Available online at www.sciencedirect.com
ScienceDirect
Journal of Banking & Finance 32 (2008) 1098–1109
Journal of BANKING & FINANCE
www.elsevier.com/locate/jbf

The causal effect of board size in the performance of small and medium-sized firms ☆

Morten Bennedsen [a,c], Hans Christian Kongsted [b,c], Kasper Meisner Nielsen [c,d,*]

[a] Department of Economics, Copenhagen Business School, Denmark
[b] Department of Economics and Centre for Applied Microeconometrics, University of Copenhagen, Denmark
[c] Department of Finance, Chinese University of Hong Kong, Hong Kong SAR, China
[d] Centre for Economic and Business Research, Copenhagen, Denmark

Received 14 February 2007; accepted 6 September 2007
Available online 1 October 2007

Abstract

Empirical studies of large publicly traded firms have shown a robust negative relationship between board size and firm performance. The evidence on small and medium-sized firms is less clear; we show that existing work has been incomplete in analyzing the causal relationship due to weak identification strategies. Using a rich data set of almost 7000 closely held corporations we provide a causal analysis of board size effects on firm performance: We use a novel instrument given by the number of children of the chief executive officer (CEO) of the firms. First, we find a strong positive correlation between family size and board size and show this correlation to be driven by firms where the CEO's relatives serve on the board. Second, we find empirical evidence of a small adverse board size effect driven by the minority of small and medium-sized firms that are characterized by having comparatively large boards of six or more members.

JEL classification: G30; G32; K22

Keywords: Board size; Board of directors; Corporate governance; Privately held firms

1. Introduction

The structure and size of corporate boards have received much attention in the media and in the business community recently, fuelled by the prominent business failures of large companies such as Enron, Worldcom and Parmalat. The general view that board characteristics matter is reflected by an abundance of national and international guidelines for good corporate governance. A survey of the codes of conduct reveals that without exemption, a substantial amount of space is devoted to the specific organization of the corporate board.[1] Some codes even go as far as to recommend specific limitations on board size. These recommendations find their support in recent empirical research, which has established a negative relationship between board size and firm performance.

Characteristics of corporate boards are generally viewed as arising endogenously in response to the agency problems inherent in governing any organization (Hermalin and Weisbach, 2003). Board size, in particular, is known to be correlated with observable firm characteristics (e.g. firm size, firm age, industry affiliation) as well as unobserved factors that are potentially correlated with firm performance

☆ This paper was reviewed and accepted while Prof. Giorgio Szego was the Managing Editor of The Journal of Banking and Finance and by the past Editorial Board.

* Corresponding author. Address: Department of Finance, Chinese University of Hong Kong, Hong Kong SAR, China. Tel.: +852 2609 7743.
E-mail address: nielsen@baf.msmail.cuhk.edu.hk (K.M. Nielsen).

[1] All codes of conduct for good corporate governance available on the homepage of the European Corporate Governance Institute (www.ecgi.org) in January 2005 were collected and analyzed for discussions of the structure and role of the corporate board.

0378-4266/$ - see front matter © 2007 Elsevier B.V. All rights reserved.
doi:10.1016/j.jbankfin.2007.09.016

(e.g. investment and growth opportunities). This makes a causal interpretation of any observed correlation between board size and performance highly contestable even when it is possible to control for observable determinants of board size.

The main contribution of the present paper is to provide a thorough causal analysis of board size effects in small and medium-sized firms. Our instrumental variable (IV) approach exploits a unique dataset that allows us to define a novel instrument for board size, the number of children of the CEO. Given the prevalence of family firms, this instrument is firmly grounded in the institutional setting surrounding most closely held corporations. We show that the CEO's number of children is a plausible and valid instrument for board size: We find a strong positive correlation between the instrument and board size driven by the sub sample of firms where CEO children serve on the board. Moreover, we find little evidence to suggest that the CEO's number of children is correlated with unobservable determinants of firm performance; this supports the exclusion restriction. This allows us to give the observed correlation a causal interpretation: First, we find an overall small negative board size effect. Second, the adverse board size effect is driven by the minority of small and medium-sized firms with comparatively large boards of six or more members. Thus, we find no effect for firms with small boards of three to five directors.

In small and medium-sized companies, the role of the corporate board focuses on providing strategic advice; extending the network of the management; and, mitigating distributional conflicts among owners (Bennedsen, 2002 a.o.). Since the CEO often is a large owner with significant power, the board puts less emphasis on hiring, monitoring and providing the right incentives for the daily management. This is different from the large publicly traded companies that the board size literature so far has focused on. However, there are at least four reasons why our results are relevant for the general board literature: First, it is worth noticing that we use the population of privately held firms in Denmark which includes small and large firms. Second, a large body of literature shows that the most prevalent firm around the world is privately held *and* controlled by families.[2] Third, using data from Denmark, we obtain results that are consistent with the theoretical contributions by Jensen (1993) and Lipton and Lorsch (1992) and the empirical results in Yermack (1996) on large publicly traded firms in the US. Finally, we can replicate the basic results of a much cited analysis of board size on small and medium-sized firms in Finland by Eisenberg et al. (1998).

The rest of the paper is organized as follows: In the next subsection we provide a brief survey on board size literature focusing on causality issues. Section 2 describes the dataset. Section 3 establishes the source of exogenous variation in board size derived from the CEO's family characteristics. In Section 4 a standard OLS based approach is used, IV is introduced and finally we show that the negative board size effect is driven by the minority of firms with a comparatively large board. Section 5 concludes.

1.1. A review of the literature with a focus on causality

Theoretically, based on Mancur Olson's arguments from his study on the problems of collective actions, Jensen (1993) and Lipton and Lorsch (1992) argued that large corporate boards may be less efficient due to difficulties in solving the agency problem among the members of the board.[3] This conclusion is summarized in the survey by Hermalin and Weisbach (2003, p. 13, their emphasis):

> The idea is that when boards become *too* big, agency problems (such as director free-riding) increase within the board and the board becomes more symbolic and less a part of the management process.

Hermalin and Weisbach also emphasize that the corporate board should be considered an endogenously determined institution and that its organization depends on a number of firm characteristics. This is confirmed by several empirical studies analyzing the observable determinants of board organization (see Lehn et al., 2003; Boone et al., 2005; Linck et al., accepted for publication).

The first empirical study of board size effects on performance was done by Yermack (1996) who analyzes a panel of 452 large US firms from 1984 to 1991. Using a fixed effects approach, he shows that there is a negative and significant board size effect on Tobin's Q. The negative board size effect on performance has been confirmed in a number of studies on large publicly traded US firms. Other studies of large US firms provide evidence that the board size effect depends on the organizational form; Adams and Mehran (2005) find a positive board size effect for US banking firms whereas Coles et al. (forthcoming) show that the negative board size effect does not hold for firms with complex operations. Several studies show that the negative board size effects also exist for publicly traded firms in other countries: Conyon and Peck (1998) analyse firms in the UK, France, the Netherlands, Denmark and Italy; Mak and Yuanto (2001) in Malaysia and Singapore; Loderer and Peyer (2002) in Switzerland; and de Andres et al. (2005) in 10 OECD countries. In contrast, Jong et al. (2000) and Black et al. (2004) report insignificant effects in Dutch and Korean firms, respectively. Kiel and Nicholson (2003) find positive board size effects in Australia. Thus with few exceptions, the negative board size effect is well established for large publicly held corporations across countries.

[2] See La Porta et al. (1999), Claessens et al. (2000), Faccio and Lang (2002).

[3] Jensen (1993, p. 865) writes *"When boards get beyond seven or eight people they are less likely to function effectively and are easier for the CEO to control."*

In a frequently cited study, Eisenberg et al. (1998) extend the board size literature to include small and medium-sized closely held corporations. Their sample consisted of almost 900 firms in Finland, most of which had from 3 to 7 directors on the board. A significant negative board size effect was found even for these small firms. Moreover, the estimated effect on performance was large: According to their most conservative estimate, an increase in board size, e.g. from 3 to 4 directors, lowers the returns on assets by approximately 11% points on average at the sample mean of 13%.

In sum, the negative board size effect has been confirmed by many studies on publicly traded firms and extended to closely held corporations by a single study. This has created a general view in the literature that board size is negatively related to performance for firms and boards of all sizes. Hermalin and Weisbach (2003) conclude: "The data therefore appear to reveal a fairly clear picture: board size and firm value are negatively correlated".[4] This is in contrast to the theoretical literature, which holds that a negative board size effect should only apply to firms with a relatively large number of directors.

In the following, we re-examine the board size effect in small and medium-sized firms. To the best of our knowledge this is the first paper that seeks to thoroughly identify the causal effect of board size on performance. Using an IV approach we address a general concern in the literature that board characteristics could be correlated with inherently unobservable determinants of firm performance. This suggests that board size should be treated as an endogenous regressor to estimate its causal effect on performance. Eisenberg et al. address this concern by using simultaneous equations estimation and adopt an identification approach which *a priori* hinges on a single restriction, namely the exclusion of the business group affiliation dummy from the performance relationship. The validity of this exclusion restriction is questioned by evidence in the corporate finance literature of lower firm value and performance in business groups (see Claessens et al., 2006; Volpin, 2002 a.o.). Thus, the Eisenberg et al. identifying assumption seems unfounded by the literature. Empirically, we show that their findings of a large, negative board size effect can be attributed to an omitted negative effect of business group affiliation.

Studies on publicly traded firms have used other exclusion restrictions, for example the implementation of anti-director rights, ownership concentration, ownership by banks and institutional investors, network between boards in financial and non-financial firms (Postma et al., 2003); the degree of state ownership (Beiner et al., 2004); CEO tenure, CEO age, firm age and the amount of free cash flow (Coles et al., accepted for publication); and the percentages of outside directors (de Andres et al., 2005). It seems difficult to argue that these variables do not have a direct effect on firm performance, as would be required for valid identification: Numerous studies starting with Demsetz and Lehn (1985) and Morck et al. (1988) have analyzed the impact of ownership concentration on firm performance with mixed results; the efficiency and performance of state owned enterprises have been a major concern in the expansive literature on privatization; the relationship between performance, good governance and the number of outside directors has been central in the debate over the last decade on how to improve the quality of governance in corporations.

While acknowledging the inherent difficulties in a full system analysis of board size and firm performance, we argue in this paper that valid identifying assumptions can be established. In particular, we show that the causal effect going from board size variations to the performance of small and medium-sized firms can be identified from the close family ties that characterize the majority of these firms. In comparison to the system analysis found in the literature, our approach is focused upon the causal performance effect while the determinants of board size are treated as a reduced form.

2. Data

Our data include all closely held corporations with limited liability in Denmark in 1999. The data originate from the annual reports that all closely held corporations are required to submit to the Danish Ministry of Economic and Business Affairs. The data include financial items from both the income statement and the balance sheet, ownership information, and the name and identity of the CEO and the board members.

We consider the population of joint stock companies, which are obligated to have a corporate board of at least three members. They total 14,909 in 1999. We comply with the standard selection criteria for performance evaluations by excluding regulated industries and financial intermediaries from the analysis, thereby reducing the number of firms to 8225.[5] A number of extremely small firms (primarily firms that were recently established) and firms that have changed industry or reporting standards are also excluded. As a result, 7496 firms represent the population for this analysis.

Our main strategy in identifying the causal effect of board size on firm performance relies on CEO's family characteristics. We use a sample of 6850 firms with information on the CEO's family characteristics.[6] To access

[4] This tendency was confirmed by tracking papers and articles that discuss board size effects using GOOGLE SCHOLAR. More than 100 articles state the existence of a negative board size effect on large *and* small firms using the Eisenberg et al. study as their only reference for the effect in small and medium-sized firms.

[5] *Inter alia*, utilities, financial intermediaries, business services, community, social and personal service activities that are likely to be regulated industries are excluded. Our sample consists of firms with primary industry affiliation within NACE groups 10 through 36 and 45 through 63.

[6] We cannot track the family characteristics of foreign CEOs who have not become naturalized. As Danish nationality law prevents adults from holding multiple citizenships our sample will by construction exclude foreign CEOs.

Table 1
Board size and return on assets

Board size	All firms				CEO family characteristics sample			
	N	Assets	RoA	Industry-adjusted RoA	*N*	Assets	RoA	Industry-adjusted RoA
3	4542	10.7	0.067	0.005	4191	10.6	0.067	0.004
		(5.8)	(0.063)	(0.000)		(5.8)	(0.063)	(0.000)
4	1614	20.6	0.061	−0.001	1459	18.5	0.063	0.001
		(7.8)	(0.061)	(0.000)		(7.5)	(0.061)	(0.001)
5	871	27.4	0.065	0.003	794	26.3	0.066	0.004
		(12.5)	(0.066)	(0.004)		(11.8)	(0.065)	(0.004)
6	288	108.9	0.047	−0.016	251	95.0	0.052	−0.011
		(25.6)	(0.050)	(−0.011)		(23.7)	(0.051)	(−0.013)
7+	181	184.5	0.035	−0.025	155	172.4	0.036	−0.023
		(42.5)	(0.040)	(−0.012)		(39.7)	(0.041)	(−0.008)
All	7496	22.8	0.064	0.002	6850	20.9	0.065	0.002
		(7.1)	(0.062)	(0.000)		(6.9)	(0.062)	(0.000)
F-test, equal means		103.8***	4.37***	4.02***		79.8***	3.11**	2.71**
		[0.000]	[0.002]	[0.003]		[0.000]	[0.015]	[0.029]

This table reports the mean and median of book value of *assets*, operating return on assets (*RoA*) and *industry-adjusted RoA* for board size categories ranging from 3 to 7+. Medians are reported in parentheses. *All firms* is the gross sample of firms, whereas *CEO family characteristics sample* is the sample of firms for which we were able to obtain information on the CEO's family characteristics (see Section 2 for further details). We test the equality of means across firm size categories. Numbers in brackets are *p*-values, whereas *** and ** denote significance at the 1% and 5% level, respectively.

the family records in the official Danish Civil Registration System (CPR), we have obtained the CEO's social security number (CPR number) from the Danish Commerce and Companies Agency. This dataset reports both the names and CPR numbers of the founders, management and board members of all limited liability firms.[7] The CPR number of each CEO was submitted to CPR, which then provided the name and CPR number of all nuclear family members.

The CEO family characteristics sample of 6850 firms has an average board size of 3.7, mean assets of 20.9 million DKR (2.8 million EUR) and a mean firm age of 18.1 years. Thus, our sample consists mainly of small and medium-sized firms. It complements the samples used by Yermack (1996) and others to study board size effects in large publicly traded firms which in general have much larger boards. The main variables in the gross and CEO family characteristics samples and their relationships to board size can be compared in Table 1, which shows that small and medium-sized firms dominate both samples and that the number of directors is positively related to firm size measured by assets.

Table 1 also shows the raw relationship between performance and board size. For both samples, there are no noticeable differences between the average RoAs of firms with 3, 4 or 5 directors. Firms with six or more board members have lower RoAs on average. This pattern is confirmed when we industry-adjust RoA at the two-digit industry level. In conclusion, Table 1 illustrates that there is some evidence of increased board size being associated with lower returns on assets, but only for firms with comparatively large boards.

3. Family size as exogenous variation in board size

We argue in the following that exactly the fact that many small and medium-sized firms have strong family ties provides a valuable source of variation in governance characteristics, which can be claimed as exogenous in terms of corporate performance.[8] Specifically, we use information on the family relationships of the CEO to establish a valid instrument for the relationship between corporate performance and board size.

The candidate source of exogenous variation in board size is the CEO's number of children. Two conditions must be satisfied for the IV estimation strategy to work. First, a systematic relationship should be established between the CEO-related instrument and the size of the corporate board. Secondly, the CEO-related information should be exogenous, that is, not related to firm performance given the set of observable determinants of performance controlled for. Each condition is considered in turn and evidence is provided to substantiate this identification strategy.

First, due to the significant overlap between ownership and control in small and medium-sized firms the bulk of CEOs are controlling owners. In fact, more than 75% of the CEOs are also owners of the corporation. We regard the CEO's number of children at or above the age of 18[9] as being positively related to the size of the relevant 'pool' of director candidates. We expect such a correlation to be most pronounced in family-related businesses where CEO relatives serve on the board.

[7] Under Danish corporate law firms are required to file with the Agency any change in CEO or board positions within two weeks of the actual date of occurrence.

[8] Bennedsen et al. (2004) estimate – using a 50% control threshold – that between 80% and 90% of all small and medium-sized firms in Denmark are controlled by families.

[9] The age at which people are legally eligible to become board members in Denmark.

Table 2
CEO family size, board size and performance

CEO's number of children aged 18+	*N*	Board size	RoA	Industry-adjusted RoA
0	2377	3.56	0.0665	0.0006
1	989	3.63	0.0561	−0.0006
2	2262	3.66	0.0690	0.0006
3	906	3.78	0.0583	−0.0005
4+	317	4.32	0.0677	0.0005
All	6850	3.67	0.0648	0.0000
F-test, difference		6.12***	0.02	0.02
between 0 and 4+		[0.000]	[0.878]	[0.887]

This table reports the mean board size, operating return on assets (*RoA*) and *industry-adjusted RoA* for CEO's number of children aged 18 or above categories ranging from 0 to 4+. We test the equality of means between firms where the CEO has 0 and 4+ children aged 18 or above. Numbers in brackets are *p*-values, whereas *** denotes significance at the 1% level.

Table 3
Board member identity and CEO relatives

Board member identity	All board members		Board members in sub sample of firms with CEO relatives on board		
	N	%	*N*	%	% relatives
CEO	6625	26.4	3631	29.4	
CEO relatives					
Spouse	2592	10.3	2592	21.0	52.0
Child	1608	6.4	1608	13.0	32.3
Sibling	202	2.3	202	1.6	4.1
Parent	578	0.8	578	4.7	11.6
Other owners	3749	14.9	1010	8.2	
Other owners' relatives	373	1.5	123	1.0	
Outsiders	9397	37.4	2608	21.1	
All	25,124	100.0	12,358	100.0	

This table reports the identity of *All board members* in the CEO family characteristics sample and for *Board members in the sub sample of firms with CEO relatives on the board*. We classify board members into: CEO, CEO relatives, other owners, other owners' relatives and outsiders (the residual). CEO relatives are the relatives of the CEO who are not owners of the firm. We define other owners' relatives as people related to other owners but unrelated to the CEO. Outsiders is the residual group of directors that are neither CEO, owner or their immediate family members. Relatives are defined as nuclear family members. We further classify CEO relatives into spouses, children, siblings and parents.

Table 2 shows the mean board size as a function of the CEO's number of children aged 18 or above. We include both male and female children as the male bias present in e.g. Asian countries appears to be less strong in Denmark. Of the CEO children serving as board members in our sample, 38% are female. The table indicates a general tendency toward a positive relationship between board size and CEO family size. We can reject the equality of means between individual family size categories. Specifically, in firms where the CEO has no children the average board size is 3.56 compared to an average of 4.32 for firms where the CEO has four or more (adult) children. The underlying correlation coefficient between board size and the CEO's number of children aged 18 or above is 0.13. As expected, the correlation is stronger (with a correlation coefficient of 0.18) in the sub sample of firms where CEO children serve on the board. In contrast, the correlation between the instrument and the return on assets is small: −0.004 for RoA and −0.011 for industry-adjusted RoA with *p*-values of 0.75 and 0.34, respectively. While no firm conclusions can be drawn at this stage, this can be seen as consistent with our exclusion restriction.

To further validate our claim that the number of CEO's children provides a source of systematic variations in board size across firms, Table 3 reports the identity of board members. We report the number of directors who are either CEO, relatives of the CEO, other owners, other owners' relatives, or outsiders (the residual). We define relatives of the CEO such that we only count relatives who are not owners of the firm. Likewise we define other owners' relatives as people related to other owners but unrelated to the CEO. Finally, the residual group of outsider directors are neither the CEO, owners nor their immediate family members.[10]

Table 3 shows that 26.4% of all board members are CEOs, whereas CEO relatives occupy 19.8% of all board seats. Thus, in total the CEO and their relatives account for almost 50% of all directorships. Other owners and relatives account for 16.4%, whereas outsiders occupy the remaining 37.4%. As a measure of the quantitative importance of our instrument, the number of CEO children, we note that among the CEO relatives the children account for 32.3% of the family board seats, corresponding to 6.4% of all board seats and 10.9% of board seats not occupied by managers or owners. Moreover, in firms with CEO-relatives on the board, the CEO and relatives account for more than two-thirds of the total board seats. Among these firms, the CEO's children account for 13% of all directorships. In sum, the evidence is consistent with our identification strategy: CEOs and their relatives are frequently appointed as board members of small and medium-sized firms.

Table 4 reports the first stage regression. We find a strong positive effect of the CEO's number of children aged 18 or above on board size. On average, the board size increases by 0.08 members for each adult offspring, an effect which is significant at the one-percent level. The effect is robust against controlling for CEO and ownership characteristics in Column II. Column III uses a sample in which CEO children are actually serving on the board. Consistent with our identification strategy we find a larger effect of CEO children on board size in the sub-sample of firms where our story predicts the strongest link. Finally, in Column IV we restrict the sample to CEOs with at least one adult child. Again, the coefficient on the number of children is almost twice as large as the coefficient obtained in the full sample (Column II). Thus, the identification of board size is not driven by CEOs without children as we

[10] We define relatives as nuclear family members. Thus, Table 3 provides a lower bound on the estimated family influence on boards of small and medium-sized firms.

Table 4
First stage regression of board size–firm performance relationship

	(I)	(II)	(III)	(IV)
A. Identification				
CEO's number of children aged 18+	0.0845*** (7.40)	0.0779*** (6.88)	0.1348*** (3.45)	0.1343*** (6.59)
B. Controls				
Firm size (log. assets)	0.2623*** (17.7)	0.2196*** (15.3)	0.1860*** (7.39)	0.2309*** (14.1)
Firm age	0.0026*** (2.91)	0.0027*** (3.05)	0.0011 (0.57)	0.0027** (2.49)
Business group	0.3526*** (4.26)	0.3182*** (3.96)	0.1924 (0.91)	0.1972** (2.27)
Multiple business segments	0.0239 (0.94)	0.0221 (0.89)	0.0426 (0.83)	0.0277 (0.90)
C. CEO and ownership				
CEO age		0.0097** (2.36)	0.0235*** (3.05)	0.0125*** (2.93)
CEO is owner		−0.3483*** (−10.6)	−0.0943 (−1.33)	−0.3434*** (−8.25)
Multiple owners		0.3873*** (17.1)	0.4061*** (6.52)	0.3939*** (13.5)
Industry effects	YES	YES	YES	YES
N	6850	6850	1241	4473
R-squared	0.16	0.21	0.20	0.21

The dependent variable is board size. This table reports the first stage from the two-stage-least-squares estimation of board size–firm performance relationship using the *CEO's number of children aged 18+* as instrument for board size. Columns I and II is the CEO family characteristics sample, Column III is the sub sample of firms with CEO-children on the board, whereas Column IV is the sub sample of firms where the CEO has at least one child aged 18+. Numbers in parentheses are *t*-statistics based on robust standard errors. Each equation also includes intercept and industry dummies on the two-digit NACE level. *, ** and *** denote significance at the 10%, 5% and 1% levels in a two-sided test, respectively.

find a stronger correlation for the sub-sample of CEOs with (adult) offspring. Throughout, we control for an array of firm characteristics.[11] Consistent with e.g. Lehn et al. (2003) we find that standard controls such as firm size, firm age, and business group affiliation are strong determinants of board size.

The second condition for the validity of our identification strategy is the requirement that CEO family characteristics are indeed excludable from the performance relationship. Two types of endogeneity problems figure prominently in the literature: Reverse causation and omitted variable bias. Reverse causation in this context implies that CEOs make fertility decisions based on firm performance. We note that the fertility decision and subsequent firm performance are well separated in time with firms being observed in 1999 and CEO offspring being born in 1981 at the latest. Moreover, we present an alternative specification that employs the number of *founders'* children as instrument for board size. In the founder sample, fertility and business decisions are separated even longer in time making reverse causation highly unlikely.

In terms of omitted variables, the basic exogeneity claim is – conditionally on observable determinants of current performance – that no correlation exists between the instrument, the CEO's number of children, and unobservables affecting current firm performance. The claim is supported first of all by the fact that we are able to control for a rich set of current firm characteristics. Secondly, while a small negative correlation between the number of CEO children and firm performance was identified above, this can be attributed to the reduced-form relationship going via board size and thus fully consistent with the exclusion restriction. While the exclusion restriction remains contestable we will address some immediate concerns regarding omitted variables.

First, the innate ability of the CEO in managing the firm is a potential omitted variable and (positively) related to fertility. More children could also provide a source of highly motivated labour and thus enhance the productivity of the firm. However, there are also potential negative effects of having more children due to the trade-off between time invested in child-bearing activities and the available time for the CEO to mind his or her business. While the likelihood that time-intensive child-care activities have an impact on firm performance reduces due to the long time-lag between births and current firm performance, there is *a priori* no definite sign apparent for any correlation related to ability and fertility decisions. Second, a prime candidate for an omitted variable in the context of small and medium-sized firms is 'family conflict'. Bennedsen et al. (2004) argue that the likelihood of family conflict increases in the number of children and argue that conflicts potentially affect firm performance negatively. If this bias is prevalent our IV estimates of the board size effect will be negatively biased. Family conflict considerations are also the main reason that we do not consider information on the CEO's current or previous marriages as exogenous in this context. Third, older CEOs might be more prone to place family members on the board and might work less hard due to early retirement on the job. In this case our instrument will correlate with firm performance due to an omitted retirement effect. We therefore include a control for CEO age.[12] Fourth, another potential source of correlation could be derived from the process of CEO choice in family firms. In particular, Bennedsen et al. (2007) show that the *departing* CEO's family size is positively correlated with appointing a family heir as the new CEO, which is

[11] We will introduce each of the control variables in Section 4.

[12] To capture the potential non-linearity between CEO age and firm performance due to early retirement on the job, we specify the CEO age control such that the reference group is CEOs aged 60 and below. For CEOs in this group the CEO age variable takes the value zero, whereas for CEOs aged above 60 the variable measures actual age minus 60. Our results are robust to alternative specifications using age thresholds of 65 and 70, as well as an indicator for CEOs aged 60 or above. We thank a referee for suggesting this.

shown to be harmful to post-succession performance. However, here we measure the family size of the *current* CEO. Thus, any effect of the current CEO's family characteristics on performance again seem ambiguous. We further control for direct performance effects by including a dummy for firms where the CEO is an owner. Moreover, with a median firm age of 14 years, few firms will have undergone any generational change in management. The net impact, if any, on firm performance via a family CEO channel appears ambiguous.

In sum, we will conclude that there is little evidence that our instrument does not satisfy the basic exclusion restriction. Any effect of CEO's family relationships on current performance runs via the size of the corporate board and not through current but unobserved aspects of the management of the firm.

4. Board size and firm performance

This section reexamines the relationship between board size and firm performance. We report OLS results as well as the second stage of the IV analysis using the CEO's number of children as an exogenous source of variation in board size. As a robustness check we also provide results obtained by using the number of founders' children as an alternative instrument for board size. We then show how the differences between our results and the results in Eisenberg et al. most likely can be attributed to their identification strategy and provide additional insights on the composition of the board size effect.

4.1. OLS and instrumental variable results

The dependent variable in the performance equation is the operating return on assets (RoA) of the firm in 1999. The variable of main interest, the number of board members, enters linearly in the basic specification. Other studies have imposed a log transformations, e.g. Yermack (1996) and Eisenberg et al. (1998). The range of variation in board size is narrow and, if anything, the unconditional relationship between board size and performance in Table 1 suggests smaller effects in the lower range of board size, not larger effects as would be implied by a log transformation. None of our basic findings are affected by the choice of a simple linear specification.

The following standard set of controls[13] for firm performance is employed throughout the empirical analysis: Firm size (log. of assets); firm age; dummies for firms operating in multiple business segments and for being in a business group. Ownership distribution may have a direct impact on performance, since it is the main mechanism aligning the interest of controlling and non-controlling owners (Bennedsen and Wolfenzon, 2000). We control for the ownership distribution by including an indicator variable that takes the value one when the firm has multiple owners, thereby using single-owned firms as the reference category. We further add a dummy for whether the CEO is an owner, to control for differences in performance between firms with a family CEO and firms with an outside CEO and a control for CEO age.

Table 5 reports the results from the OLS and IV regressions. The regressions in Columns I and II include only board size and standard controls, whereas Column III and IV add CEO and ownership variables. Most effects of standard controls are consistent across the specifications. Firm size has an increasing although concave effect on performance. The multiple business segment dummy is insignificant, whereas firms with a business group affiliation have a significantly lower performance. Older firms seem slightly less profitable than younger firms. The OLS estimate of the performance effect of board size is negative and, although small, highly significant. Adding CEO and ownership information does not change that conclusion.

The consistency of the OLS results and their *ceteris paribus* interpretation clearly rely on the exogeneity of all regressors in the performance equation, including the board size variable. The IV regressions examine the empirical validity of this assumption. As argued in the introduction, unobserved performance determinants may exist that are also related to board size. If so, the OLS results do not identify the causal effect of board size variations on performance.

Columns II and IV in Table 5 report IV estimation results based on the extended specification of the structural performance equation. The performance equation is estimated in a two-stage least squares procedure. The first stage is a reduced-form regression of board size on the instrument, CEO's number of children, and all the other exogenous variables in the model.[14] The second-stage regression includes the predicted value of board size from the first-stage regression along with the exogenous determinants of performance.

The estimated effect of board size is negative but insignificantly different from zero which suggests that performance and board size are unrelated once endogeneity is controlled for. Even with inflated standard errors we safely reject any negative board size effects in the order of magnitude of 11% points found by Eisenberg et al. (1998).

The relative precision of the IV estimates clearly relies on the strength of the instrument. A test of the validity of the instrument can be provided by testing the significance of the reduced-form relationship between the potentially endogenous regressor, board size, and the instrumental variable, the CEO's number of children, conditional on the set of included exogenous regressors in the performance equation. In the case of no significance, a "weak instruments" problem exists. Staiger and Stock (1997) argue that *F*-tests

[13] Industry dummies at the two-digit NACE level are included throughout.

[14] The corresponding first-stage regressions of board size were reported in Columns I and II in Table 4, respectively.

Table 5
OLS and IV estimates of the board size–firm performance relationship

Sample	CEO family characteristics sample				Founder family characteristics sample	
	(I)	(II)	(III)	(IV)	(V)	(VI)
Estimation method	OLS	IV	OLS	IV	OLS	IV
A. Board variables						
Board size	−0.0068***	−0.0161	−0.0063***	−0.0090	−0.0110***	−0.0131
	(−4.59)	(−1.12)	(−4.17)	(−0.58)	(−3.26)	(−0.39)
B. Controls						
Firm size	0.0145***	0.0170***	0.0144***	0.0150***	0.0171***	0.0174***
	(8.32)	(4.00)	(8.17)	(3.83)	(4.83)	(2.54)
Firm age	−0.0005***	−0.0005***	−0.0005***	−0.0005***	−0.0001	−0.0001
	(−6.20)	(−5.64)	(−5.64)	(−5.14)	(−0.81)	(−0.80)
Business group	−0.0321***	−0.0288***	−0.0328***	−0.0319***	−0.0336**	−0.0333**
	(−5.78)	(−3.93)	(−5.95)	(−4.46)	(−2.39)	(−2.32)
Multiple business segments	−0.0011	−0.0008	−0.0022	−0.0021	−0.002	−0.0021
	(−0.33)	(−0.23)	(−0.68)	(−0.65)	(−0.34)	(−0.35)
C. CEO and ownership						
CEO age			−0.0019***	−0.0019***		
			(−5.54)	(−4.77)		
CEO is owner			0.0156***	0.0147**		
			(3.74)	(2.15)		
Multiple owners			0.0081**	0.0091	0.0007	0.0013
			(2.48)	(1.37)	(0.11)	(0.11)
D. Founders						
Multiple founders					0.0153	0.0155
					(2.48)	(2.16)
Industry effects	YES	YES	YES	YES	YES	YES
Identification		54.3***		47.3***		14.5***
		[0.000]		[0.000]		[0.000]
Hausman test		0.42		0.03		0.57
		[0.516]		[0.862]		[0.210]
N	6850	6850	6850	6850	2087	2087
RMSE	0.13	0.13	0.13	0.13	0.13	0.13

The dependent variable is the operating return on assets (RoA). This table reports the second stage from the two-stage-least-squares estimation of the board size–firm performance relationship. We use the *CEO's number of children aged 18+* and the *founders' number of children aged 18+* as instrument for board size in the *CEO* and F*ounder family characteristics sample*, respectively (see Section 4 for a motivation of the instrument and Table 4 for the first-stage regressions). *Identification* is an *F*-test of the significance of the instrument in the first-stage regression. *Hausman test* is a test of significant bias in the corresponding OLS estimates. *RMSE* reports the root mean squared error. Numbers in parentheses are *t*-statistics, whereas numbers in brackets are *p*-values. Both are computed using robust standard errors. Each equation also includes intercept and industry dummies on the two-digit NACE level. *, ** and *** denote significance at the 10%, 5% and 1% levels in a two-sided test, respectively.

of significance should be at least five and preferably 10. The CEO's number of children qualify as a valid instrument based on this criterion with a *F*-test of identification of 54.3 and 47.3 in Columns II and IV, respectively. Thus, our instrument, the CEO's number of children, appears strong in both specifications.

Having established a significant correlation between the proposed source of exogenous variation and the size of the board, the IV results can then be used to address the question if the board size effect estimated by a simple OLS regression is substantially biased or not. Table 5 reports the Hausman test, which tests the significance of the differences between the OLS estimates (which are consistent and efficient if board size turns out exogenous) and the IV results (which are consistent in any case).[15] Based on the CEO's number of children instrument there is no evidence that the OLS estimates are significantly biased, as the Hausman test has a *p*-value of 52%. Thus, the OLS results are preferable on the grounds of efficiency.[16] A similar conclusion emerges from Column IV where we have added ownership controls.

As a robustness check we now consider an alternative strategy using the family relations of the *founders* of the firm in identifying the board size-performance relationship. A founder-based strategy is considered conservative in terms of the critical *a priori* argument of exogeneity of the instrumental variable. Nonetheless, the added credibility of the founder-based instrument comes at a potential

[15] The particular form of the test performed here is a residual-addition test, see e.g. Wooldridge (2002).

[16] OLS can be seen as a special case of IV where no instruments are used. When all the regressors are in fact exogenous, the OLS estimator is efficient in this class of estimators, see Wooldridge (2002, p. 97) for further discussion.

cost in terms of the precision of the estimates because it is expected to show a lower correlation with current board size than the alternative, the current CEO's number of children. Further, personal founder information is only available for around one-third of the firms, due to the fact that founder information is available only for firms incorporated in 1986 or later.[17] The requirement that all founders are individuals leaves a sample of 2087 observations.[18]

The construction of the sample explicitly imposes a time lag between fertility decisions affecting founder-related information and the earliest establishment date of any firm in the sample, which thereby limits the relevance of "reverse causation" considerations. Specifically, because the founder data only include firms established in 1986 or later, the fertility decision was taken at least 5 years before the firm was established as we only count children aged 18 or above 1999 (i.e. children born in 1981 or before).

Column VI in Table 5 reports the results from the IV estimates using number of founders' children aged 18 or above as the instrument for board size. In addition to the controls used throughout the paper, we control for the number of founders of the firm. The basic insights from the main analysis are confirmed. Board size has a negative, although insignificant effect on performance. The test of identification reveals that the number of founders' children is not a weak instrument for board size. The test for whether board size is endogenous remains insignificant which again implies that that the OLS results in Column V confirming a small negative board size effect, should be preferred.[19] Thus, our results remain unchanged when we apply a more conservative instrument in terms of fulfilling the exclusion restriction.

In conclusion, the CEO's number of children has been established as a valid instrument for board size. Based on the Hausman test, OLS results are preferred to the IV-estimates. Thus, we find a negative board size effect although of a significantly lower order of magnitude than the findings of the existing study by Eisenberg et al. (1998). To explain this difference we proceed by replicating the Eisenberg et al. identification strategy in our sample of Danish small and medium-sized firms.

4.2. Replication of the Eisenberg et al. identification strategy

Eisenberg et al. address the endogeneity concern by using a simultaneous equations approach. They model board size as a function of performance, size, age and whether or not the firm belongs to a business group.[20] The performance equation, on the other hand, models the return on assets (RoA) as a function of board size, board member payment disturbances, the size and age of the firm, and the change of total assets as a measure of growth opportunities. The identification of board size effects in the performance relationship *a priori* hinges on a single restriction, namely the exclusion of the business group dummy from this relationship. We already noted in the introduction that there is ample empirical evidence to counter such a restriction. Likewise, we found a strong negative effect of business group affiliation in Table 5. Nevertheless, in order to replicate the Eisenberg et al. findings on our data we will follow their identifying strategy and impose the exclusion restriction. The results are reported in Table 6 together with OLS results to facilitate a comparison with our results. We report the results without (Columns I and II) and with ownership variables as controls (Columns III and IV) as ownership information is absent in Eisenberg et al.

The OLS results again show a small negative board size effect comparable to the results we obtained in Table 5 where the business group affiliation dummy was included. In contrast, the IV results differ dramatically as we now find a negative board size effect of 11% points. Thus, when replicating the identification strategy we obtain results which are very similar to the Eisenberg et al. result: Increasing the board size by one from three to four directors will lead to 11% points lower return on assets.

The replication of their identification strategy shows that the extremely large board size effect is an artifact of the Eisenberg et al. identification strategy. From Table 4 it is evident that business group affiliation is positively and significantly correlated with board size. Thus, the business group dummy meets the first out of the two necessary conditions for a valid instrument. However, there appears to be a strong and significantly negative direct effect of business group affiliation on performance as shown in Table 5. Thus, the proposed instrument violates the exclusion restriction, due to the well-documented negative effect of business group affiliation on performance (see Claessens et al., 2006; Volpin, 2002 a.o.). Eisenberg et al. thereby erroneously attribute the negative effect of business group affiliation to board size due to the direct effect on firm performance.

4.3. Additional insights on the negative board size effect

In this section we consider whether small and medium-sized firms with comparatively large boards dominate the negative effect as suggested by the theory on corporate boards (Jensen, 1993; Lipton and Lorsch, 1992).

We apply two approaches in Table 7. The first approach uses the fact that board size is an integer to construct

[17] The founders of a firm are defined as the one or more individuals who filed the forms and officially registered the firm with the Danish Commerce and Companies Agency. In most cases the founders are one or more of the original owners. In any case, the founders can be held liable for the firm's activities until the company is formally incorporated.

[18] Approximately one-third of the firms with personal founders have a single founder and approximately 90% of the firms have three or less founders.

[19] Essentially, because we cannot empirically reject that the regressor in question is exogenous, the OLS estimator is efficient, see Wooldridge (2002, p. 97).

[20] See Table 3 of Eisenberg et al.

Table 6
OLS and IV estimates of the board size–firm performance relationship using the Eisenberg et al. (1998) identification strategy

Estimation method	(I) OLS	(II) IV	(III) OLS	(IV) IV
A. Board variables				
Board size	−0.0074***	−0.1127***	−0.0068***	−0.1304***
	(−4.97)	(−3.85)	(−4.53)	(−3.59)
B. Controls				
Firm size	0.0123***	0.0447***	0.0121***	0.0439***
	(7.56)	(5.12)	(7.37)	(4.84)
Firm age	−0.0005***	−0.0004**	−0.0005***	−0.0002
	(−6.27)	(−2.43)	(−5.73)	(−1.34)
Multiple business segments	−0.0010	0.0044	−0.0021	0.0037
	(−0.32)	(1.03)	(−0.67)	(0.81)
C. CEO and ownership				
CEO age			−0.0019***	−0.0013*
			(−5.45)	(−1.66)
CEO is owner			0.0158***	−0.0307**
			(3.77)	(−2.24)
Multiple owners			0.0079**	0.0596***
			(2.43)	(4.00)
Industry effects	YES	YES	YES	YES
Identification		18.3***		15.3***
		[0.000]		[0.000]
Hausman test		33.5***		48.4***
		[0.000]		[0.000]
N	6850	6850	6850	6850
RMSE	0.13	0.16	0.13	0.17

The dependent variable is the operating return on assets (RoA). This table reports the second stage from the two-stage-least-squares estimation of the board size–firm performance relationship where we replicate the Eisenberg et al. identification strategy by using *Business Group* affiliation as the instrument for board size. *Identification* is an *F*-test of the significance of the instrument in the first-stage regression. *Hausman* is a test of significant bias in the corresponding OLS estimates. Numbers in parentheses are *t*-statistics, whereas numbers in brackets are *p*-values. Both are computed using robust standard errors. Each equation also includes intercept and industry dummies on the two-digit NACE level.*RMSE* reports the root mean squared error. Numbers in parentheses are *t*-statistics, whereas numbers in brackets are *p*-values. *, ** and *** denote significance at the 10%, 5% and 1% levels in a two-sided test, respectively.

Table 7
Flexible OLS estimates of the board size–firm performance relationship

Estimation method	(I) OLS	(II) OLS	(III) OLS	(IV) OLS
A. Dummy specification				
Dummy for board size = 4 (BS4)	−0.0054			
	(−1.36)			
Dummy for board size = 5 (BS5)	−0.0062			
	(−1.27)			
Dummy for board size = 6 (BS6)	−0.0209**	−0.0180*		
	(−2.10)	(−1.83)		
Dummy for board size ⩾ 7 (BS7+)	−0.0368***	−0.0335***		
	(−3.74)	(−3.48)		
Dummy for board size ⩾ 6 (BS6+)			−0.0237***	
			(−3.19)	
B. Piecewise linear specification				
Small boards (SBS = Min[board size, 5])				−0.0030
				(−1.31)
Large boards (LBS = Board size * BS6+)				−0.0032***
				(−2.94)
Joint *F*-test, exclude BS4 and BS5	1.42			
	[0.243]			
F-test, BS6 = BS7+		1.43		
		[0.232]		
C. Controls	YES	YES	YES	YES
D. CEO and ownership	YES	YES	YES	YES
Industry effects	YES	YES	YES	YES
N	6850	6850	6850	6850
RMSE	0.13	0.13	0.13	0.13

The dependent variable is the operating return on assets (RoA). The models include control, CEO and ownership variables even though they are not reported. Each equation also includes intercept and industry dummies on the two-digit NACE level. *RMSE* reports the root mean squared error. Numbers in parentheses are *t*-statistics, whereas numbers in brackets are *p*-values. Both are computed using robust standard errors. *, ** and *** denote significance at the 10%, 5% and 1% levels in a two-sided test, respectively.

dummy variables for boards of four, five, six and seven (or more) members. The second approach uses a piecewise linear approach, which specifies a linear relationship between board size and RoA, but allows for different slopes in small (five or fewer members) and large boards (six or more members). The effects of other performance determinants are largely unaltered and therefore not reported in Table 7.

The unrestricted dummy variable specification in Column I suggests no significant performance differences between boards of three to five members. Boards with six and seven or more members are associated with a significantly lower RoA. The *F*-test of excluding dummies for small boards of five or less members is easily accepted. The restricted specification reported in Column II shows a strongly significant effect of large boards. Boards with six (seven) members have a 2.09 (3.68)% point lower RoA. This suggests that the small negative board size effect we found in the previous section is an average of no effect for small boards and a negative effect for larger boards. In Column II of Table 7 we cannot reject the null of identical effects of six and seven or more members. In Column III we therefore estimate the joint effect of six or more board members. Finally, in Column IV we use the piecewise linear specification that allows a change in the slope of the board size-performance relationship at six board members. The breakpoint between five and six is suggested by the unconditional RoAs reported for each board size in Table 1 and by the results in Columns I and II. Again, the effect is found to be insignificant in small boards. The effect in large boards is of a similar order of magnitude as the estimates in Columns II and III. The predicted performance effect of a board of six members in Column IV is −3.42% points.[21]

[21] The predicted effect of a board of six members in Column IV is $-0.0030*5 + (-0.0032*6) = -0.0342$ and $(-0.0032*6) = -0.0192$ when we include and exclude the insignificant small boards effect, respectively.

In summary, the results of the decomposition of the negative board size effect are thus supportive of the prediction by Jensen (1993) and Lipton and Lorsch (1992) that agency problems prevail in boards with seven or more members. The findings are also consistent with Yermack's (1996) finding of a negative board size effect in boards of seven or more members. Finally, the prediction e.g. of Lehn et al. (2003) that no systematic relationship should exist between board characteristics and performance if firms maximize value is seen to be validated for the great majority of firms in our sample.

5. Conclusion

A primary contribution of this paper is to produce estimates of the effect of board size on performance that can be given a causal interpretation. Moreover, we find that standard OLS results provide valid and precisely estimated small negative board size effects.

Based on these findings, we separated the effect of (comparatively) large versus small boards. First, no performance effects were found when varying the board size at levels below six directors, the typical range of board size in small and medium-sized firms. Second, a significantly negative effect was found when increasing the size of boards with six or more members. This is consistent with the findings in Yermack (1996) on listed US corporations and shows that a negative board size effect extends to small and medium-sized closely held firms, but only to the minority of firms with comparatively large boards.

Overall, our analysis challenges the existence of a large negative board size effect for small boards in closely held corporations. As theory suggests, there are good reasons not always to choose the minimum board size. Given that board organization and the optimal number of directors occupy such a prominent place in many guidelines for good corporate governance, we believe our analysis, together with the well-established negative board size effect in large publicly traded firms, contains a clear policy message: Finding the right number of directors is a trade-off between the benefits of having sufficient competencies represented and the cost arising from increased free-riding among directors. Each firm must find the best trade-off, and for most small and medium-sized firms it is anything from three to five board members.

Acknowledgement

This project has been supported by CEBR (www.cebr.dk) and the Danish Social Science Research Foundation under the research project GOCOW. Kongsted and Nielsen would also like to thank Centre for Applied Microeconometrics (www.econ.ku.dk/cam). We thank Mariassunta Giannetti, Denis Gromb, Randall Morck, Thomas Rønde, Annette Vissing-Jørgensen and the seminar participants at the FMA 2005 Meeting in Chicago, Governance in Family/Unlisted Firms in Thun, EFMA Symposium on Corporate Governance and Shareholder Activism in Milan, and the Centre for Applied Microeconometrics (CAM) at University of Copenhagen for useful comments.

References

Adams, R., Mehran, H., 2005. Corporate performance, board structure and its determinants in the banking industry, Working paper, Federal Reserve Bank of New York.

de Andres, P.A., Azofra, V., Lopez, F., 2005. Corporate boards in some OECD countries: Size, composition, functioning and effectiveness, Corporate Governance. An International Review 13, 197–210.

Beiner, S., Drobetz, W., Schmid, F., Zimmerman, H., 2004. Is board size an independent corporate governance mechanism? Kyklos 57, 327–356.

Bennedsen, M., 2002. Why do firms have boards? Working paper, Copenhagen Business School.

Bennedsen, M., Nielsen, K.M., Wolfenzon, D., 2004. The family behind the family firm: Evidence from successions in Danish firms, CEBR Discussion Paper 2004-14.

Bennedsen, M., Nielsen, K.M., Pérez-González, F., Wolfenzon, D., 2007. Inside the family firm: The role of families in succession decisions and performance. Quarterly Journal of Economics 122, 647–691.

Bennedsen, M., Wolfenzon, D., 2000. The balance of power in closely held corporations. Journal of Financial Economics 58, 113–139.

Black, B.S., Jang, S., Kim, W., 2004. Does corporate governance affect firms' market value? Evidence from Korea, Working Paper, Stanford Law School.

Boone, A.L., Field, L.C., Karpoff, J.M., Raheja, C.G., 2005. The determinants of corporate board size and composition: an empirical analysis. Journal of Financial Economics 85, 66–101.

Claessens, S., Fan, J.P.H., Lang, L.H.P., 2000. The separation of ownership and control in East Asian corporations. Journal of Financial Economics 58, 81–112.

Claessens, S., Fan, J.P.H., Lang, L.H.P., 2006. The benefits of group affiliation: Evidence from East Asia. Emerging Markets Review 7, 1–26.

Coles, J.L., Daniel, N.D., Naveen, L., accepted for publication. Boards: Does one size fits all? Journal of Financial Economics.

Conyon, M.J., Peck, S.I., 1998. Board size and corporate performance: Evidence from European countries. The European Journal of Finance 4, 291–304.

Demsetz, H., Lehn, K., 1985. The structure of corporate ownership: Causes and consequences. Journal of Political Economy 93, 1155–1177.

Eisenberg, T., Sundgren, S., Wells, M.T., 1998. Larger board size and decreasing firm value in small firms. Journal of Financial Economics 48, 113–139.

Faccio, M., Lang, L.H.P., 2002. The ultimate ownership of Western European corporations. Journal of Financial Economics 65, 365–395.

Hermalin, B., Weisbach, M., 2003. Boards of directors as an endogenously determined institution: A survey of the economic literature. Federal Reserve Bank of New York Policy Review 9, 7–26.

Jensen, M.C., 1993. The modern industrial revolution, exit, and the failure of internal control systems. Journal of Finance 48, 831–880.

Jong, A., DeJong, D.V., Mertens, G., Wasley, C., 2000. The role of self-regulation in corporate governance: Evidence and Implications from the Netherlands. Journal of Corporate Finance 11, 473–503.

Kiel, G.C., Nicholson, G.J., 2003. Board composition and corporate performance: How the Australian experience informs contrasting theories of corporate governance. Corporate Governance 11, 189–205.

La Porta, R., López-de-Silanes, F., Shleifer, A., 1999. Corporate ownership around the world. Journal of Finance 54, 471–517.

Lehn, K., Patro, S., Zhao, M., 2003. Determinants of the size and structure of corporate boards: 1935–2000, Working paper, University of Pittsburgh.

Linck, J.S., Netter, J.M., Yang, T., accepted for publication. The Determinants of board structure, Journal of Financial Economics.

Lipton, M., Lorsch, J., 1992. A modest proposal for improved corporate governance. Business Lawyer 48, 59–77.

Loderer, C., Peyer, U., 2002. Board overlap, seat accumulation and share prices. European Financial Management 8, 165–192.

Mak, Y.T., Yuanto, K., 2001. Size really matters: Further evidence on the negative relationship between board size and firm value. Pacific-Basin Finance Journal 13, 301–318.

Morck, R.K., Shleifer, A., Vishny, R., 1988. Management ownership and market valuation: an empirical analysis. Journal of Financial Economics 20, 293–315.

Postma, T.J.B.M., van Ees, H., Sterken, E., 2003. Board composition and firm performance in the Netherlands. Eastern Economic Journal 29 (1), 41–58.

Staiger, D., Stock, J., 1997. Instrumental variables regression with weak instruments. Econometrica 65, 557–586.

Volpin, P., 2002. Governance with poor investor protection: Evidence from top executive turnover in Italy. Journal of Financial Economics 64, 61–90.

Wooldridge, J.M., 2002. Econometric Analysis of Cross Section and Panel Data. MIT Press, Boston.

Yermack, D., 1996. Higher market valuation of companies with a small board of directors. Journal of Financial Economics 40, 185–212.