estimate Model (2) and partition the sample based on the median value of two tenure diversity measures: the tenure standard deviation and the Herfindahl index of tenure. We present the results in Table A2 of the Online Appendix. When we focus on low board tenure observations, we observe no difference across cells (i.e., board tenure dispersion is not relevant to explain differences across cells). This is true irrespective of whether we use Tobin's Q or ROA as the dependent variable. However, when we consider high tenure dispersion, we observe that the negative effect of long tenure is more pronounced when tenure dispersion is low (measured by the volatility or the Herfindahl index). The difference is statistically significant at the 1% and 7% levels, respectively, when Tobin's Q is the dependent variable. This result supports the idea that high dispersion in tenure length mitigates the under-monitoring problem.

We observe a qualitatively similar pattern when we consider the effect on ROA. The point estimates of the coefficients are more negative in the low dispersion samples (but these differences are not statistically significant).

## *6.2. Specialized Committees*

Finally, it is possible that a shock to tenure from the death of a director may have a greater effect if the deceased is the Chairperson of the board (when the Chairperson is not the CEO) or a committee chair. However, examining one type of director at a time yields extremely noisy coefficient estimates. We further investigate this aspect by grouping directors who are Chairperson of the board or chair of a committee. We also reproduce the analysis for audit committee members, but focus on financial reporting in that case. The results are largely inconclusive. Across the different specifications, we find that the basic inverted U-shape is present in the different subsamples. However, we do not observe a pattern that is qualitatively different in these subsamples from the one that we observe in the overall sample (based on the entire board). One possible explanation for this finding is that the full board takes the important decisions. Another issue is that this test does not benefit from substantial statistical power. A typical board in our sample has approximately seven outside directors, while a typical committee has about four outside directors. In this context, it is difficult to distinguish between the effect of director tenure on the full board and on different committees.

## **7. Conclusion**

We investigate the relation between average board tenure and both firm performance and corporate decisions, while holding other firm, CEO, and board characteristics constant. We find that average board tenure has an inverted U-shaped relation with firm value, and that this relation

is also reflected in M&A performance, financial reporting quality, and CEO compensation. The results indicate that for firms with short-tenured boards, the marginal effect of board learning dominates the entrenchment effect, whereas for firms with long-tenured boards, the entrenchment effect dominates the learning effect. We further show that the marginal benefit of learning depends on firms' governance and information environment. Specifically, we find that information complexity exacerbates the cost of short board tenure, and that CEO entrenchment exacerbates the cost of long board tenure.

Our results hold for a pooled sample using specifications that control for a large number of potentially confounding effects. They also hold when we examine stock market reactions to announcements of the sudden death of an outside director (an unexpected exogenous shock to board tenure) in short windows, and when we consider a longer window immediately following the death of an external director. The results of these tests are consistent with a causal interpretation that board tenure drives changes in firm value. We note that the results based on the pooled sample rely on the premise that adjustment costs or frictions prevent firms from optimizing board tenure all the time, and the results based on market reactions rely on the fact that prices can aggregate information in an unbiased way.