Mind the gap: The age dissimilarity between the chair and the CEO

Marc Goergen [a,b,*], Peter Limbach [c], and Meik Scholz [c]

[a] *Cardiff Business School, Cardiff University, United Kingdom*
[b] *European Corporate Governance Institute (ECGI), Belgium*
[c] *Karlsruhe Institute of Technology, Germany*

This version: September 16, 2015

A B S T R A C T

We study the relation between the chair of the board of directors and the CEO. We argue that substantial age dissimilarity between the two – giving rise to cognitive conflict – increases board monitoring and firm value for firms with greater monitoring needs. We find evidence for our hypothesis using data on German two-tier boards. German law mitigates endogeneity concerns as it prevents CEO duality and also restricts CEO power in other ways. Additional identification attempts include CEO-firm and chair-firm fixed effects, random effects, dynamic panel data estimations, and the use of the 2007 financial crisis as an exogenous shock to monitoring needs. We find that during the crisis, when fast decision making and managerial discretion were needed, the link between age dissimilarity and firm value changed.

Keywords: Chair-CEO relation, CEO, chair of the board, cognitive conflict, monitoring, board meetings, firm value

JEL classification: G3, G39

* Corresponding author at: Cardiff Business School, Cardiff University, Colum Drive, CF10 3EU, Cardiff, United Kingdom. Tel.: +44 (0)29 208 76450. E-mail address: GoergenM@cardiff.ac.uk.

1. Introduction

To date, very little is known about the impact on corporate governance of the chair's characteristics and the interaction between non-executive and executive directors via the chair and CEO. Yet, there is a great need for a sound understanding of the chair's impact on governance and the form of the optimal chair-CEO relation. This need arises not only because many countries have a two-tier board system under which the roles of the chair and CEO are separated, but also because an increasing fraction of firms operating under the single-tier board system are abandoning CEO duality.[1] We address this gap in the literature by studying the relationship between the chair of the supervisory board and the CEO under the German two-tier board system.

Under the German system, the chair plays a key role as he or she presides over the supervisory board, schedules its meetings, sets the meeting agendas, distributes material in advance of meetings, leads the board's discussions, and is expected to be kept informed by the CEO about any relevant firm issues (see the German Stock Corporation Act (AktG), paragraphs 95-116, and the German Corporate Governance Code (GCGC), section 5.2). According to German Co-determination law (paragraph 29(2), MitbestG), which applies to firms with at least 2,000 employees, the chair is also the only member of the supervisory board who has two voting rights in case of a voting tie.

We suggest that the relation between the chair and the CEO is shaped by the age similarity between the two. Age affects an individual's attitude, behavior, and thinking, (see, e.g., Rhodes, 1983; Serfling, 2014; Taylor, 1975). Hence, directors of a similar age are likely to hold similar attitudes, opinions and beliefs (Wagner et al., 1984; Westphal and Zajac,

[1] The 2014 U.S. Spencer Stuart Board Index reports that 47% of S&P 500 companies split the role of the CEO and the chair, and another 24% have planned a split of these two roles over the following five years. For the U.K., Renneboog and Zhao (2011) report a separate CEO and chair for 87% of their observations between 1996 and 2007.

1995a) as they have witnessed the same historical events and social trends. In other words, directors of a similar age are likely to be mentally connected and similarly minded.

We therefore hypothesize that increasing age dissimilarity between the chair and the CEO reduces mutual attraction between the two and thereby fosters the chair's cognitive independence and gives rise to cognitive conflict (Amason, 1996; Forbes and Milliken, 1999; McPherson et al., 2001). This leads to more intensive monitoring in the form of more scrutinizing and critical judgment of the CEO's decisions and proposed actions. In addition, more scrutinizing forces the CEO to provide more information to convince the chair and the board of her plans, which makes the chair and the board better informed and hence even better able to monitor the CEO more intensively (Adams and Ferreira, 2007). The positive relation between chair-CEO age dissimilarity and monitoring intensity is expected to increase firm value. As age-induced dissimilarities between individuals are most evident across different generations (e.g., Pilcher, 1994), we argue that a generational difference, i.e., a generational age gap, between the chair and the CEO has the strongest impact on monitoring intensity and ultimately firm value.

We find strong empirical support for our hypothesis about the effects of chair-CEO age dissimilarity on monitoring intensity and firm value. Our two key results are as follows. First, we find a significantly positive effect of chair-CEO age dissimilarity on firm value, as measured by Tobin's Q, particularly when there is a generational age gap. Second, we find that substantial age dissimilarity between the chair and the CEO increases the number of board meetings, which likely proxies for the level of monitoring (see Adams, 2005; Brick and Chidambaran, 2010).[2] In line with Adams and Ferreira (2007) who argue that the optimal level of board monitoring varies across firms, we only observe the aforementioned positive

[2] Under the German two-tier governance system, board meetings are particularly likely to reflect (board) monitoring intensity because the supervisory board's main responsibility is to monitor management on behalf of the shareholders as prescribed by German law (see paragraph 111(1), AktG, and, e.g., Andres et al., 2014).

effects of the number of board meetings on firm value for firms with greater monitoring needs (i.e., those with high free cash flows, dispersed control, and low intangibles).

Importantly, all of our regressions control for other dissimilarities between the chair and the CEO, including differences in education, gender and nationality. They also control for similarities such as those stemming from the time the two have been working together and family relations. They also adjust, among others, for the chair's and the CEO's experience and power as measured by, e.g., their tenure and whether they have founded the firm.

As we use data on German two-tier boards, our results are also less likely to suffer from endogeneity caused by CEO power. Importantly, they do not suffer from endogeneity caused by CEO duality. This is the case as, according to German law (paragraph 105, AktG), the duties of the management board ("Vorstand") are clearly delineated from decision control and monitoring as well as nominating activities that are performed by the supervisory board ("Aufsichtsrat"). The supervisory board's independence is further strengthened as German law prohibits membership by the same individual of both boards, thereby enforcing a strict separation of the roles of the chair and the CEO. Importantly, the CEO is not allowed to be involved with the nomination and appointment of members of the supervisory board.[3] In contrast, evidence for the U.S. one-tier system suggests that CEOs typically influence the composition of the board of directors (Fracassi and Tate, 2012; Hermalin and Weisbach, 1998; Shivdasani and Yermack, 1999), leading to increased demographic similarity (Westphal and Zajac, 1995a).

Although the use of German data mitigates endogeneity caused by CEO power and prevents endogeneity caused by CEO duality, we nevertheless use CEO-firm as well as chair-

[3] Paragraph 124(3) of the German Stock Corporation Act (AktG) prohibits executives from nominating members of the supervisory board. The firm's nomination committee nominates candidates for the supervisory board as well as candidates for the CEO position. Importantly, the CEO cannot be a member of this committee.

firm fixed effects and dynamic panel Generalized Method of Moments (GMM) regressions to address potential endogeneity. Furthermore, we use the return on assets (ROA), a measure of firm performance, as an alternative to firm value, measured by Tobin's Q. All of these robustness tests confirm our results. Further, our hypothesis is confirmed when age dissimilarity is measured more broadly, i.e., when we consider age dissimilarity between the chair and the entire management board or between the CEO and the entire supervisory board.

Our most important endogeneity test consists of treating the 2007 financial crisis as an exogenous shock, altering the optimal levels of monitoring. The results indicate that chair-CEO age dissimilarity has a causal relation, as hypothesized, with monitoring intensity and firm value. Specifically, we find that firms with substantial chair-CEO age dissimilarity hold significantly fewer board meetings, i.e., they reduce their monitoring levels during the crisis. We further find that during the crisis substantial chair-CEO age dissimilarity destroys firm value, consistent with the increased need for managerial discretion and fast decision making (see, e.g., De Jonghe and Öztekin, 2015; Faleye et al., 2011; Li et al., 2014). Importantly, the negative effect on firm value during the crisis almost cancels out the positive effect observed during the non-crisis years. We hence conclude that firms should *mind the gap*.

Importantly, our dataset benefits from sufficient time-series variation, necessary for parameter identification. In particular, for 14% (15%) of all observations there is a CEO (chair) change. During the financial crisis, a change of either the CEO or the chair (or both) occurs in 29% of the firm-year observations. This percentage varies between 22% and 25% for the sub-samples of firms with high and those with low monitoring needs. Further, the use of random effects as an alternative to firm-fixed effects, as one way to address potentially low time-series variation (see, e.g., Andres, 2008), confirms our results.

Our study makes a major contribution to the as yet very limited literature about the effects of the chair's characteristics on firm value. To the best of our knowledge, the only other study that explicitly examines the role of the chair is Waelchli and Zeller (2013). They use survey data on unlisted Swiss firms and report that chair age is negatively related to firm performance. They argue that this reduction in performance is caused by a drop in the chair's cognitive abilities and motivation. However, they do not find such a relation for their control sample of listed firms. Likewise, we do not find an impact of chair age on firm value and on the number of board meetings for our sample of listed German firms.

We also contribute to the emerging literature on the effects of (dis)similarities between the CEO and the board of directors. For the U.S., Fracassi and Tate (2012), Hwang and Kim (2009), and Lee et al. (2014) provide evidence that social ties between the CEO and the other directors reduce firm value as they weaken the intensity of monitoring by the board. Ngyuen (2012) finds similar results for large French firms. While the aforementioned studies focus on the entire board as well as similarity stemming from social ties, our study is concerned with demographic similarity and focuses on the important relation between the chair and the CEO.

Our study has policy implications for regulation pertaining to the composition of the board of directors, with particular reference to the age of the chair. Indeed, our results on the effect of age dissimilarity between the chair and CEO on monitoring intensity and firm value suggest that in terms of corporate governance *one size does not fit all*. These findings are in direct contrast with recommendations from corporate governance codes to limit the age of corporate board members.

Our results are not only relevant to the two-tier governance system, but also to an already large and still increasing fraction of firms operating under the single-tier board

system, which have moved towards the separation of the roles of the chair and the CEO. Hence, there is an increasing need to understand the relation between the chair and the CEO. We provide evidence that demographic characteristics, age in particular, significantly shape this relation and, importantly, that this relation matters for firm value.

The remainder of the paper is structured as follows. The next section reviews the existing literature and derives our main hypothesis. Section 3 discusses the methodology and presents our data. Section 4 provides the results of the regressions on firm value. Section 5 addresses the following two important questions. First, does substantial age dissimilarity between the chair and CEO indeed result in more monitoring? Second, is the positive effect of chair-CEO age dissimilarity on monitoring and firm value limited to firms with greater monitoring needs? Section 6 tests the robustness of our results. Conclusions follow.

2. Literature Review and Hypothesis Development

2.1 Age and age similarity

Demographic attributes – including age, educational level, ethnicity and gender – affect individual behavior, decision-making, thinking, etc. (Pfeffer, 1983). Among these demographic attributes, age and gender are the most clearly discernible ones. Contrary to gender and most other demographic attributes, age is a multifarious and dynamic collection of personal characteristics which encompass the experiences that have been made during an individual's life. As such, aging constitutes a diverse set of factors that progressively shape the personality of a human being (Medawar, 1952), thereby continuously affecting behavior, communication, (strategic) decision making, information processing and usage, risk-taking, thinking and commitment to work (e.g., Child, 1974; Hambrick and Mason, 1984; Rhodes,

1983; Serfling, 2014; Taylor, 1975; Verhaeghen and Salthouse, 1997; Vroom and Pahl, 1971; Zenger and Lawrence, 1989).[4]

Further, Stangor et al. (1992) find that age *per se* constitutes a salient basis for group categorization, independent of whether there are underlying attitudinal or behavioral differences. In this regard, Ferris et al. (1991) argue that "age plays a major role in establishing the social context in which organizational members interact" (p. 617). Wagner et al. (1984) extend this to members of boards of directors. Directors of a similar age are likely to share experiences, and are hence likely to hold similar attitudes, opinions and beliefs. Moreover, as they have witnessed the same historical events and social trends, which have shaped their life experiences and moral values, directors and managers of a similar age are likely to be mentally connected and similarly minded.

2.2 Similarities among directors and corporate governance

Forbes and Milliken (1999) argue that, to ensure its effectiveness, the board should be cognitively independent and critically minded such that different points of views are able to emerge and the decisions proposed by the executives are scrutinized sufficiently. However, this is unlikely to be the case if board members – particularly the chair and the CEO – are demographically similar, such as of similar age.

This can be explained by the "similar attraction" phenomenon or homophily (e.g., Byrne, 1971; Byrne and Griffitt, 1973; see also McPherson et al., 2001). Human beings prefer to interact and communicate with individuals that are similar to them. The reason is that similarity ensures more affirmative feedback while limiting disagreement as well as the

[4] For example, older directors and executives have been found to use more information in their decision making process and to provide a more accurate assessment of that information (Taylor, 1975). They are also associated with less risk-taking behavior, while younger directors and executives tend to take more and partly excessive risks (see, e.g., Serfling, 2014; Vroom and Pahl, 1971).

emergence of alternative opinions. As a consequence, (demographic or social) similarity between the CEO and board members can lead to less effective corporate governance.

In support of this argument, Fracassi and Tate (2012), Hwang and Kim (2009), and Lee et al. (2014) find that U.S. boards where the CEO has social ties with the other directors – in the form of shared networks, similar regional or educational background or similar political orientation – are associated with weaker corporate governance and reduced firm value. Ngyuen (2012) finds comparable results for large French firms. Furthermore, Westphal and Zajac (1995a) find that CEOs who are able to influence the nomination process tend to appoint directors with similar demographic characteristics.[5] They find that demographic similarity is associated with increased CEO compensation. Westphal and Zajac (1995b) find that, when the board is demographically similar to the CEO, it is more likely to use human-resource based explanations (i.e., attracting and retaining managerial talent) rather than agency based explanations (i.e., alignment of interest) to justify the adoption of long-term incentive plans for the CEO.

2.3 Age dissimilarity, monitoring intensity and firm value

We hypothesize that substantial age dissimilarity between the chair and the CEO increases board monitoring effectiveness, and ultimately firm value. Specifically, we argue that greater age dissimilarity increases cognitive independence of the chair and gives rise to cognitive conflicts between the chair and the CEO. This should lead to more scrutinizing and critical judgment of the actions and decisions proposed by the latter, forcing the CEO to provide more information to convince the chair and the board of her plans. Put differently,

[5] In a related study concerned with executive careers in German banks, Berger et al. (2013) find that homophily, based on age and gender as well as social ties, increases the chances of an outsider appointment to banks' management boards.

the CEO is forced to increase transparency by providing more detailed and value-relevant information regarding her proposed actions (Amason, 1996; Forbes and Milliken, 1999). [6]

We expect a certain level of age dissimilarity between individuals to be necessary for cognitive conflict to arise. In other words, we expect the relation between age dissimilarity on the one side and monitoring intensity and firm value on the other side to be strongest for large chair-CEO age differences. Particularly, as age-induced dissimilarities between individuals (such as the chair and the CEO) are most evident across different generations (e.g., Pilcher, 1994), we argue that a generational difference, i.e., a generational age gap, between the chair and the CEO has the strongest impact on monitoring intensity and firm value.

3. Methodology, Sample Selection and Descriptive Statistics

3.1 Methodology and measures for the chair-CEO age dissimilarity

Our main model is as follows:

$$\begin{aligned} y_{it} = {} & \alpha + \beta_1 * \text{Gap20 chair-CEO}_{it} + \beta_2 * \text{other chair-CEO dissimilarities}_{it} \\ & + \beta_3 * \text{CEO characteristics}_{it} + \beta_4 * \text{chair characteristics}_{it} \\ & + \beta_5 * \text{supervisory board characteristics}_{it} + \beta_6 * \text{firm characteristics}_{it} \\ & + \text{year dummies} + \mu_i + \varepsilon_{it} \end{aligned} \quad \textbf{(1)}$$

As dependent variables, we use *Tobin's Q* to measure firm value and the number of supervisory board meetings (*Board meetings*) to measure monitoring intensity.

Gap20 chair-CEO is our primary measure for the chair-CEO age dissimilarity. This dummy variable is set to one if the age difference between the chair and the CEO is a

[6] Consistent with the importance of cognitive conflict and critical questions, the 2012 U.S. Business Roundtable's Principles of Corporate Governance state: "Board independence depends not only on directors' individual relationships and outlook but also on their ability to question management, exercise constructive skepticism and express their views even when those views may differ from those of management or other directors" (p. 14).

generational gap. In line with the sociology literature (e.g., Strauss and Howe, 1997), we define a generational age gap as an age difference of at least 20 years. Again, the rationale for using a generational age gap is that cognitive conflict between the chair and the CEO should be strongest if both are from different generations.

In addition, we also use *Chair-CEO age difference (+/-)*, which is the age of the chair minus the age of the CEO, and its square, i.e., *Squared chair-CEO age difference*. In this regard, it is important to note that cognitive conflict, but also communication problems, between the chair and the CEO may not only arise if the former is considerably older than the latter, but also if the former is younger than the latter. If the relation between age difference and firm value is non-linear, as suggested, and if the sign of the age difference does not matter, only the squared term of this functional form (i.e., the second-order polynomial) is expected to be significant. Alternatively, we use *Chair-CEO age difference absolute*, which is the absolute value of the age difference between the chair and the CEO. This alternative measure is used in conjunction with *Chair younger*, a dummy variable, which is set to one if the chair is younger than the CEO, and zero otherwise. Based on the above argument, we do not expect this dummy variable to be significantly different from zero. Finally, whenever we use *Chair-CEO age difference absolute*, we use the natural logarithm of the dependent variable given that we postulate a non-equidistant (i.e., a non-uniform) effect of each year of age difference.

All of the regressions include the following five sets of control variables. All these variables are defined in detail in Appendix A. The first set includes chair-CEO dissimilarities other than age, i.e., education, gender and nationality, as well as chair-CEO similarities, i.e., the number of years the chair and CEO have been working together in their respective positions (*Chair-CEO joint tenure*) and a dummy variable equaling one if the chair and CEO

are from the same family (*Chair-CEO same family*). All of these variables may affect cognitive dissonance and communication between the chair and the CEO, in addition to age dissimilarity.

The following four sets of control variables include CEO characteristics, chair characteristics, supervisory board characteristics and firm characteristics. CEO characteristics include the variables *CEO tenure*, i.e., the number of years the CEO has been serving as the firm's CEO, and *Founder CEO*, a dummy variable equaling one if the CEO founded the firm. These two variables serve as proxies for the CEO's experience and power (see, e.g., Adams et al., 2005). Chair characteristics include *Busy chair*, a dummy variable set to one if the chair holds three or more directorships (Fich and Shivdasani, 2006), *Chair tenure* and *Founder chair* (both defined as above for CEOs) and a dummy variable *Chair is former firm executive*, which is set to one if the chair was an executive of the firm earlier in her career (in the spirit of Fahlenbrach et al., 2011, and Andres et al., 2014). The last three variables attempt to capture the chair's experience and power.

The two dummy variables *CEO change* and *Chair change*, which are set to one for years with a CEO and chair change, respectively, are also included in this set of controls. As the chair-CEO age difference may change due to chair and CEO changes, which are likely to correlate with the firm's performance and number of board meetings, these two controls are necessary to separate the (persistent) effect of the variables measuring the chair-CEO age dissimilarity from the (one-off) effects of changes at the top of the firm.

Supervisory board characteristics include *Board age*, which is the average age of the shareholder representatives on the supervisory board, *Busy board* (as defined in Fich and

Shivdasani, 2006,) and *CV board age*.[7] The latter is the coefficient of variation calculated as the standard deviation of the age of shareholder representatives on the supervisory board divided by *Board age*. *CV board age* controls for age diversity on the supervisory board, which might correlate with the age of the chair and thus with our measures of chair-CEO age dissimilarity.

Firm characteristics include *Book leverage* (i.e., total debt over total assets), the number of a firm's business segments generating at least 10% of the firm's total revenues (*Business segments*), capital expenditures as a fraction of total assets (*CapEx/TA*), a dummy variable *Family firm* (we use the definition from Andres, 2008), *Firm age* (since foundation), *Free float* (of the firm's voting shares), R&D expenses as a fraction of total revenues (*R&D/Sales*), return on equity (*ROE*), *Sales growth* (i.e., the nominal growth rate over the past two years), *Stock volatility* (i.e., the standard deviation of daily stock returns over the past two years) and *Total assets* as used in the existing literature (e.g., Andres, 2008; Bebchuk et al., 2009; Bhagat and Bolton, 2008, Custódio and Metzger, 2014).

Some of the regressions in Table 2 and Table 3 examine the effects of chair and CEO age (*Chair age* and *CEO age*) on firm value and monitoring intensity, with and without chair and CEO age and our main variable *Gap20 chair-CEO*. This allows us to investigate whether age itself matters and whether our results for age dissimilarity are only reflecting age effects.

The main estimation technique we use is firm-fixed effects regressions. As robustness checks (see Section 6.2), we use CEO-firm fixed effects and chair-firm fixed effects as well

[7] As information about the age of the employee representatives on the supervisory board is not available, we have to limit age-related variables for the supervisory board to the shareholder representatives.

as random effects.[8] All the regressions are based on an unbalanced panel of data covering the years 2005 to 2010. We describe this panel in the following sub-sections.

3.2 Sample selection

We start by gathering information on all firms that are members of the three largest German stock exchange indices – the DAX, MDAX and SDAX – for each year during 2005 and 2010.[9] This results in an unbalanced panel of 780 firm-year observations for 172 firms. We exclude 31 firm-year observations for 7 firms that are not incorporated under German law (e.g., Air Berlin plc and EADS N.V.). For the remaining 165 firms we collect information for the CEO and each shareholder representative on the supervisory board. Following Westphal and Zajac (1995a), we exclude firm-year observations for which the age of more than 25% of the supervisory board members is not available. This leads to the exclusion of 36 firm-year observations. Finally, we exclude another 10 firm-year observations due to missing data. This leaves us with a final unbalanced panel comprising 700 firm-year observations for 150 firms, covering approximately 86% of the market capitalization of all German firms at the end of 2006.

Most of the non-financial information is collected from the annual reports, company filings (e.g., security prospectuses or governance reports) and company websites, Hoppenstedt Aktienführer, Munzinger Biographien, and Standard & Poor's Capital IQ database. Any remaining gaps in the data (particularly age) are filled by contacting the

[8] Due to changes in CEOs and chairs during the sample period, we have more CEOs (234 distinct CEOs) and more chairs (214 distinct chairs) than sample firms (150 distinct firms).
[9] We include firms from regulated industries (i.e., SIC codes 4000-4999 and 6000-6999). Our results do not change when we exclude these firms (see Section 6.3).

investor relations departments of the firms concerned.[10] Accounting data is retrieved from S&P Capital IQ. Data on stock prices is from Datastream.

3.3 Descriptive statistics

Table 1 presents descriptive statistics for our dataset. Panel A focuses on the age characteristics of the chair and the CEO, the other chair-CEO dissimilarities as well as the CEO characteristics and chair characteristics. The age gap between the chair and the CEO is at least 20 years for 15.2% of all observations. Importantly, for all such cases the chair is older than the CEO. The average CEO age is 54 years, while the average chair age is 63 years. On average, the absolute age difference between the chair and the CEO is 11.3 years. The chair is younger than the CEO for 13% of all observations.[11]

In terms of other chair-CEO dissimilarities, the chair and CEO have a different educational background for 58% of the observations and are of different genders for only two observations as virtually all chairs and CEOs are male. Further, the chair and CEO are of a different nationality for 16.7% of all observations. The average length of the (firm-specific) relation between the chair and the CEO (*Chair-CEO joint tenure*) is almost 4 years. Finally, the chair and CEO are from the same family for 2% of all observations.

[Insert Table 1 about here]

Moving on to the CEO and chair characteristics, average CEO tenure is about 6 years. The percentage of founder CEOs is 5%, and this is in line with Andres (2008). Turning to the chair characteristics, for 76% of all observations the chair is busy. Average chair tenure is 5

[10] Despite our best efforts, we are not able to gather data on all of the variables for all of the sample firms. In particular, we are not able to obtain information about the chair's age for three firms. We are also not able to obtain full information about board meetings for two firm-year observations and information about active board committees for four firm-year observations.

[11] For chairs that are younger than the CEO, the mean age difference is 6 years with a maximum of 18 years (not tabulated). Appendix B shows the distribution of the age difference between the CEO and the chair.

years. The chair is the firm's founder for 5.1% and a former firm executive for 29% of all observations, respectively. There are no cases of deaths of CEOs or chairs in our sample.

Turning to supervisory board characteristics in Panel B, average board size is about 12, with approximately 7 shareholder representatives. Note that, in Germany, board size depends on firm size as prescribed by law (see paragraph 95, AktG). Average board tenure (traced back to 1998) is about 5 years. Average board age (based on shareholder representatives) is about 60 years. The average annual number of board meetings is about 6. Sample firms typically have about 3 active board committees. All supervisory board (and chair) characteristics have values in line with those reported by the Spencer Stuart Board Index for 2007 and 2009.

Panel C reports descriptive statistics for the firm characteristics. On average, book leverage is 25%, the number of business segments is 2.27, capital expenditures amount to 4% of total assets, firm age (since foundation) is 87 years, R&D expenditures are 1.3% of sales, return on equity is 10%, and Tobin's Q is 1.46. The average (median) book value of total assets is 49,263 (2,575) million EUR. Regarding control and ownership, average free float is approximately 48%. About one third of all firm-year observations relate to family firms.[12] These descriptive statistics are similar to those from other studies on Germany, such as Andres (2008), Bermig and Frick (2010), and Dittmann et al. (2010).

Finally, Panel D contains descriptive statistics for the management board characteristics. The management board is younger on average, smaller in size and has lower tenure as compared to the supervisory board (see Panel B).

[12] Compared to Andres (2008), we find a lower percentage of family firms. There are at least two reasons for this. First, Andres (2008) does not restrict his sample to the largest stock listed firms (DAX, MDAX and SDAX) as he uses all firms listed on the Official Market ("Amtlicher Handel") of the Frankfurt Stock Exchange at December 31, 1998. It is then not surprising that we find a lower fraction of family firms given our focus on the largest German firms. Second, Andres (2008) excludes banks and insurance companies which are less likely to be family firms.

4. Chair-CEO Age Dissimilarity and Firm Value

We now turn to the regression results for the link between chair-CEO age dissimilarity and firm value (i.e., Tobin's Q) shown in Table 2. All regressions adjust for firm-fixed and year-fixed effects and include the sets of control variables introduced in Section 3.1. The regressions vary in terms of the measure of chair-CEO age dissimilarity. When we use *Chair-CEO age difference absolute*, we use the natural logarithm of Tobin's Q as the dependent variable, as motivated in Section 3.1.[13]

[Insert Table 2 about here]

Regression (1) does not include any measure of chair-CEO age dissimilarity, but includes CEO age and chair age. Neither of these two variables is significant at any of the conventional levels.[14] In contrast, any of the four measures of chair-CEO age dissimilarity (see regressions (2) to (6)) is significant at the 5% level or better. In detail, our main measure of chair-CEO age dissimilarity, i.e., *Gap20 chair-CEO*, is significant at the 1% level in all regressions that include this variable (regressions (2), (3), and (5)), independent of whether we control for the age of the chair and the CEO (regression (3)) or whether we use the natural logarithm of Tobin's Q (*ln(Tobin's Q)*) as the dependent variable (in regression (5)).

Regressions (4) and (6) include the signed age difference as well as its square and the absolute age difference, respectively, as alternative measures of age dissimilarity. In regression (4), the square of the signed age difference is significant (at the 1% level), while the simple chair-CEO age difference is not significant, as expected. This further supports our reasoning that only the large age differences rather than all age differences create value and

[13] Using the logarithmic form, we also account for potential outliers and allow the reader to interpret the findings as semi-elasticities.

[14] This finding is in line with the recent literature. For example, Custódio and Metzger (2014) report that CEO age is not associated with firm value in the U.S. Waelchli and Zeller (2013) find that chair age is not associated with lower firm performance in publicly listed Swiss firms. See also the introduction to the present paper.

that the sign of the age difference does not matter. Regression (6) confirms this conclusion. The regression coefficient on *Chair-CEO age difference absolute* is positive and significant at the 5% level. In contrast, the *Chair younger* dummy variable is not significant. This confirms our argument that what matters is age dissimilarity between the chair and the CEO and not whether the former is older than the latter (or vice-versa). When we interact the variable *Chair-CEO age difference absolute* with the dummy variable *Chair younger* in unreported regressions, we find that the coefficient on the interaction term is not significant, while the coefficient on *Chair-CEO age difference absolute* remains significant. This constitutes another test, in addition to the use of the second-order polynomial of the signed age difference between the chair and the CEO, of the validity of our argument that the age difference between the chair and the CEO, but not the sign of this difference, matters.

Regression (7) of Table 2 controls for additional important characteristics of the management board, which capture age variation and experience and are thus likely to correlate with chair-CEO age dissimilarity. These characteristics are the size of the management board, the average age and tenure of its members, and the coefficient of variation (CV) of the ages of its members. These variables, except for management board size, are calculated excluding the CEO (for whose characteristics we control separately). The results remain qualitatively similar when we add the above controls.

To sum up, there is consistent evidence across all seven regressions that chair-CEO age dissimilarity is associated with significantly higher firm value. Importantly and in line with our main hypothesis, differences in firm value are associated with *differences* in age between the chair and CEO, and not with their age levels. Finally, it is the greater age differences – such as a generational age gap – and not age differences of any size that are associated with higher firm value.

As to the different sets of control variables, the regression results confirm the results from previous studies. More specifically, we find that founder CEOs and founder chairs (to a lesser extent) are associated with higher firm value, confirming the results of Andres (2008). Yet, we do not find that the chair and CEO being from the same family has any consistent effect on firm value. We shall return to this result below, when reviewing the regressions on the number of board meetings. As expected, free float and a change in the CEO are associated with lower firm value. Finally and in line with existing research, we find that firm size, leverage and the number of business segments are associated with lower firm value (see, e.g., Andres, 2008; Bebchuk et al., 2009; Custódio and Metzger, 2014; Dittmann et al., 2010).

5. Chair-CEO Age Dissimilarity, Monitoring Intensity and the Need for Monitoring

We now focus on the following two questions that arise from our previous analysis. First, is the positive relation between chair-CEO age dissimilarity and firm value indeed a reflection of greater monitoring? Second, is the positive relation between chair-CEO age dissimilarity and firm value mainly observed for firms requiring greater monitoring? If the answer to both of these questions is affirmative, this will provide further support for our main hypothesis.

5.1 Does greater age dissimilarity between the chair and CEO result in more monitoring?

In order to answer this question, we check whether greater age dissimilarity between the chair and CEO results in more board meetings. The number of board meetings is an appropriate metric for the amount of board monitoring as argued, for example, by Adams (2005) and Brick and Chidambaran (2010). In support of this argument, Schwartz-Ziv and Weisbach (2013) document that board meetings devote most of their time to monitoring management. It is important to note that, in what follows, board meetings refer to supervisory board meetings.

The monitoring focus of board meetings is particularly emphasized under the German two-tier board system, where the supervisory board's main responsibility is to monitor the firm's management board on behalf of the shareholders, as prescribed by paragraph 111(1), AktG (see also Adams and Ferreira, 2007). The monitoring responsibilities of the German supervisory board are similar to those of the U.S. board of directors (see paragraphs 84, 87 and 111, AktG). However, according to section 3.6 of the German Corporate Governance Code, board meetings should (and predominantly do) take place *without* any member of the management board (including the CEO). This is in contrast to the U.S. corporate governance system where SOX mandates only one board meeting without the executive directors per year (see Larcker and Tayan, 2013).

The results from the regression analysis are shown in Table 3. We run two types of regressions, both include firm-fixed and year-fixed effects. The first type (regressions (1) to (4)) is fixed-effects Poisson count regressions with the number of board meetings as the dependent variable. The second type (regressions (5) and (6)) is fixed-effects OLS regressions with the natural logarithm of the number of board meetings (i.e., *ln(Board meetings)*) as the dependent variable.

We use the same sets of control variables as for the regressions on Tobin's Q in Table 2 and include the following four additional controls. First, we include the number of active board committees (*No. of active committees*) as in Vafeas (1999) to explain board meetings. Ex ante it is not clear how the number of active committees affects board meetings. On the one side, a greater number of active committees will take away some of the business from the board, hence reducing the need for board meetings. On the other side, a greater number of active committees may be a reflection of the greater complexity of the organization, and hence may be positively correlated with the number of board meetings. Second, we add

average tenure of the supervisory board members (*Avg. tenure SB members*). Board members who have longer (joint) tenure are likely to require fewer board meetings. There are at least two reasons for this: experience, and hence more efficient decision making, as well as "groupthink", the latter referring to avoidance of conflict by actively foregoing critical questions (Coles et al., 2014; Janis, 1972). Third, we include the fraction of union representatives among the employee representatives (*Union representatives*). This fraction is likely to increase the number of board meetings as union representatives pursue employee interests but tend to have less firm-specific, operational knowledge as they do not work for the firm (e.g., Fauver and Fuerst, 2006). Finally, we also include the Tobin's Q from the previous year to account for past performance as firms with weak performance are likely to hold more board meetings. The regression results shown in Table 3 do not change qualitatively when we exclude these four additional controls.

[Insert Table 3 about here]

We find no evidence in regressions (1) and (3) that CEO age and chair age *per se* affect board meeting frequency. However, we find that *Gap20 chair-CEO* has a significant (at the 5% level) and positive impact on the number of board meetings. This is the case for all three regressions, which contain this dummy variable, i.e., regressions (2), (3) and (5). We further find that the squared chair-CEO age difference (see regression (4)) and the absolute chair-CEO age difference (see regression (6)) have a significant (at the 5% level) and positive effect on the number of board meetings. Finally, we obtain similar results when we include the additional controls for management board characteristics (see regression (7)).

We now turn to the control variables. In line with our argument that more board meetings mean more intensive monitoring, we find that firms with a founder CEO as well as those with their CEO being related to the chair hold fewer board meetings. This suggests that

a chair who is related to the CEO is less likely to monitor the latter. In contrast, a change in the CEO increases the number of board meetings. As per our expectations, we also find that supervisory boards with greater average tenure meet less frequently, whereas boards with more union representatives as well as more active committees meet more frequently. Finally and similar to Adams (2005), more complex organizations, as reflected by greater firm size, and more business segments hold more board meetings. We also find a positive effect of stock volatility on the number of board meetings.

To sum up, we find strong evidence that age dissimilarity between the chair and the CEO is associated with significantly more intensive board monitoring. This is consistent with our general argument and the results for firm value shown in Section 4. The results also suggest that what matters is the age difference between the chair and the CEO, and not the actual chair and CEO ages. Similar to the regressions on firm value, we find that only the large age differences matter in terms of the number of board meetings.

5.2 The need for monitoring

While our results so far suggest that greater monitoring creates value, Adams and Ferreira (2007) predict that too much monitoring may destroy firm value. They argue that less monitoring, or more "friendly boards", may be optimal for firms whose CEO needs advice rather than monitoring. In turn, this suggests that greater age dissimilarity between the chair and CEO only creates value in firms with relatively high monitoring needs. We investigate the validity of this conjecture by conducting a sub-sample analysis where we attempt to distinguish between firms with relatively high and firms with relatively low monitoring needs. We expect that firms with greater free cash flows relative to their sales (measured by the variable *FCF/Sales*), more dispersed control (as reflected by a below average Herfindahl index of ownership of voting stock (*Herf. control*) and the absence of a

majority shareholder (the dummy variable *Blockholder 50%* being equal to zero)), and below average intangible assets as a fraction of total assets (measured by the variable *Intangible assets*) are more likely to require more monitoring than other firms.

The regressions for each sub-sample are identical to those in Table 2. The results are reported in Table 4. For brevity, we only report the regression coefficient on our main variable of interest, *Gap20 chair-CEO*. The regressions suggest that the positive effect of the chair-CEO age dissimilarity is only observed for those firms that are likely to have more monitoring needs. These are the firms with above average free cash flows (regression (2)), with a below average Herfindahl index of control (regression (3)), without a majority shareholder (regression (5)), and with below average intangibles (regression (7)). The coefficient on the variable *Gap20 chair-CEO* is significant at the 1% level in all of these regressions, while it is statistically insignificant – as expected – in the four regressions for the sub-samples of firms with relatively low monitoring needs.

[Insert Table 4 about here]

For the same sub-samples, we also repeat the regression analysis from Table 3, which focused on the link between the chair-CEO age dissimilarity and the number of board meetings. This analysis can be found in Table 5. In line with the previous table, we find that *Gap20 chair-CEO* has a positive and significant effect (at the 10% level or better) on the number of board meetings for firms with above average free cash flows (regression (2)), a lower control concentration (regressions (3)) and (5)) and below average intangibles (regression (7)). It is insignificant for firms with lower monitoring needs.

[Insert Table 5 about here]

To conclude, the results shown in both Table 4 and Table 5 provide strong support for our main hypothesis that a considerable age difference between the chair and the CEO positively affects firm value as it leads to more intensive monitoring. Importantly, the positive relation between chair-CEO age dissimilarity on the one side and firm value and board meetings on the other side is mainly observed for firms requiring relatively greater monitoring.

6. Identification and Robustness

This section tests the robustness of our previous results. In Section 6.1, we present an identification strategy, using the 2007 financial crisis as an exogenous shock to optimal monitoring levels, to provide results that allow for causal inference with respect to the main hypothesis stating that considerable age differences between the chair and the CEO lead to more monitoring of the latter. Section 6.2 raises and addresses several endogeneity concerns. Section 6.3 contains additional robustness tests.

6.1 The financial crisis and the reduced need for monitoring

In this section, we investigate whether and how the 2007 financial crisis affected the link between chair-CEO age dissimilarity and the number of board meetings. We repeat the same exercise for the link between the chair-CEO age dissimilarity and firm value. The 2007 financial crisis constitutes an exogenous shock (see, e.g., Erkens et al., 2012). We expect that in the immediate aftermath of the financial crisis, i.e., in the years 2008 and 2009, there was considerably less need for monitoring, more need for fast decision making (De Jonghe and Öztekin, 2015, provide evidence in support of this), including an increased need for managerial discretion (see Li et al., 2014, for empirical evidence on this), as well as potentially more advice seeking from the CEO. Beltratti and Stulz (2012) find that banks with more shareholder-friendly boards performed worse during the 2007 crisis. In other words,

while the work load of both the management and the supervisory board was likely to be greater during the crisis (for example, due to strategy changes and an increased need for communication with banks and suppliers), the need to monitor the CEO was likely to be lower. The reason is that in the recession years 2008 and 2009 the agency problem of managerial discretion over free cash flow (Jensen and Meckling, 1976; Jensen, 1986) was significantly lower. On the one hand, earnings and cash flows declined significantly, leaving less cash in the hands of the CEO.[15] On the other hand, there was less corporate investment during the crisis (see, e.g., Campello, Graham, and Harvey, 2010).

We test the above conjecture by including the interaction between *Gap20 chair-CEO* and *Financial crisis*, a dummy variable, which equals one for the years 2008 and 2009, and zero otherwise. We expect this interaction to have a negative impact on the number of board meetings. In particular, the negative coefficient should (more or less) cancel out the positive effect from chair-CEO age dissimilarity observed during the non-crisis years. Put differently, if our main hypothesis is correct and chair-CEO age dissimilarity intensifies monitoring, then there will be a significant reduction in board meetings when the need for monitoring declines.

Yet, while it is possible to reduce the number of board meetings at relatively short notice (down to a minimum of four meetings per year as prescribed by German law), it likely takes longer to change chair-CEO age dissimilarity. Thus, at the start of the crisis the cognitive dissonance between the chair and the CEO is likely to remain for firms where there is a considerable age difference pre-crisis. It is unlikely that two persons with a (very) different age – reflecting, e.g., different experiences that may conflict with each other and a different language – can simply adjust their behavior and way of thinking given the

[15] This assertion is backed up by our data as we find that the percentage of firm-year observations with negative net income during the crisis years is 27% compared to only 8% during the non-crisis years. Further, (EBITDA-based) ROA during the crisis years is lower by -2.4% (i.e., a decline of -22% relative to the sample mean). These differences are statistically significant.

exogenous shock caused by the crisis. Consequently, the chair may reduce his or her monitoring as much as possible, but cognitive conflicts and communication problems (or the greater effort to communicate) will likely remain. This may in turn hamper fast decision making and advice giving/seeking as argued in the literature (see, e.g., Westphal 1999; Adams and Ferreira, 2007; Li, Lu, and Phillips, 2014). Given the particular importance of fast decision making and advice during crises, we expect the interaction to have a negative impact on firm value.

Given the exogeneity of the 2007 financial crisis, the results of this analysis allow for causal inferences. Table 6 reports the regressions on the number of board meetings. The results confirm our previous finding of a positive and significant effect of *Gap20 chair-CEO* on the number of board meetings. In support of our above argumentation, the interaction between *Gap20 chair-CEO* and *Financial crisis* is also significant, and has a negative sign. The normally positive effect of chair-CEO age dissimilarity is now virtually cancelled out, or to the very least heavily reduced, during the financial crisis. This is the case not only for the full sample (regression (1)), but also for the sub-samples of firms with greater monitoring needs as reflected by above average free cash flows (regression (3)), a below average Herfindahl index of control (regression (4)), and without a majority shareholder (regression (6)). The results are somewhat more nuanced for the sub-samples of firms with below average intangibles (regression (8)) and those with above average intangibles (regression (9)). For the former, we find that the interaction term is negative but not significant, while it is significantly negative for firms with a high fraction of intangible assets, i.e., with particularly high needs for advice.

[Insert Table 6 about here]

Table 7, which reports the equivalent regressions on Tobin's Q, suggests a similar effect of the financial crisis on firm value. The table confirms our previous result of a positive and significant effect of *Gap20 chair-CEO* on Tobin's Q. As expected, the interaction between *Gap20 chair-CEO* and *Financial crisis* is significantly negative. The normally positive effect of chair-CEO age dissimilarity is heavily reduced during the financial crisis for both the full sample (regression (1)) and the sub-samples with greater monitoring needs (regressions (3), (4), (6) and (8)). The only exception to the rule is observations with a below average Herfindahl index of control (regression (4)) where the coefficient on *Gap20 chair-CEO* is positive and significant, but the interaction of the former with *Financial crisis* is not significant. The *overall* effect of chair-CEO age dissimilarity, i.e., *Gap20 chair-CEO + Gap 20 chair-CEO*Financial crisis*, is still positive as suggested by regression (1) and regressions (3), (4), (6) and (8), i.e., for those firms (with high monitoring needs) for which the age gap is generally expected to have a positive effect on firm value. We find that the interaction term and hence also the overall effect are significantly negative for the sub-sample of firms with a high fraction of intangible assets (regression (9)), consistent with regression (9) in Table 6, and for those firms which have already a potentially high monitoring level due to their concentrated control structure (regressions (5) and (7)). These results further suggest that considerable age dissimilarity between the chair and the CEO destroys firm value when firms have particularly high needs for advice or when their needs for additional monitoring are low. This conclusion is consistent with the literature that shows that (too) intensive board monitoring can be costly (see, e.g., Faleye et al., 2011). [16]

[Insert Table 7 about here]

[16] We note that for the firms with concentrated control age dissimilarity between the chair and CEO is greatest. Indeed, the 95th percentile for the variable *Chair-CEO age difference (+/-)* has a value of 39 for these firms, while it is only 32 for the full sample. As the disadvantages of age dissimilarity are more likely to kick in at very high levels, this might also explain why the overall effect is negative.

Figure 1 visualizes the effects of the financial crisis on Tobin's Q. The figure shows that there was a decrease in the average Tobin's Q for firms with a generational age gap between the chair and CEO during 2008, which was greater than that for firms without such a gap. This would suggest that, during a major economic crisis, management-friendlier boards create more value than less friendly boards. This is consistent with Beltratti and Stulz (2012).

[Insert Figure 1 about here]

To sum up, as conjectured we find evidence that the 2007 financial crisis reduced the emphasis on board monitoring. This is reflected by the significant reduction in the positive effect of age dissimilarity between the chair and CEO during the crisis for those firms with greater monitoring needs and, for firms with lower monitoring needs, the emergence of a negative effect of age dissimilarity on firm value during the crisis.

These results suggest the following three important conclusions. First, firms should *mind the gap* as one size does not clearly fit all. While considerable age dissimilarity between the chair and CEO creates value for firms with greater monitoring needs, intensive monitoring may destroy firm value when firms need more managerial discretion and advice to react to shocks. Second, our full-sample results (see Tables 2 and 3) tend to misrepresent the true effects of age dissimilarity on board monitoring and firm value. Finally, the fact that the financial crisis – an exogenous shock – had a significant impact on the relationship between age dissimilarity on the one side and monitoring and firm value on the other side suggests that the relationship is unlikely to be spurious. Nevertheless, we perform additional endogeneity tests in the next sub-section to further test the robustness of our results.

6.*2 Potential endogeneity concerns*

This sub-section addresses two types of endogeneity concerns. The first is unobserved CEO and chair heterogeneity. Specifically, certain CEO and/or chair characteristics might be significantly correlated with our measures of chair-CEO age dissimilarity, leading to spurious regression results. For example, the *Gap20 chair-CEO* dummy variable might be correlated with the chair's or the CEO's prior industry and/or management experience. While our analyses in Sections 5 and 6 include some measures of the chair's and the CEO's experience, such as tenure and whether one of them is the founder of the company, we do not fully adjust for experience and other time-invariant heterogeneity.[17]

We use CEO-firm and chair-firm fixed effects to address potential unobserved heterogeneity and endogenous matching. We proceed by rerunning the regressions from Table 2 (Tobin's Q) and Table 3 (board meetings). The results are reported in Table 8.

[Insert Table 8 about here]

Both the regressions adjusting for CEO-firm fixed effects (see regressions (1) and (2)) and the regressions adjusting for chair-firm fixed effects (see regressions (3) and (4)) confirm our previous results. There is a positive and significant effect of *Gap20 chair-CEO* on both Tobin's Q and the number of board meetings. Hence, it seems very unlikely that our results can be attributed to unobserved heterogeneity or endogenous matching.

The second endogeneity concern is dynamic endogeneity. To address this issue, we use the Generalized Method of Moments (GMM) regression technique (e.g., Blundell and Bond, 1998). As Wintoki et al. (2012) argue, dynamic endogeneity is a major issue in

[17] In an earlier version of this paper, we used a number of dummy variables indicating whether the CEO and chair have a degree in law, economics or sciences, and/or have a doctorate. We also included another set of variables, which measured the fraction of supervisory board members with a background in academia, finance, auditing, law, and manufacturing. While some of these variables were significant, importantly they did not qualitatively affect our key result of a positive effect of chair-CEO age dissimilarity on firm value.

corporate governance research. It consists of previous realizations of the dependent variable affecting current levels of some or all of the independent variables. Wintoki et al. illustrate this via the link between firm value and board structure. While past board structure may have an impact on current firm performance, current board structure may also be the result of past firm performance. Indeed, poor past performance may cause changes to the board of directors. Why might dynamic endogeneity be an issue for this study? It may be the case that shareholders of underperforming companies call for changes to the board. Such changes might be in the form of replacing the incumbent chair with an older individual, which would then increase age dissimilarity between the chair and the CEO, which in turn would intensify board monitoring of the CEO as well as the other executives.

The results from the GMM regressions are shown in Table 9. We still find that *Gap20 chair-CEO* has a positive and significant impact (at the 5% level or better) on both firm value and the number of board meetings. *Chair-CEO age difference absolute* also has a positive and significant (at the 5% level) impact on both dependent variables. Hence, our main results are unlikely to be driven by omitted variable bias and/or dynamic endogeneity.

[Insert Table 9 about here]

6.3 *Additional robustness tests*

In the following, we discuss the results of additional robustness tests. For brevity, most of these tests are not reported in tabular form. First, despite sufficient time-series variation in our data (see the introduction of this paper), we use random effects, as motivated and used in Andres (2008), to address the potential concern that parameter identification may be limited given that chair-CEO age dissimilarity only changes when the CEO or the chair (or both) change. When we rerun all of our regressions using random instead of firm-fixed effects, our results are confirmed. Table 10 shows the results of these regressions for our

main analyses. The results for the sub-samples are not shown for the sake of brevity. In additional unreported regressions, we restrict our sample to observations for which *CEO change* or *Chair change* or both dummy variables equal one and then consider the effect of our main variable, *Gap20 chair-CEO*, on firm value and the number of board meetings. We also consider the effect of this variable when we focus on those observations without CEO and chair changes. The regression coefficient on the *Gap20 chair-CEO* dummy variable remains positive and statistically significant in all regressions, independent of whether we focus on CEO and chair changes or whether we exclude them.

Second, we use the return on assets (ROA), a measure of firm performance, as an alternative to firm value, measured by Tobin's Q. More specifically, we rerun the regressions shown in Table 2 and Table 8 using ROA instead of Tobin's Q as the dependent variable. The results (shown in Appendix C) strongly support our previous results. We find a consistently positive relation between chair-CEO age dissimilarity and firm profitability. This relation remains significant even when we control for CEO-firm and chair-firm fixed effects and also when we run dynamic panel system GMM estimations. It also remains significant when we use random effects (not reported).

Third, in unreported regressions we examine whether the positive relation between age dissimilarity and firm value also holds when we consider age dissimilarities more broadly. More specifically, we use the variable *Gap20 chair-management board*, which equals one if there is a generational age gap between the chair and the entire management board (based on the average age of its members), and the variable *Gap20 supervisory board-CEO*, which equals one if there is a generational gap between the entire supervisory board (based on the average age of the shareholder representatives) and the CEO. When we use either of these variables instead of *Gap20 chair-CEO* as well as the same control variables as

in Table 2, we find that the corresponding regression coefficients are positive and significant at the 1% and 5% level, respectively. However, when we add *Gap20 chair-CEO* to these regressions, neither of the two broader measures of age dissimilarity remains significant, while the coefficient on *Gap20 chair-CEO* is significant at the 1% level. Overall, these results provide further support for our reasoning that age dissimilarities create value and suggest that age dissimilarity between the chair and the CEO matters most.

Fourth, we perform several additional analyses to check the robustness of our findings. The corresponding regression results are not shown for the sake of brevity. We control for firms which are majority-controlled by other firms. The majority shareholder is likely to be represented on the supervisory board and may influence the choice of its chair. Using both fixed effects and random effects, the results for our measures of chair-CEO age dissimilarity remain qualitatively similar, while the coefficient on the added dummy variable for majority-controlled firms is statistically insignificant. Next, when we substitute the variable *Chair is former firm CEO* for the variable *Chair is former firm executive*, the results remain qualitatively similar. This is also the case when we exclude either those chairs who were CEOs or, more generally, those chairs who were executives of the firms they now oversee. Finally, our results do not change when we winsorize the variable *Tobin's Q* at the 5^{th} and 95^{th} percentile, when we exclude all firms from regulated industries (i.e., firms with SIC codes 4000-4999 and 6000-6999), or when we exclude firms with less than four firm-year observations.

7. Conclusion

Despite the importance of the chair on corporate boards under both the one-tier and the two-tier governance systems, the literature has remained relatively silent about how chair

characteristics affect corporate governance effectiveness. Also, little is known about the determinants of the important relation between the chair and the CEO.

This study focuses on the chair-CEO relation and how it affects monitoring and firm value. We hypothesize that substantial age dissimilarity leads to cognitive conflict between the chair and the CEO, which results in more intensive monitoring of the latter and ultimately higher firm value and performance. To test our hypothesis, we examine the relation between the chair of the supervisory board and the CEO in the German two-tier board system. Using Germany as a laboratory considerably mitigates endogeneity problems as German law prohibits CEO duality as well as the CEO's involvement with the nomination and appointment of the members of the supervisory board.

We provide evidence that greater age dissimilarity between the chair and the CEO, particularly in the form of a generational age gap, leads to more intensive monitoring and higher firm value. Specifically, substantial age dissimilarity creates value in firms expected to rely more heavily on monitoring. These are firms with greater free cash flows, less concentrated control and fewer intangibles. We find that these firms also hold significantly more board meetings. Thus, we find strong support for our hypothesis.

Our findings are robust to a variety of robustness tests including CEO- and chair-firm fixed effects, dynamic panel data estimations, and the use of ROA as an alternative to Tobin's Q. Most importantly, we employ the 2007 financial crisis as an exogenous shock to the optimal levels of monitoring. We find that firms with substantial chair-CEO age dissimilarity significantly reduce the number of board meetings in the immediate aftermath of the crisis. We further find that during the crisis substantial chair-CEO age dissimilarity destroys firm value, consistent with the increased need for managerial discretion and fast decision making during the crisis. The negative effect during the crisis almost cancels out the

positive effect during the non-crisis years. We hence conclude that firms should *mind the gap*.

Our results of the effect of chair-CEO age dissimilarity on the number of board meetings and firm value suggest that in terms of corporate governance regulation *one size does not fit all*. Our findings can be interpreted as evidence that is in contrast with corporate governance codes, which recommend age limits for the members of corporate boards. In fact, our results suggest that for some firms age limits might be suboptimal as they prevent such firms from achieving the optimal age dissimilarity between the chair and the CEO.

Finally, we believe that the insights from this study are not only relevant for the two-tier board system, but also for the one-tier board system prevailing, for example, in the U.K. and the U.S., where a steadily increasing number of firms are abandoning CEO duality. For these firms as well as for their shareholders, a sound understanding of the optimal chair-CEO relation is likely to be of great relevance.

Acknowledgements

The authors would like to thank André Betzer, Abe de Jong, Christian Kohl, Daniel Metzger, Martin Ruckes, Klaus Schaeck, and participants at the 2013 annual meetings of the German Finance Association (DGF) in Wuppertal, the 2013 Workshop on Corporate Governance and Investment at the American University of Sharjah, and seminar participants at Bangor University, the University of Glasgow, the University of Hull, the University of Swansea, WHU Vallendar and the University of Wuppertal for insightful comments and suggestions.

References

Adams, R.B., 2005. What do boards do? Evidence from board committee and director compensation data, Working paper, Stockholm School of Economics.

Adams, R.B., Almeida, H., Ferreira, D., 2005. Powerful CEOs and their impact on corporate performance, Rev. Financ. Stud. 18, 1403-1432.

Adams, R.B., Ferreira, D., 2007. A theory of friendly boards, J. Financ. 62, 217-250.

Amason, A.C., 1996. Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams, Acad. Manag. J. 39, 123-148.

Anderson, R.C., Reeb, D.M., 2003. Founding-family ownership and firm performance: Evidence from the S&P 500, J. Financ. 58, 1301-1328.

Andres, C., 2008. Large shareholders and firm performance – An empirical examination of founding-family ownership, J. Corp. Financ. 14, 431-445.

Andres, C., Fernau, E., Theissen, E., 2014. Should I stay or should I go? Former CEOs as monitors, J. Corp. Financ. 28, 26-47.

Bebchuck, L., Cohen, A., Ferrell, A., 2009. What matters in corporate governance?, Rev. Financ. Stud., 783-827.

Beltratti, A., Stulz, R.M., 2012. The credit crisis around the globe: Why did some banks perform better?, J. Financ. Econom. 105, 1-17.

Berger, A., Kick, T., Koetter, M., Schaeck, K., 2013. Does it pay to have friends? Social ties and executive appointments in banking, J. Bank. Financ. 37, 2087-2105.

Bermig, A., Frick, B., 2010. Board size, board composition, and firm performance: Empirical evidence from Germany, Working paper, University of Paderborn.

Bhaghat, S., Bolton, B., 2008. Corporate governance and firm performance, J. Corp. Financ. 14, 257-273.

Blundell, R.W., Bond, S.R., 1998. Initial conditions and moment restrictions in dynamic panel data models, J. Econom. 87, 115-143.

Brick, I.E., Chidambaran, N.K., 2010. Board meetings, committee structure, and firm value, J. Corp. Financ. 16, 533-553.

Business Roundtable, 2012. Principles of Corporate Governance 2012, Business Roundtable, Washington, DC, USA.

Byrne, R., 1971. The attraction paradigm, New York: Academic Press.

Byrne, D., Griffitt, W., 1973. Interpersonal attraction, Annual Rev. Psychol. 24, 317-336.

Campello, M., Graham, J.R., Harvey, C.R., 2010. The real effects of financial constraints: Evidence from a financial crisis, J. Financ. Econom. 97, 470-487.

Child, J., 1974. Managerial and organizational factors associated with company performance, J. Manag. Stud. 11, 13-27.

Coles, J.L., Daniel, N.D., Naveen, L., 2014. Board Groupthink, Working paper, University of Utah.

Custódio, C., Metzger, D., 2014. Financial expert CEOs: CEO's work experience and firm's financial policies, J. Financ. Econom. 114, 125-154.

De Jonghe, O., Öztekin, Ö., 2015. Bank capital management: International evidence, J. Financ. Intermed. 24, 154-177.

Dittmann, I., Maug, E., Schneider, C., 2010. Bankers in the board of German firms: What they do, what they are worth, and why they are (still) there, Rev. Financ. 14, 35-71.

Erkens, D.H., Hung, M., Matos, P., 2012. Corporate governance in the 2007-2008 financial crisis: Evidence from financial institutions worldwide, J. Corp. Financ. 18, 389-411.

Fahlenbrach, R., Minton, B., Pan, C., 2011. Former CEO directors: Lingering CEOs or valuable resources?, Rev. Financ. Stud. 24, 3486-3518.

Faleye, O. Hoitash, R., Hoitash, U., 2011. The costs of intense board monitoring, J. Financ. Econom. 101, 160-181.

Fauver, L., Fuerst, M.E., 2006. Does good corporate governance include employee representation? Evidence from German corporate boards, J. Financ. Econom. 82, 673-710.

Ferris, G.R., Judge, T.A., Chachere, J.G., Liden, R.C., 1991. The Age Context of Performance-Evaluation Decisions, Psychol. Aging 6, 616-622.

Fich, E.M., Shivdasani, A., 2006. Are busy boards effective monitors?, J. Financ. 61, 689-724.

Forbes, D.P., Milliken, F.J., 1999. Cognition and corporate governance: Understanding boards of directors as strategic decision-making groups, Acad. Manag. Rev. 24, 489-505.

Fracassi, C., Tate, G., 2012. External networking and internal firm governance, J. Financ. 67, 153-194.
Hambrick, D.C., Mason, P.A., 1984. Upper echelons: The organization as a reflection of its top managers, Acad. Manag. Rev. 9, 193-206.
Hermalin, B.E., Weisbach, M.S., 1998. Endogenously chosen boards of directors and their monitoring of the CEO, Am. Econom. Rev. 88, 96-118.
Hwang B.-H., Kim S., 2009. It pays to have friends, J. Financ. Econom. 93, 138-158.
Janis, I. L., 1972. Victims of Groupthink, New York: Houghton Mifflin.
Jensen, M.C. and Meckling, W.H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure, J. Financ. Econom. 3, 305-360.
Jensen, M.C., 1986. Agency costs of free cash flow, corporate finance, and takeovers, Am. Econ. Rev. 76, 323-329.
Larcker, D. and Tayan, B., 2013. Corporate Governance Matters: A Closer Look at Organizational Choices and Their Consequences, New Jersey: FT Press, USA.
Lee, J., Lee, K.J., Nagarajan, N.J., 2014. Birds of a feather: Value implications of political alignment between top management and directors, J. Financ. Econom. 112, 232-250.
Li, M., Lu, Y., Phillips, G., 2014. CEOs and the Product Market: When are powerful CEOs beneficial?. Working paper, University of Southern California.
McPherson, M., Smith-Lovin, L., Cook, J.M., 2001. Birds of a feather: Homophily in social networks, Annual Rev. Sociol. 27, 415-444.
Medawar, P.B., 1952. An Unsolved Problem of Biology, London: H. K. Lewis.
Nguyen, B.D., 2012. Does the Rolodex matter? Corporate elite's small world and the effectiveness of boards of directors, Manag. Sci. 58, 236-252.
Pfeffer, J., 1983. Organizational demography, Research in Organizational Behavior 5, 299-357.
Pilcher, J., 1994. Mannheim's sociology of generations: An undervalued legacy, Br. J. Sociol. 45, 481-495.
Renneboog, L., Zhao, Y., 2011. US knows us in the UK: On director networks and CEO compensation, J. Corp. Financ. 17, 1132-1157.
Rhodes, S.R., 1983. Age-related differences in work attitudes and behavior: A review and conceptual analysis, Psychol. Bulletin 93, 328-367.
Schwartz-Ziv, M., Weisbach, M.S., 2013. What do boards really do? Evidence from minutes of board meetings, J. Financ. Econom. 108, 349-366.
Serfling, M.A., 2014. CEO age and the riskiness of corporate policies, J. Corp. Financ. 25, 251-273.
Shivdasani, A., Yermack, D., 1999. CEO involvement in the selection of new board members: An empirical analysis, J. Financ. 54, 1829-1853.
Spencer Stuart, 2007. Spencer Stuart German Board Index 2007, Spencer Stuart, Chicago, IL, USA.
Spencer Stuart, 2009. Spencer Stuart German Board Index 2009, Spencer Stuart, Chicago, IL, USA.
Spencer Stuart, 2014. Spencer Stuart U.S. Board Index 2014, Spencer Stuart, Chicago, IL, USA.
Stangor, C., Lynch, L., Duan, C., Glas, B., 1992. Categorization of individuals on the basis of multiple social features, J. Personality Social Psychol. 62, 207-218.
Strauss, W., Howe, N., 1997. The Fourth Turning: An American Prophecy - What the Cycles of History Tell Us about America's Next Rendezvous with Destiny, New York: Broadway Books Publisher.
Taylor, R.N., 1975. Age and experience as determinants of managerial information processing, Acad. Manag. J. 18, 74-81.
Vafeas, N., 1999, July. Board meeting frequency and firm performance, J. Financ. Econom. 53, 113-142.
Verhaeghen, P., Salthouse, T.A. 1997. Meta-analyses of age-cognition relations in adulthood: Estimates of linear and nonlinear age effects and structural models, Psychol. Bulletin 122, 231-249.
Vroom, V.H., Pahl, B., 1971. Relationship between age and risk taking among managers, J. Appl. Psychol. 55, 399-405.
Waelchli, U., Zeller, J., 2013. Old captains at the helm: Chairman age and firm performance, J. Bank. Financ.37, 1612-1628.
Wagner, W.G., Pfeffer, J., O'Reilly, C.A., 1984. Organizational demography and turnover in top-management group, Administrative Sci. Q. 29, 74-92.
Westphal, J.D., 1999. Collaboration in the Boardroom: Behavioral and Performance Consequences of CEO-Board Social Ties, Acad. Manag. J. 42, 7-24.

Westphal, J.D., Zajac, E.J., 1995a. Who shall govern? CEO/board power, demographic similarity, and new director selection, Administrative Sci. Q. 40, 60-83.
Westphal, J.D., Zajac, E.J., 1995b. Accounting for explanations of CEO compensation: Substance and symbolism, Administrative Sci. Q. 40, 283-308.
Wintoki, M.B., Linck, J.S., and Netter, J. M., 2012. Endogeneity and the dynamics of internal corporate governance, J. Financ. Econom. 105, 581-606.
Zenger, T.R., Lawrence, B.S., 1989. Organizational demography: The differential effects of age and tenure distributions on technical communication, Acad. Manag. J. 32, 353-376.

Table 1.
Summary statistics. This table presents the descriptive statistics for the sample of German firms listed on the DAX, MDAX or SDAX in the sample period 2005 to 2010. All variables are defined in Appendix A.

Variable	mean	1. quart.	median	3. quart.	SD	min	max	N
Panel A - CEO and chair characteristics								
Age characteristics								
Gap20 chair-CEO	0.152							697
Chair-CEO age difference absolute	11.28	5.00	10.00	16.00	7.87	0.00	40.00	697
Chair-CEO age difference (+/-)	9.68	3.00	10.00	16.00	9.77	-15.00	40.00	697
Squared chair-CEO age difference	189.02	25.00	100.00	256.00	233.00	0.00	1,600	697
CEO age (yrs)	53.68	49.00	54.00	59.00	7.11	33.00	71.00	700
Chair age (yrs)	63.37	59.00	65.00	68.00	7.67	31.00	82.00	697
Chair younger	0.13							697
Other chair-CEO dissimilarities								
Chair-CEO different education	0.58							700
Chair-CEO different gender	0.003							700
Chair-CEO different nationality	0.17							700
Chair-CEO joint tenure	3.85	2.00	3.00	5.00	2.87	1.00	16.00	700
Chair-CEO same family	0.02							700
CEO characteristics								
CEO change	0.14							700
CEO tenure	6.36	3.00	5.00	9.00	5.29	1.00	38.00	700
Founder CEO	0.05							700
Chair characteristics								
Busy chair	0.76							700
Chair change	0.15							700
Chair tenure	5.06	2.00	4.00	7.00	3.90	1.00	28.00	700
Chair is former firm executive	0.29							700
Founder chair	0.05							700
Panel B - Supervisory board characteristics								
Board age	59.91	57.17	60.67	63.33	4.80	44.30	71.40	700
Board meetings	5.79	4.00	5.00	17.00	2.40	4.00	34.00	698
Board size	12.38	6.00	12.00	17.00	5.67	3.00	21.00	700
Busy board	0.81							700
CV board age	0.13	0.09	0.13	0.17	0.06	0.01	0.34	700
Avg. tenure SB members	5.24	4.16	5.33	6.25	1.68	1.00	11.83	700
No. of active committees	3.07	2.00	3.00	4.00	1.66	0.00	8.00	696
Union representatives	0.24	0.00	0.33	0.43	0.22	0.00	1.00	700
Panel C - Firm characteristics								
Book leverage	0.25	0.11	0.22	0.35	1.90	0.00	0.89	700
Business segments	2.27	2.00	2.00	3.00	1.03	1.00	6.00	700
CapEx/TA	0.04	0.02	0.04	0.06	0.04	0.00	0.22	700
Family firm	0.32							700
FCF/Sales	0.10	0.03	0.08	0.13	0.17	-0.78	1.34	651
Firm age (foundation)	87.43	35.00	87.00	130.00	56.68	1.00	262.00	700
Free float (%)	47.82	28.99	47.56	66.36	24.55	0.00	100.00	698
Herf. control	0.17	0.02	0.10	0.27	0.20	0.00	0.97	699
Intangible assets	0.14	0.02	0.09	0.21	0.16	0.00	0.74	700
R&D/sales	0.01	0.00	0.00	0.01	0.03	0.00	0.26	700
ROA	0.11	0.06	0.10	0.14	0.08	-0.25	0.40	651
ROE	0.10	0.05	0.11	0.18	0.27	-2.73	3.62	700
Sales growth	1.19	0.97	1.12	1.26	0.64	-5.38	7.42	700
Tobin's Q	1.46	1.01	1.20	1.54	0.84	0.59	8.46	699
Total assets	49,263.1	936.2	2,575.7	13,565.5	184,648.8	50.9	2,202,423.0	700

Panel D – Management board characteristics

CV management board age	0.09	0.06	0.09	0.12	0.04	0.01	0.32	618
Management board age	49.91	46.67	50.18	53.50	4.91	30.00	63.00	698
Management board size	4.59	3.00	4.00	5.00	1.86	2.00	13.00	700
Management board tenure	4.48	2.50	4.00	5.75	3.27	0.00	34.00	674

Table 2.

Chair-CEO age dissimilarity and firm value (Tobin's Q). This table reports firm-fixed effects panel regression results of *Tobin's Q* on measures of age dissimilarity between the CEO and the chair of the supervisory board, other CEO-chair characteristics, CEO characteristics, chair characteristics, supervisory board characteristics, and firm characteristics for German firms listed on the DAX, MDAX, or SDAX between the sample period 2005 to 2010. *Tobin's Q* is calculated as sum of the firm's market capitalization and the difference between the book value of total assets and the book value of equity, divided by the book value of total assets. Specifications (1) to (4) and (7) use *Tobin's Q* as the dependent variable, while specifications (5) and (6) use the natural logarithm of *Tobin's Q* as the dependent variable. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. *Chair-CEO age difference (+/-)* is the age difference between the chair and the CEO, calculated as the chair's age minus the age of the CEO. *Chair-CEO age difference absolute* is the absolute value of the age difference between the chair and the CEO. All other variables are defined in Appendix A. Robust t-statistics (in parentheses) are based on standard errors clustered by industry (4-digit SIC codes) and year. The constant is included in all regressions, but not reported. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Tobin's Q				ln(Tobin's Q)		Tobin's Q
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gap20 chair-CEO		**0.2693*** (3.705)**	**0.3251*** (4.054)**		**0.1496*** (4.052)**		**0.2649*** (3.193)**
Chair-CEO age difference (+/-)				**-0.0042 (-1.400)**			
Squared chair-CEO age difference				**0.0004*** (3.371)**			
Chair-CEO age difference absolute						**0.0041** (2.193)**	
Chair younger						-0.0114 (-0.335)	
CEO age	0.0309 (0.157)		0.4161* (1.801)				
Chair age	0.1450 (0.592)		-0.0605 (-0.269)				
Other chair-CEO dissimilarities							
Chair-CEO different education	0.0114 (0.259)	-0.0168 (-0.370)	-0.0312 (-0.673)	0.0107 (0.246)	-0.0013 (-0.056)	0.0128 (0.563)	-0.0200 (-0.439)
Chair-CEO different gender	0.0343 (0.231)	-0.0097 (-0.074)	0.0145 (0.097)	-0.0317 (-0.243)	0.0062 (0.094)	0.0144 (0.215)	0.1228 (0.838)
Chair-CEO different nationality	0.0212 (0.207)	0.0319 (0.318)	0.0451 (0.461)	0.0225 (0.217)	-0.0012 (-0.031)	-0.0053 (-0.130)	0.0234 (0.221)
Chair-CEO joint tenure	-0.0015 (-0.120)	0.0082 (0.577)	0.0052 (0.372)	0.0008 (0.064)	0.0016 (0.259)	-0.0022 (-0.411)	0.0077 (0.539)
Chair-CEO same family	0.0230 (0.158)	0.2442* (1.798)	0.2355 (1.620)	0.0745 (0.509)	0.0975 (1.447)	0.0205 (0.294)	0.1443 (0.864)
CEO characteristics							
CEO change	-0.0776** (-2.118)	-0.0922** (-2.511)	-0.0890** (-2.421)	-0.0862** (-2.341)	-0.0509*** (-2.826)	-0.0446** (-2.389)	-0.0945** (-2.256)
CEO tenure	-0.0110 (-1.525)	-0.0121* (-1.898)	-0.0164** (-2.189)	-0.0100 (-1.485)	-0.0059* (-1.833)	-0.0029 (-0.810)	-0.0140*** (-2.730)
Founder CEO	0.3519* (1.754)	0.4745*** (2.959)	0.4540*** (2.763)	0.3707** (2.077)	0.3009*** (3.009)	0.2650** (2.266)	0.5304*** (3.700)
Chair characteristics							
Busy chair	0.0126 (0.257)	0.0167 (0.341)	0.0197 (0.402)	0.0138 (0.279)	0.0103 (0.464)	0.0076 (0.342)	0.0011 (0.024)
Chair change	0.0402 (0.994)	0.0400 (1.010)	0.0416 (1.036)	0.0425 (1.064)	0.0063 (0.333)	0.0073 (0.381)	0.0071 (0.211)
Chair tenure	0.0003 (0.035)	-0.0079 (-0.745)	-0.0062 (-0.575)	-0.0013 (-0.135)	-0.0053 (-1.217)	-0.0032 (-0.781)	-0.0074 (-0.655)
Chair is former firm executive	-0.0675 (-0.945)	-0.0674 (-1.058)	-0.0523 (-0.800)	-0.0505 (-0.713)	-0.0429 (-1.353)	-0.0435 (-1.298)	-0.0625 (-0.936)

Founder chair	0.1283 (1.032)	0.1034 (1.052)	0.0785 (0.745)	0.1381 (1.246)	0.1070** (1.969)	0.1429** (2.271)	0.1018 (1.056)
Supervisory board characteristics							
Board age	0.0116 (1.483)	0.0110 (1.458)	0.0121 (1.542)	0.0117 (1.507)	0.0063* (1.741)	0.0060* (1.674)	0.0133* (1.707)
Busy board	-0.0336 (-0.510)	-0.0645 (-1.011)	-0.0631 (-0.946)	-0.0541 (-0.847)	-0.0282 (-0.883)	-0.0159 (-0.493)	-0.1220* (-1.749)
CV board age	-0.5073 (-0.940)	-0.4260 (-0.797)	-0.4271 (-0.800)	-0.5633 (-1.056)	-0.0170 (-0.065)	-0.0882 (-0.339)	-0.3066 (-0.549)
Firm characteristics							
Book leverage	-0.6507** (-2.453)	-0.6459** (-2.446)	-0.6593** (-2.491)	-0.6654** (-2.530)	-0.3265*** (-2.722)	-0.3196*** (-2.687)	-0.7882*** (-2.755)
Business segments	-0.0851*** (-2.931)	-0.0908*** (-3.194)	-0.0909*** (-3.137)	-0.0845*** (-2.962)	-0.0427*** (-3.166)	-0.0389*** (-2.868)	-0.1030*** (-3.475)
CapEx/TA	-0.9548 (-1.625)	-0.7941 (-1.372)	-0.7527 (-1.274)	-0.9728* (-1.649)	-0.7951** (-2.526)	-0.9208*** (-2.893)	-0.2398 (-0.455)
Family firm	-0.3203*** (-2.935)	-0.2703*** (-2.826)	-0.2532*** (-2.679)	-0.2902*** (-2.909)	-0.1245** (-2.386)	-0.1501*** (-2.669)	-0.2557*** (-3.306)
Firm age (foundation)	-0.0800 (-0.634)	-0.1096 (-0.836)	-0.1083 (-0.803)	-0.0715 (-0.535)	0.0106 (0.175)	0.0317 (0.535)	-0.1653 (-0.899)
Free float	-0.0029** (-2.339)	-0.0029** (-2.325)	-0.0029** (-2.287)	-0.0028** (-2.253)	-0.0011** (-1.991)	-0.0011** (-1.973)	-0.0012 (-1.080)
R&D/sales	-2.5271 (-0.754)	-2.5928 (-0.794)	-2.9352 (-0.858)	-2.2436 (-0.696)	-1.0152 (-0.612)	-0.7303 (-0.447)	-3.4934 (-1.158)
ROE	0.0311 (0.482)	0.0138 (0.211)	0.0147 (0.224)	0.0188 (0.290)	-0.0146 (-0.456)	-0.0083 (-0.259)	0.0131 (0.197)
Sales growth	0.0007 (0.030)	0.0102 (0.436)	0.0124 (0.511)	-0.0014 (-0.059)	-0.0079 (-0.909)	-0.0136 (-1.526)	-0.0095 (-0.588)
Stock volatility	2.1577 (0.898)	1.4166 (0.588)	1.5823 (0.662)	1.8185 (0.759)	-0.5760 (-0.398)	-0.2433 (-0.170)	4.9004** (2.207)
Total assets	-0.1611*** (-2.814)	-0.1539*** (-2.877)	-0.1633*** (-2.987)	-0.1554*** (-2.810)	-0.1099*** (-3.748)	-0.1083*** (-3.517)	-0.1140* (-1.937)
Management board characteristics							
CV management board age							1.3902** (2.471)
Management board age							-0.0138* (-1.781)
Management board size							-0.2090** (-1.994)
Management board tenure							0.0150 (1.476)
Number of observations	694	694	694	694	694	694	599
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year
Within R-squared	0.286	0.301	0.304	0.293	0.438	0.425	0.374

Table 3.

Chair-CEO age dissimilarity and board monitoring (number of meetings). This table reports firm-fixed effects panel regression results of board meetings on measures of age dissimilarity between the CEO and the chair of the supervisory board, other CEO-chair characteristics, CEO characteristics, chair characteristics, supervisory board characteristics, and firm characteristics for German firms listed on the DAX, MDAX, or SDAX in the sample period 2005 to 2010. *Board meetings* is the number of board meetings held by the supervisory board during the fiscal year. Specifications (1) to (4) use *Board meetings* as the dependent variable, while specifications (5) to (7) use the natural logarithm of *Board meetings* as the dependent variable. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. *Chair-CEO age difference (+/-)* is the age difference between the chair and the CEO, calculated as the chair's age minus the age of the CEO. *Chair-CEO age difference absolute* is the absolute value of the age difference between the chair and the CEO. All other variables are defined in Appendix A. Robust t-statistics (in parentheses) in specifications (1) to (4) are based on standard errors clustered by firm. Standard errors in regressions (5) to (7) are based on industry (4-digit SIC codes) and year clustering. The constant is included in all regressions, but not reported. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Poisson				OLS		
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Gap20 chair-CEO		**0.1184** **(2.192)**	**0.1347** **(2.146)**		**0.1019** **(2.074)**		**0.1477** **(3.175)**
Chair-CEO age difference (+/-)				**-0.0030** **(-1.012)**			
Squared chair-CEO age difference				**0.0003** **(2.192)**			
Chair-CEO age difference absolute						**0.0055** **(2.421)**	
Chair younger						0.0174 (0.399)	
CEO age	-0.1361 (-0.632)		0.0151 (0.064)				
Chair age	-0.0536 (-0.264)		-0.1531 (-0.715)				
Other chair-CEO dissimilarities							
Chair-CEO different education	-0.0308 (-0.873)	-0.0486 (-1.377)	-0.0472 (-1.337)	-0.0391 (-1.096)	-0.0536* (-1.819)	-0.0490* (-1.679)	-0.0607** (-2.145)
Chair-CEO different gender	-0.2180 (-1.444)	-0.1833 (-1.438)	-0.2298 (-1.485)	-0.2074 (-1.579)	-0.1399* (-1.718)	-0.1460* (-1.712)	-0.2697*** (-2.991)
Chair-CEO different nationality	-0.0380 (-0.605)	-0.0166 (-0.292)	-0.0230 (-0.376)	-0.0214 (-0.382)	-0.0152 (-0.330)	-0.0145 (-0.309)	-0.0047 (-0.106)
Chair-CEO joint tenure	0.0058 (0.645)	0.0097 (1.047)	0.0098 (1.067)	0.0068 (0.828)	0.0099 (1.637)	0.0075 (1.290)	0.0176*** (2.696)
Chair-CEO same family	-0.4247*** (-4.022)	-0.3132*** (-2.850)	-0.3335*** (-3.052)	-0.3691*** (-3.552)	-0.2862** (-2.409)	-0.3060*** (-2.626)	-0.2581** (-2.250)
CEO characteristics							
CEO change	0.0872*** (2.823)	0.0829*** (2.679)	0.0794** (2.554)	0.0840*** (2.759)	0.0758*** (2.734)	0.0799*** (2.871)	0.0744** (2.455)
CEO tenure	0.0089 (1.583)	0.0063 (1.238)	0.0058 (0.987)	0.0077 (1.445)	0.0046 (1.242)	0.0080* (1.959)	0.0004 (0.097)
Founder CEO	-0.3641*** (-3.398)	-0.3023*** (-2.807)	-0.3080*** (-2.892)	-0.3492*** (-3.346)	-0.2936** (-2.173)	-0.3240** (-2.387)	-0.2610* (-1.828)
Chair characteristics							
Busy chair	-0.0168 (-0.408)	-0.0165 (-0.401)	-0.0143 (-0.348)	-0.0177 (-0.427)	-0.0273 (-0.856)	-0.0308 (-0.963)	-0.0252 (-0.779)
Chair change	-0.0164 (-0.404)	-0.0103 (-0.249)	-0.0127 (-0.308)	-0.0096 (-0.233)	0.0222 (0.847)	0.0232 (0.886)	0.0468* (1.732)
Chair tenure	-0.0033 (-0.451)	-0.0078 (-1.026)	-0.0062 (-0.849)	-0.0059 (-0.829)	-0.0069 (-1.403)	-0.0065 (-1.365)	-0.0131** (-2.508)
Chair is former firm executive	0.1092 (1.463)	0.1049 (1.434)	0.1151 (1.569)	0.1175 (1.579)	0.0938* (1.657)	0.0962* (1.687)	0.1222** (2.075)

Founder chair	0.1196 (0.727)	0.1096 (0.689)	0.0863 (0.549)	0.1346 (0.840)	0.1074 (0.836)	0.1422 (1.070)	0.1837 (1.306)
Supervisory board characteristics							
Board age	0.0050 (0.824)	0.0041 (0.714)	0.0049 (0.816)	0.0043 (0.727)	0.0067 (1.428)	0.0060 (1.281)	0.0080* (1.705)
Busy board	-0.0742 (-1.336)	-0.0828 (-1.498)	-0.0896 (-1.638)	-0.0805 (-1.465)	-0.0618 (-1.522)	-0.0552 (-1.371)	-0.0080 (-0.214)
CV board age	0.6242 (1.382)	0.6823 (1.521)	0.6883 (1.528)	0.5687 (1.272)	0.5817* (1.928)	0.4904 (1.624)	0.5244* (1.875)
Avg. tenure SB members	-0.0447*** (-3.398)	-0.0393*** (-2.819)	-0.0395*** (-2.837)	-0.0404*** (-3.085)	-0.0368*** (-3.409)	-0.0378*** (-3.552)	-0.0373*** (-3.236)
No. of active committees	0.0439* (1.771)	0.0423* (1.717)	0.0438* (1.742)	0.0446* (1.810)	0.0342* (1.854)	0.0353* (1.937)	0.0447** (2.418)
Union representatives	0.3021** (2.015)	0.2733* (1.864)	0.2814* (1.927)	0.2667* (1.801)	0.3091*** (2.888)	0.2965*** (2.768)	0.2617** (2.392)
Firm characteristics							
Book leverage	-0.3754* (-1.830)	-0.3775* (-1.817)	-0.3910* (-1.901)	-0.3846* (-1.879)	-0.3133** (-1.985)	-0.3070* (-1.953)	-0.4424*** (-2.709)
Business segments	0.0671*** (2.762)	0.0652*** (2.733)	0.0637*** (2.623)	0.0693*** (2.886)	0.0447*** (2.841)	0.0479*** (3.047)	0.0491*** (3.004)
Firm age (foundation)	0.2892 (1.418)	0.2646 (1.333)	0.2671 (1.364)	0.2812 (1.471)	0.1894* (1.776)	0.2092** (1.988)	0.2702* (1.933)
CapEx/TA	-0.6596 (-1.273)	-0.5821 (-1.074)	-0.5279 (-0.973)	-0.6677 (-1.278)	-0.6448 (-1.591)	-0.7585* (-1.837)	-0.6950* (-1.698)
Family firm	-0.0292 (-0.276)	-0.0071 (-0.060)	0.0131 (0.129)	-0.0204 (-0.190)	-0.0381 (-0.315)	-0.0536 (-0.446)	0.0252 (0.209)
Free float	0.0011 (1.100)	0.0011 (1.103)	0.0012 (1.156)	0.0012 (1.169)	0.0004 (0.598)	0.0004 (0.627)	0.0006 (0.914)
R&D/sales	-1.4256 (-1.115)	-1.6034 (-1.197)	-1.5783 (-1.184)	-1.3719 (-1.066)	-1.4168 (-1.318)	-1.0866 (-1.037)	-2.4760*** (-3.163)
ROE	-0.0215 (-0.489)	-0.0323 (-0.681)	-0.0314 (-0.665)	-0.0357 (-0.746)	-0.0104 (-0.236)	-0.0096 (-0.219)	-0.0266 (-0.634)
Sales growth	-0.0817** (-2.225)	-0.0709** (-2.004)	-0.0720** (-2.011)	-0.0786** (-2.219)	-0.0533** (-2.146)	-0.0583** (-2.271)	-0.0397 (-1.450)
Stock volatility	4.7652* (1.684)	4.6603* (1.688)	4.7428* (1.702)	4.7165* (1.690)	4.6311** (2.134)	4.7455** (2.198)	4.2346* (1.765)
Tobin's Q	0.0116 (0.486)	0.0074 (0.312)	0.0051 (0.222)	0.0079 (0.341)	0.0046 (0.256)	0.0077 (0.436)	-0.0183 (-0.551)
Total assets	0.1187** (2.028)	0.1162** (1.987)	0.1141* (1.959)	0.1190** (2.056)	0.0967** (2.321)	0.1023** (2.484)	0.1064*** (2.613)
Management board characteristics							
CV management board age							-0.4187 (-1.136)
Management board age							0.0059 (1.239)
Management board size							0.0039 (0.054)
Management board tenure							-0.0056 (-0.921)
Number of observations	680	680	680	680	690	690	598
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year
Within R-squared	–	–	–	–	0.2233	0.2256	0.2776

Table 4.

Need for Monitoring - Chair-CEO age dissimilarity and firm value (sub-sample analysis). This table shows firm-fixed effects panel sub-sample regression results of *Tobin's Q* on the indicator variable *Gap20 chair-CEO* and control variables as in Table 2 for German firms listed on the DAX, MDAX, or SDAX in the sample period 2005 to 2010. *Tobin's Q* is calculated as the sum of the firm's market capitalization and the difference between the book value of total assets and the book value of equity, divided by the book value of total assets. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. All other variables are defined in Appendix A. Robust t-statistics (in parentheses) are based on standard errors clustered by industry (4-digit SIC codes) and year. The constant is included in all the regressions, but not reported. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Tobin's Q							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent variables	FCF/sales ≤ mean	FCF/sales > mean	Herf. control ≤ mean	Herf. control > mean	Blockholder 50% = 0	Blockholder 50% = 1	Intangible assets ≤ mean	Intangible assets > mean
Gap20 chair-CEO	**0.0559 (0.768)**	**0.6647*** (3.686)**	**0.1909*** (2.501)**	**0.1152 (0.740)**	**0.3052*** (3.664)**	**0.0630 (0.292)**	**0.2946*** (3.342)**	**0.0344 (0.393)**
Other chair-CEO dissimilarities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chair characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supervisory board characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	398	248	438	256	503	191	458	236
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year

Table 5.

Need for Monitoring - Chair-CEO age dissimilarity and board meetings (sub-sample analysis). This table contains Poisson firm-fixed effects panel sub-sample regression results *Board meetings* on the indicator variable *Gap20 chair-CEO* and control variables as in Table 3 for German firms listed on the DAX, MDAX, or SDAX in the sample period 2005 to 2010. *Board meetings* is the number of board meetings held by the supervisory board during the fiscal year. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. All other variables are defined in Appendix A. Robust t-statistics (in parentheses) are based on standard errors clustered by firm. The constant is included in all regressions, but not reported. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Board meetings							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Independent variables	FCF/sales ≤ mean	FCF/sales > mean	Herf. ownership ≤ mean	Herf. ownership > mean	Blockholder 50% = 0	Blockholder 50% = 1	Intangible assets ≤ mean	Intangible assets > mean
Gap20 chair-CEO	**0.0442 (0.503)**	**0.2869*** (3.134)**	**0.1732** (2.514)**	**0.1884 (1.525)**	**0.1482** (2.104)**	**0.0392 (0.355)**	**0.1037* (1.753)**	**0.0689 (0.529)**
Other chair-CEO dissimilarities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chair characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supervisory board characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	379	230	428	225	493	170	446	226
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year

Table 6.

Chair-CEO age dissimilarity and board meetings during the financial crisis. This table contains Poisson firm-fixed effects panel sub-sample regression results of *Board meetings* on the indicator variable *Gap20 chair-CEO* and control variables as in Table 3 for German firms listed on the DAX, MDAX, or SDAX in the sample period 2005 to 2010. *Board meetings* is the number of board meetings held by the supervisory board during the fiscal year. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. *Financial crisis* is an indicator variable set to one if the observation year is either the year 2008 or the year 2009, and zero otherwise. All regression specifications include year dummies for each of the non-crisis years, i.e., 2005, 2006, 2007, and 2010. All other variables are defined in Appendix A. Robust t-statistics (in parentheses) are based on standard errors clustered by firm. The constant is included in all regressions, but not reported. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Board meetings								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Independent variables	Full sample	FCF/sales ≤ mean	FCF/sales > mean	Herf. control ≤ mean	Herf. control > mean	Blockholder 50% = 0	Blockholder 50% = 1	Intangible assets ≤ mean	Intangible assets > mean
Gap20 chair-CEO	**0.1915*** (2.682)**	**0.0581 (0.600)**	**0.3124*** (3.077)**	**0.3110*** (2.813)**	**0.1962 (1.578)**	**0.2549** (2.556)**	**0.0574 (0.449)**	**0.1823** (2.157)**	**0.1883 (1.171)**
Gap20 chair-CEO*Financial crisis	**-0.1754** (-2.083)**	**-0.0339 (-0.522)**	**-0.1996 (-1.625)**	**-0.2970** (-2.303)**	**-0.0018 (-0.033)**	**-0.2616** (-2.289)**	**-0.0078 (-0.110)**	**-0.1766 (-1.563)**	**-0.2206** (-2.411)**
Financial crisis	**-0.0163 (-0.349)**	**-0.0781 (-1.599)**	**-0.0243 (-0.386)**	**0.0322 (0.629)**	**-0.0897* (-1.678)**	**0.0114 (0.0236)**	**-0.0993* (-1.770)**	**0.0068 (0.119)**	**-0.0152 (-0.267)**
Other chair-CEO dissimilarities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chair characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supervisory board characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	680	379	230	428	225	493	170	446	226
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year

Table 7.

Chair-CEO age dissimilarity and firm value during the financial crisis. This table shows firm-fixed effects panel sub-sample regression results of *Tobin's Q* on the indicator variable *Gap20 chair-CEO* and control variables as in Table 2 for German firms listed on the DAX, MDAX, or SDAX in the sample period 2005 to 2010. *Tobin's Q* is calculated as the sum of the firm's market capitalization and the difference between the book value of total assets and the book value of equity, divided by the book value of total assets. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. *Financial crisis* is an indicator variable set to one if the observation year is either the year 2008 or the year 2009, and zero otherwise. All regression specifications include year dummies for each of the non-crisis years, i.e., 2005, 2006, 2007, and 2010. All other variables are defined in Appendix A. Robust t-statistics (in parentheses) are based on standard errors clustered by industry (4-digit SIC codes) and year. The constant is included in all regressions, but not reported. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Tobin's Q								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Independent variables	Full sample	FCF/sales ≤ mean	FCF/sales > mean	Herf. control ≤ mean	Herf. control > mean	Blockholder 50% = 0	Blockholder 50% = 1	Intangible assets ≤ mean	Intangible assets > mean
Gap20 chair-CEO	**0.3906*** (4.684)**	**0.0697 (0.853)**	**0.7121*** (3.763)**	**0.2255** (2.260)**	**0.1983 (1.284)**	**0.3715*** (3.735)**	**0.1815 (0.890)**	**0.4675*** (4.556)**	**0.0099 (0.102)**
Gap20 chair-CEO*Financial crisis	**-0.3258*** (-3.832)**	**-0.0643 (-1.016)**	**-0.1772 (-1.464)**	**-0.1251 (-1.197)**	**-0.3676*** (-2.837)**	**-0.2258** (-2.359)**	**-0.3083** (-2.151)**	**-0.4418*** (-3.974)**	**-0.1326** (-2.028)**
Financial crisis	**-0.2069*** (-3.278)**	**-0.1113*** (-3.060)**	**-0.2864*** (-2.932)**	**-0.1934*** (-3.962)**	**-0.1158 (-1.484)**	**-0.2335*** (-4.847)**	**-0.2163 (-1.626)**	**-0.1791** (-3.153)**	**-0.1214 (-1.597)**
Other chair-CEO dissimilarities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chair characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supervisory board characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	694	398	248	438	256	503	191	458	236
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year	Firm, year

Table 8.

Unobserved CEO or chair heterogeneity – CEO-firm and chair-firm fixed effects. This table shows panel regression results for the indicator variable *Gap20 chair-CEO* and control variables for German firms listed on the DAX, MDAX, or SDAX in the sample period 2005 to 2010 using CEO-firm-fixed effects (specification (1) and (2)) or chair-firm-fixed effects (specification (3) and (4)). *Tobin's Q* is calculated as the sum of the firm's market capitalization and the difference between the book value of total assets and the book value of equity, divided by the book value of total assets. *Board meetings* is the number of board meetings held by the supervisory board during the fiscal year. The dependent variable in regressions (1) and (3) is *Tobin's Q*, specification (2) and (4) use the natural logarithm of *Board meetings* as the dependent variable. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. If not stated otherwise, control variables in specification (1) and (3) follow Table 2, controls in specification (2) and (4) are identical to Table 3. Differences in the set of control variables result from omitting time invariant variables for the CEO (i.e., *Founder CEO*) or the chair of the supervisory board (i.e., *Founder chair*, *Chair is former firm executive*), respectively. All other variables are defined in Appendix A. Robust t-statistics (in parentheses) are based on standard errors clustered by industry (4-digit SIC codes) and year. The constant is included in all regressions, but not reported. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Tobin's Q	Board meetings	Tobin's Q	Board meetings
Independent variables	(1)	(2)	(3)	(4)
Gap20 chair-CEO	**0.3101*** (3.152)**	**0.2992*** (3.169)**	**0.2324** (2.265)**	**0.1100* (1.890)**
Other chair-CEO dissimilarities	Yes	Yes	Yes	Yes
CEO characteristics	CEO change, CEO tenure	CEO change, CEO tenure	Yes	Yes
Chair characteristics	Yes	Yes	Busy chair, Chair change, Chair tenure	Busy chair, Chair change, Chair tenure
Supervisory board characteristics	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes
Number of observations	694	690	694	690
Fixed effects	CEO-firm, year	CEO-firm, year	Chair-firm, year	Chair-firm, year

Table 9.

Dynamic panel data models (system GMM estimations). This table contains results of the dynamic, system Generalized Method of Moments (GMM) regressions of *Tobin's Q*, *ln(Tobin's Q),* and *Board meetings* on measures of age dissimilarity between the CEO and the chair of the supervisory board for German firms listed on the DAX, MDAX and SDAX in 2005 and 2010. *Tobin's Q* is calculated as the sum of the firm's market capitalization and the difference between the book value of total assets and the book value of equity, divided by the book value of total assets. *Board meetings* is the number of board meetings held by the supervisory board during the fiscal year. *Board meetings* used in regression (4) and (5) is the natural logarithm of the number of firm's board meetings in a given year. Control variables for the specifications (1) to (3) are identical to Table 2, while control variables for specification (4) and (5) follow those used in Table 3. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. All other variables are defined in Appendix A. The system GMM includes two sets of regressions: (i) regressions in levels with the lagged differences (t-2) of the dependent and independent variables as instruments and (ii) regressions in first differences with the lagged levels (t-3) of the dependent and independent variables as instruments. We use the year dummies as strictly exogenous variables. The GMM style variables are the respective dependent variable as well as *Gap20 chair-CEO*, *CEO-chair different education*, *CEO-chair different gender*, *CEO-chair different nationality*, *Board age*, *Free float*, *Book leverage*, *CapEx/TA*, *R&D/sales*, *ROE*, *Sales growth*, *Stock volatility*, and *Total assets*. We use the small sample option (similar to Wintoki et al., 2012). Running the dynamic panel estimations without this option, all results remain significant. AR(1) and AR(2) are tests for first-order and second-order serial correlation, respectively, in the first differenced residuals under the null of no serial correlation. The Hansen test of over-identification is based on the null that all instruments are valid. The Diff-in-Hansen test of exogeneity is based on the null that the instruments used for the equations in levels are exogenous. The constant is included in all regressions, but not reported. All t-statistics are based on robust standard errors clustered at the firm level. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Tobin's Q	ln(Tobin's Q)	ln(Tobin's Q)	Board meetings	Board meetings
Independent variables	(1)	(2)	(3)	(4)	(5)
Gap20 chair-CEO	**0.6007** **(2.397)**	**0.2783*** **(2.661)**		**0.4227*** **(2.912)**	
Chair-CEO age difference absolute			**0.0077** **(2.127)**		**0.0157** **(2.381)**
Chair younger			-0.0252 (-0.335)		0.0298 (0.299)
Board meetings $_{t-1}$				0.3082*** (2.856)	0.3154*** (3.242)
ln(Tobin's Q $_{t-1}$)		0.5315*** (5.171)	0.5774*** (6.154)		
Tobin's Q $_{t-1}$	0.3532** (2.112)			-0.0033 (-0.053)	0.0301 (0.558)
Other chair-CEO dissimilarities					
Chair-CEO different education	0.0494 (0.370)	-0.0187 (-0.334)	-0.0039 (-0.078)	-0.1234* (-1.726)	-0.1163* (-1.660)
Chair-CEO different gender	-0.5043 (-0.411)	-0.4065 (-0.640)	-0.0486 (-0.115)	-0.3180 (-0.543)	-0.0947 (-0.184)
Chair-CEO different nationality	-0.0669 (-0.406)	-0.0216 (-0.268)	-0.0526 (-0.649)	0.0991 (1.020)	0.0813 (0.971)
Chair-CEO joint tenure	0.1123** (2.278)	0.0432** (2.119)	0.0342* (1.775)	0.0166 (0.633)	0.0040 (0.190)
Chair-CEO same family	-1.1853* (-1.703)	-0.5086* (-1.776)	-0.3479 (-1.531)	-0.5567* (-1.685)	-0.3721 (-1.102)
CEO characteristics					
CEO change	0.0491 (0.367)	-0.0057 (-0.084)	-0.0056 (-0.101)	-0.0799 (-0.731)	-0.0172 (-0.199)
CEO tenure	-0.0359 (-1.633)	-0.0159 (-1.590)	-0.0112 (-1.420)	-0.0227* (-1.893)	-0.0103 (-0.995)
Founder CEO	2.3047* (1.849)	0.7378* (1.820)	0.4975 (1.423)	0.7632* (1.692)	0.3479 (0.890)
Chair characteristics					
Busy chair	-0.1053 (-0.480)	-0.0140 (-0.155)	-0.0426 (-0.545)	0.0478 (0.419)	0.0247 (0.229)

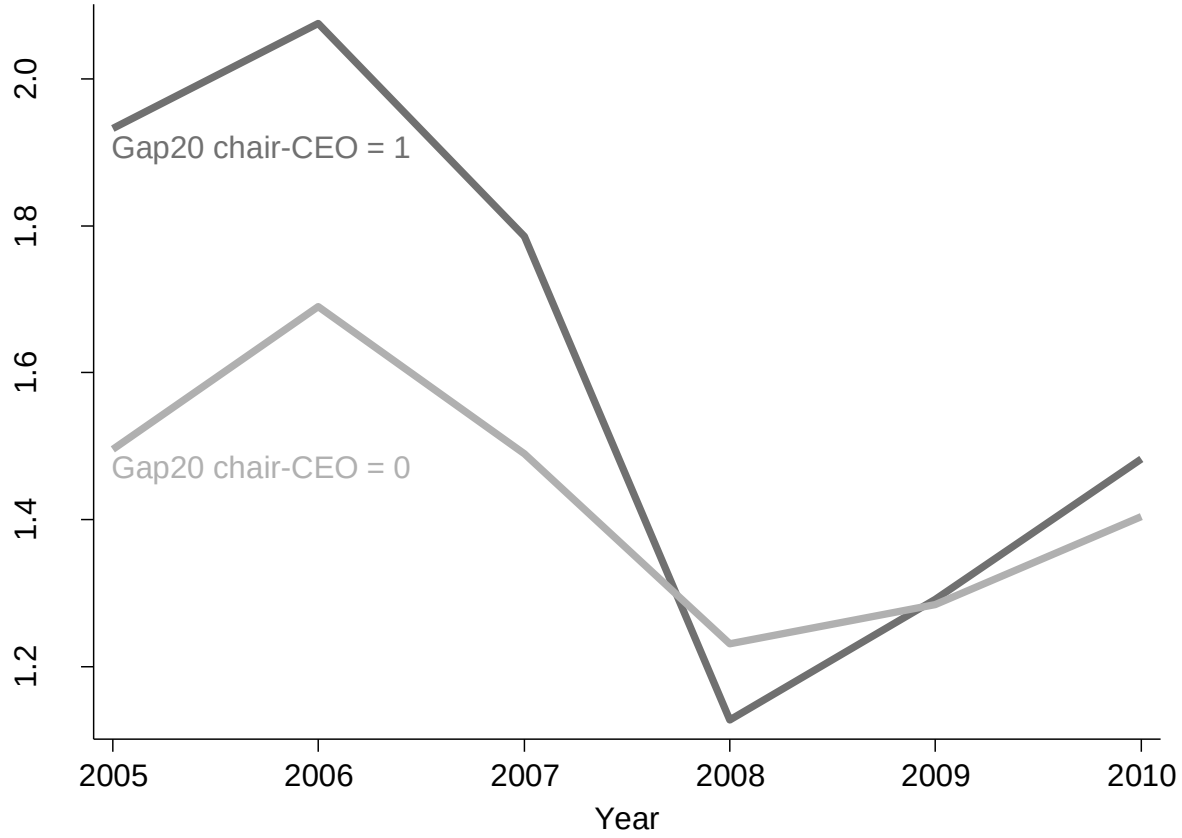
Chair change	0.0066 (0.048)	0.1028 (1.632)	0.0809* (1.666)	-0.0144 (-0.148)	-0.0491 (-0.544)
Chair tenure	-0.0457 (-1.493)	-0.0128 (-1.010)	-0.0069 (-0.689)	-0.0087 (-0.434)	-0.0113 (-0.704)
Chair is former firm executive	-0.2944 (-1.133)	-0.1500 (-1.400)	-0.2072** (-2.008)	-0.1035 (-0.897)	-0.1768 (-1.451)
Founder chair	0.9425 (1.509)	0.2897 (1.087)	0.2885 (1.272)	0.1636 (0.634)	0.0850 (0.348)
Supervisory board characteristics					
Board age	0.0030 (0.127)	0.0066 (0.699)	0.0034 (0.436)	-0.0065 (-0.459)	0.0014 (0.121)
Busy board	0.0031 (0.014)	-0.0211 (-0.232)	0.0155 (0.234)	-0.1895 (-1.417)	-0.1616 (-1.543)
CV board age	0.0335 (0.021)	0.0841 (0.106)	0.1455 (0.234)	-0.4224 (-0.443)	0.6048 (0.669)
Avg. tenure SB members				0.0074 (0.243)	0.0094 (0.386)
No. of active committees				-0.0239 (-0.783)	-0.0072 (-0.277)
Union representatives				-0.0249 (-0.072)	0.0434 (0.150)
Firm characteristics					
Book leverage	-0.2948 (-0.785)	-0.2050 (-1.103)	-0.2111 (-1.491)	0.2073 (0.965)	0.3131 (1.445)
Business segments	-0.1727** (-2.001)	-0.0438 (-0.989)	-0.0155 (-0.421)	-0.0164 (-0.334)	0.0292 (0.686)
CapEx/TA	2.2758 (1.316)	0.9613 (1.327)	0.8183 (1.088)	0.1563 (0.145)	0.1158 (0.128)
Family firm	0.3601* (1.805)	0.1838* (1.666)	0.0889 (0.982)	0.0083 (0.052)	-0.0336 (-0.277)
Free float	-0.0017 (-0.472)	0.0009 (0.652)	0.0005 (0.440)	0.0002 (0.110)	0.0001 (0.070)
Firm age (foundation)	0.1098 (0.905)	0.0440 (0.817)	0.0223 (0.504)	0.0650 (1.073)	-0.0178 (-0.328)
R&D/sales	3.7106 (1.388)	1.1760 (0.921)	1.0331 (0.926)	-0.3028 (-0.189)	-0.6896 (-0.463)
ROE	-0.2226* (-1.873)	-0.1621*** (-2.798)	-0.1163** (-2.195)	-0.0773 (-1.006)	-0.0578 (-0.722)
Sales growth	-0.1059 (-1.231)	-0.0367 (-1.186)	-0.0478 (-1.615)	-0.0047 (-0.096)	-0.0299 (-0.643)
Stock volatility	6.7823 (1.242)	1.1845 (0.437)	0.1588 (0.067)	5.4007 (1.586)	4.0891 (1.236)
Total assets	0.0386 (1.183)	0.0129 (0.915)	0.0038 (0.267)	0.0556 (1.581)	0.0185 (0.700)
Year controls	Yes	Yes	Yes	Yes	Yes
Number of observations	539	539	539	536	536
Arellano-Bond test for AR(1) (p-value)	0.019	0.000	0.000	0.000	0.000
Arellano-Bond test for AR(2) (p-value)	0.644	0.460	0.459	0.528	0.525
Hansen test for overidentification restrictions (p-value)	0.467	0.593	0.523	0.568	0.416
Diff-in-Hansen test GMM (p-value)	0.249	0.400	0.346	0.611	0.403

Table 10.

Random effects regressions. This table reports random effects panel regression results of *Tobin's Q* and *Board meetings* on measures of age dissimilarity between the CEO and the chair of the supervisory board, other CEO-chair characteristics, CEO characteristics, chair characteristics, supervisory board characteristics, and firm characteristics for German firms listed on the DAX, MDAX, or SDAX between the sample period 2005 to 2010. Specifications (1) and (2) use *Tobin's Q* as the dependent variable. Specification (3) uses the natural logarithm of *Tobin's Q*. Specifications (4) and (5) use *Board meetings* as the dependent variable. Specification (6) uses the natural logarithm of *Board meetings* as the dependent variable. *Gap20 chair-CEO* is a dummy variable that equals one if the age difference between the chair of the supervisory board and the CEO is at least 20 years, and zero otherwise. *Chair-CEO age difference (+/-)* is the age difference between the chair and the CEO, calculated as the chair's age minus the age of the CEO. *Chair-CEO age difference absolute* is the absolute value of the age difference between the chair and the CEO. All other variables are defined in Appendix A. Robust t-statistics (in parentheses) are based on standard errors clustered by industry (4-digit SIC codes) and year. The constant is included in all regressions, but not reported. Specifications (2) and (5) include year dummies for each of the non-crisis years, i.e., 2005, 2006, 2007, and 2010. Industry-fixed effects are based on the Fama and French 12 industries. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Tobin's Q			Board meetings		
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
Gap20 chair-CEO	**0.2348*** (3.124)**	**0.3487*** (4.049)**		**0.1286** (1.972)**	**0.1870** (2.090)**	
Gap20 chair-CEO*Financial crisis		**-0.3143*** (-3.742)**			**-0.1479* (-1.680)**	
Financial crisis		**-0.1618*** (-3.320)**			**-0.0519 (-1.053)**	
Chair-CEO age difference absolute			**0.0051*** (3.031)**			**0.0045** (2.152)**
Chair younger			-0.0015 (-0.042)			-0.0073 (-0.191)
Other chair-CEO dissimilarities	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
CEO characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Chair characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Supervisory board characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Firm characteristics	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Number of observations	694	694	694	690	690	690
Fixed effects	Industry, year	Industry, year	Industry, year	Industry, year	Industry, year	Industry, year

Figure 1.
Gap20 chair-CEO and firm value (Tobin's Q) over time. This figure shows a plot of annual average values of *Tobin's Q* for firms with and without an age difference between the chair of the supervisory board and the CEO of at least 20 years.



Appendices

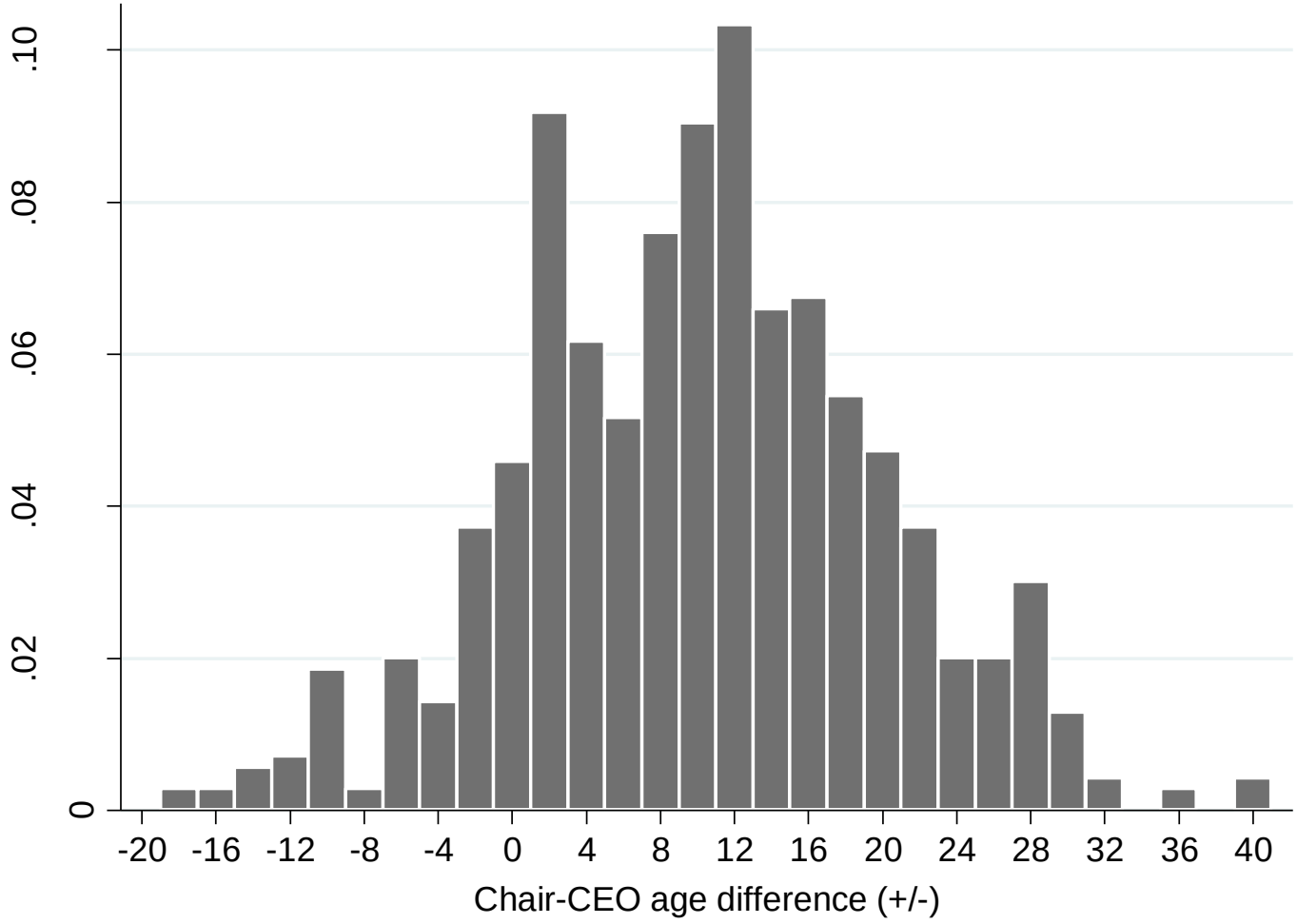
Appendix A. Definition of variables.

Variable	Definition
Dependent variables	
Board meetings	The number of ordinary and extraordinary board meetings as well as the number of video and telephone conferences held by the supervisory board during the fiscal year. Meetings are reported in the firms' annual reports.
ROA	Earnings before interest, tax, depreciation and amortization (EBITDA) divided by the book value of total assets.
Tobin's Q	The firm's market value to its replacement costs approximated by the market capitalization plus the difference between the book value of total assets and the book value of equity, all divided by the book value of total assets.
Age characteristics	
CEO age	The natural logarithm of the age of the firm's chief executive officer (CEO).
Chair-CEO age difference (+/-)	The age difference (in years) between the chair of the supervisory board and the CEO calculated as chair age minus CEO age.
Chair-CEO age difference absolute	The absolute value of the age difference (in years) between the chair of the supervisory board and the CEO.
Chair age	The natural logarithm of the age of the supervisory board's chair.
Gap20 chair-CEO	Dummy variable that takes a value of one if the age difference between the chair of the supervisory board and the CEO and is at least 20 years, and zero otherwise. This dummy variable measures a generational gap, as reflected by an age difference of at least 20 years as suggested by Strauss and Howe (1997).
Squared chair-CEO age difference	The squared age difference between the CEO and the chair of the supervisory board.
Other chair-CEO dissimilarities	
Chair-CEO different education	Dummy variable that is set to one if the chair of the supervisory board and the CEO do not have the same education (law, economics, else), and zero otherwise.
Chair-CEO different gender	Dummy variable that is set to one if the chair of the supervisory board and the CEO have a different gender, and zero otherwise.
Chair-CEO different nationality	Dummy variable that is set to one if the chair of the supervisory board and the CEO have different nationalities, and zero otherwise.
Chair-CEO joint tenure	The number of years the chair of the supervisory board and the CEO have been working together in these positions.
Chair-CEO same family	Dummy variable that is set to one if the chair of the supervisory board and the CEO are from the same family.
CEO characteristics	
CEO change	Dummy variable set to one for years when there is a CEO change.
CEO tenure	The number of years the CEO has been serving as the CEO of the firm.
Founder CEO	Dummy variable set to one if the CEO is the founder of the firm, and zero otherwise.
Chair characteristics	
Busy chair	Dummy variable that takes a value of one if the chair of the supervisory board holds three or more directorships, and zero otherwise.
Chair change	Dummy variable set to one if either the firm's chair of the supervisory board takes office in a given year.
Chair tenure	The number of years the chair has been serving as the chair of the supervisory board.
Chair is former firm CEO	Dummy variable that takes the value of one if the chair of the supervisory board is the firm's former CEO, zero otherwise.
Chair is former firm executive	Dummy variable that takes the value of one if chair of the supervisory board is a former member of the firm's management board, and zero otherwise.
Founder chair	Dummy variable set to one if the chair of the supervisory board is the founder of the company, and zero otherwise.

Supervisory board characteristics	
Board age	The average age of all the shareholder representatives on the supervisory board.
Board size	The total number of members on the supervisory board.
Busy board	Dummy variable that takes the value of one if at least 50% of the shareholder representatives hold three or more directorships, and zero otherwise.
CV board age	The coefficient of variation of the supervisory board age defined as the standard deviation of the age of shareholder representatives on the supervisory board divided by the average age of shareholder representatives.
Avg. tenure SB members	The average tenure (in years) of all supervisory board members. Board appointment is traced back to the year 1998.
No. of active committees	The number of committees involving members of the supervisory board and that meet at least once a year.
Union representatives	The number of union representatives on the supervisory board divided by the number of employee representatives.
Management board characteristics	
CV management board age	The coefficient of variation of the management board age defined as the standard deviation of the age of the members of the management board, excluding the CEO, divided by the average age of the members of the management board, excluding the CEO.
Management board age	The average age of the members of the management board, excluding the CEO.
Management board size	The natural logarithm of the total number of members of the management board.
Management board tenure	The average number of years the members of the management board have been serving on the firm's management board, excluding the CEO.
Firm characteristics	
Book leverage	The firm's book value of total debt divided by the book value of total assets, both measured at the end of the fiscal year t-1.
Blockholder 50%	Dummy variable that takes the value of one if a single shareholder holds at least 50% of the common shares outstanding, and zero otherwise.
Business segments	The number of business segments reported in S&P Capital IQ that generate at least 10% of the firm's annual total revenues.
CapEx/TA	The firm's capital expenditures (CapEx) standardized by total assets, both measured at the end of the fiscal year t-1.
Family firm	Dummy variable that is set to one if the firm is a family firm according to the definition used in Anderson and Reeb (2003), and zero otherwise.
FCF/Sales	Free cash flow (defined as EBITDA - CapEx) divided by total sales.
Firm age (foundation)	The natural logarithm of the number of years since the foundation of the firm.
Free float	The percentage of the company's voting shares to be free float.
Herf. control	The Herfindahl index of all blockholders that own at least 5% of the firm's ordinary shares.
Intangibles assets	The firm's book value of intangible assets divided by the book value of total assets.
R&D/sales	The annual R&D expenditures divided by total revenue, both measured at the end of the fiscal year t-1. Missing R&D values are set to zero.
ROA	Earnings before interest, tax, depreciation and amortization (EBITDA) divided by the book value of total assets.
ROE	The firm's net income divided by the book value of equity, both measured at the end of the fiscal year t-1.
Sales growth	The nominal growth rate of total revenues over the past two years.
Stock volatility	Stock volatility is measured as the stock volatility (standard deviation) over the past two years using daily stock returns.
Total assets	The natural logarithm of the book value of total assets at the end of the fiscal year t-1.

Appendix B. Histogram for Chair-CEO age difference (+/-).

This figure shows a histogram of the age difference between the the chair of the supervisory board and the CEO for the sample of German firms listed on the DAX, MDAX or SDAX in the sample period 2005 to 2010.



Appendix C. Chair-CEO age dissimilarity and firm profitability (return on assets).

This table reports panel regression results of return on assets (*ROA*) on measures of chair-CEO age dissimilarity and additional controls for German firms listed on the DAX, MDAX, or SDAX in 2005 and 2010. *ROA* is defined as EBITDA to book value of total assets. Regressions (1) to (4) use firm-fixed effects, regression (5) uses CEO-firm fixed effects, regression (6) uses chair-firm fixed effects, and regressions (7) and (8) are dynamic panel system GMM estimations (similar to those in Table 9). ROE_{t-1} is excluded from the set of control variables named *Firm characteristics*. All other sets of controls are as in Table 2. All variables are defined in Appendix A. Regressions (1) to (6) use robust t-statistics (in parentheses) are based on standard errors clustered by industry (4-digit SIC codes) and year, regressions (7) and (8) use robust standard errors clustered by firm. A constant is included in all regressions, but not reported. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	ROA	ROA	ROA	ln(ROA)	ROA	ROA	ROA	ln(ROA)
	Firm-fixed effects				**CEO-firm FE**	**Chair-firm FE**	**System GMM**	
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gap20 chair-CEO	**0.0439*** (4.466)**	**0.0354*** (3.036)**			**0.0342* (1.649)**	**0.0226** (2.059)**	**0.0787* (1.781)**	
Chair-CEO age difference (+/-)			**0.0005 (0.946)**					
Squared chair-CEO age difference			**0.0001*** (2.594)**					
Chair-CEO age difference absolute				**0.0013*** (2.794)**				**0.0025** (1.987)**
Chair younger				-0.0038 (-0.429)				0.0130 (0.455)
CEO age		-0.0292 (-0.862)						
Chair age		0.0582* (1.774)						
Other chair-CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CEO characteristics	Yes	Yes	Yes	Yes	CEO tenure, CEO change	Busy chair, Chair change, Chair tenure	Yes	Yes
Chair characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supervisory board characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	646	646	646	646	646	646	502	502
Fixed effects	Firm, year	Firm, year	Firm, year	Firm, year	CEO-firm, year	Chair-firm, year	Firm, year	Firm, year
R-squared (within)	0.208	0.212	0.211	0.184	0.248	0.248		
Arellano-Bond test for AR(1) (p-value)							0.001	0.000
Arellano-Bond test for AR(2) (p-value)							0.593	0.363
Hansen test for overidentification restrictions (p-value)							0.452	0.207
Diff-in-Hansen test GMM (p-value)							0.371	0.207