9-2018

Zombie board: Board tenure and firm performance

Sterling HUANG
Singapore Management University, SHUANG@smu.edu.sg

Gilles HILARY
Georgetown University

Published in Journal of Accounting Research. 56, (4), 1285-1329.
DOI: 10.1111/1475-679X.12209

Zombie Board: Board Tenure and Firm Performance

STERLING HUANG* AND GILLES HILARY†

Received 6 August 2014; accepted 12 February 2018

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

*Singapore Management University; †Georgetown University.

Accepted by Christian Leuz. We thank an anonymous referee and our editor for their insightful and constructive comments that helped significantly improve this paper. Special thanks go to Hannes Wagner for generously sharing his data on director deaths. We wish to acknowledge the helpful input of Renee Adams, Morten Bennedsen, Daniel Bens, Lily Brooks, Robert Bushman, Guoli Chen, Lily Fang, Denis Gromb, Maria Guadalupe, Melissa Lewis, Angie Low, Brian Miller, Amine Ouazad, Urs Peyer, Anil Shivdasani, and workshop and conference participants at INSEAD, Singapore Management University, the 4th INSEAD-London Conference, the 25th Australasian Banking and Finance Conference, the 2013 Financial Accounting and Reporting Section Mid-year Conference, the 2013 European Accounting Association Annual conference, the 2013 European Financial Management Association Annual meeting, the 2013 American Accounting Association Annual Meeting, and the 2013 Financial Management Association Annual Meeting. Huang gratefully acknowledges funding from the School of Accountancy Research Center (SOAR) at Singapore Management University. An online appendix to this paper can be downloaded at http://research.chicagobooth.edu/arc/journal-of-accounting-research/online-supplements.

inverted U-shaped pattern in a sample of firms affected by the death of a director.

JEL codes: 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 United States 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 2013–2014 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., Yermack [1996], Chhaochharia and Grinstein [2007]). In contrast, we examine how board tenure reflects the tradeoff 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 tradeoff 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 tradeoffs 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 five to seven 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 *ROA* to measure a firm's performance. The economic magnitude is such that an increase in board tenure from five to seven 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, Soo, 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.[1]

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

---

[1] However, older studies find either consistent negative (e.g., Mansi, Maxwell, and Miller [2004], Carey and Simnett [2006]) or positive (e.g., Myers, Myers, and Omer [2003], Ghosh and Moon [2005]) effects.

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 variation around the optimal choice. The cross-sectional regression can be informative if this is the case (the concern about reverse-causality remains a related but separate issue). Consistent with the view articulated by Milgrom and Roberts [1992], Ittner and Larcker [2001, p. 398] indicate 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 nonlinearly 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 (i.e., acquisitions, corporate disclosure, and CEO compensation) in the following year. Sudden deaths that move board tenure toward 10 years are associated with a mean abnormal announcement return of 1%, whereas the corresponding effect of those that move board tenure away from 10 years is 1.4%. 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., Malmendier, Tate, and Yan [2011], Celikyurt, Sevilir, and Shivdasani [2012]). 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 2013–2014 Policy Survey). The Council of Institutional Investors, which manages over U.S. $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 its company governance ratings. ISS views "tenure of more than nine years as excessive by virtue of potentially compromising a director's independence."[2]

Outside the United States, 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 U.K. 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, 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.[3]

Aside from practical interest, board tenure captures the tradeoff 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 (Hwang and Kim [2009], Fracassi and Tate [2012]), 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 tradeoff, how these director-specific tradeoffs 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 (Hermalin and Weisbach [1998], Coles, Daniel, and Naveen [2013]).

---

[2] http://www.issgovernance.com/file/files/ISSGovernanceQuickScore2.0.pdf.

[3] 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 nondictatorial 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 subsection 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 nonlinear 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 U.S. firms from the WRDS Investor Responsibility Research Center (IRRC) database, which covers S&P 1500 firms in the United States 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.[4]

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 eight 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.

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 multiyear 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 subsection 4.5 that sudden deaths have both an economically and a statistically significant effect on board tenure.

---

[4] Our sample includes utility and financial firms, although excluding them does not affect our conclusions.

TABLE 1

Summary Statistics

Panel A: Pooled sample

	N	Mean	Median	SD	P25	P75
Tobin	12,034	1.73	1.46	0.83	1.14	2.05
ROA	11,604	5.06	5.22	6.90	2.09	8.96
Board Tenure	12,034	8.22	7.71	3.64	5.71	10.00
Std dev of Board Tenure	12,034	6.07	5.51	3.38	3.67	7.84
CEO Age	12,034	55.58	56.00	6.98	51.00	60.00
CEO Tenure	12,034	8.23	6.00	7.13	3.00	11.00
CEO Shareholding	12,034	2.00	0.29	4.96	0.08	1.06
CEO-Founder	12,034	0.20	0.00	0.40	0.00	0.00
CEO-Chair	12,034	0.61	1.00	0.49	0.00	1.00
Classified Board	12,034	0.38	0.00	0.48	0.00	1.00
Independent Board	12,034	0.85	1.00	0.35	1.00	1.00
Busy Board	12,034	2.26	2.00	2.09	1.00	3.00
Interlocked Board	12,034	0.05	0.00	0.21	0.00	0.00
Board Size	12,034	9.27	9.00	2.34	8.00	11.00
Sale Growth	12,034	0.11	0.08	0.23	0.00	0.18
LagROA	12,034	5.10	5.40	8.32	2.22	9.37
Stock Return	12,034	0.04	0.08	0.43	−0.17	0.30
Firm Age	12,034	3.75	3.71	0.75	3.18	4.41
Num Acq	12,034	0.14	0.00	0.49	0.00	0.00
Goodwill	12,034	0.11	0.05	0.14	0.00	0.18
Leverage	12,034	0.23	0.22	0.17	0.07	0.34
Num Seg	12,034	1.77	1.00	1.32	1.00	2.00
Firm Size	12,034	7.43	7.31	1.47	6.41	8.38
Capex	12,034	0.06	0.04	0.05	0.02	0.07

(*Continued*)

TABLE 1—*Continued*

Panel A: Pooled sample

	N	Mean	Median	SD	P25	P75
Risk	12,034	−2.30	−2.30	0.50	−2.64	−1.96
IPO	12,034	0.00	0.00	0.06	0.00	0.00
Gender Diversity	12,034	0.16	0.18	0.14	0.00	0.28
Ethnic Diversity	12,034	0.29	0.31	0.19	0.17	0.46
Age Diversity	12,034	0.58	0.60	0.11	0.52	0.66
Director Shareholding	12,034	0.38	0.00	1.15	0.00	0.16
% Retirement Age Directors	12,034	0.13	0.11	0.14	0.00	0.20
Director Age	12,034	61.00	61.14	4.18	58.44	63.71
% Outside Executives	12,034	0.16	0.13	0.14	0.00	0.25
% Born in 1930 Cohort	12,034	0.04	0.00	0.09	0.00	0.07
% Born in 1940 Cohort	12,034	0.25	0.23	0.18	0.11	0.38
% Born in 1950 Cohort	12,034	0.43	0.43	0.19	0.30	0.56
% Born in 1960 Cohort	12,034	0.22	0.20	0.17	0.10	0.33
% Born in 1970 Cohort	12,034	0.04	0.00	0.08	0.00	0.08
Equity Issuance	10,990	0.02	0.01	0.08	−0.01	0.03
Debt Issuance	12,011	0.17	0.06	0.46	−0.04	0.21
Liquidity	12,034	2.21	1.77	1.60	1.21	2.63

Panel B: Death sample

Cause of Sudden Death	*N*	%
Accidents	13	8.61
Heart attack	46	30.46
Murder	1	0.66
Stroke	11	7.28

(*Continued*)

TABLE 1—*Continued*

Panel B: Death sample		
Cause of Sudden Death	*N*	%
Sudden death undisclosed causes	55	36.42
Acute illness	18	11.92
Suicide	7	4.64
Total sudden death	151	
Deaths other than sudden	290	
Total deaths	441	

The sample period is from 1998 to 2010. We define all variables in the appendix. We multiply ROA by 100. Panel A reports summary statistics of our pooled sample. Panel B reports the causes of sudden death.

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 online 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.[5]

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%),[6] stroke (7%), and accidents (8%).

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:

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

[5] Table A3 in the online 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.

[6] 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.

where i indexes firms, t indexes time, and α_t and α_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 $t-1$.[7] $Tenure_{i,t\text{-}1}$ denotes the average board tenure of all outside directors, $Tenure^2_{i,t-1}$ 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., Yermack [1996], Fich and Shivdasani [2006]). 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 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*^{2} 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 five- to seven-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.[8] We find these estimates

---

[7] 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.

[8] 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

TABLE 2

Board Tenure and Firm Value

	(1) *Tobin*	(2) *ROA*	(3) *Tobin*	(4) *ROA*	(5) *Tobin*	(6) *ROA*	(7) *Tobin*	(8) *ROA*
Board Tenure	0.028	0.341			0.039	0.353	0.021	0.246
	(2.76)***	(3.69)***			(3.46)***	(3.43)***	(1.88)*	(2.21)**
Board Tenure Squared	−0.0014	−0.016			−0.002	−0.015	−0.001	−0.012
	(−3.39)***	(−4.18)***			(−3.18)***	(−3.73)***	(−2.96)***	(−2.71)***
$D(\textit{Board tenure} \leq 8)$			−0.036	−0.275				
			(−1.88)*	(−2.35)**				
$D(\textit{Board tenure} \geq 11)$			−0.081	−0.267				
			(−3.76)***	(−2.70)***				
Std dev of Board Tenure	0.000	−0.021	0.003	0.003	−0.002	−0.031	0.004	−0.076
	(0.10)	(−0.58)	(0.76)	(0.09)	(−0.44)	(−0.78)	(0.78)	(−1.70)*
CEO Age	−0.003	−0.053	−0.003	−0.055	−0.002	−0.054	−0.009	0.004
	(−1.62)	(−2.77)***	(−1.63)	(−2.83)***	(−0.99)	(−2.67)***	(−0.90)	(0.04)
CEO Tenure	0.006	0.068	0.006	0.071	0.006	0.076	0.020	0.471
	(2.56)**	(3.29)***	(2.60)***	(3.38)***	(2.42)**	(3.59)***	(0.72)	(1.57)
CEO Shareholding	0.000	0.005	−0.000	0.003	0.001	0.002	−0.004	0.010
	(0.04)	(0.21)	(−0.04)	(0.14)	(0.28)	(0.07)	(−1.36)	(0.38)
CEO-Founder	0.006	−0.170	0.007	−0.148	0.023	−0.050	0.273	0.100
	(0.13)	(−0.41)	(0.16)	(−0.36)	(0.47)	(−0.12)	(0.08)	(0.05)
CEO-Chair	−0.002	0.188	−0.000	0.204	−0.010	0.281	−0.032	−0.020
	(−0.11)	(1.04)	(−0.01)	(1.13)	(−0.49)	(1.51)	(−1.43)	(−0.09)
Classified Board	0.055	−0.070	0.056	−0.054	0.059	0.005	0.034	−0.105
	(2.99)***	(−0.38)	(3.05)***	(−0.30)	(3.12)***	(0.03)	(1.96)**	(−0.57)
Independent Board	0.001	0.015	0.001	0.015	0.011	0.001	−0.005	−0.034
	(0.05)	(0.07)	(0.03)	(0.07)	(0.42)	(0.01)	(−0.17)	(−0.14)
Busy Board	0.008	−0.030	0.008	−0.026	0.009	−0.037	0.004	−0.069
	(1.24)	(−0.52)	(1.24)	(−0.45)	(1.27)	(−0.62)	(0.60)	(−1.00)

(*Continued*)

TABLE 2—*Continued*

	(1) *Tobin*	(2) *ROA*	(3) *Tobin*	(4) *ROA*	(5) *Tobin*	(6) *ROA*	(7) *Tobin*	(8) *ROA*
Interlocked Board	−0.095	−0.605	−0.090	−0.563	−0.105	−0.677	−0.103	−0.676
	(−2.42)**	(−1.85)*	(−2.32)**	(−1.71)*	(−2.60)***	(−2.00)**	(−2.45)**	(−2.05)**
Board Size	−0.013	−0.029	−0.014	−0.040	−0.009	−0.000	−0.011	−0.012
	(−2.08)**	(−0.54)	(−2.25)**	(−0.74)	(−1.39)	(−0.00)	(−1.76)*	(−0.18)
Sale Growth	0.076	1.302	0.076	1.299	0.066	1.882	0.068	1.337
	(2.59)***	(3.57)***	(2.60)***	(3.56)***	(2.05)**	(4.92)***	(2.24)**	(3.18)***
LagROA	0.005	0.096	0.005	0.097	0.005	0.090	0.002	0.039
	(4.41)***	(6.95)***	(4.46)***	(7.03)***	(4.31)***	(6.18)***	(2.10)**	(2.47)**
Stock Return	0.193	2.948	0.193	2.953	0.195	3.020	0.151	2.884
	(13.17)***	(17.24)***	(13.17)***	(17.25)***	(12.74)***	(16.97)***	(10.13)***	(16.52)***
Firm Age	−0.212	0.183	−0.191	0.529	−0.229	−0.552	−0.141	1.974
	(−1.77)*	(0.17)	(−1.60)	(0.51)	(−1.85)*	(−0.51)	(−1.01)	(1.27)
Num Acq	0.031	0.508	0.031	0.505	0.031	0.511	0.032	0.564
	(2.13)**	(3.73)***	(2.15)**	(3.70)***	(2.07)**	(3.59)***	(2.22)**	(3.91)***
Goodwill	−0.776	−5.656	−0.767	−5.601	−0.798	−6.393	−0.584	−6.688
	(−7.02)***	(−5.45)***	(−6.94)***	(−5.36)***	(−6.94)***	(−6.16)***	(−4.50)***	(−4.86)***
Leverage	−0.596	−3.876	−0.589	−3.825	−0.706	−4.538	−0.531	−2.794
	(−6.90)***	(−4.43)***	(−6.82)***	(−4.36)***	(−7.28)***	(−4.77)***	(−5.29)***	(−2.67)***
Num Seg	−0.008	−0.086	−0.009	−0.090	−0.008	−0.164	−0.010	−0.124
	(−0.97)	(−0.98)	(−1.06)	(−1.02)	(−0.95)	(−1.84)*	(−1.04)	(−1.17)
Firm Size	−0.138	−0.234	−0.140	−0.241	−0.138	−0.516	−0.159	−0.499
	(−5.22)***	(−0.77)	(−5.30)***	(−0.79)	(−4.85)***	(−1.66)*	(−5.31)***	(−1.06)
Capex	0.840	3.818	0.859	4.007	0.725	1.654	0.284	2.450
	(3.41)***	(1.70)*	(3.49)***	(1.78)*	(2.91)***	(0.72)	(1.08)	(0.96)
Risk	0.039	−0.460	0.040	−0.456	0.039	−0.372	0.012	−0.137
	(2.31)**	(−2.47)**	(2.39)**	(−2.45)**	(2.19)**	(−1.91)*	(0.71)	(−0.67)

(*Continued*)

TABLE 2—*Continued*

	(1) *Tobin*	(2) *ROA*	(3) *Tobin*	(4) *ROA*	(5) *Tobin*	(6) *ROA*	(7) *Tobin*	(8) *ROA*
IPO	0.092	−0.638	0.087	−0.711	0.074	−1.035	0.103	−0.564
	(0.97)	(−0.60)	(0.91)	(−0.66)	(0.70)	(−0.81)	(0.89)	(−0.57)
Gender Diversity					−0.154	−1.097		
					(−1.54)	(−1.18)		
Ethnic Diversity					−0.000	0.275		
					(−0.00)	(0.67)		
Age Diversity					−0.157	−0.826		
					(−1.42)	(−0.76)		
Director Shareholding					0.000	−0.035		
					(0.04)	(−0.39)		
% Retirement Age Directors					−0.036	0.091		
					(−0.39)	(0.11)		
Director Age					−0.001	0.028		
					(−0.15)	(0.51)		
% Outside Executives					−0.001	0.315		
					(−0.02)	(0.50)		
% Born in 1930 Cohort					0.075	1.846		
					(0.23)	(0.58)		
% Born in 1940 Cohort					0.261	2.471		
					(1.00)	(0.94)		
% Born in 1950 Cohort					0.344	1.976		
					(1.35)	(0.75)		
% Born in 1960 Cohort					0.576	4.010		
					(2.16)**	(1.48)		

(*Continued*)

TABLE 2—*Continued*

	(1) *Tobin*	(2) *ROA*	(3) *Tobin*	(4) *ROA*	(5) *Tobin*	(6) *ROA*	(7) *Tobin*	(8) *ROA*
% Born in 1970 Cohort					0.562	3.312		
					(1.81)*	(1.07)		
Equity Issuance					−0.036	−3.798		
					(−0.37)	(−3.60)***		
Debt Issuance					0.014	−0.338		
					(0.93)	(−2.08)**		
Liquidity					−0.021	−0.367		
					(−2.00)**	(−3.57)***		
Observations	12,034	12,846	12,034	12,846	10,314	10,593	12,034	12,846
R^2	0.708	0.569	0.709	0.568	0.713	0.579	0.774	0.652
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CEO fixed effect	No	No	No	No	No	No	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The sample period is from 1998 to 2010. We define all variables in the appendix. We multiply the coefficient associated with *ROA* by 100. Constants are included but not displayed in all regressions. We measure all monetary items in 2002 dollars, and present *t*-statistics in parentheses. ***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively. We correct standard errors for heteroskedasticity and clustering of observations at the firm level.

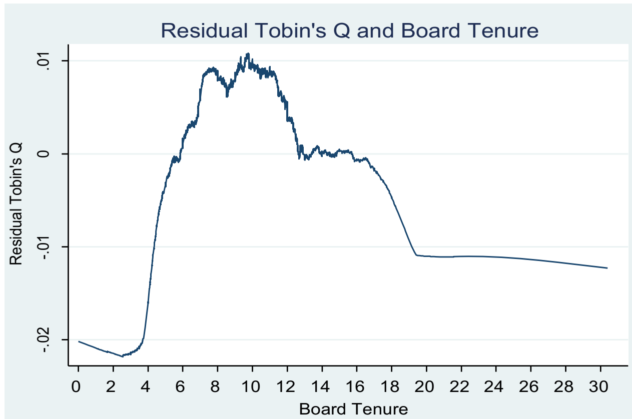

FIG. 1.—Descriptive plot: residual *Tobin's Q* and board tenure: This figure plots the residual *Tobin's Q* on board tenure using a locally weighted polynomial curve (LOWESS). Residual *Tobin's Q* is the residual of regressing *Tobin's Q* on the control variables (excluding tenure and tenure squared).

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.[9]

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 eight 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 artifact 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

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.

[9] 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.

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- to 11-year range. The economic magnitude is such that firms with a board tenure below eight 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 trade off 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 two-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 reestimate 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 five to seven 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%.[10]

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.[11] 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 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

---

[10] For example, holding all other variables at mean, the predicted change in *ROA* when board tenure changes from five to seven 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.

[11] 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 cutoff age, which is consistent with industry practice following a survey by Spencer and Stuart [2011] and prior studies (e.g., Gibbon and Murphy [1992], Yermack [2004]).

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. Columns 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.[12]

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–C tabulate the results using *Tobin's Q* as the dependent variable, while panels D–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, $D(\mathit{Tenure} \geq 11)$ 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 $D(\mathit{Tenure} \leq 8)$ between firms with different levels of CEO entrenchment. $D(\mathit{Tenure} \geq 11)$ 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., Adams and Ferreira [2007], Duchin, Matsusaka and Ozbas [2010]). 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

[12] 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 nonlinear function.

TABLE 3

CEO Power

Tobin's Q as a Measure of Firm Performance			
Panel A: CEO tenure			
	High CEO Tenure	*Low CEO Tenure*	Test of Difference in Coefficients
	(1)	(2)	
	Tobin	*Tobin*	*p*-Value
$D(Board\ tenure \leq 8)$	−0.080	−0.048	0.399
	(−2.91)***	(−1.77)*	
$D(Board\ tenure \geq 11)$	−0.163	−0.068	0.032
	(−5.15)***	(−2.21)**	
Controls	Yes	Yes	
Observations	6,590	5,650	
R^2	0.711	0.705	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	
Panel B: CEO-chair duality			
	CEO-Chair	*No CEO-Chair*	Test of Difference in Coefficients
	(1)	(2)	
	Tobin	*Tobin*	*p*-Value
$D(Board\ tenure \leq 8)$	−0.048	−0.098	0.226
	(−1.98)**	(−2.87)***	
$D(Board\ tenure \geq 11)$	−0.110	−0.100	0.828
	(−3.40)***	(−2.99)***	
Controls	Yes	Yes	
Observations	7,281	4,753	
R^2	0.741	0.753	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	
Panel C: CEO-founder			
	CEO-Founder	*No CEO-Founder*	Test of Difference in Coefficients
	(1)	(2)	
	Tobin	*Tobin*	*p*-Value
$D(Board\ tenure \leq 8)$	−0.090	−0.058	0.548
	(−1.88)*	(−2.69)***	
$D(Board\ tenure \geq 11)$	−0.205	−0.094	0.093
	(−2.90)***	(−4.16)***	
Controls	Yes	Yes	
Observations	2,437	9,597	
R^2	0.739	0.715	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	
ROA as a Measure of Firm Performance			
Panel D: CEO tenure			
	High CEO Tenure	*Low CEO Tenure*	Test of difference in Coefficients
	(3)	(4)	
	ROA	*ROA*	*p*-Value
$D(Board\ tenure \leq 8)$	−0.546	−0.487	0.887
	(−1.83)*	(−1.71)*	

(*Continued*)

TABLE 3—*Continued*

ROA as a Measure of Firm Performance

Panel D: CEO tenure

	High CEO Tenure (3) *ROA*	*Low CEO Tenure* (4) *ROA*	Test of difference in Coefficients p-Value
$D(\textit{Board tenure} \geq 11)$	−0.959	−0.140	0.036
	(−3.58)***	(−1.69)*	
Controls	Yes	Yes	
Observations	7,048	6,039	
R^2	0.546	0.582	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

Panel E: CEO-chair duality

	CEO-Chair (3) *ROA*	*No CEO-Chair* (4) *ROA*	Test of Difference in Coefficients p-Value
$D(\textit{Board tenure} \leq 8)$	−0.318	−1.028	0.161
	(−1.53)	(−2.22)**	
$D(\textit{Board tenure} \geq 11)$	−0.752	−0.109	0.087
	(−3.10)***	(−0.37)	
Controls	Yes	Yes	
Observations	7,697	5,149	
R^2	0.663	0.592	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

Panel F: CEO-founder

	CEO-Founder (3) *ROA*	*No CEO-Founder* (4) *ROA*	Test of Difference in Coefficients p-Value
$D(\textit{Board tenure} \leq 8)$	−0.739	−0.377	0.511
	(−1.47)	(−1.65)*	
$D(\textit{Board tenure} \geq 11)$	−1.126	−0.517	0.098
	(−2.25)**	(−2.34)**	
Controls	Yes	Yes	
Observations	2,624	10,222	
R^2	0.621	0.575	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

The sample period is from 1998 to 2010. We estimate the following regressions for each subsample: $FirmVal_{i,t} = \alpha_i + \alpha_t + \beta_1 D(Tenure \leq 8)_{i,t-1} + \beta_2 D(Tenure \geq 11)_{i,t-1} + \Gamma X_{i,t-1} + \varepsilon_{i,t}$, where i indexes firm, and t indexes year. Note that α_i and α_t are firm and year fixed effects, respectively. $FirmVal_{i,t}$ is measured by *Tobin's Q* (panels A–C) or *ROA* (panels D–F). *High* (*Low*) *CEO Tenure* is an indicator variable equal to 1 if the CEO tenure is above (below) median, and 0 otherwise. *CEO-Chair* (*No CEO-Chair*) is an indicator variable equal to 1 if a CEO is also (is not) the chairman of the board. *CEO-Founder* (*No CEO-Founder*) is an indicator equal to 1 if a CEO is also (is not) the founder of the firm. We define all other variables in the appendix. For panels A and D, we include all control variables under column 1 of table 2 other than *CEO Tenure*. For panels B and E, we include all control variables under column 1 of table 2 other than *CEO-Chair Duality*. For panels C and F, we include all control variables under column 1 of table 2 other than *CEO-Founder* status. The last column of each panel compares the difference in coefficients across two subsamples using seemingly unrelated estimations, and we report the p-value of two-sided t-tests. We measure all monetary items in 2002 dollars. We multiply the coefficient associated with *ROA* by 100. We present t-statistics in parentheses. ***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively. We correct standard errors for heteroskedasticity and clustering of observations at the firm level.

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]).[13] 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–C tabulate the results using *Tobin's Q* as the dependent variable, while panels D–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, $D(\textit{Board tenure} \leq 8)$ 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 $D(\textit{Board tenure} \geq 11)$ between the two types of subsamples. $D(\textit{Board tenure} \leq 8)$ 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.

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

[13] 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 the nonadjusted analyst coverage measure.

TABLE 4

Information Complexity

Tobin's Q as a Measure of Firm Performance

Panel A: Analyst coverage

	High Coverage	*Low Coverage*	Test of Difference in Coefficients
	(1)	(2)	
	Tobin	*Tobin*	*p*-Value
D(*Board tenure* ≤ 8)	−0.020	−0.141	0.001
	(−0.75)	(−5.23)***	
D(*Board tenure* ≥ 11)	−0.128	−0.079	0.240
	(−4.01)***	(−2.71)***	
Controls	Yes	Yes	
Observations	6,475	5,559	
R^2	0.759	0.663	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

Panel B: Forecast dispersion

	High Forecast Dispersion	*Low Forecast Dispersion*	Test of Difference in Coefficients
	(1)	(2)	
	Tobin	*Tobin*	*p*-Value
D(*Board tenure* ≤ 8)	−0.121	−0.026	0.013
	(−3.53)***	(−0.95)	
D(*Board tenure* ≥ 11)	−0.131	−0.090	0.323
	(−3.28)***	(−2.94)***	
Controls	Yes	Yes	
Observations	6,123	5,911	
R^2	0.716	0.773	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

Panel C: Forecast errors

	High Forecast Error	*Low Forecast Error*	Test of Difference in Coefficients
	(1)	(2)	
	Tobin	*Tobin*	*p*-Value
D(*Board tenure* ≤ 8)	−0.091	−0.040	0.097
	(−3.06)***	(−1.51)	
D(*Board tenure* ≥ 11)	−0.126	−0.107	0.669
	(−3.75)***	(−3.61)***	
Controls	Yes	Yes	
Observations	5,889	6,145	
R^2	0.695	0.783	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

ROA as a Measure of Firm Performance

Panel D: Analyst coverage

	High Coverage	*Low Coverage*	Test of Difference in Coefficients
	(3)	(4)	
	ROA	*ROA*	*p*-Value
D(*Board tenure* ≤ 8)	−0.024	−1.312	0.004
	(−0.10)	(−3.43)***	

(*Continued*)

TABLE 4—*Continued*

ROA as a Measure of Firm Performance

Panel D: Analyst coverage

	High Coverage	*Low Coverage*	Test of Difference in Coefficients
	(3)	(4)	
	ROA	*ROA*	*p*-Value
D(*Board tenure* ≥ 11)	−0.378	−0.796	0.243
	(−1.54)	(−2.58)**	
Controls	Yes	Yes	
Observations	6,881	5,965	
R^2	0.597	0.608	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

Panel E: Forecast dispersion

	High Forecast Dispersion	*Low Forecast Dispersion*	Test of Difference in Coefficients
	(3)	(4)	
	ROA	*ROA*	*p*-Value
D(*Board tenure* ≤ 8)	−1.006	−0.247	0.089
	(−2.50)**	(−1.08)	
D(*Board tenure* ≥ 11)	−0.932	−0.364	0.166
	(−2.75)***	(−1.44)	
Controls	Yes	Yes	
Observations	6,470	6,376	
R^2	0.618	0.604	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

Panel F: Forecast errors

	High Forecast Error	*Low Forecast Error*	Test of Difference in Coefficients
	(3)	(4)	
	ROA	*ROA*	*p*-Value
D(*Board tenure* ≤ 8)	−0.743	−0.022	0.095
	(−1.97)**	(−0.10)	
D(*Board tenure* ≥ 11)	−0.734	−0.428	0.420
	(−2.60)***	(−1.76)*	
Controls	Yes	Yes	
Observations	6,152	6,694	
R^2	0.616	0.636	
Firm fixed effect	Yes	Yes	
Year fixed effect	Yes	Yes	

The sample period is from 1998 to 2010. We estimate the following regressions for each subsample: $FirmVal_{i,t} = \alpha_i + \alpha_t + \beta_1 D(Tenure \leq 8)_{i,t-1} + \beta_2 D(Tenure \geq 1_1)_{i,t-1} + \Gamma X_{i,t-1} + \varepsilon_{i,t}$, where i indexes firm, and t indexes year. Note that α_i and α_t are firm and year fixed effects, respectively. $FirmVal_{i,t}$ is measured by *Tobin's Q* (panels A–C) or *ROA* (panels D–F). *High* (*Low*) *Coverage* is an indicator variable equal to 1 if the size-adjusted analyst coverage is above (below) median, and 0 otherwise. Size-adjusted analyst coverage is the residual from a regression of analyst coverage on firm size. *High* (*Low*) *Forecast Dispersion* is an indicator variable equal to 1 if the forecast dispersion is above (below) median, and 0 otherwise. *High* (*Low*) *Forecast Error* is an indicator variable equal to 1 if the analyst forecast error is above (below) median, and 0 otherwise. We define all other variables in the appendix. We include all control variables in column 1 of table 2. The last column of every panel compares the difference in coefficients across two subsamples using seemingly unrelated estimations, and we report the *p*-value of two-sided *t*-tests. We multiply the coefficient associated with *ROA* by 100. We measure all monetary items in 2002 dollars, and present *t*-statistics in parentheses. ***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively. We correct standard errors for heteroskedasticity and clustering of observations at the firm level.

TABLE 5
Event Study: Sudden Death

Panel A: Event study: sudden death (unwinsorized)

	Move Away from 10 Years	Move Closer Toward 10 Years	p-Value of Test of Mean Difference
N	73	78	
Mean	−1.429%	1.038%	
t-Statistics	(−3.218)***	(2.428)***	0.00

Panel B: Event study: sudden death (winsorized)

	Move Away from 10 Years	Move Closer Toward 10 Years	p-Value of Test of Mean Difference
N	73	78	
Mean	−1.36%	0.97%	
t-Statistics	(−3.42)***	(2.37)***	0.00

Panel C: Event study: sudden death (median return)

	Move Away from 10 Years	Move Closer Toward 10 Years	p-Value of Test of Median Difference
N	73	78	
Median	−0.93%	0.40%	
Wilcoxon z-statistics	(−2.94)***	(1.93)*	0.00

This table reports the three-day announcement returns for a sample of outside directors who died suddenly between 1998 and 2010. Panel A reports unwinsorized announcement returns. Panel B reports results using winsorized announcement returns at top and bottom one percentile. Panel C reports median announcement returns. We define all variables in the appendix. We present t-statistics in parentheses for panels A and B, and Wilcoxon z-statistics in parentheses for panel C. ***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively.

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 cutoff 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- to 11-year range, tenure moves closer to the 8- to 11-year year range, and tenure remains within the 8- to 11-year 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 indistinguishable 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 preexisting 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 reestimate 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 five- to seven-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 tradeoff between knowledge and entrenchment, then corporate policies and decisions should reflect the same tradeoff. 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

TABLE 6
Regression: Death Sample

	(1) *Tobin*	(2) *ROA*
Board Tenure	0.102	1.021
	(1.66)*	(1.71)*
Board Tenure Squared	−0.0061	−0.047
	(−2.62)***	(−2.31)**
Std dev of Board Tenure	0.040	0.113
	(1.12)	(0.40)
CEO Age	0.009	−0.055
	(0.70)	(−0.65)
CEO Tenure	0.010	0.137
	(0.87)	(1.45)
CEO Shareholding	−0.006	−0.017
	(−0.29)	(−0.12)
CEO-Founder	−0.095	−0.426
	(−0.39)	(−0.22)
CEO-Chair	−0.032	0.666
	(−0.17)	(0.42)
Classified Board	0.082	0.620
	(0.64)	(0.47)
Independent Board	−1.560	−2.796
	(−1.34)	(−0.34)
Busy Board	0.037	−0.127
	(1.45)	(−0.46)
Interlocked Board	−0.997	−7.872
	(−1.39)	(−1.06)
Board Size	−0.058	−0.764
	(−1.99)**	(−2.26)**
Sale Growth	0.488	−1.049
	(1.29)	(−0.14)
LagROA	−0.350	0.165
	(−0.82)	(2.56)**
Stock Return	0.254	3.698
	(1.71)*	(2.15)**
Firm Age	−0.030	−0.265
	(−0.21)	(−0.13)
Num Acq	0.351	−0.422
	(1.21)	(−0.31)
Goodwill	−1.037	3.098
	(−1.96)*	(0.51)
Leverage	−1.595	−2.587
	(−4.50)***	(−0.66)
Num Seg	−0.040	−0.168
	(−0.76)	(−0.26)
Firm Size	−0.055	2.076
	(−1.27)	(2.47)**
Capex	−0.210	59.517
	(−0.14)	(2.67)***
Risk	1.314	−19.218
	(1.22)	(−1.40)

(*Continued*)

TABLE 6—*Continued*

	(1) *Tobin*	(2) *ROA*
IPO	0.900	−0.741
	(1.38)	(−0.15)
Observations	441	439
R^2	0.193	0.370
Industry fixed effect	Yes	Yes

The sample period is from 1998 to 2010. The table reports the regression results for a sample of outside directors who died between 1998 and 2010. We define all variables in the appendix. We multiply the coefficient associated with *ROA* by 100. Constants are included but not displayed in all regressions. We measure all monetary items in 2002 dollars, and present t-statistics in parentheses. ***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively. We correct standard errors for heteroskedasticity and clustering of observations at the firm level.

prevents us from performing this analysis for the market reaction around M&A announcements).[14]

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 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.

[14] For completeness, we connect the valuation result of board tenure to these corporate decisions using a structural equation modeling approach. We present the results in section VI of the online appendix.

TABLE 7

Corporate Policies: Pooled Sample

Panel A: M&A announcement returns

	(1) *CAR* [0,1]	(2) *CAR* [−2,2]
Board Tenure	0.0019	0.0026
	(2.29)**	(2.13)**
Board Tenure Squared	−0.0001	−0.0001
	(−2.80)***	(−2.12)**
Controls	Yes	Yes
Observations	2,884	2,884
R^2	0.070	0.053
Industry fixed effect	Yes	Yes
Year fixed effect	Yes	Yes

Panel B: Financial reporting quality

	(1) *AQ*	(2) *Abn Acc*	(3) *C-Score*	(4) *Restate*
Board Tenure	0.003	0.002	0.014	−0.102*
	(2.00)**	(2.56)**	(2.49)**	(−1.96)
Board Tenure Squared	−0.00012	−0.0001	−0.00056	0.005**
	(−1.82)*	(−2.21)**	(−2.49)**	(2.34)
Controls	Yes	Yes	Yes	Yes
Observations	10,976	10,612	11,232	3,632
R^2	0.386	0.388	0.220	0.01
Firm fixed effect	Yes	Yes	Yes	No
Industry fixed effect	No	No	No	Yes
Year fixed effect	Yes	Yes	Yes	Yes

Panel C: CEO compensation

	(1) *Tot Comp*	(2) *Excess Comp*	(3) *Log Delta*
Board Tenure	−0.033	−0.032	0.033
	(−2.89)***	(−2.82)*	(1.92)*
Board Tenure Squared	0.001	0.001	−0.0014
	(1.86)*	(1.75)*	(−1.88)*
Controls	Yes	Yes	Yes
Observations	11,499	11,499	10,698
R^2	0.764	0.580	0.837
Firm fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes

The sample period is from 1998 to 2010. We define all variables in the appendix. All regressions contain the same set of control variables as in column 1 of table 2. Panel A further controls for *Public target*, *All cash deal*, and *Deal Size*. Panel B further controls for *Tangibility*, *Dividend paying*, *Operating cycle*, *Cash*, *Vol*(*CFO*), and *Vol*(*Sale*). We measure all monetary items in 2002 dollars, and present *t*-statistics in parentheses. ***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively. We correct standard errors for heteroskedasticity and clustering of observations at the firm level.

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 nonrestating firms using the 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.

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. 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 ALL DEATH-CORPORATE DECISIONS

Table 8 reports the results of the death sample for financial reporting quality (columns 1–3) and for CEO compensation (columns 4–6). Following the same intuition as our test for firm performance, we reestimate model (1) cross-sectionally in the year following the director's death. Across the three measures of financial reporting quality, we continue to find a quadratic relation between board tenure and financial reporting quality. For CEO compensation analysis, we find that death of directors moves tenure close to the optimal reduces excess compensation and increases the pay-performance sensitivity. Overall, the results suggest that financial reporting quality and better compensation contracting are channels through which board tenure affects firm valuation.

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 nonparametric 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 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,

TABLE 8

Corporate Policies: Death Sample

	(1) *AQ*	(2) *Abn Acc*	(3) *C-Score*	(4) *Tot Comp*	(5) *Excess Comp*	(6) *Log Delta*
Board Tenure	0.004	0.021	0.750	−0.172	−0.086	0.302
	(1.95)*	(1.77)*	(2.67)***	(−2.36)**	(−1.77)*	(2.00)**
Board Tenure Squared	−0.0002	−0.001	−0.028	0.0053	0.0048	−0.014
	(−1.82)*	(−2.09)**	(−2.33)**	(1.98)**	(3.18)***	(−1.94)*
Std dev of Board Tenure	0.002	0.000	0.093	−0.012	−0.028	0.046
	(1.65)	(0.00)	(0.73)	(−0.35)	(−0.99)	(0.62)
CEO Age	0.000	0.002	−0.015	−0.021	−0.007	−0.005
	(0.47)	(1.38)	(−0.24)	(−1.87)*	(−0.93)	(−0.18)
CEO Tenure	−0.000	0.001	−0.120	0.004	0.008	−0.013
	(−0.24)	(0.56)	(−1.13)	(0.28)	(0.78)	(−0.38)
CEO Shareholding	0.001	−0.003	0.132	0.006	−0.004	0.119
	(1.48)	(−1.06)	(1.06)	(0.25)	(−0.28)	(1.40)
CEO-Founder	−0.005	−0.006	2.274	0.316	−0.104	−0.146
	(−0.61)	(−0.22)	(1.55)	(1.13)	(−0.48)	(−0.25)
CEO-Chair	−0.004	0.016	−1.963	0.006	0.098	0.569
	(−0.77)	(0.50)	(−1.82)*	(0.04)	(0.81)	(1.28)
Classified Board	0.006	−0.027	2.107	0.116	0.374	−0.000
	(1.07)	(−1.41)	(1.03)	(0.70)	(3.14)***	(−0.00)
Independent Board	−0.022	−0.011	0.953	0.083	0.056	−1.086
	(−3.42)***	(−0.14)	(0.86)	(0.19)	(0.24)	(−1.06)
Busy Board	−0.000	−0.005	−0.089	0.079	0.042	0.067
	(−0.20)	(−1.38)	(−0.51)	(2.60)**	(1.77)*	(0.79)
Interlocked Board	0.068	0.156	−1.871	−2.311	−2.604	2.605
	(2.05)**	(1.15)	(−0.41)	(−1.57)	(−3.44)***	(1.47)
Board Size	0.001	0.006	−0.164	0.010	−0.050	−0.071
	(0.66)	(0.81)	(−1.16)	(0.28)	(−2.04)**	(−0.66)
Sale Growth	0.006	0.014	−0.645	0.165	−0.129	0.315
	(1.36)	(0.57)	(−1.16)	(0.47)	(−0.35)	(0.41)
LagROA	−0.011	−0.140	0.856	0.709	−0.336	1.822
	(−1.84)*	(−1.77)*	(0.79)	(1.14)	(−0.83)	(2.34)**
Stock Return	−0.007	0.011	−1.823	−0.217	0.309	0.553
	(−1.30)	(0.37)	(−1.74)*	(−1.35)	(2.06)**	(1.54)
Firm Age	−0.013	−0.024	1.137	−0.063	0.059	0.256
	(−1.73)*	(−0.88)	(1.43)	(−0.36)	(0.49)	(0.64)
Num Acq	0.008	0.036	−2.106	0.047	0.004	0.168
	(2.01)**	(1.87)*	(−2.64)***	(0.36)	(0.04)	(0.71)
Goodwill	0.024	0.015	1.454	−0.356	0.197	−0.113
	(1.26)	(0.18)	(0.48)	(−0.56)	(0.47)	(−0.10)
Leverage	−0.007	−0.161	3.846	0.953	0.250	1.258
	(−0.63)	(−1.71)*	(1.90)*	(1.97)*	(0.70)	(1.37)
Num Seg	−0.005	−0.019	0.248	0.114	−0.033	−0.088
	(−1.49)	(−1.34)	(0.61)	(1.65)	(−0.69)	(−0.67)
Firm Size	0.003	0.022	0.229	0.015	0.040	0.156
	(2.03)**	(1.22)	(0.82)	(0.20)	(0.77)	(0.80)
Capex	0.043	−0.314	−6.606	−0.218	−3.090	1.347
	(1.04)	(−0.84)	(−0.41)	(−0.12)	(−2.08)**	(0.38)
Risk	−0.074	0.203	8.219	−0.357	0.947	−5.962
	(−1.71)*	(1.26)	(1.79)*	(−0.31)	(0.93)	(−1.88)*

(*Continued*)

TABLE 8—*Continued*

	(1) *AQ*	(2) *Abn Acc*	(3) *C-Score*	(4) *Tot Comp*	(5) *Excess Comp*	(6) *Log Delta*
IPO	−0.030	0.022	2.140	−0.615	0.817	−0.046
	(−1.92)*	(0.44)	(1.55)	(−1.13)	(2.27)**	(−0.07)
Observations	415	415	415	194	193	194
R^2	0.135	0.096	0.107	0.293	0.345	0.291
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes

The sample period is from 1998 to 2010. The table reports the regression results for a sample of outside directors who died between 1998 and 2010. We define all variables in the appendix. Constants are included but not displayed in all regressions. We measure all monetary items in 2002 dollars, and present t-statistics in parentheses. ***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively. We correct standard errors for heteroskedasticity and clustering of observations at the firm level.

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 reestimate 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 undermonitoring 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 our conclusions are subject to different caveats. For example, 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. In addition, the results based on market reactions rely on the fact that prices can aggregate information in an unbiased way.

APPENDIX

Variable Definition and Sample Construction

A.1 FIRM PERFORMANCE MEASURES

1) *Tobin's Q*: Market value of equity plus book value of assets minus the sum of book value of common equity and deferred taxes, all divided by the book value of assets.
2) *ROA*: Log of one plus *ROA*, where *ROA* is the net income plus extraordinary items and discontinued operations, all divided by lagged total assets.

A.2 MERGER AND ACQUISITION MEASURES

1) Sample Construction

We obtain a sample of acquisitions from the SDC's Merger and Acquisitions database from 1998 to 2010. We follow Masulis, Wong, and Xie [2007] and impose a few additional filters: the acquisition must be completed.

1) The acquirer must control less than 50% of the target's shares prior to the announcement, and must own 100% of the target's shares after the transaction.
   a) The deal value must be disclosed in SDC, and must exceed U.S. $1 million.
   b) The acquirer must be included in the IRRC database with valid tenure information.
   c) The relevant financial information and share price information are available from Compustat and CRSP.
2) Announcement Returns

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. We use the CRSP value-weighted return as the market return, and estimate market model parameters over the 200-day period from event day 210 to event day 11. The choices of model and parameters are similar to those used in prior studies, such as Masulis, Wong, and Xie [2007].

A.3 FINANCIAL REPORTING QUALITY MEASURES

1) Abnormal Accrual

We examine abnormal accruals (*Abn_Accruals*), which are widely used to study earnings management (Dechow and Dichev [2002], McNichols [2002], Kothari, Leone, and Wasley [2005]). Following Dechow and Dichev [2002] and McNichols [2002], we estimate the following model by year for each of the 48 Fama-French industries, requiring at least 20 observations for each estimation:

$$TA_{i,t} = \alpha_0 + \alpha_1 CFO_{i,t-1} + \alpha_2 CFO_{i,t} + \alpha_3 CFO_{i,t+1} + \alpha_4 \Delta Sales,\ t + \alpha_5 PPE_{i,t} + \varepsilon_{i,t}, \tag{A1}$$

where *CFO* is the operating cash flow, measured as the sum of net income, depreciation and amortization, and changes in current liabilities, minus changes in current assets, scaled by average total assets. Δ*Sales* refers to the change in sales revenue, and *PPE* denotes property, plants, and equipment. The absolute value of the residuals from the above regression serves as our measure of abnormal accruals. We further multiply the absolute value of the residuals by –1 to arrive at a measure that increases with financial reporting quality.

2) Accrual Quality

Accrual Quality at year t is calculated as the standard deviation of the residuals from model (A1) during the years $t-5$ to $t-1$. We multiply the accrual quality measure by –1 so that the value increases with financial reporting quality.

3) *C-Score*

The *C-Score* is constructed based on Basu's [1997] model as follows:

$$X_i = \beta_1 + \beta_2 D_i + \beta_3 R_i + \beta_4 D_i * R_i + e_i,$$

where X is the earnings over the market value of equity at the prior fiscal year end, R is the annual stock return, and D is an indicator variable that equals 1 if $R < 0$, and 0 otherwise. The coefficient β_4 captures the incremental timeliness of bad news over good news, that is, accounting conservatism. Khan and Watts [2009] assume that β_3 and β_4 are linear functions of firm-specific characteristics each year, as follows:

$$\beta_3 = \mu_1 + \mu_2 Size_i + \mu_3 MB_i + \mu_4 Lev_i$$
$$C\text{-}Score = \beta_4 = \lambda_1 + \lambda_2 Size_i + \lambda_3 MB_i + \lambda_4 Lev_i,$$

where *Size* is the log of the market value of equity, *MB* is the ratio of the market value of equity to the book value of equity, and *Lev* is the total debt divided by the market value of equity. Thus, the annual cross-sectional regression model that is used to estimate *C-Score* can be written as follows:

$$X_i = \beta_1 + \beta_2 D_i + R_i(\mu_1 + \mu_2 Size_i + \mu_3 MB_i + \mu_4 Lev_i) + D_i R_i(\lambda_1 + \lambda_2 Size_i + \lambda_3 MB_i + \lambda_4 Lev_i) + (\delta_1 Size_i + \delta_2 MB_i + \delta_3 Lev_i + \delta_4 D_i Size_i + \delta_5 D_i MB_i + \delta_6 D_i Lev_i) + \varepsilon_i,$$

where the coefficients δ_1–δ_6 capture the independent effects of firm-specific variables and their interactions with D on earnings, while the coefficients λ_1–λ_4 are used to construct the *C*-Score. We estimate the above equation cross-sectionally for each industry with at least 20 observations in a given year based on the Fama-French 48 industry classification.

4) Restatement

We collect data on accounting restatements from Audit Analytics. To be included in our sample, each restatement must have a start and an end date. We use these dates to determine the fiscal year to which the restatement applies. A firm is classified as restating its results for a given year if any financial results (quarterly, annual, or otherwise) are subsequently restated. This classification tracks the year(s) to which the restatement applies, rather than the year during which the restatement is announced (Armstrong et al. [2013]).

A.4 CEO COMPENSATION MEASURES

We obtain CEO compensation data from the Execucomp database.

1) Total Compensation: Log of CEO total compensation.
2) Delta: Log of compensation delta. Delta measures the dollar change in wealth associated with a 1% change in the firm's stock price, and originates from Coles, Daniel, and Naveen [2006, 2013] and Core and Guay [2002].
3) Excess Compensation: Excess compensation received by CEO. It is calculated as the residual of regressing log total compensation on past stock return, stock volatility, firm size, and year and industry fixed effects.

A.5 INDEPENDENT VARIABLES

1) *Board Tenure* is the average tenure of all outside directors, where a director's tenure is calculated as the year of the annual meeting (IRRC variable *meetingdate*) minus the start year of directorship (variable *dirsince*) minus any breaks in the directorship service (indicated by the variable *priorserv*).[15] We base the classification of directors on the IRRC classification (variable *classification*).[16] There are four cases in which conflicting starting year information may be recorded for the same director in the same company: (1) The same director ID is assigned to two different individuals. We resolve this issue by checking the original SEC filing. (2) Directors appointed between two

[15] The IRRC database stopped collecting the *priorserv* indicator variable in 2003. We manually collect this variable for subsequent years by searching proxy statements for each director. For each director identified as having prior service with the board, we manually collect the period of prior service on the board.

[16] As noted in Chhaochharia and Grinstein [2009], the IRRC uses a more stringent definition of independence to classify directors than stock exchange listing rules. For example, under stock exchange listing rules, a past employee of the company may qualify as an independent director as long as the employment relationship ends more than three years before the board appointment. However, the IRRC treats such a director as a nonindependent director. Guthrie, Sokolowsky, and Wan [2011] show that the reclassification of a director's independence may introduce systematic bias. In this study, we focus on the tenure of nonexecutive directors.

annual meetings are usually ratified by shareholders in the next shareholder meeting. If an appointment and the subsequent annual meeting occur in different years, conflicting starting year information will be recorded on the SEC filing (and in the IRRC). In this case, we use the appointment year. (3) Some directors are reappointed to the board after a break in service, and the IRRC may record the year of the most recent appointment. Instead, we use the year of the first appointment and adjust for breaks in service when calculating a director's tenure. (4) An inconsistent starting year may be recorded before and after a corporate transformation (e.g., incorporation, M&A, reorganization). We use the starting year of the predecessor firm.

2) *D*(*Board tenure* $\leq$ 8): An indicator variable that equals 1 if the board tenure is equal to or less than eight years, and 0 otherwise.
3) *D*(*Board tenure* $\geq$ 11): An indicator variable that equals 1 if the board tenure is equal to or more than 11 years, and 0 otherwise.
4) *Std dev of Board Tenure*: Standard deviation of board tenure.
5) *CEO Age*: Age of CEO.
6) *CEO Tenure*: Tenure of CEO.
7) *CEO Shareholding*: Percentage of outstanding shares owned by the CEO.
8) *CEO-Founder*: An indicator variable that equals 1 if the CEO is the founder of the firm, and 0 otherwise. We identify founder information from two sources: (1) the CEO has the title of "Founder" or "Co-Founder" disclosed in the IRRC, Execucomp, or Boardex, and (2) the CEO joined the firm before an IPO.
9) *CEO-Chair*: An indicator variable that equals 1 if the CEO is also the Chairman of the board, and 0 otherwise.
10) *Classified Board*: An indicator variable that equals 1 if the board is staggered, and 0 otherwise.
11) *Independent Board*: An indicator variable that equals 1 if the board has a majority of independent directors, and 0 otherwise.
12) *Busy Board*: An indicator variable that equals 1 if a majority of directors hold more than three directorships, and 0 otherwise.
13) *Interlocked Board*: An indicator variable that equals 1 if the board is interlocked with another company as defined by Execucomp, and 0 otherwise.
14) *Board Size*: Number of directors on the board.
15) *Sales Growth*: Growth in sales.
16) *LagROA*: One-year lagged *ROA*, where *ROA* is the net income plus extraordinary items and discontinued operations, all divided by lagged total assets.
17) *Stock Return*: Log of one plus the stock return over the last year.
18) *Firm Age*: Log of firm age. We calculate firm age from the year a firm was founded. We estimate the founding year from three sources: we first collect firm age data from Jay Ritter's Web site, in which he

collects the age of firms from the founding year. Second, we manually search for the remaining firms in Capital IQ and Hoover. If neither of these two sources provides the necessary information, we use the first year when the stock appears in the CRSP database as the founding year.

19) *Num Acq*: Number of acquisitions.
20) *Goodwill*: Goodwill scaled by total assets.
21) *Leverage*: Short-term debt plus long-term debt, all divided by total assets.
22) *Num Seg*: Number of business segment disclosed under Compustat Segment files.
23) *Firm Size*: Log of total assets.
24) *Capex*: Capital expenditures over total assets.
25) *Risk*: Log of the standard deviation of the daily stock return over the last year.
26) *IPO*: An indicator variable that equals 1 if a firm is spun off or listed in that year.
27) *Gender Diversity*: Blau Index of directors' gender. The Blau Index is calculated as $1 - \sum_{i=1}^{s} p^2$, where s is the number of categories, and p is the fraction of directors belonging to category i. Gender is measured over two groups: female and male.
28) *Ethnic Diversity*: Blau Index of directors' ethnicity. The Blau Index is calculated as $1 - \sum_{i=1}^{s} p^2$, where s is the number of categories, and p is the fraction of directors belonging to category i. Ethnicity is measured over six groups: Caucasian, Indian American, Asian, Hispanic, Black, and Other.
29) *Age Diversity*: Blau Index of directors' age cohort. The Blau Index is calculated as $1 - \sum_{i=1}^{s} p^2$, where s is the number of categories, and p is the fraction of directors belonging to category i. Age is measured in terms of birth cohorts, which are 10-year periods starting in 1920, 1930, 1940, 1950, 1960, and 1970.
30) *Director Shareholding*: Average share ownership of directors.
31) *% Retirement Age Directors*: Percentage of directors that are over 70 years of age.
32) *Director Age*: Average age of directors.
33) *% Outside Executives*: Percentage of directors that work as executives.
34) *% Born in XXX Cohort*: Percentage of directors born in XXX birth cohort, where XXX are 10-year periods starting in 1920, 1930, 1940, 1950, 1960, and 1970. We use the percentage of directors born in 1970 as the holdout group in the regression.
35) *Equity Issuance*: Following Baker, Stein, and Wurgler [2003], we calculate the amount of equity issuance as the change in common equity plus the change in deferred taxes minus the change in retained earnings, all scaled by total assets.
36) *Debt Issuance*: Percentage change in total liabilities.
37) *Liquidity*: Current assets over current liabilities.

38) *Analyst Coverage*: Following Duchin, Matsusaka, and Ozbas [2010], we calculate size-adjusted analyst coverage, which is the residual from a regression of the number of analysts on firm size.
39) *Forecast Errors*: Absolute value of the difference between analyst forecasts and actual EPS, scaled by total assets.
40) *Forecast Dispersion*: Standard deviation of forecast errors, scaled by total assets.
41) *Public Target*: An indicator variable that equals 1 if the acquisition target is a public firm, and 0 otherwise.
42) *All Cash Deal*: An indicator variable that equals 1 if the acquisition is conducted using all cash, and 0 otherwise.
43) *Deal Size*: Total value of the transaction over market value.
44) *Tangibility*: Net PPE over assets.
45) *Dividend*: An indicator variable that equals 1 if the firm pays dividend in year t, and 0 otherwise.
46) *Operating Cycle*: Log of 360 times the sum of receivables over sales and inventory over COGS.
47) *Vol* (*CFO*): Volatility of operating cash flow over the last five years, where *CFO* is the operating cash flow, measured as the sum of net income, depreciation and amortization, and changes in current liabilities, minus changes in current assets, scaled by average total assets.
48) *Vol* (*Sales*): Volatility of sales over the last five years, where we scale sales by the average total assets.
49) *Cash*: Cash over total assets.
50) *Tenure Median*: Median tenure of all outside directors.
51) *Tenure Mode*: Mode tenure of all outside directors.
52) *Board tenure HHI*: The Herfindahl Index is defined as the sum of the squared percentage, where the percentage is the tenure of outside director i over the sum of the tenure of all outside directors.
53) *Board tenure range*: Maximum director tenure minus minimum director tenure.

REFERENCES

ADAMS, R., AND D. FERREIRA. "A Theory of Friendly Boards." *Journal of Finance* 62 (2007): 217–50.

ARMSTRONG, C.; D. LARCKER; G. ORMAZABAL; AND D. TAYLOR. "The Relation Between Equity Incentives and Misreporting: The Role of Risk-Taking Incentives." *Journal of Financial Economics* 109 (2013): 327–50.

BAKER, M.; J. STEIN; AND J. WURGLER. "When Does the Market Matter? Stock Prices and the Investment of Equity-Dependent Firms." *Quarterly Journal of Economics* 118 (2003): 969–1005.

BASU, S. "The conservatism principle and the asymmetric timeliness of earnings." *Journal of accounting and economics* 24 (1997): 3–37.

BEBCHUK, L., AND A. COHEN. "The Cost of Entrenched Boards." *Journal of Financial Economics* 78 (2005): 409–33.

BEBCHUK, L.; M. CREMERS; AND U. PEYER. "The CEO Pay Slice." *Journal of Financial Economics* 102 (2011): 199–221.

BECKER, B., AND P. STROMBERG. "Fiduciary Duties and Equity-Debtholder Conflicts." *Review of Financial Studies* 25 (2012): 1931–69.

BELL, T.; M. CAUSHOLLI; AND R. KNECHEL. "Audit Firm Tenure, Non-Audit Services, and Internal Assessments of Audit Quality." *Journal of Accounting Research* 53 (2015): 461–509.

BIDDLE, G.; G. HILARY; AND R. VERDI. "How Does Financial Reporting Quality Relate to Investment Efficiency?" *Journal of Accounting and Economics* 48 (2009): 112–31.

CAREY, P., AND R. SIMNETT. "Audit Partner Tenure and Audit Quality." *The Accounting Review* 81 (2006): 653–76.

CELIKYURT, U.; M. SEVILIR; AND A. SHIVDASANI. "Venture Capitalists on Boards of Mature Public Firms." *Review of Financial Studies* 27 (2012): 1–46.

CHANG, Y. Y.; S. DASGUPTA; AND G. HILARY. "CEO Ability, Pay, and Firm Performance." *Management Science* 56 (2010): 1633–52.

CHENG, Q., AND D. FARBER. "Earnings Restatement, Changes in CEO Compensation and Firm Performance." *The Accounting Review* 83 (2008): 1217–250.

CHENHALL, R., AND F. MOERS. "The Issue of Endogeneity Within Theory-Based Quantitative Management Accounting Research." *European Accounting Review* 16 (2007): 173–96.

CHHAOCHHARIA, V., AND Y. GRINSTEIN. "Corporate Governance and Firm Value: The Impact of the 2002 Governance Rules." *Journal of Finance* 62 (2007): 1789–825.

CHHAOCHHARIA, V., AND Y. GRINSTEIN. "CEO Compensation and Board Structure." *Journal of Finance* 64 (2009): 231–61.

CHI, W., AND H. HUANG. "Discretionary Accruals, Audit Firm Tenure and Audit-Partner Tenure: Empirical Evidence from Taiwan." *Journal of Contemporary Accounting and Economics* 1 (2005): 65–92.

COLES, J.; N. DANIEL; AND L. NAVEEN. "Managerial Incentives and Risk-Taking." *Journal of Financial Economics* 79 (2006): 431–68.

COLES, J.; N. DANIEL; AND L. NAVEEN. "Calculation of Compensation Incentives and Firm-Related Wealth Using Execucomp: Data, Program and Explanation." SSRN Working paper, 2013.

CORE, J., AND W. GUAY. "Estimating the Value of Employee Stock Option Portfolios and Their Sensitivities to Price and Volatility." *Journal of Accounting Research* 40 (2002): 613–30.

DAVIS, L. R.; B. S. SOO; AND G. M. TROMPETER. "Auditor Tenure and the Ability to Meet or Beat Earnings Forecasts." *Contemporary Accounting Research* 26 (2009): 517–48.

DECHOW, P., AND I. DICHEV. "The Quality of Accruals and Earnings: The Role of Accrual Estimation Errors." *The Accounting Review* 77 (2002): 35–59.

DEMSETZ, H., AND K. LEHN. "The Structure of Corporate Ownership: Causes and Consequences" *Journal of Political Economy* 93 (1985): 1155–77.

DUCHIN, R.; J. MATSUSAKA; AND O. OZBAS. "When Are Outside Directors Effective." *Journal of Financial Economics* 96 (2010): 195–214.

FAMA, E. "Agency Problems and the Theory of Firms." *Journal of Political Economy* 88 (1980): 288–307.

FAMA, E. F.; L. FISHER; M.C. JENSEN; AND R. ROLL. "The Adjustment of Stock Prices to New Information." *International Economic Review* 10 (1969): 1–21.

FARBER, D. "Restoring Trust After Fraud: Does Corporate Governance Matter?" *The Accounting Review* 80 (2005): 539–61.

FICH, E., AND A. SHIVDASANI. "Are Busy Boards Effective Monitors?" *Journal of Finance* 61 (2006): 689–724.

FINKELSTEIN, S., AND D. HAMBRICK. "Top-Management-Team Tenure and Organizational Outcomes: The Moderating Role of Managerial Discretion." *Administrative Science Quarterly* 35 (1990): 484–503.

FRACASSI, C., AND G. TATE "External Networking and Internal Firm Governance." *Journal of Finance* 67 (2012): 153–94.

GHOSH, A., AND D. MOON. "Auditor Tenure and Perceptions of Audit Quality." *The Accounting Review* 80 (2005): 585–613.

GIBBON, R., AND K. MURPHY. "Optimal Incentive Contracts in Presence of Career Concerns: Theory and Evidence." *Journal of Political Economy* 100 (1992): 468–505.

GORMLEY, T., AND D. MATSA. "Common Errors: How to (and Not to) Control for Unobserved Heterogeneity." *Review of Financial Studies* 27 (2014): 617–61.

GUTHRIE, K.; J. SOKOLOWSKY; AND K. WAN. 2011 "CEO Compensation and Board Structure Revisited." *Journal of Finance* 67 (2011): 1149–68.

HERMALIN, B., AND M. WEISBACH. "Endogenously Chosen Boards of Directors and Their Monitoring of the CEO." *American Economic Review* 88 (1998): 96–118.

HWANG, B., AND S. KIM. "It Pays to Have Friends." *Journal of Financial Economics* 93 (2009): 138–58.

INSTITUTIONAL SHAREHOLDER SERVICES (ISS). 2013–2014 Policy Survey. Available at https://www.issgovernance.com/file/files/ISS2013-2014PolicySurveyResultsReport.pdf.

ITTNER, C. D., AND D. LARCKER. "Assessing Empirical Research in Managerial Accounting: A Value-Based Management Perspective." *Journal of Accounting and Economics* 32 (2001): 349–410.

JONES, J. "Earnings Management During Import Relief Investigations." *Journal of Accounting Research* 29 (1991): 193–228.

KHAN, M., AND R. WATTS. "Estimation and Empirical Properties of a Firm-Year Measure of Accounting Conservatism." *Journal of Accounting and Economics* 48 (2009): 132–50.

KLINE, R. "Assumptions of Structural Equation Modeling," in *Handbook of Structural Equation Modeling*, edited by R. Hoyle. New York: Guilford Press, 2012: 111–25.

KOTHARI, S. P.; A. LEONE; AND C. WASLEY. "Performance Matched Discretionary Accrual Measure." *Journal of Accounting and Economics* 39 (2005): 163–97.

KUHNEN, C. "Social Networks, Corporate Governance and Contracting in the Mutual Fund Industry." Working paper, Stanford Graduate School of Business, 2007.

LANG, M.; J. S. RAEDY; AND M.H. YETMAN. "How Representative Are Firms that Are Cross-Listed in the United States? An Analysis of Accounting Quality." *Journal of Accounting Research* 41 (2003): 363–86.

LARCKER, D. F. "Discussion of 'Are Executive Stock Options Associated with Future Earnings?" *Journal of Accounting and Economics* 36 (2003): 91–103.

LIST, C. "Group Knowledge and Group Rationality: A Judgment Aggregation Perspective." *Episteme* 2 (2005): 25–38.

MALMENDIER, U.; G. TATE; AND J. YAN. "Overconfidence and Early-Life Experiences: The Effect of Managerial Traits on Corporate Financial Policies." *Journal of Finance* 66 (2011): 1687–733.

MANSI, S. A.; W. F. MAXWELL; AND D. MILLER. "Does Auditor Quality and Tenure Matter to Investors? Evidence from the Bond Market." *Journal of Accounting Research* 42 (2004): 755–93.

MASULIS, R.; C. WONG; AND F. XIE. "Corporate Governance and Acquirer Returns." *Journal of Finance* 62 (2007): 1851–89.

MCNICHOLS, M. "Discussion of the Quality of Accruals and Earnings: The Role of Accrual Estimation Errors." *The Accounting Review* 77 (2002): 61–69.

MILGROM, P., AND J. ROBERTS. *Economics, Organization and Management.* Englewood Cliffs, NJ: Prentice Hall, 1992.

MYERS, J. N.; L. A. MYERS; AND T. C. OMER. "Exploring the Term of the Auditor-Client Relationship and the Quality of Earnings: A Case for Mandatory Auditor Rotation." *The Accounting Review* 78(2003): 779–99.

NGUYEN, B. D. "Does the Rolodex Matter? Corporate Elite's Small World and the Effectiveness of Boards of Directors." Working paper, University of Cambridge, 2008.

NGUYEN, B. D., AND K. NIELSEN. "The Value of Independent Directors: Evidence from Sudden Deaths." *Journal of Financial Economics* 98 (2011): 550–67.

PAULY, M., AND M. VAN HEES. "Logical Constraints on Judgement Aggregation." *Journal of Philosophical Logic* 35 (2006): 569–85.

POZEN, R., AND T. HAMACHER. "The Trend Towards Board Term Limits Is Based on Faulty Logic." *Financial Times,* May 31, 2015.

ROSENSTEIN, S., AND J. WYATT. "Outside Directors, Board Independence and Shareholder Wealth." *Journal of Financial Economics* 26 (1990): 175–191.

SHIVDASANI, A., AND M. ZENNER. "Best Practices in Corporate Governance: What Two Decades of Research Reveal." *Journal of Applied Corporate Finance* 16 (2004): 29–41.

SPENCER AND STUART. Spencer and Stuart Annual Board Governance Index 2011. See https://www.spencerstuart.com/.

SZULANSKI, G., AND R. JENSEN. "Presumptive Adaptation and the Effectiveness of Knowledge Transfer." *Strategic Management Journal* 27 (2006): 937–57.

VAN KNIPPENBERG, D., AND M. C. SCHIPPERS. "Work Group Diversity." *Annual Review of Psychology* 58 (2007): 515–41.

VON HIPPEL, E. "Sticky Information and the Locus of Problem Solving: Implications for Innovation." *Management Science* 40 (1994): 429–39.

WAHID, A. "Director Heterogeneity and Its Impact on Board Effectiveness." Working paper, Harvard University, 2012.

WALTON, R. "The Diffusion of New Work Structures: Explaining Why Success Didn't Take." *Organizational Dynamics* 3 (1975): 3–21.

WATTS, R. "Conservatism in Accounting, Part I: Explanations and Implications." *Accounting Horizons* 17 (2003): 207–21.

WILLIAMS K. Y., AND C. A. O'REILLY. "Diversity in Organizations: A Review of 40 Years of Research." *Research in Organizational Behavior* 20 (1998): 77–140.

YERMACK, D. "Higher Market Valuation of Companies with a Small Board of Directors." *Journal of Financial Economics* 40 (1996): 185–211.

YERMACK, D. "Remuneration Retention and Reputation Incentives for Outside Directors." *Journal of Finance* 59 (2004): 2281–308.