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ORIGINAL ARTICLE

The relationship between director tenure and director quality

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Abstract This study seeks to determine whether corporate directors become less effective over time and whether term limits should be placed on their service as corporate board members. Using a sample of over 29,000 firm-year observations, we find a significant positive association between director tenure and director quality at low and intermediate levels of director tenure and a significant negative association at higher levels of director tenure. We also find that the negative effects of having long-tenured directors vary across companies based on certain firm-specific characteristics. We extend prior research in several ways. First, we employ a unique measure of director quality that we calculate by adopting the ranking methodology of the Google PageRank algorithm. Second, in our analysis, we separate directors' total tenure on corporate boards into what we call "inside tenure" and "outside tenure." A third contribution is that we demonstrate that the curvilinear relationship between director tenure and director quality differs depending on certain firm-specific characteristics. Our results imply that term limits need to be considered since director quality tends to decrease in the latter years of a director's service. However, our results demonstrate that not all firms experience the negative effects of director entrenchment equally. Therefore, it would not be appropriate, based on our results, to recommend a specific maximum number of years of service that would apply for all corporate directors.

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Introduction

In recent years, there have been calls for setting term limits on corporate directors in the academic literature, the popular press, and by corporate governance advocates. For example, Institutional Shareholder Services (2015, p. 10) states that "a tenure of more than 9 years is considered to potentially compromise a director's independence." The National Association of Corporate Directors (2011, p. 12) maintains that "governance structures and practices should encourage the board to refresh itself" and that "the board needs to ensure that it is positioned to change and evolve with the needs of the company." Are such calls for term limits warranted? Do corporate directors become less effective over time and therefore should have limits placed on their service as corporate board members? In this paper, we empirically examine these questions by examining the relationship between director tenure and the quality of directors' board service.

There are two prevailing viewpoints concerning whether having long-tenured directors is detrimental or beneficial to a company. One point of view is that directors become "entrenched" once their board service reaches a certain level. So-called entrenched directors may become complacent in their role and be resistant to change. They may also become lax in fulfilling their responsibility to monitor the activities of management. Long-tenured directors are also claimed to be overly friendly toward management, resulting in them overly relying on management assertions. In other words, long-tenured directors are often claimed to be subservient to management and not truly the

independent monitors that the job requires. To the extent director entrenchment exists, one solution would be a periodic turnover of directors, including planned director succession. Such board "refreshment" would help eliminate any negative aspects associated with director entrenchment. As stated by Libit and Freier (2016, p. 1), "Board refreshment, which is at the forefront of many investors' minds, is a critical tool to enhance board diversity (including, but not limited to, gender, race, ethnicity and age, as well as diversity of experience, skills, and perspectives) and to recruit board expertise aligned with the company's evolving corporate strategy."

A second and contrary viewpoint regarding the impact of director tenure is that director quality increases with tenure. Directors gain valuable firm-specific and industry-specific information as their board service increases. According to this viewpoint, long-tenured directors are effective in their governance role due to the expertise that they acquire over time.

Many prior studies view these two perspectives as independent, competing hypotheses and not as potentially interrelated concepts. Specifically, most prior research proposes that either the "Entrenchment Hypothesis" (which predicts that directors' governance effectiveness decreases with increased tenure) or the "Expertise Hypothesis" (which predicts that directors' governance effectiveness increases with increased tenure) will be supported. Not surprisingly, prior empirical results are conflicting; some studies document results consistent with the Expertise Hypothesis, and others find results consistent with the Entrenchment Hypothesis.

Recently, a third strand of research has emerged which hypothesizes a curvilinear relationship between director tenure and corporate governance effectiveness (Johnson et al. 2013; Veltrop et al. 2018). Specifically, these recent studies predict that director tenure increases director quality in the early years of a director's service as he/she gains valuable experience/expertise, and then in later years the negative effects of entrenchment begin to dominate, resulting in a decrease in director effectiveness. Results consistent with a curvilinear relationship between director tenure and director quality are documented by Veltrop et al. (2018) and by Huang (2013), who finds that increased director tenure is beneficial up to around the 9-year point and then becomes detrimental subsequent to that point.

The current paper falls into this recent line of research in that we do not predict a linear relationship between director tenure and director quality that is uniform for all levels of director tenure. We extend prior research in several ways. First, we calculate individual director "quality scores" by adapting the ranking methodology of the Google PageRank algorithm. We then combine these director-specific scores into an average quality score for the board as a whole. The vast majority of prior research employs only board-level statistics rather than individual director measures. Thus, we extend prior research by computing a board-level quality score based on the computed quality scores for each individual director.

Second, we separate a director's total tenure on corporate boards into what we call "inside tenure" versus "outside tenure." Inside tenure is defined as the length of board service on the board of the company being currently examined. Outside tenure is defined as that director's total years of service on all other boards. It is important to differentiate the two concepts since entrenchment only relates to inside tenure (i.e., entrenchment is only impacted by inside tenure) while experience/expertise can arise from both inside and outside tenure. A final extension of prior research and contribution of this paper to the corporate governance literature is that we predict (and empirically examine) that the relationship between director tenure and director quality differs depending on certain firm-specific characteristics. In other words, we hypothesize that the interaction between any negative effects of entrenchment and any positive effects of experience (i.e., a possible curvilinear relationship between director tenure and director quality) would vary across companies. Specifically, we test for differences in the curvilinear relationship across companies based on factors such as firm size, the quantity of outside boards that directors sit on, and the size of the board.

Using a sample of over 29,000 firm-year observations gathered from the *Audit Analytics* database over the years 2004–2014, we first test for a linear relationship between director quality and tenure. We find a significant positive correlation between director tenure and director quality, which implies that based on the overall sample, corporate governance effectiveness increases as directors' tenure increases. This result is consistent with the Expertise Hypothesis and holds for both inside and outside tenure.

We next refine our analysis and test for a curvilinear relationship between director tenure and director quality. We predict a significant positive association between director tenure and director quality at low and intermediate levels of director tenure, where the positive effects of any expertise/experience would dominate any negative effects from entrenchment. Further, we predict a significant negative association at higher levels of director tenure, where any negative effects of entrenchment would dominate any potential positive effects from increased experience. Our results support the hypothesized curvilinear relationship. This result is consistent with recent research findings and supports the conclusion that the positive effects of experience dominate in the early years of a director's tenure while the negative effects of entrenchment tend to dominate in later years.

In an extension of prior research, we next test for differences in the curvilinear relationship between director tenure and director quality based on three firm-specific characteristics. Specifically, we hypothesize (and empirically demonstrate) that the negative effects of entrenchment are greater for (1) small firms, (2) firms with a small number of board members, and (3) firms whose directors serve on few outside boards. Based on social identity theory, in each of these cases, we argue that directors would tend to have a great deal of their human capital invested in that particular firm and would be more likely to become entrenched. Using the terminology of Veltrop et al. (2018), directors in these cases would be likely to socially identify more strongly with the firm and would likely become entrenched to a greater degree than directors who do not strongly socially identify with the firm.

Our results are consistent with the view that both an experience effect and an entrenchment effect occur over a director's service on a corporate board. These results are relevant to the current discussion about whether term limits for directors should be mandated. Our results indicate that term limits should be considered given that director quality tends to decrease over the latter years of a director's service. However, our results demonstrate that the negative effects of entrenchment differ based on certain firm-specific characteristics. Therefore, it would be inappropriate, based on our results, to recommend a specific maximum number of years of service that would apply for all corporate directors. Rather, we conclude that only certain types of firms would benefit from specified director term limits.

Prior literature

Prior research presents diametrically opposing viewpoints and often conflicting empirical evidence regarding whether increased director tenure results in decreased or increased director quality (i.e., corporate governance effectiveness). In the discussion to follow, we will categorize prior research studies into those that examine (1) the Entrenchment Hypothesis, (2) the Expertise Hypothesis, and (3) a hypothesized simultaneous interactive effect producing a curvilinear relationship between director tenure and director quality.

The entrenchment hypothesis

A number of prior studies examine what we refer to as the Entrenchment Hypothesis. It has also been labeled the Management Friendliness Hypothesis (Vafeas 2003) or the CEO-Allegiance Hypothesis (Byrd et al. 2010). Regardless of the name used to identify the concept, its predictions are the same. Specifically, according to this view "management friendly" or "entrenched," directors are not effective in their role as independent monitors of management and are unable to govern the company effectively.

Those who advocate that long-tenured directors are detrimental to effective corporate governance typically voice three concerns. First, so-called entrenched directors may be resistant to change and may desire to maintain the *status quo* even in the presence of information demonstrating change is needed. In other words, due to their long service on the board, they may become complacent and see no reason to change with the times and their opinions may become fossilized over time. Second, long-tenured directors have the temptation to become overly deferential to management and refuse to criticize and/or challenge managerial assertions. Vafeas (2003, p. 1045) states that "seasoned directors are more likely to befriend, and less likely to monitor managers," and over time "may be co-opted by management as directors become less mobile and less employable." A third concern of proponents of the Entrenchment Hypothesis is that entrenched directors' allegiance may shift from shareholders and toward management (Byrd et al. 2010). In such cases, an outside director essentially becomes an insider, instead of an independent monitor of management.

The results of several prior studies support the Entrenchment Hypothesis. For example, Vafeas (2003) documents a positive association between director tenure and CEO compensation. Vafeas (2003) finds that CEO salaries tend to increase when the company's most senior director is a member of the board's compensation committee. Vafeas' (2003, p. 1062) conclusion is that "given the opportunity, Senior directors compromise shareholder interests by inflating CEO salaries." Similarly, Byrd et al. (2010) find a positive relationship between director tenure and CEO pay for a sample of firms in which the CEO's tenure is at least 6 years. These results support their CEO-Allegiance Hypothesis and "suggest that the independence of outside directors may be compromised when they serve for longer tenure periods together with the same CEO" (Byrd et al. 2010, p. 86).

Results supporting the Entrenchment Hypothesis are also reported by Niu and Berberich (2015). They examine a sample of S&P 1500 directors and document that long-tenured directors are more likely to be associated with governance problems such as a corporate bankruptcy, major accounting restatements, or major litigation or regulatory infractions.

The expertise hypothesis

As an opposing viewpoint, proponents of the Expertise Hypothesis maintain that increased director tenure

increases director quality and increases a director's capacity to effectively govern the firm. This increased director quality is due to the increased expertise/experience gained by a director as his/her knowledge about the firm, its industry, and its operating environment grows over time.

Proponents of the Expertise Hypothesis predict a positive association between director tenure and director quality since long-tenured directors possess a significantly greater amount of firm-specific knowledge than newer directors. As another benefit of long-tenured board members, Bebchuk et al. (2002) assert that long-serving directors would have a greater tendency to criticize and/or challenge a company's CEO than less senior directors. In addition, Bebchuk et al. (2010) maintain that less experienced board members would likely be more deferential toward management than long-tenured directors. Similarly, Katz and McIntosh (2014) argue that "long-tenured directors may be in the best position to manage a powerful chief executive by virtue of their shared history and many years of building trust and collegiality together."

Prior research has reported empirical results that support the Expertise Hypothesis. For example, Fiegener et al. (1996) document a positive association between director tenure and financial performance for their sample of companies in the banking industry. Beasley (1996) analyzes the relationship between the composition of a company's board of directors and financial statement fraud. Beasley (1996) discovers that increased tenure by outside directors is negatively associated with the likelihood of financial statement fraud.

More recent research by Dou et al. (2015) indicates that the previously mentioned calls for term limits on directors may be ill-advised since "extended tenure" directors (i.e., those with at least 15 years of service) tend to attend more board meetings and are more likely to take on more committee assignments. In addition, Dou et al. (2015, p. 583) assert that "Firms with a higher proportion of these directors have lower chief executive (CEO) pay, higher CEO turnover-performance sensitivity, and a smaller likelihood of intentionally misreporting earnings."

A proposed curvilinear relationship

Recent research no longer predicts a linear relationship between director tenure and director quality across all levels of director tenure. Predictions of either a positive linear relationship (which would support the Expertise Hypothesis) or a negative linear relationship (which would support the Entrenchment Hypothesis) are viewed as too simplistic in recent works. In addition, predictions of a linear relationship when the relationship may be curvilinear in nature may help to account for the conflicting results reported in prior research. Johnson et al. (2013, p. 243) summarize the argument in favor of a curvilinear relationship as follows:

> A potential explanation for the mixed results is that tenure has a nonlinear effect, and some studies in fact find an inverted-U relationship between director tenure and both corporate reputation (Musteen et al. 2010) and strategic change (Golden and Zajac 2001).

Veltrop et al. (2018) employ social identity theory and find an inverted U-shaped relationship between director tenure and director task involvement. Their results are consistent with the hypothesis that director tenure and task involvement are positively associated during the early and intermediate years of a director's tenure when the director gains expertise in governance functions and benefits from the company-specific expertise that is gained. Tenure and task involvement become negatively associated in the latter years as the negative effects of entrenchment begin to dominate the positive effects of experience. Interestingly, they find that those directors who strongly socially identify with the company tend to experience the negative effects of entrenchment sooner and to a greater extent than directors who do not strongly socially identify with the organization. Huang's (2013) results support a curvilinear relationship between director tenure and director quality. Huang (2013) finds that director tenure and firm value are positively associated up to approximately 9 years of tenure. However, he discovers that firm value declines after that point, which indicates that the negative effects of entrenchment tend to dominate the positive effects of expertise/experience for long-tenured directors.

Hypothesis development

The previous literature review on the relationship between director tenure and director quality, especially literature that examines the effect of expertise versus entrenchment, clearly demonstrates conflicting predictions and conflicting empirical results. In this paper, we first reexamine the prior conflicting findings using a unique measure of director quality, and then we extend prior research efforts by examining several new hypothesized facets of the relationship between director tenure and director quality. Our first sequence of empirical tests utilizes a linear model to test the competing Entrenchment and Expertise Hypotheses.

There are a number of arguments, and resulting empirical findings, both for and against the Entrenchment and Expertise Hypotheses. However, recent evidence tends to support a prediction of a positive linear association between director tenure and director quality. Huang (2013)

and Veltrop et al. (2018) each test for a curvilinear relationship and include both director tenure and director tenure squared as independent variables in their models. Both studies find a significant positive association between the tenure variable and a measure of director quality and a significant negative association between the tenure squared variable and director quality. The significant positive coefficient on the non-squared tenure variable indicates that "on average" director tenure is positively associated with measures of director quality even though the relationship is curvilinear in nature. Based on these recent results, our first hypothesis is:

Hypothesis 1 There is a significant positive relationship between the average length of tenure for the board of directors and the average director quality score for that firm.

Figure 1 provides a graphical representation of the proposed linear relationship. A finding of a significant positive relationship between director tenure and director quality would lend support to the Expertise Hypothesis since that result would be consistent with the view that in general, corporate governance effectiveness increases as directors gain additional experience/expertise.

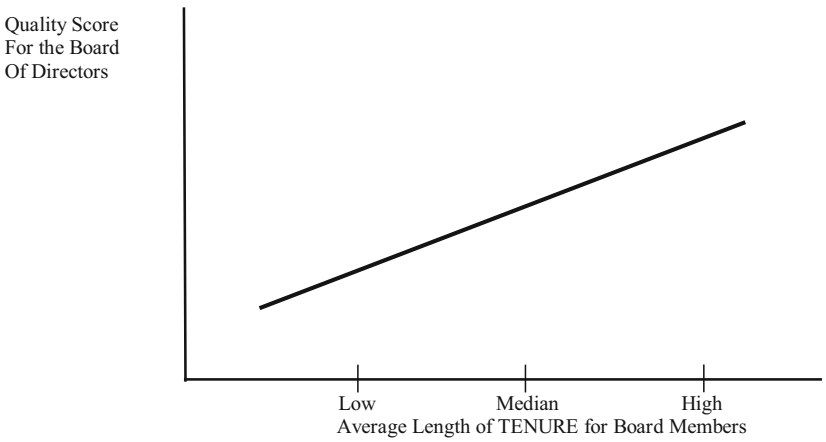
We conduct empirical tests of Hypothesis 1 in order to reexamine prior research findings with a unique measure of director quality and two different measures of director tenure. Our two tenure measures are referred to as INSIDETENURE, which is defined as the average number of years of tenure that directors have accrued from serving on that company's board, and OUTSIDETENURE, which is defined as the average number of years of tenure that directors have gained from serving on other companies' boards. Prior research has exclusively utilized a tenure variable similar to our INSIDETENURE variable and has ignored directors' tenure on other companies' boards in their tests. We believe it is important to analyze both tenure measures since a director can gain valuable expertise from serving on outside boards. Moreover, the positive effects of tenure on experience/expertise may differ based on whether the tenure was accrued on the current company's board or on outside boards.

As stated earlier, most recent research proposes a curvilinear relationship between director tenure and director quality. We also test for a curvilinear relationship since we predict that the positive effects of expertise dominate in the early years of a director's tenure, while the negative effects of entrenchment begin to dominate in the later years. Figure 2 demonstrates our predicted curvilinear relationship between director tenure and director quality. Therefore, our second hypothesis is:

Hypothesis 2 For low levels of director tenure, there is a significant and positive relationship between INSIDETENURE and the average director quality score for that firm, but that relationship becomes significantly negative when INSIDETENURE is at higher levels.

In Hypothesis 2, we predict that the negative effects of entrenchment begin to dominate the positive effects of expertise at higher levels of tenure. Since Hypothesis 2 predicts entrenchment effects, we only employ our inside tenure variable in our tests because directors potentially become entrenched as their tenure on the current board increases. While OUTSIDE tenure can effect experience/expertise, the length of tenure on outside boards should have little effect on whether a director becomes entrenched on the current board.

As an extension of existing research, we further hypothesize (in Hypotheses 3 through 5) that the predicted negative effects of entrenchment that occur as directors' tenure increases will differ across companies based on



TENURE is measured separately for the following:
INSIDETENURE = The average # of years of tenure for directors from serving on that company's board.
OUTSIDETENURE = The average # of years of tenure for directors from serving on boards of other companies.

Fig. 1 Hypothesized relationship between the average length of tenure for board members and the average director quality score for the firm. Hypothesis 1: There is a significant and positive relationship between the length of tenure for the board of directors and the average director quality score for that firm

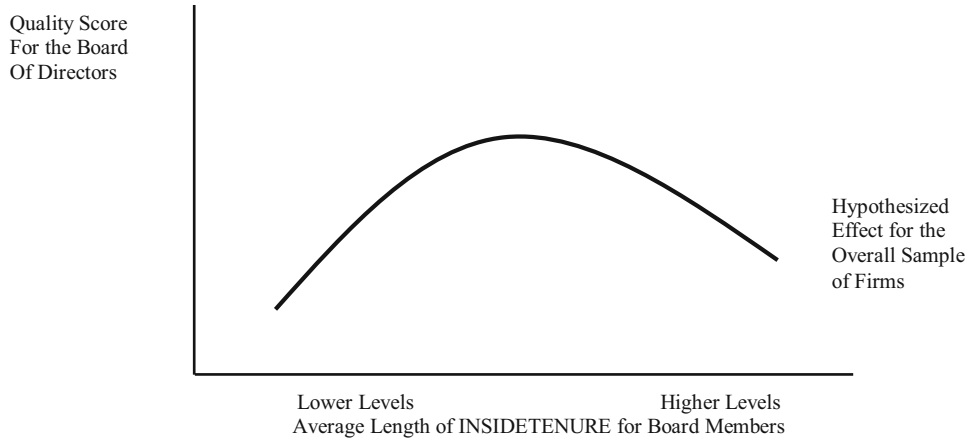


Fig. 2 Hypothesized effect of the length of tenure on the relationship between INSIDETENURE and the average director quality score for the firm. Hypothesis 2: For low levels of director tenure, there is a significant and positive relationship between INSIDETENURE and the average director quality score for that firm, but that relationship becomes significantly negative when INSIDETENURE is at higher levels

certain firm-specific characteristics. In other words, in Hypotheses 3 through 5, we predict that the curvilinear relationship hypothesized in Hypothesis 2 will not be the same for all firms. Figure 3 demonstrates our predictions in graphical form. Specifically, we hypothesize that the negative effects of entrenchment will be greater as the degree of social identification exhibited by the board of directors increases. Firms where the board of directors exhibit high social identification will exhibit a greater amount of entrenchment, leading to a more pronounced negative effect between director tenure and governance effectiveness.

Veltrop et al. (2018, pp. 449–450) define the concept of social identification as follows:

> Social identification describes a process where individuals come to see themselves as interchangeable exemplars of a social group rather than as unique individuals (Turner 1982). Social identification with the organization can then be described as the extent to which individuals define themselves in terms of a specific organization (Ashforth et al. 2008; Cooper and Thatcher 2010). This self-conception in terms of "we" rather than "I" is referred to as social identity and implies a psychological merging of self and organization (Brewer 1991; van Knippenberg and Sleebos 2006).

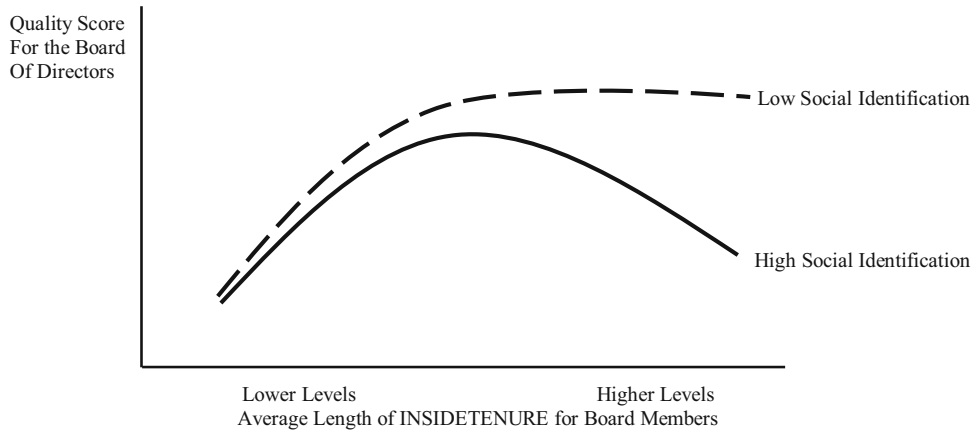


Fig. 3 Hypothesized impact of firm-specific factors on the relationship between INSIDETENURE for board members and the average director quality score for the firm. Hypothesis 3: For high levels of director tenure, the negative relationship between director tenure and the average director quality score for that firm will be stronger for small firms than for large firms. Hypothesis 4: For high levels of director tenure, the negative relationship between director tenure and the average director quality score for that firm will be stronger for firms with a low number of board members than for firms with a high number of board members. Hypothesis 5: For high levels of director tenure, the negative relationship between director tenure and the average director quality score for that firm will be stronger for firms whose directors serve on a low number of outside boards than for firms whose directors serve on a high number of outside boards

Veltrop et al. (2018) find that the negative effects of entrenchment will be larger for those directors who more strongly "socially identify" with the company than for those directors that do not. They propose that for directors who strongly socially identify with the organization, entrenchment is more likely to reduce directors' predisposition to independently monitor, evaluate, and advise senior management. They also argue that directors who strongly socially identify with the organization are more likely to accept the prevailing organizational norms and values and "go with the flow."

When strong social identification with the organization exists, directors will typically view senior management in stereotypical terms as more trustworthy and possessing similar values, goals, and attitudes (Brewer 1991; Hogg and Terry 2000; van Knippenberg and Hogg 2003). Strong social identification by a director causes the director to be more likely to accept the actions of management. As a result, directors who strongly socially identify with the organization are more likely to be positive about senior management as organizational members (Hewstone et al. 2002; Tajfel 1982), and they are more likely to interpret strategic decisions made by senior management as appropriate. These perceptions by the board will increase the level of entrenchment exhibited by those directors. Based on this prior research, higher social identification by the board is positively related to stronger entrenchment.

Furthermore, prior research has identified characteristics of the firm and the board which may indicate an increased likelihood of social identification, and therefore increased entrenchment. For example, O'Reilly et al. (1989) find that groups of smaller size have a decreased level of conflict and therefore find it easier to cooperate. Cohen and Bailey (1997) find that a group's ability to cooperate is a measure of the social integration of the group. Because of the increased ability to cooperate, members within small groups feel more social integration with the group. In other words, smaller settings (e.g., smaller firm size and/or smaller board size) lead to higher social identification. In addition, when the number of board members is small, a director may deem that his/her actions could more significantly influence the company, whereas a member of a large board could potentially "get lost in the crowd" and believe that they have relatively little influence.

Board size is often used as a measure of board independence, with larger boards often thought to be more independent of management (Zahra and Pearch 1989; Zahra and Stanton 1988; Chaganti et al. 1985). A small board would therefore be more dependent on management and may experience a greater amount of entrenchment. Thus, prior theory and research relates firm size and board size to the level of social identification and the likelihood of entrenchment.

Veltrop et al. (2018) conduct their analysis of social identification at the individual director level, and they measure a director's social identification with the organization based on the director's self-reported answers to four questions on the relationship between the director and the organization. By contrast, our analysis is at the board (or organization) level, and we employ three firm-specific characteristics as proxies for the extent to which the board as a whole is likely to socially identify with the firm.

First, based on prior research, we hypothesize that directors may be more likely to strongly socially identify with a small company than a larger, more complex organization. If a company is small (and relatively less complex), a director may feel that his/her actions could have a greater impact on the fortunes of the company. Such a director may strongly identify with the organization and would likely become entrenched to a greater extent than directors of large companies. Thus, we predict that small firms may experience the negative effects of entrenchment of long-tenured directors to a greater extent than large firms. Our third hypothesis is:

Hypothesis 3 For high levels of director tenure, the negative relationship between director tenure and the average director quality score for that firm will be stronger for small firms than for large firms.

It should be noted that we do not predict any differences in the positive relationship between director tenure and director quality at low and intermediate levels of director tenure based on firm size.

Similarly, a director may be more likely to socially identify with the company if he/she is a member of a small board of directors. Based on the arguments from prior research, it is likely that directors on small boards may experience greater social identification, and therefore greater entrenchment than directors on large boards. We therefore predict that firms with a small number of board members may experience the negative effects of entrenched directors to a greater extent than firms with a large board of directors. Our fourth hypothesis is:

Hypothesis 4 For high levels of director tenure, the negative relationship between director tenure and the average director quality score for that firm will be stronger for firms with a low number of board members than for firms with a high number of board members.

Here again, we do not predict any differences in the positive relationship between director tenure and director quality at low and intermediate levels of director tenure based on the size of the firm's board of directors.

Finally, we contend that is likely that a director might more strongly socially identify with an organization when he/she does not serve on a number of other boards. Put

another way, it would be less likely for a board member to strongly socially identify with a particular company if he/she serves on numerous boards. In such a case, the board member's time would be spread across a number of organizations and the likelihood of strongly identifying with any one company would be reduced. However, if a director only serves, for example, on one board, his/her time could be devoted to that one company, with the possibility of strongly socially identifying with that company being increased. We predict that firms whose board members serve on few outside boards are more likely to socially identify with that firm and are therefore more likely to become entrenched than firms whose directors serve on multiple outside boards. Our fifth hypothesis is therefore:

Hypothesis 5 For high levels of director tenure, the negative relationship between director tenure and the average director quality score for that firm will be stronger for firms whose directors serve on a low number of outside boards than for firms whose directors serve on a high number of outside boards.

Once again, Hypothesis 5 does not predict any differences in the positive relationship between director tenure and director quality at low and intermediate levels of director tenure based on the average number of outside board memberships held by a firm's directors.

Data, empirical methodology, and descriptive statistics

Data

We collected all required data from the *Audit Analytics* database. We used both the Corporate Governance and Audit Data subsets of *Audit Analytics* for the years 2004 through 2014. For each company, we gathered the following annual data: firm size as measured by the natural log of sales, the number of outside board memberships held by the board of directors, the number of reported material weaknesses in internal control, the total number of board members, the stock exchange on which the company's stock is traded, and the name of the company's auditor. We also collected annual data for each firm on two director tenure measures: the average number of years of tenure for directors from serving on that company's board, and the average number of years of tenure for directors from serving on outside boards. A total of 29,005 firm-year observations were gathered.

Calculation of director quality scores

In order to test our hypotheses relating director quality and director tenure, we first develop a unique measure of director quality. In an effort to calculate individual director quality scores, we adapt the Google PageRank algorithm to rank director quality, where the "quality" of each director is based on that director's connection to the number of material weaknesses in internal control for the firms on whose boards that director sits.

We employ material weaknesses in internal control in our calculation of director quality scores because internal control weaknesses can be used as a proxy for corporate governance effectiveness. There are two reasons we use reported internal control weaknesses in our director quality score model. First, the number of reported material weaknesses in internal control is an appropriate proxy for governance effectiveness because the Sarbanes–Oxley Act of 2002 holds corporate directors directly responsible for a company's effective internal control environment. Second, prior research provides support for this corporate governance effectiveness proxy. For example, Doyle et al. (2007, p. 202) assert that they "expect a well-governed firm to exhibit fewer material weaknesses, all else equal." In addition, Johnstone et al. (2011, p. 333) argue that "The limited related research in this area reports a positive association between levels of internal control quality and superior corporate governance." The findings of Hoitash et al. (2009), Krishnan (2005), and Zhang et al. (2007) also support using internal control weaknesses as a proxy for governance effectiveness, since all three studies find that weaknesses in internal control are less likely for those firms which have a high quality audit committee of the board of directors. We therefore use the number of reported material weaknesses in internal control as the input into the Google PageRank algorithm in order to compute individual director quality scores.

The PageRank algorithm was originally developed by Google to rank websites. In a simple sense, the algorithm works as follows. One would first count the number of incoming links to a website. Incoming links are then weighted by the importance of the linking website. Links are also weighted by the number of outgoing links: One link from a website with 10,000 outgoing links is worth less than one link from a website with ten outgoing links (all else being equal). Websites that receive many links from important websites are ranked higher. Based on the links, a rank is then computed for each website.

Similarly, we adapt the PageRank algorithm to "rank" individual board members. In essence, each board member represents a website. Each member of a board "links" to the other board members. The impact of outgoing links from any one board member is represented by measuring

the board performance according to material weaknesses in internal controls (MWIC). If all members of a board served on only that one board, then this method would rank everyone on the board the same, regardless of the board's performance. However, the power of this approach is derived from the fact that (1) many board members serve on multiple boards, and (2) not all of the boards on which they serve perform equally well. In Appendix, we provide a detailed example that demonstrates how the PageRank algorithm, as adapted for use in assessing director quality, computes individual director quality scores.

Descriptive statistics

In our regression models, we label the dependent variable QUALITYSCORE, which indicates a company's average director quality score in a given year. Specifically, using the process described above, we first compute a quality score for each director for each of our sample years. Then, for a given year, we calculate the director quality score for the board as a whole by averaging the individual director quality scores for that year. For the 29,005 firm-year observations, the mean of our QUALITYSCORE variable was 4.32, and the range was from 1.35 to 14.37. Table 1 displays descriptive statistics on our dependent variable, along with descriptive statistics for both our independent and control variables. In Table 1, Panel A provides descriptive statistics for the entire sample of firms, "small" firms, and "large" firms, respectively. We define small (large) firms as those below (above) the median value of our firm size variable.

Panel A of Table 1 presents details on our primary independent variable of interest, which we label INSIDETENURE. We define INSIDTENURE as the average number of years that a company's directors have served on that company's board. Panel A shows that the mean of INSIDETENURE is 7.42, with values ranging from zero to 29.57. The mean of this inside tenure variable is also approximately 7 years both our small company and large company subsamples. Therefore, our sample company directors have an average tenure of around 7 years on that company's board. We use the average number of years of tenure on outside company boards, labeled OUTSIDETENURE, as an alternative independent variable in some of our empirical tests. Panel A of Table 1 reveals that, on average, the directors in our sample had an average tenure of only 2.42 years on other companies' boards. Notice that average INSIDETENURE (7.42 years) is greater than average OUTSIDETENURE (2.42 years). If every director on every board also served on outside boards, then average INSIDETENURE would equal average OUTSIDETENURE, since one firm's outside director is, after all, the other firm's inside director. However, many firms have directors that serve on only that board, with no service on outside boards. Therefore, when computing the average length of tenure for any individual firm, the average length of OUTSIDETENURE for that board's directors (which could even be zero) could easily be less than the average length of INSIDETENURE, given that many directors have zero outside board service. Summing INSIDETENURE and OUTSIDETENURE reveals that the directors in our sample have an average overall tenure of approximately 10 years on corporate boards.

In Table 1, Panel A also provides information on two variables that we employ in our regression models in an attempt to control for the effects of extraneous factors on the relationship between director tenure and director quality. We utilize the number of outside board memberships held by a company's board of directors (OUTSIDEBOARDS) and the natural log of sales (FIRMSIZE) as control variables. In Table 1, Panel B provides descriptive statistics for two categorical variables that we also employ as control variables in our regression models. In our regressions, we control for the effects of both auditor type (AUDITOR) and stock exchange differences (EXCHG) on the relationship between director tenure and director quality. Since both a company's exchange listing and auditor may impact the company's effectiveness in monitoring internal controls, we utilize these two categorical variables in an effort to control for such effects. As expected, the data reported in Panel B demonstrate that for our sample firms, larger companies tend to be audited by either a "Big Four" or national auditing firm and are more likely to be listed on a major stock exchange. However, the descriptive statistics provided in Table 1, Panel B reveal that there appears to be sufficient cross-representation of exchange listing and auditor association for our results to be robust.

Empirical model

In order to test our hypothesized relationships between director tenure and director quality, we utilize a Tobit regression model. Tobit regression is an appropriate procedure when the dependent variable is truncated. In our case, the dependent variable (the average director quality score for the board) must be greater than or equal to zero. In such a case, a Tobit regression model fits the data better than an ordinary least squares model that assumes a normally distributed dependent variable or a model such as logistic regression that assumes a binary dependent variable (McDonald and Moffitt 1980). Our primary regression model is:

Table 1 Descriptive statistics for regression variables

Variable	N	Mean	SD	Median	Min	Max
Panel A: Descriptive statistics for interval regression variables						
Descriptive statistics for full sample						
QUALITYSCORE	29,055	4.320	1.361	4.032	1.347	14.373
FIRMSIZE	29,055	21.231	2.005	21.143	13.305	28.816
OUTSIDEBOARDS	29,055	4.162	4.283	3.000	0.000	32.000
INSIDETENURE	29,055	7.422	3.964	6.818	0.000	29.571
OUTSIDETENURE	29,055	2.418	2.998	1.455	0.000	48.444
Descriptive statistics for "small" firms[a]						
QUALITYSCORE	14,528	4.229	1.354	3.958	1.347	13.109
FIRMSIZE	14,528	19.668	1.091	19.857	13.305	21.143
OUTSIDEBOARDS	14,528	2.560	2.847	2.000	0.000	26.000
INSIDETENURE	14,528	7.600	4.207	6.857	0.000	29.571
OUTSIDETENURE	14,528	1.844	2.888	0.833	0.000	48.444
Descriptive statistics for "large" firms[a]						
QUALITYSCORE	14,527	4.411	1.362	4.149	1.586	14.373
FIRMSIZE	14,527	22.794	1.399	22.436	21.144	28.816
OUTSIDEBOARDS	14,527	5.764	4.843	5.000	0.000	32.000
INSIDETENURE	14,527	7.244	3.696	6.786	0.000	28.667
OUTSIDETENURE	14,527	2.992	2.997	2.250	0.000	36.222

Variable	Full sample	"Small" firms[a]	"Large" firms[a]
Panel B: Descriptive statistics for categorical regression variables (# of observations within each category)			
EXCHANGE = 0	922	564	358
EXCHANGE = 1	28,133	13,964	14,169
	29,055	14,528	14,527
AUDITOR = 0	4842	3804	1038
AUDITOR = 1	24,213	10,724	13,489
	29,055	14,528	14,527

[a]Small firms are defined as firms with log of total assets less than the median of 21.143

$$\begin{aligned}\text{QUALITYSCORE} = {} & a_0 + b_1\text{FIRMSIZE} \\ & + b_2\text{EXCHANGE} + b_3\text{AUDITOR} \\ & + b_4\text{OUTSIDEBOARDS} \\ & + b_5\text{INSIDETENURE} + \text{e}\end{aligned}$$

where QUALITYSCORE is the average director quality score for the board of directors, FIRMSIZESIZE is the natural log of sales, EXCHG is coded 1 if the firm is listed on the NYSE, AMEX, or NASDAQ and 0 otherwise, AUDITOR is coded 1 if the firm's auditor is a "Big Four" or national firm and 0 otherwise, OUTSIDEBOARDS is the number of outside boards held by the board of directors, and INSIDETENURE is the average number of years of director tenure from service on that company's board.

Results

Table 2 provides our Tobit regression results for the entire sample of 29,005 firm-year observations. Panel A of Table 2 indicates a significant positive correlation between the average number of years of director tenure on a company's board (INSIDETENURE) and the average director quality score of the board (QUALITYSCORE). The results reported in Table 2, Panel A support our Hypothesis 1 that director quality (and hence corporate governance effectiveness) increases as director tenure on a company's board increases. These results, therefore, provide support for the Expertise Hypothesis. The results displayed in Panel A of Table 2 are reported as a comparison to prior research, since most previous research utilizes a tenure variable similar to our inside tenure variable.

In Panel B of Table 2, we reexamine the relationship between director tenure and director quality by employing an alternative measure of tenure. In Panel B, we use OUTSIDETENURE, which is defined as the average level

Table 2 Regression results examining the relationship between the average length of tenure for board members and the average director quality score for the firm

Variable	Coefficient	Std. Error	*t*-value	$P > \|t\|$
Panel A: Results examining INSIDETENURE only				
FIRMSIZE	− 0.095	0.004	− 22.690	0.000
EXCHANGE	− 0.120	0.042	− 2.850	0.004
AUDITOR	0.301	0.021	14.320	0.000
OUTSIDEBOARDS	0.132	0.002	67.770	0.000
INSIDETENURE	0.080	0.010	7.800	0.000
Panel B: Results examining OUTSIDETENURE only				
FIRMSIZE	− 0.089	0.004	− 20.980	0.000
EXCHANGE	− 0.127	0.042	− 3.020	0.003
AUDITOR	0.265	0.021	12.570	0.000
OUTSIDEBOARDS	0.110	0.003	39.720	0.000
OUTSIDETENURE	0.118	0.011	10.520	0.000
Panel C: Results examining INSIDETENURE and OUTSIDETENURE				
FIRMSIZE	− 0.090	0.004	− 21.130	0.000
EXCHANGE	− 0.151	0.042	− 3.580	0.000
AUDITOR	0.277	0.021	13.090	0.000
OUTSIDEBOARDS	0.113	0.003	40.080	0.000
INSIDETENURE	0.059	0.010	5.610	0.000
OUTSIDETENURE	0.104	0.011	9.010	0.000

$$\text{QUALITYSCORE} = \beta_0 + \beta n(\text{FIRMSIZE, EXCHANGE, AUDITOR, OUTSIDEBOARDS, INSIDETENURE, OUTSIDETENURE})$$

where QUALITYSCORE = the overall quality score for the board of directors; FIRMSIZE = natural log of sales (proxy for firm size); EXCHANGE = stock exchange: equals 1 if firm is listed on NYSE, AMEX or NASDAQ, 0 otherwise; AUDITOR = auditor code: equals 1 if the firm's auditor is "Big Four," 0 otherwise; OUTSIDEBOARDS = the number of outside board memberships held by the board of directors; INSIDETENURE = the average # of years of tenure for directors from serving on that company's board; OUTSIDETENURE = the average # of years of tenure for directors from serving on outside boards

of tenure of a company's directors on other boards. The results reveal that OUTSIDETENURE is also positively associated with director quality. This result also supports the Expertise Hypothesis and implies that a director's quality increases as he/she gains experience/expertise from serving on outside company boards.

In Panel C of Table 2, we extend the analysis by *separately* examining the effect of inside tenure and outside tenure on director quality. Panel C reveals a significant positive correlation between years of tenure from serving on outside boards (OUTSIDETENURE) and average director quality score, even after controlling for the effects of INSIDETENURE. Therefore, these results imply that a board's corporate governance effectiveness increases as directors accrue experience from serving on that company's board as well as from serving on other boards. This result extends prior research since, as stated earlier, most prior research has examined what we label inside tenure and does not investigate the effects of outside board tenure on director quality.

The results displayed in Table 2 support our Hypothesis 1 and indicate that director quality increases as director tenure increases. These results imply that directors gain valuable experience/expertise from serving on corporate boards that grows over time and that director quality increases with directors' years of service on outside boards even after controlling for service on the board being examined. However, Table 2 findings are the result of using a linear regression model, when in fact the relationship between director tenure and director quality may be curvilinear in nature. In Table 3, we test for such a curvilinear relationship.

In Table 3, we provide the results of our test of Hypothesis 2, which predicts a positive association between director tenure and director quality at lower levels of tenure and a negative association between tenure and director quality at higher levels of tenure. In essence, the hypothesis predicts that the positive effects of experience/expertise dominate at lower levels of tenure, while the negative effects of entrenchment dominate at higher tenure levels. In Table 3, we estimate our Tobit regression model separately for (1) those companies whose directors have an average tenure on that company's board of less than or equal to 9 years and (2) those whose directors have an

Table 3 Regression results examining the effect of the length of tenure on the relationship between INSIDETENURE and the average director quality score for the firm

Variable	Coefficient	Std. error	*t*-value	$P > \|t\|$
Panel A: Results for firms with average director tenure (INSIDETENURE) less than or equal to 9 years				
FIRMSIZE	− 0.086	0.005	− 17.220	0.000
EXCHANGE	− 0.208	0.048	− 4.300	0.000
AUDITOR	0.304	0.027	11.090	0.000
OUTSIDEBOARDS	0.110	0.003	34.620	0.000
INSIDETENURE	0.043	0.004	9.820	0.000
OUTSIDETENURE	0.033	0.005	7.110	0.000
Panel B: Results for firms with average director tenure (INSIDETENURE) greater than 9 years				
FIRMSIZE	− 0.105	0.008	− 12.650	0.000
EXCHANGE	− 0.015	0.090	− 0.070	0.947
AUDITOR	0.266	0.032	8.440	0.000
OUTSIDEBOARDS	0.127	0.006	23.040	0.000
INSIDETENURE	− 0.017	0.004	− 4.150	0.000
OUTSIDETENURE	0.020	0.006	3.460	0.001

$$\text{QUALITYSCORE} = \beta_0 + \beta n(\text{FIRMSIZE, EXCHANGE, AUDITOR, OUTSIDEBOARDS, INSIDETENURE, OUTSIDETENURE})$$

where QUALITYSCORE = The overall quality score for the board of directors; FIRMSIZE = Natural log of sales (proxy for firm size); EXCHANGE = Stock exchange: equals 1 if firm is listed on NYSE, AMEX or NASDAQ, 0 otherwise; AUDITOR = Auditor code: equals 1 if the firm's auditor is "Big Four," 0 otherwise; OUTSIDEBOARDS = The number of outside board memberships held by the Board of Directors; INSIDETENURE = The average # of years of tenure for directors from serving on that company's board; OUTSIDETENURE = The average # of years of tenure for directors from serving on outside boards

average tenure on that company's board greater than 9 years. We use 9 years as the cutoff point between lower levels of tenure and higher levels of tenure based on the findings of Huang (2013). Huang (2013) documents that firm value and director tenure are positively associated up to the 9-year tenure point and are negatively associated past that point.[1] Also, as stated earlier, the analysis in Table 3 is based on our INSIDETENURE variable, since entrenchment relates only to inside tenure and we are testing for entrenchment effects.

Panel A (B) of Table 3 reports regression results for those companies whose directors have relatively low (high) levels of tenure on that company's board, where tenure of 9 years serves as the cutoff between low-tenure boards and high-tenure boards. The results reported in Table 3 support Hypothesis 2. Specifically, Panel A reveals that INSIDETENURE is significantly positively correlated with director quality for firms with relatively lower tenured boards. Conversely, the Panel B results demonstrate a significant negative correlation between director tenure and director quality for firms with relatively high levels of director tenure. Therefore, as predicted by Hypothesis 2, director tenure and director quality are positively related in the early years of a director's tenure when the positive effects of experience dominate, and are negatively related in later years as the negative effects of entrenchment begin to dominate the experience effects. Thus, the results reported in Table 3 support the findings of prior research that the relationship between director tenure and director quality is curvilinear in nature.

In Tables 4, 5, 6, we provide the results of a series of tests designed to determine whether the curvilinear relationship between director tenure and director quality documented in Table 3 is the same for all firms, or if the relationship differs based on certain firm-specific factors. Specifically, in each case, we test whether the negative effects of entrenchment that occur at higher levels of tenure differ based on certain firm-specific characteristics. In other words, we seek to determine whether directors of certain types of firms vary in their level of entrenchment as their tenure progresses.

In Table 4, we provide the results of our test of Hypothesis 3, which proposes that the negative effects of entrenchment that occur in the later years of a director's tenure will be stronger for directors of small firms than for directors of large firms. The rationale for this prediction is that directors of small firms are more likely to strongly socially identify with the organization than directors of

[1] We conducted sensitivity analyses in order to determine the best cutoff point between long-tenured directors and those with shorter tenure. The sensitivity analyses revealed that 9 years was the optimal cutoff point for our sample.

Table 4 Regression results examining the impact of FIRMSIZE on the relationship between INSIDETENURE for board members and the average director quality score for the firm

Variable	Coefficient	Std. error	*t*-value	$P > \|t\|$
Panel A: Firms with FIRMSIZE less than or equal to the median (small firms)				
Results for firms with average director tenure less than or equal to 9 years				
FIRMSIZE	− 0.014	0.012	− 1.110	0.268
EXCHANGE	− 0.215	0.066	− 3.280	0.001
AUDITOR	0.258	0.033	7.830	0.000
OUTSIDEBOARDS	0.154	0.007	21.910	0.000
INSIDETENURE	0.210	0.027	7.820	0.000
OUTSIDETENURE	− 0.002	0.022	− 0.080	0.938
Results for firms with average director tenure greater than 9 years				
FIRMSIZE	− 0.000	0.017	− 0.030	0.980
EXCHANGE	− 0.041	0.106	− 0.390	0.695
AUDITOR	0.237	0.037	6.410	0.000
OUTSIDEBOARDS	0.151	0.011	14.120	0.000
INSIDETENURE	− 0.144	0.040	− 3.630	0.000
OUTSIDETENURE	0.066	0.028	2.370	0.018
Panel B: Firms with FIRMSIZE greater than the median (large firms)				
Results for firms with average director tenure less than or equal to 9 years				
FIRMSIZE	− 0.134	0.009	− 14.980	0.000
EXCHANGE	− 0.223	0.073	− 3.040	0.002
AUDITOR	0.176	0.054	3.230	0.001
OUTSIDEBOARDS	0.102	0.004	26.030	0.000
INSIDETENURE	0.172	0.026	6.630	0.000
OUTSIDETENURE	0.120	0.020	5.890	0.000
Results for firms with average director tenure greater than 9 years				
FIRMSIZE	− 0.169	0.018	− 9.580	0.000
EXCHANGE	− 0.043	0.166	− 0.260	0.796
AUDITOR	0.213	0.061	3.490	0.000
OUTSIDEBOARDS	0.134	0.007	19.350	0.000
INSIDETENURE	− 0.085	0.049	− 1.720	0.086
OUTSIDETENURE	0.016	0.029	0.560	0.575

larger, more complex companies, which would lead to an increased likelihood of entrenchment.

Panel A (B) provides the results of our analysis for small (large) firms, where we use the median of our firm size variable as the dividing line between small and large firms. Panel A demonstrates that, for our small firm subsample, director quality and director tenure are positively associated at lower levels of tenure and are negatively associated at higher levels of tenure. Therefore, the results for our small firm subsample mirror the results reported in Table 3 for the sample as a whole, namely that the positive effects of experience dominate at lower levels of tenure while the negative effects of entrenchment begin to dominate at higher levels. By contrast, the results reported in Panel B for our large firm subsample only reveal a significant (at the 0.05 level) relationship between director tenure and director quality at lower levels of tenure. The Panel B results are consistent with the view that, for our large company subsample, the positive effects of experience prevail at low tenure levels and that any entrenchment effects at higher tenure levels are not great enough to cause director quality to decrease in the later years of director tenure. Therefore, these results support Hypothesis 3, because we find that the relationship between director quality and director tenure is significantly negative at higher levels of tenure only for the small company subsample. Thus, the results are consistent with the hypothesis that the negative effects of entrenchment are stronger for small company directors than large company directors.

Table 5 reports the results of Hypothesis 4, which predicts that the negative effects of entrenchment that occur in the later years of a director's tenure will be stronger for directors of companies with a relatively small number of board members than for directors of companies with larger boards. Similar to our prediction about firm size, we propose that directors on boards with few board members are

Table 5 Regression results examining the impact of NUMBER OF BOARD MEMBERS on the relationship between INSIDETENURE for board members and the average director quality score for the firm

Variable	Coefficient	Std. error	*t*-value	$P > \|t\|$
Panel A: Firms with NUMBER OF BOARD MEMBERS less than or equal to the median				
Results for firms with average director tenure less than or equal to 9 years				
FIRMSIZE	− 0.033	0.008	− 4.240	0.000
EXCHANGE	− 0.234	0.061	− 3.860	0.000
AUDITOR	0.268	0.033	8.110	0.000
OUTSIDEBOARDS	0.207	0.006	32.760	0.000
INSIDETENURE	0.228	0.024	9.390	0.000
OUTSIDETENURE	− 0.061	0.020	− 3.100	0.002
Results for firms with average director tenure greater than 9 years				
FIRMSIZE	− 0.049	0.011	− 4.460	0.000
EXCHANGE	0.056	0.107	0.530	0.598
AUDITOR	0.244	0.038	6.470	0.000
OUTSIDEBOARDS	0.200	0.009	21.230	0.000
INSIDETENURE	− 0.130	0.037	− 3.540	0.000
OUTSIDETENURE	− 0.004	0.025	− 0.160	0.872
Panel B: Firms with NUMBER OF BOARD MEMBERS greater than the median				
Results for firms with average director tenure less than or equal to 9 years				
FIRMSIZE	− 0.063	0.007	− 8.650	0.000
EXCHANGE	− 0.009	0.080	− 0.110	0.910
AUDITOR	0.106	0.051	2.100	0.036
OUTSIDEBOARDS	0.120	0.004	25.230	0.000
INSIDETENURE	0.278	0.028	9.800	0.000
OUTSIDETENURE	0.012	0.024	0.490	0.621
Results for firms with average director tenure greater than 9 years				
FIRMSIZE	− 0.123	0.015	− 8.420	0.000
EXCHANGE	− 0.113	0.158	− 0.710	0.477
AUDITOR	0.194	0.057	3.390	0.001
OUTSIDEBOARDS	0.151	0.008	19.330	0.000
INSIDETENURE	− 0.081	0.056	− 1.430	0.152
OUTSIDETENURE	− 0.151	0.034	− 4.430	0.000

more likely to strongly socially identify with the organization than directors on large boards, which would lead to an increased likelihood of entrenchment. In Table 5, Panel A (B) reports the results for firms with relatively small (large) boards of directors. We divide our sample into two subsamples based on whether the firm's board has more or less than the median number of board members.

Panel A provides the results for our subsample of firms that have boards with fewer than the median number of directors. For these firms, the results parallel those found for the sample as a whole. Specifically, for this subsample, we find a significant positive association between director quality and INSIDETENURE for low values of tenure and a significant negative association for firms with highly tenured boards. However, Panel B reveals that the association between inside tenure and director quality is insignificant at higher tenure values for the subset of our companies with large boards. Table 5 results support Hypothesis 4, since we only find a significant negative association between director tenure and director quality at higher tenure values for firms with relatively small boards. The results are therefore consistent with the view the directors on small boards become entrenched to a greater extent than directors on large boards.

Finally, in Table 6, we report the results of our empirical test of Hypothesis 5, which proposes that the negative effects of entrenchment that occur in the later years of a director's tenure will be stronger for firms whose directors serve on a low number of outside boards than for firms whose directors serve on a high number of outside boards. The reasoning behind this hypothesis is that directors who have few outside board memberships will be more likely to strongly socially identify with a particular organization than directors who spread their board service across numerous organizations. Therefore, board members with relatively few outside board memberships are likely to become entrenched to a greater extent than directors with multiple outside board positions.

Table 6 Regression results examining the impact of NUMBER OF OUTSIDE BOARDS on the relationship between INSIDETENURE for board members and the average director quality score for the firm

Variable	Coefficient	Std. error	*t*-value	$P > \mid t \mid$
Panel A: Firms with NUMBER OF OUTSIDE BOARDS less than or equal to the median				
Results for firms with average director tenure less than or equal to 9 years				
FIRMSIZE	− 0.049	0.006	− 8.320	0.000
EXCHANGE	− 0.252	0.056	− 4.480	0.000
AUDITOR	0.209	0.028	7.520	0.000
OUTSIDEBOARDS	0.147	0.014	10.730	0.000
INSIDETENURE	0.196	0.022	9.020	0.000
OUTSIDETENURE	− 0.030	0.023	− 1.280	0.202
Results for firms with average director tenure greater than 9 years				
FIRMSIZE	− 0.072	0.010	− 7.410	0.000
EXCHANGE	− 0.081	0.090	− 0.900	0.370
AUDITOR	0.214	0.033	6.500	0.000
OUTSIDEBOARDS	0.209	0.021	9.890	0.000
INSIDETENURE	− 0.117	0.034	− 3.410	0.001
OUTSIDETENURE	0.006	0.030	0.190	0.850
Panel B: Firms with NUMBER OF OUTSIDE BOARDS greater than the median				
Results for firms with average director tenure less than or equal to 9 years				
FIRMSIZE	− 0.137	0.008	− 16.350	0.000
EXCHANGE	− 0.188	0.084	− 2.240	0.025
AUDITOR	0.358	0.075	4.800	0.000
OUTSIDEBOARDS	0.102	0.005	21.690	0.000
INSIDETENURE	0.208	0.032	6.440	0.000
OUTSIDETENURE	0.108	0.024	4.570	0.000
Results for firms with average director tenure greater than 9 years				
FIRMSIZE	− 0.163	0.015	− 10.930	0.000
EXCHANGE	0.110	0.267	0.410	0.681
AUDITOR	0.172	0.092	1.870	0.062
OUTSIDEBOARDS	0.133	0.008	16.770	0.000
INSIDETENURE	− 0.083	0.066	− 1.260	0.209
OUTSIDETENURE	0.013	0.036	0.350	0.727

Panel A (B) of Table 6 reports the regression results for firms whose directors serve on a relatively small (large) number of outside boards. Specifically, the Panel A (B) results are for the subsample of firms where the number of outside directorships held by a company's board is below (above) the median of our OUTSIDEBOARDS variable. For the subset of firms whose directors sit on relatively few outside boards, the results reported in Panel A parallel the results found for the sample as whole. In particular, for these firms, there is a significant positive relationship between INSIDETENURE and director quality at low levels of tenure, and a significant negative association at higher tenure levels. These results support the hypothesis that the negative effects of entrenchment dominate the positive effects of experience for these firms at high levels of tenure. The Panel A results contrast with those reported in Panel B for the subset of firms whose directors sit on relatively more outside boards. For these firms, there is a significant positive association between director inside tenure and director quality at low tenure levels, and an insignificant association at high tenure levels. Overall, Table 6 results support Hypothesis 5, since we only find a significant negative association between director tenure and director quality at higher tenure values for firms whose directors sit on relatively few outside boards. The results are therefore consistent with the hypothesis that directors who have few outside board membership become entrenched to a greater extent than those who have multiple outside directorships.

Conclusions and implications

This paper explores the relationship between director tenure and director quality (i.e., corporate governance effectiveness). A majority of prior research has explored

two competing hypotheses in an attempt to determine whether having long-tenured directors is detrimental or beneficial to a company. The Entrenchment Hypothesis predicts that long-tenured directors become overly deferential to management, fossilized in their thinking, and become ineffective in their role as monitors of management, resulting in a corresponding decrease in governance effectiveness as tenure increases. Alternatively, the Expertise Hypothesis posits that as directors' tenure increases, they gain valuable expertise/experience which results in increased governance effectiveness. In an effort to replicate prior research findings, we first test for a linear relationship between director quality and tenure using a unique measure of director quality. Our results reveal a significant positive association between director tenure and director quality, which implies that corporate governance effectiveness increases as directors' tenure increases. This result is consistent with prior research that has supported the Expertise Hypothesis.

We then refine our analysis and test for a curvilinear relationship between director quality and director tenure. We hypothesize a significant positive correlation between director tenure and director quality at low and intermediate levels of tenure (where the expertise/experience effect would likely dominate any entrenchment effect). We further hypothesize a significant negative correlation at higher levels of tenure (where entrenchment effects would likely dominate). Our findings support the hypothesized curvilinear relationship. This result is consistent with recent research findings and implies that the positive effects of experience tend to dominate in the early years of a director's tenure while the negative effects of entrenchment appear to dominate in later years. In the earlier years of a director's tenure, the director will more likely gain benefits from company-specific experience, while at the same time it is less likely that the director will have yet become entrenched. This will lead to the experience effect dominating any potential entrenchment effect in the early years of tenure. However, as tenure increases, it is likely that entrenchment will become stronger, while at the same time the marginal positive benefit of additional experience might be diminished. This will lead to the entrenchment effect dominating any potential experience effect in later years of tenure, causing a negative relationship between director tenure and governance effectiveness. Overall, this would cause a curvilinear relationship between director tenure and director quality over the entire length of director tenure, as illustrated in Fig. 2.

We next test for differences in this curvilinear relationship between firms based on three firm-specific characteristics. Specifically, we find that the negative effects of entrenchment that occur at higher levels of director tenure are greater for (1) small firms, (2) firms with a small number of board members, and (3) firms whose directors serve on few outside boards. In each of these cases, we contend that directors would tend to have a significant amount of their human capital invested in that particular firm and would be more likely to become entrenched. Directors in these cases would be likely to strongly "socially identify" with the firm and would likely become entrenched to a greater degree than directors who do not so strongly socially identify with the organization (Veltrop et al. 2018).

This paper contributes to the corporate governance literature in several ways. First, we extend prior research by developing a method to calculate individual director quality scores. Our individual director quality scores are computed by using the number of reported material weaknesses in internal control for all companies for which a director serves as a board member as the input to the Google PageRank algorithm. A firm's number of internal control weaknesses has been used as a proxy for corporate governance effectiveness in numerous prior research efforts. The development of this method of calculating individual director quality scores extends prior research since most prior research efforts utilize board-level measures of director quality rather than individual director measures.

We also extend prior literature by conducting our analysis separately for "inside tenure" and "outside tenure." We define inside tenure as the length of board service on the board of the company being currently examined, and we define outside tenure as years of service on all other outside boards. Virtually all prior research examines what we label inside tenure and ignores a director's service on outside boards. However, we feel it is important to differentiate the two concepts since entrenchment effects are due to one's length of service on a particular board (i.e., inside tenure), while experience/expertise can arise from both inside and outside tenure. In our tests for a curvilinear relationship between director tenure and director quality, we emphasize inside tenure since we are testing for entrenchment effects.

A third way that this paper contributes to the corporate governance literature is that we hypothesize (and empirically test) that the curvilinear relationship between director tenure and director quality differs depending on certain firm-specific characteristics such as firm size, the size of the board, and the number of outside boards that directors sit on. Specifically, we find that entrenchment effects differ across firms based on the previously described firm-specific characteristics.

Our results are consistent with the hypothesis that both an experience/expertise effect and an entrenchment effect occur over a director's service on a corporate board. These

results are relevant to the current discussion about whether term limits for directors should be instituted.

Currently, companies vary in their placement of limits on director tenure. Companies that do not limit director tenure often cite reasons that are consistent with the Experience Hypothesis described earlier. For example, General Motors (2016, p. 9) states the following in their Corporate Governance Guidelines:

> The Board does not believe it should establish term limits. While term limits could help ensure that there are fresh ideas and viewpoints available to the Board, they hold the disadvantage of losing the contribution of directors who have been able to develop, over a period of time, increasing insight into the Company and its operations and, therefore, provide an increasing contribution to the Board over time.

Similarly, Coca-Cola (2015) states in its Corporate Governance Guidelines that:

> Term limits may cause the loss of experience and expertise important to the optimal operation of the Board. Directors who have served on the Board for an extended period of time can provide valuable insight into the operations and future of the Company based on their experience with and understanding of the Company's history and objections.

As an alternative to strict term limits, many companies instead institute some form of periodic review of directors. Although not establishing term limits, General Motors (2016, p. 10) "considers each director's individual performance and contributions annually, and oversees a more extensive individual Board member evaluation process every 5 years."

Other firms, however, institute specific term limits on a director's tenure. Often, these firms cite justification that is consistent with the Entrenchment Hypothesis. For example, Scotiabank (2016, p. 2) states the following in its Corporate Governance Policies:

> The Board believes that its term limits provide an appropriate balance between experience and fresh perspectives. The Board's term limits, combined with director independence assessments and the Board evaluation process, enable the Board to confirm that effective and independent-minded directors are nominated for election and allow the Board to properly conduct its succession planning.

For Directors appointed prior to December 2010, Scotiabank has placed a 10-year term limit on director service. General Electric (2016, p. 2) states that all directors, other than the CEO, will have a term limit of 15 years. And PNB General (2014, p. 15) states that "an Independent Director of a company may only serve for a total of five consecutive years." Thus, companies often differ in their use of limits on director tenure.

There is also conflicting evidence as to the exact percentage of companies that establish limits on director tenure. For example, according to the executive recruiting firm Spencer Stuart, only 3% of the S&P 500 firms have term limits for directors (Katz and McIntosh 2014). However, a survey by Heidrick and Struggles (2007) found that 22% of respondents imposed term restrictions on directors, more than doubling the 9% they found in 2001. Regardless of the exact extent of director term limits, shareholder groups continue to highlight the issue of director tenure. The Council of Institutional Investors (2016, p. 25) adopted a policy calling for boards to evaluate director tenure when assessing director independence. As stated in their policies, "Extended periods of service may adversely impact a director's ability to bring an objective perspective to the boardroom." Commenting on this policy, Borus (2013) notes that "extended tenure can lead an outside director to start to think more like an insider."

Finally, this paper should provide additional opportunities for future research examining the relationship between social identification, entrenchment, and governance effectiveness of the board of directors. For example, future research could examine additional factors that could be related to social identification. One such factor that might be related to social identification and entrenchment is the "power" of individual directors. It could be argued that firm size and board size may also be a proxy for the power of individual directors. In this context, director power would be more of an individual director measure, and although potentially relevant, our focus in this paper is more on the social identification of the board as a whole. We therefore use firm-level measures in our analyses. Although outside of our firm-level focus, the extent to which individual director "power" (and other individual director level variables) could also be related to social identification and/or entrenchment is a potentially relevant issue for future research.

Our overall results indicate that term limits may need to be considered since director quality tends to decrease in the latter years of a director's service. However, our results demonstrate that the negative effects of entrenchment that occur in the later years of a director's service differ across companies based on certain firm-specific characteristics and that not all firms experience the negative effects of entrenchment equally. We find that the negative effects of entrenchment that occur at higher levels of director tenure are greater for (1) small firms, (2) firms with a small number of board members, and (3) firms whose directors serve on few outside boards. Therefore, it would not be appropriate, based on our results, to recommend a specific

maximum number of years of service that would apply for all corporate directors. However, our results should be useful to corporate directors, investors, management, and other stakeholder groups that have an interest in the effects of director tenure on director quality and whether term limits should be mandated for corporate directors.

Appendix

This appendix provides a numerical example that shows how the Google PageRank algorithm, as adapted for use in assessing director quality, calculates individual director quality scores. Suppose we have the data shown below, which list three fictional organizations, the number of members on their board, the members' names, the number of MWICs per organization, and the percentile for each MWIC value, adjusted for ties.

Company	Number of board members	Board member	Number of MWICs[a]	MWIC percentile (see table below)
Jones enterprises	3	Bill	0	0.7143
Jones enterprises	3	Sally	0	0.7143
Jones enterprises	3	Jane	0	0.7143
Doe industries	2	Jane	1	0.3571
Doe industries	2	John	1	0.3571
Smith company	2	Jane	2	0.0714
Smith company	2	Sally	2	0.0714

[a]Given

The calculation of MWIC percentiles is as follows:

Company	Board member	Number of MWICs	Sequential rank[a]	Rank adjusted for ties[b]	MWIC percentile[c]
Jones enterprises	Bill	0	1	2	0.7143
Jones enterprises	Sally	0	2	2	0.7143
Jones enterprises	Jane	0	3	2	0.7143
Doe industries	Jane	1	4	4.5	0.3571
Doe industries	John	1	5	4.5	0.3571
Smith company	Jane	2	6	6.5	0.0714
Smith company	Sally	2	7	6.5	0.0714

[a]Firms are ranked in order of the number of MWICs, from smallest to largest. The "Sequential Rank" is simply the integer rank, starting from 1 to N, where N equals the total number of observations. In this case, $N = 7$

[b]The "Rank Adjusted for Ties" equals the average of the "Sequential Rank" for that company. For example, for Jones Enterprises, the Rank Adjusted for Ties equals $[(1 + 2 + 3)/3] = 2$

[c]The MWIC Percentile = [(N − Rank Adjusted for Ties)/N]. For example, the MWIC Percentile for Jones Enterprises = $[(7 - 2)/7] = 0.7143$

These data are then converted into the relational matrix M shown below, according to

$$M_{ij} = \sum_{k=1}^{K} \mathrm{MWIC}_{\mathrm{Percentile}}/(n_k * (n_k - 1)),$$

where both i and j represent indices for all of the N board members and $M_{ij} = 0$ when $i = j$.

Relational matrix M:

	Bill	Jane	Sally	John
Bill	0	0.71/(3·2) = .12	0.71/(3·2) = .12	0
Jane	0.36/(2·1) = 0.18	0	0.71/(3·2) + 0.07/(2·1) = 0.15	0.71/(3·2) = .12
Sally	0.71/(3·2) = .12	0.71/(3·2) + 0.07/(2·1) = 0.15	0	0
John	0	0.36/(2·1) = 0.18	0	0

For each board member i, we check to see whether they serve on the same organization's board k as member j. If they do not, then $M_{ij} = 0$. If they do, then we divide the *MWIC Percentile* for that organization by the product of the number of board members n_k for that organization and the number of board members for that organization less 1. The logic here is that each member on any given board is effectively "voting" for the quality of all the other members on the board. However, because there are n_k board members, they get $1/n_k$ votes. Furthermore, their vote

credit is distributed among the other members on the board, excepting themselves, additionally reducing their vote for each other member by $1/(n_k - 1)$. This value is then summed over all organizations K. Thus, if two board members sit together on multiple boards, then their votes are aggregated by summing.

Matrix M is then converted into the row stochastic matrix S shown below by normalizing across the rows such that the sum of each row i in S equals 1.

Row stochastic matrix S:

	Bill	Jane	Sally	John
Bill	0.00	0.50	0.50	0.00
Jane	0.40	0.00	0.33	0.27
Sally	0.44	0.56	0.00	0.00
John	0.00	1.00	0.00	0.00

Matrix S is then used as the primary input into matrix G, where:

$$G = \alpha * S + (1 - \alpha) * E$$

Here, matrix G is an $N \times N$ matrix that represents the weighted sum of matrices S and E, where the $N \times N$ matrix E effectively represents random noise. The parameter α controls the relative weight given to the noise matrix E and the input matrix S. For our purposes e_{ij} is set to $1/N$ for all i and j from 1: N, and $\alpha = 0.85$, as used in the original PageRank algorithm.

Lastly, the PageRank of each board member is the principal eigenvector of matrix G. We can find it by using the power iteration method shown below:

$$r(t + 1) = r(t) * G \text{ while } r(t + 1) - r(t) < \varepsilon$$

Here $r(t)$ is a $N \times 1$ initial starting point vector at time t, the values of which can be chosen at random but are typically set to $1/N$ for all i from 1:N, indicating no initial bias. The algorithm is repeated until the change in r from time t to time $t + 1$ falls below a preset tolerance level ε. For this particular example dataset, using $\varepsilon = 0.01$, it took eight iterations before converging on the PageRank values shown in the table below.

PageRank Values:

Bill	0.259
Jane	0.366
Sally	0.252
John	0.122

These PageRank values represent a quality score for each director, where the higher the number, the higher the corporate governance effectiveness for that member (based on the relationship to weaknesses in internal control). As can be seen in the example dataset, Jane is the member with the highest overall quality because every other member votes for her. And despite the fact that they both serve on exactly one board, Bill is rated substantially higher than John, largely due to the difference in quality of the boards on which they serve. Although she serves on two different boards, Sally's quality rating is pulled downwards because one of the boards on which she serves is the lowest performing of them all.

References

Ashforth, B.E., S.H. Harrison, and K.G. Corley. 2008. Identification in organizations: An examination of four fundamental questions. *Journal of Management* 34(3): 325–374.

Beasley, M.S. 1996. An empirical analysis of the relation between the board of director composition and financial statement fraud. *The Accounting Review* 71(4): 443–465.

Bebchuk, L.A., J.M. Fried, and D.I. Walker. 2002. Managerial power and rent extraction in the design of executive compensation. *University of Chicago Law Review* 69: 751–846.

Bebchuk, L., Y. Grinstein, and U. Peyer. 2010. Lucky CEOs and lucky directors. *Journal of Finance* 65(6): 2362–2401.

Borus, A. 2013. More on CII's new policies on universal proxy and board tenure. *Council of Institutional Investors.* www.cii.org/article_content.asp?article=208. Accessed 12 Jan 2017.

Brewer, M.B. 1991. The social self: On being the same and different at the same time. *Personality and Social Psychology Bulletin* 17(5): 475–482.

Byrd, J., E.S. Cooperman, and G.A. Wolfe. 2010. Director tenure and the compensation of bank CEOs. *Managerial Finance* 36(2): 86–102.

Chaganti, R., V. Mahajan, and S. Sharma. 1985. Corporate board size, composition and corporate failures in retailing industry. *Journal of Management Studies* 22: 400–417.

Coca-Cola Company. 2015. *Corporate governance guidelines*. http://www.coca-colacompany.com/investors/corporate-governance-guidelines. Accessed 12 Jan 2017.

Cohen, S., and D. Bailey. 1997. What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management* 23: 239–290.

Cooper, D., and S.M. Thatcher. 2010. Identification in organizations: The role of self-concept orientations and identification motives. *Academy of Management Review* 35(4): 516–538.

Council of Institutional Investors. 2016. *Corporate governance policies*. http://cii.membershipsoftware.org/files/policies/09_30_16_corp_gov_policies.pdf. Accessed 12 Jan 2017.

Dou, Y., S. Sahgal, and E.J. Zhang. 2015. Should independent directors have term limits? The role of experience in corporate governance. *Financial Management* 44(3): 583–621.

Doyle, J., W. Ge, and S. McVay. 2007. Determinants of weaknesses in internal control over financial reporting. *Journal of Accounting and Economics* 44(1): 193–223.

Fiegener, M., J. Nielsen, and J.R. Sisson. 1996. Tenure characteristics of outside directors and financial performance: Results from the banking industry. *American Business Review* 14(1): 89–96.

General Electric Company. 2016. *Governance principles.* https://www.ge.com/sites/default/files/GE_governance_principles_2016_2.pdf. Accessed 12 Jan 2017.

General Motors. 2016. *Corporate governance guidelines*. http://www.gm.com/content/dam/gm/en_us/english/Group4/InvestorsPDFDocuments/Corporate_Governance_Guidelines.pdf. Accessed 12 Jan 2017.

Golden, B.R., and E.J. Zajac. 2001. When will boards influence strategy? Inclination × power = strategic change. *Strategic Management Journal* 22(12): 1087–1111.

Heidrick and Struggles. 2007. *10th annual corporate board effectiveness study*. Los Angeles: Heidrick & Struggles and USC/Center for Effective Organizations.

Hewstone, M., M. Rubin, and H. Willis. 2002. Intergroup bias. *Annual Review of Psychology* 53: 575–604.

Hogg, M.A., and D.J. Terry. 2000. Social identity and self-categorization processes in organizational contexts. *Academy of Management Review* 25: 121–140.

Hoitash, U., R. Hoitash, and J.C. Bedard. 2009. Corporate governance and internal control over financial reporting: A comparison of regulatory regimes. *The Accounting Review* 84(3): 839–867.

Huang, S. 2013. *Zombie boards: Board tenure and firm performance*. Working paper, INSEAD Business School. http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=2302917. Accessed 12 Jan 2017.

Institutional Shareholder Services. 2015. *ISS governance QuickScore 3.0*. https://www.issgovernance.com/file/products/qs-technical-document-20151030.pdf. Accessed 12 Jan 2017.

Johnson, S.G., K. Schnatterly, and A.D. Hill. 2013. Board composition beyond independence social capital, human capital, and demographics. *Journal of Management* 39(1): 232–262.

Johnstone, K., C. Li, and K.H. Rupley. 2011. Changes in corporate governance associated with the revelation of internal control material weaknesses and their subsequent remediation. *Contemporary Accounting Research* 28(1): 331–383.

Katz, D. A., and L. A. McIntosh. 2014. Renewed focus on corporate director tenure. *New York Law Journal*. http://www.wlrk.com/webdocs/wlrknew/AttorneyPubs/WLRK.23346.14.pdf. Accessed on 12 Jan 2017.

Krishnan, J. 2005. Audit committee quality and internal control: An empirical analysis. *The Accounting Review* 80(2): 649–675.

Libit, W.M., and T.E. Freier. 2016. Advancing board refreshment through the director succession planning process. *Chapman Insights: Corporate Governance Quarterly Update* 2: 1–6.

McDonald, J.F., and R.A. Moffitt. 1980. The uses of Tobit analysis. *The Review of Economics and Statistics* 62(2): 318–321.

Musteen, M., D.K. Datta, and B. Kemmerer. 2010. Corporate reputation: Do board characteristics matter? *British Journal of Management* 21(2): 498–510.

National Association of Corporate Directors. 2011. *Key agreed principles to strengthen corporate governance for U.S. publicly traded companies*. https://www.nacdonline.org/Resources/Article.cfm?ItemNumber=2686. Accessed 12 Jan 2017.

Niu, F., and G. Berberich. 2015. Director tenure and busyness and corporate governance. *International Journal of Corporate Governance* 6(1): 56–69.

O'Reilly, C.A., D.F. Caldwell, and W.P. Barnett. 1989. Work group demography, social integration, and turnover. *Administrative Science Quarterly* 34: 21–37.

PNB General Insurers Co. 2014. *Corporate governance manual*. http://www.pnbgen.com/images/stories/docs/0%20-%20Corporate%20Governance%20Manual.pdf. Accessed 12 Jan 2017.

Scotiabank. 2016. *Corporate governance policies*. http://www.scotiabank.com/ca/common/pdf/about_scotia/Corporate_Governance_Policies.pdf. Accessed 12 Jan 2017.

Tajfel, H. 1982. Social-psychology of inter-group relations. *Annual Review of Psychology* 33: 1–39.

Turner, J.C. 1982. Towards a cognitive redefinition of the social group. In *Social identity and intergroup relations*, ed. H. Tajfel, 15–40. Cambridge: Cambridge University Press.

Vafeas, N. 2003. Length of board tenure and outside director independence. *Journal of Business Finance & Accounting* 30(7–8): 1043–1064.

Van Knippenberg, D., and M.A. Hogg. 2003. A social identity model of leadership effectiveness in organizations. *Research in Organizational Behavior* 25: 243–295.

Van Knippenberg, D., and E. Sleebos. 2006. Organizational identification versus organizational commitment: Self-definition, social exchange, and job attitudes. *Journal of Organizational Behavior* 27(5): 571–584.

Veltrop, D.B., E. Molleman, R. Hooghiemstra, and H. van Ees. 2018. The relationship between tenure and outside director task involvement: A social identity perspective. *Journal of Management* 44(2): 445–469.

Zahra, S., and W.W. Stanton. 1988. The implications of board of directors' composition for corporate strategy and performance. *International Journal of Management* 5: 229–236.

Zahra, S., and J.A. Pearch. 1989. Boards of directors and corporate financial performance: A review and integrative model. *Journal of Management* 15: 291–334.

Zhang, Y., J. Zhou, and N. Zhou. 2007. Audit committee quality, auditor independence, and internal control weaknesses. *Journal of Accounting and Public Policy* 26(3): 300–327.

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