The Effect of Board Structure on Firm Value in an Emerging Market: IV, DiD, and Time Series Evidence from Korea

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The Effecgt of Board Structure on Firm Value in an Emerging Market: IV, DiD, and Firm Fixed Effects Evidence from Korea [+]

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ABSTRACT

Outside directors and audit committees are widely considered to be central elements of good corporate governance. Yet supporting evidence is limited. Prior work on the connection between these governance elements and firm value or performance relies principally on cross-sectional data and often finds little evidence of an association. Causation is also unclear. Korea provides a unique laboratory for addressing the connection between board structure and firm value in an emerging market. Using a combination of instrumental variable analysis that relies on unique features of Korean law to instrument for board structure, difference-in-difference estimation, and firm fixed effects regressions, we report evidence of a positive share price impact of boards with 50% or greater outside directors, and weaker evidence of a positive impact of audit committees. Differences between pooled *OLS* and firm fixed effects results are sometimes large, confirming the potential unreliability of cross-sectional estimates.

Key words: Korea, outside directors, audit committees, corporate governance, board of directors, emerging markets

JEL classification: G32, G34

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1. Introduction

A minimum number of outside directors (perhaps a majority), and an audit committee staffed principally by outside directors, are standard corporate governance prescriptions. Both are prescribed by law in many countries, and are central components of most voluntary, "comply or explain" corporate governance codes. Yet empirical support for the value of these governance elements is limited. In developed countries, there is no reliable evidence that either element predicts share price or overall corporate performance. In emerging markets, there is some cross-sectional evidence on the value of outside directors, but little on audit committees.

Moreover, cross-sectional results may be unreliable. Performance could predict board composition and committee structure, rather than vice-versa, or optimal board composition and committee structure could be endogenous to other omitted firm characteristics. Moreover, different elements of governance often correlate with each other. Thus, unless one controls for a broad range of governance attributes, one could incorrectly ascribe a result to the attribute being studied, rather than other unstudied attributes.

Prior research has been largely limited to *OLS* estimation, and usually to cross-sectional results, for two reasons. The first is data availability. In emerging markets, time series data on governance has not been available. In developed markets, firm-level governance changes slowly over time, so firm fixed or firm random effects approaches to time-series data have not been successful. Moreover, good instruments for governance are generally not available, leading researchers to use either no instruments or suspect instruments.

Korea provides a unique laboratory for addressing these empirical issues in an emerging market. It combines good data, large variation over time in board structure (due to legal changes and firms' responses to the 1997-1998 East Asian financial crisis), and a plausible instrument for board structure. In response to this crisis, Korea adopted governance rules in the second half of 1999 and effective in 2001, which require "large" firms (assets > 2 trillion won, around $2 billion) to have 50% outside directors, an audit committee with an outside chair and at least 2/3 outside directors as members, and an outside director nominating committee. Smaller

firms must have 25% outside directors.[1] The exogenous adoption of these rules, and the resulting involuntary changes in large firm governance, make feasible an instrumental variable (IV) analysis of the joint effect of these governance elements on firm value, using an "asset size dummy" at 2 trillion won to instrument for board structure.

We use largely hand-collected data on board composition, board committees, insider ownership, disclosure and other aspects of governance to build a broad Korean corporate governance index (KCGI) covering the vast majority of Korean public firms from 1998 through 2004, which includes indices for board structure (with subindices for board independence and the existence of board committees), disclosure, ownership parity, shareholder rights, and board procedure. We then use a variety of empirical methods to assess the importance of board structure, controlling for other components of Korean governance and for a broad array of company characteristics. We find evidence consistent with these 50% outside directors and audit committees having a potentially causal impact on the market value of large Korean firms.

First, we employ two stage least squares (2*SLS*) regressions, using our asset size dummy instrument, and find that instrumented board structure predicts higher Tobin's *q*. For a firm which previously had none of the three board structure elements required by the 1999 law, the predicted increase in *ln*(Tobin's *q*) is an economically significant 0.28-0.40, depending on specification, or a 107-163% increase in share price for a large firm with median *q* and median leverage. We also employ three stage least squares (*3SLS*), using several imperfect instruments for Tobin's *q*, and find some evidence of reverse causation, in which Tobin's *q* also predicts board structure.

Second, we employ difference-in-difference (DiD) estimation and confirm a spike in *ln*(Tobin's *q*) for large firms at the time that one would expect (second half of 1999) if investors anticipate the effects of the new law's imposition of future board structure changes on firm value.

[1] The bill to revise the *Securities and Exchange Act* to implement the three reform measures was adopted by the government on October 21st 1999; passed the National Assembly on January 21st 2000; and became effective on the first annual meeting after April 2000. Since most of the Korean public firms hold their annual meetings in February or March, the *de facto* effective time is the spring of 2001. We believe stock prices, however, reacted when the government first announced the reform measures.

The mean Tobin's *q* of large firms jumps by 0.15-0.20 relative to small firms in 2H 1999 (depending on specification); the difference in means between the two groups is stable both before and after the legal change.

The *IV* and *DiD* results provide evidence that investors assigned positive value to the board structure reforms for large Korean firms. They cannot tell us (i) whether similar changes would be valuable for "small" firms (assets < 2 trillion won), or (ii) how much of the value increase is due to each of the reforms (50% outside directors, audit committees, and nominating committees). To address these issues, we also study small firms, which can choose which governance measures to adopt, and when to do so. We investigate the value of various board structure elements using a firm fixed effects specification to control for unobserved, time-invariant firm-level heterogeneity, and extensive control variables plus year dummies to control for time-varying heterogeneity. We find evidence supporting the separate value of (i) 50% outside directors, (ii) more than 50% outside directors, and (iii) an audit committee. The predicted effect of 50% outside directors on Tobin's *q* is similar for large and small firms. Nominating and compensation committees are less important. Foreign directors predict higher Tobin's *q* if they are part of a 50%-outside board, but not otherwise. For small firms, the proportion of outside directors does not predict Tobin's *q* over a range from 25% (the minimum under the 1999 law) to 49%.

We also compare firm fixed effects estimates to pooled *OLS* estimates, and find sometimes large differences. In particular, the association between an audit committee and Tobin's *q* is non-robust in *OLS* but is strong with firm fixed effects. These differences support doubts about the reliability of cross-sectional estimates in research on boards of directors, or on corporate governance more generally (Chidambaran, Palia and Zheng, 2006).

A caveat: Most Korean companies have a controlling shareholder or family. Share prices, however, are the trading prices for noncontrolling shares. This paper cannot assess whether the relationship between governance and market value reflects changes in a firm's overall value, outsiders realizing higher share price at the expense of lower (unobservable)

private benefits to insiders, or some of both. However, the trend toward some smaller Korean firms adopting board structure reforms is consistent with a net value increase from these governance measures.

This paper is organized as follows. Section 2 reviews prior literature on the connection between board composition, or the presence of an audit committee, and overall firm value or performance. Section 3 describes our data sources and how we construct our governance indices. Section 4 covers methodology. Section 5 presents IV and DiD results, focusing on large firms. Section 6 presents firm fixed effects results, and compares them to OLS results. Section 7 concludes.

2. Literature Review

We provide here a brief literature review, focusing on research in emerging markets, and on research that focuses specifically on boards of directors and audit committees, rather than on overall corporate governance. Related cross-country research on overall corporate governance includes **[to come].** Related single-country research in emerging markets on overall corporate governance includes **[to come].**

2.1. Board Independence

2.1.1. Developed Markets

Board independence predicts firm behavior in a variety of ways: For example, more independent boards make better acquisition decisions, are more likely to choose an outsider as CEO, are more likely to resist a takeover bid, and are more likely to fire the CEO following poor performance. For reviews, see Bhagat and Black (1999), Hermalin and Weisbach (2003). However, studies have not found a positive association between board independence and overall firm value or performance. Morck, Shleifer, and Vishny (1988), Baysinger and Hoskisson (1990), Hermalin and Weisbach (1991), Mehran (1995), and Klein (1998) all find no significant relationship between the two in the United States. Yermack (1996), Agrawal and Knoeber (1996) and Bhagat and Black (2002) find a negative relationship in the U.S., as do Erickson, Park, Reising, and Shin (2005) in Canada. Bhagat and Black (2002) and Erickson et al. (2005)

report evidence that the negative relationship reflects reverse causation, in which firms which experience poor performance increase the independence of their boards.

Evidence using investment companies is slightly more encouraging. For REITs, Friday and Sermans (1998) find that increased outside director representation on the board predicts higher market/book ratios. Del Guercio, Dann, and Partch (2003) report that closed-end funds with more independent directors have a lower expense ratio. Using a 2*SLS* framework, however, Ghosh, Chinmoy and C. F. Sirmans (2003) find that independent directors have only a limited effect on REIT performance.

2.1.2. Emerging Markets

One role that outside directors might play is to constrain insider self-dealing. Concern with self-dealing is strong in many emerging markets, including Korea (e.g., Baek, Kang, and Lee, 2006). Other legal and market constraints on tunneling are often weaker in these markets. Thus, board independence may be more important in emerging markets.

In contrast to the inconclusive findings in developed markets, several emerging market studies find a positive relationship between board independence and firm performance. Countries studied include Korea (Black, Jang and Kim, 2006 and Choi, Park, and Yoo, 2007); Taiwan (Yeh and Woidtke, 2005), and Ukraine (Zheka, 2006). Dahya, Dimitrov, and McConnell (2006) report cross-country evidence for a 22-country sample, with a stronger effect in countries with weaker governance.

Studies of the value of foreign directors are mixed. In Korea, Choi, Park, and Yoo (2007) and Choi and Hasan (2005) find evidence of a positive association, but Black, Jang and Kim (2006) find no effect. Oxelheim and Randøy (2003) report that Scandinavian firms with Anglo-American board members have higher firm value.

2.2. Audit Committees

Klein (1998) finds a correlation between the presence of an audit committee and a variety of accounting and market performance measures. Vafaes and Theodorou (1998) and Weir, Laing, and McKnight (2003) find similar results in the U.K. There are no comparable studies in

emerging markets. Most of the remaining literature on audit committees focuses on an association between audit committees and financial fraud or financial reporting decisions (e.g., Anderson, Mansi, and Reeb, 2004; Xie, Davidson and DaDalt, 2002; Defond, Hann and Hu, 2004) and is not directly relevant.

3. Data and Index Construction

Prior to 1998, few Korean firms had outside directors and almost none had 50% outside directors, except for a few banks and majority state-owned enterprises (SOEs). Following the East Asian financial crisis in 1997-1998, Korean firms began to introduce outside directors and other governance reforms, partly voluntarily and partly prompted by legal changes, including the 1999 reforms we focus on here.

We study Korean companies listed on the Korea Stock Exchange. We determine board composition at 6-month intervals from 1996-2004. We also construct a detailed corporate governance index (*KCGI*) from 1998-2004. Observations of *KCGI* are at year-end, except for 2001, when we also have mid-year data.

We construct *KCGI* (0 ~ 100) as follows. *KCGI* includes 27 governance elements, divided into five equally weighted indices (each 0~20): Board Structure (5 elements); Board Procedure (14 elements); Shareholder Rights (4 elements); Disclosure (3 elements); and Ownership Parity (1 element). Board Structure Index is composed of Board Independence Subindex (2 elements, 0 ~ 10), and Board Committee Subindex (3 elements, 0 ~ 10). Within the Board Procedure, Shareholder Rights, and Disclosure indices, and the subindices of Board Structure Index, elements are equally weighted. Assuming no missing values, Board Structure Index and its subindices, which are the focus of this study, are defined as:

Board Independence Subindex = 10*(b1 + b2)/2

b1 = 1 if firm has 50% outside directors; 0 otherwise

b2 = 1 if firm has > 50% outside directors; 0 otherwise

Board Committee Subindex = 10*(b3 + b4 + b5)/3

b3 = 1 if firm has outside director nominating committee, 0 otherwise

b4 = 1 if firm has audit director committee, 0 otherwise

b5 = 1 if firm has compensation committee, 0 otherwise

Board Structure Index = Board Independence Subindex + Board Committee Subindex

If values are missing for a particular firm for a particular element, we compute an index or subindex based on the average of the non-missing elements.

To investigate variation in board composition below 50% independent directors, we also define two alternative board independence elements:

b0 = fraction of outside directors (single continuous measure of board composition)

b-below = min(2 * fraction of outside directors, 1) continuous measure for firms with < 50% outside directors

We also study firms with foreign directors, using element c7 of Board Procedure Subindex:

c7 = 1 if a firm has a foreign outside director, 0 otherwise

Figure 1 shows the mean values of the Board Independence and Board Committee subindices at each measurement date for balanced panels of large Korean public firms (assets > 2 trillion won) and small Korean public firms, respectively. *Figure 2* shows the fraction of firms with indicated scores for Board Structure Index and Board Independence and Board Committee subindice at year-end 1998 and 2004 for small and large Korean public firms. It shows in a different way than *Figure 1* the large changes in these indices over this time period.

Our principal data sources are:

- We determine board composition based on books published annually beginning in 1989 by the Korea Listed Companies Association (KLCA), containing information on each director of each Korean public company.[2]
- We compile ownership data based on the ownership data base compiled by TS2000 and the annual reports of each company.
- We extract a number of governance elements from annual surveys of public companies, conducted in mid-2001 and at each year-end thereafter, initially by the Korea Stock Exchange (*KSE*) and subsequently by the Korean Corporate Governance Service (*KCGS*). Survey results are available through year-end 2004.[3]
- We hand-collect the data needed to construct *KCGI* for 1998-2000. To reduce the cost of hand-collection, we generally assume that firms which lack a governance element in year *X* also lack this element in previous years. For example, we assume that a firm with no audit committee in 2001 has no audit committee in prior years. We collect data on audit committees for 2000 for firms with an audit committee in mid-2001; collect data for 1999 for firms with an audit committee in 2000, and so on.

[2] We determine board composition at 6-month intervals by combining this year-end information with data on annual meeting dates for each firm.

[3] English translations of the KSE and KCGS governance surveys are available from the authors on request.

We have full data from 1998-2004 for Board Structure Index and Ownership Parity Subindex. We also have data back to 1996 for board composition, which is relevant for our DiD estimation. In constructing the rest of *KCGI*, we face some challenges. We can use only elements which are available in each year. However, *KCGS* has changed its survey each year, adding some questions, dropping others, rephrasing clear questions to make them ambiguous or not comparable to prior years, and sometimes switching from (likely reliable) survey responses to (unreliable) efforts to assess governance elements based on firms' public disclosures, for elements for which public disclosure is not required.

We reduce loss of governance elements due to changes in the survey in several ways. For some elements, we hand-collect data from annual reports, charters, proxy statements, company websites, and other sources. For elements for which *KCGS* changed from relying on survey responses to relying on public disclosures, we assume either that a firm which had a governance element in year *X* also had it in year *X*+1, or that a firm which lacked a governance element in year *X*+1 also lacked this element in year *X*, as seemed appropriate for each element. For governance elements that became legally required during the sample period, we assume that firms comply with these requirements.[4]

Where data on a governance element is missing in a particular year and hand-collection is too costly or data is not publicly available, we extrapolate forward or backward from year *X* to earlier or later year(s). We believe that this "element extrapolation" is reasonably innocuous in a firm fixed effects specification, because in this specification, only *changes* in governance within firms over time should matter. More generally, extrapolation with error (compared to the unobserved true state) will add noise to our results, but should not create bias.

If KCGS asked about a governance element in, say, 2001 and 2003, but not in 2002, we construct values for 2002 by averaging the 2001 and 2003 values ("element interpolation"). If a

[4] For example, we assume that large firms and *chaebol*-affiliated firms require board approval of related-party transactions when this became legally required (for firms in the top 10 chaebol in 2000, for large firms and firms in the top-30 chaebol in 2001, and for firms in business groups with group assets over 2 trillion won in 2002).

firm responded to the KCGS survey in, say, 2001 and 2003, but not in 2002, we construct values for this firm for 2002 by averaging the 2001 and 2003 values ("firm interpolation").[5]

Data on other variables comes from various sources. We take balance sheet, income, cash flow statement data, foreign ownership data, and original listing year from the *TS2000* database maintained by the KLCA; a list of companies affiliated with the top-30 *chaebol* from press releases by the Korean Fair Trade Commission; stock market data from the KSE; information on *ADRs* from JP Morgan and Citibank websites; and industry classification from the Korea Statistics Office.

Table 1 provides details on how we obtain each element for each year.[6] *Table 2* provides summary statistics on *KCGI* and the board-related indices and elements we study in this paper, separately for all firms, large firms, and small firms. *Table 3, Panel A* defines the principal variables we study in this paper; *Panel B* provides summary statistics for the principal independent variables. Sample size, with full data on *KCGI* and control variables, varies from 368 to 501 at each measurement date.

4. Methodology

4.1 Instrumental Variable Analysis

A central methodological concern for this study is endogeneity, especially reverse causality, in which firm value predicts governance, not vice versa. To address this issue, we employ instrumental variable analysis, using an asset size dummy at 2 trillion won as an instrument for Board Structure Index. This instrument relies on legal rules adopted in the second half of 1999, which require "large" firms (book value of assets > 2 trillion won, approximately $2 billion) and banks to have 50% outside directors, an audit committee, and an outside director nominating committee. This law also requires smaller public firms to have 25% outside directors.[7]

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[5] In robustness checks, we obtain similar results if we do not interpolate for elements or firms.

[6] Element names in this paper are consistent with those in Black, Jang, and Kim (2006). Relative to *KCGI* as defined there, we lose 13 elements due to changes in the KCGS survey over time, principally in Board Procedure Index, gain one element of Board Structure Subindex (b5 = compensation committee), and rely on a less detailed source for Ownership Parity Index.

[7] Banks must comply with the same outside director and audit committee rules as large firms. They are subject to a special director nomination rule, but until July 2002 they were exempt from the outside director nomination

We limit the instrumental variable analysis to 1999-2004 because asset size dummy is not an appropriate instrument in 1998, prior to adoption of these rules. We confirm in unreported regressions that asset size dummy predicts Tobin's *q* beginning at year-end 1999, but not before. *Table 1* indicates which governance elements were legally required, for which firms, in which year. We are also limited to pooled regressions and firm random effects specifications, because asset size dummy is firm-specific and almost time-invariant. Thus, it cannot be used in a fixed effects framework.

A valid instrument must be exogenous, correlated with the instrumented variable (Board Structure Index), and should predict the dependent variable (*ln*(Tobin's *q*) only indirectly, through the instrumented variable, and not directly. First, asset size dummy is likely to be exogenous. The governance rules that apply to large firms are mandatory and not subject to firm choice. There is no evidence that the size threshold corresponds to voluntary firm behavior prior to adoption of the rules, or that firms reduce or limit their size to avoid compliance with the rules. In particular, if firms shrink below 2 trillion won in assets to avoid compliance with governance rules, rather than because of business reversals, one would expect them to cease compliance. Instead, of 7 firms that were required to comply with the large firm rules during 2001 or 2002, but then fell below the 2 trillion won threshold, 4 retain an outside director nominating committee, 5 retain 50% outside directors, and all 7 retain an audit committee.[8]

Second, asset size dummy correlates strongly with Board Structure Index ($r = 0.73$). This is expected since Board Structure Index includes the three governance elements (50% outside directors, audit committee, and outside director nominating committee) which are required for large firms.

The more troublesome question is whether asset size dummy predicts Tobin's *q* directly, or only indirectly through Board Structure Index. After all, firm size could (and indeed does)

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committee rule that applies to large firms. We treat the nomination rules that apply to banks as equivalent to having an outside director nominating committee.

[8] **[[to be updated with 2004 data]]**

directly predict Tobin's *q*. We address this issue by employing regression discontinuity analysis, adapted from labor economics (Angrist and Lavy, 1999), in which we separately control for the continuous effect of *ln*(assets) on Tobin's *q*. This procedure hopefully separates the discontinuous impact on Tobin's *q* of the governance change at 2 trillion won from the direct link between firm size and Tobin's *q*. For further analysis of the suitability of this instrument, see Black, Jang and Kim (2006).

A further reason for believing that the asset size dummy is reasonably reliable is that the direct effect of *ln*(assets) on Tobin's *q* is negative and statistically significant, while the effect of asset size dummy is significant and positive. It would be a remarkable coincidence if *ln*(assets) were to predict lower Tobin's *q* in general, yet also predict a large jump in Tobin's *q* at precisely the 2 trillion won point where governance rules kick in, for reasons other than its effect on governance. It would stretch coincidence quite a bit further for the positive effect of size on governance at 2 trillion won to appear at precisely the time (second half of 1999) when the governance rules were adopted.

We conduct the Durbin-Wu-Hausman test for endogeneity (Davidson and MacKinnon, 1993, Wooldridge, 2000). The Durbin-Wu-Hausman test procedure is similar to *2SLS*. In the first stage, we regress Board Structure Index on asset size dummy and other control variables. In the second stage, we regress Tobin's *q* on Board Structure Index, control variables, and the residual from the first-stage regression. A significant coefficient on the first-stage residual is evidence of endogeneity. The coefficient on Board Structure Subindex is identical to the *2SLS* or the *3SLS* coefficients.

In this paper, the Durbin-Wu-Hausman test for endogeneity rejects the existence of endogeneity when *ln*(Tobin's *q*) is used as a measure of firm value (*see Table 5*, *Panel A*), but not when *ln*(Market/Book) is used. The *2SLS* and *3SLS* regressions give results similar to those of our pooled regressions, though with somewhat larger coefficients on instrumented-Board Structure Index.

4.2 Difference-in-Difference Analysis

Our second principal methodological approach is difference-in-difference estimation. If investors assign higher value to firms with 50% outside directors and an audit committee, then large firms should experience an increase in Tobin's *q* when the legal rules requiring these governance elements are adopted. The effect should be realized primarily when the rules are adopted (from the second half of 1999), not at the later date when they come into force (form the second half of 2000 or the first half of 2001, depending on the date of annual meeting).

To assess whether this increase is realized, at the correct time, we employ difference-in-difference analysis, with large firms (as of June 30 1999) as the treatment group, small firms (as of June 30 1999) as the control group, and any time since the second half of 1999 as the treatment period. We deliberately exclude small firms that voluntary adopt the reform measures at a later date (voluntary adopters). This prevents the control group from being contaminated with the treatment. We also exclude large firms that adopt the reform measures at an earlier date (early adopters). This prevents the treatment group from being treated too early. Since most of the banks and SOEs are early adopters, we exclude them altogether from the difference-in-difference analysis. Although we use our full sample period (1H 1996 – 2H 2004) in our analysis, we focus only on the results that are four semiannual periods before and after the initial treatment (2H 1997 – 2H 2001).

Figure 3 reports differences in the means between the treatment and control groups in terms of *ln*(Tobin's *q*) and *ln*(Market/Book) from December 1997 (four semiannual periods before the treatment) to December 2001 (four semiannual periods after the treatment). *Table 6* eports the results of difference-in-difference analysis. We use two regression specifications:

$$\ln(\text{Tobin's } q)_{it} - \ln(\text{Tobin's } q)_{i,\text{Jun.}1999} = \alpha + \sum_{t=\text{Dec.}1996}^{\text{Dec.}2004} \beta_t D_{it}^R D_t + \sum_{t=\text{Dec.}1996}^{\text{Dec.}2004} \gamma_t D_t + \varepsilon_{it} \quad \text{---------- (1)}$$

$$\ln(\text{Tobin's } q)_{it} = \alpha' + \lambda D_{it}^R + \sum_{t=\text{Dec.}1996}^{\text{Dec.}2004} \beta_t' D_{it}^R D_t + \sum_{t=\text{Dec.}1996}^{\text{Dec.}2004} \gamma_t' D_t + \sum_{i=1}^{N} \mu_i D_i + \varepsilon_{it} \quad \text{---------- (2)}$$

Here:

- D_{it}^{R} is a dummy variable that captures the large firms. It is coded 1 if firm *i* is large and at period *t* and 0 otherwise. This dummy variable can be time-variant for firms, the size of which, changes between small and large.
- D_t is a period-specific dummy variable (at 6-month intervals, beginning Dec. 1996 and ending Dec. 2004). It is coded 1 if the indicated period is *t* and 0 if Jun. 1999.
- D_i is a firm-specific dummy variable coded 1 if the indicated firm is *i* and 0 otherwise.

β_t and β_t' are the coefficients of interest. If they are positive and significant, it indicates that treatments – the three governance requirements – had an effect. The predicted effect is indeed observed, beginning in the second half of 1999. The mean *ln*(Tobin's *q*) of the treatment group jumps by around 0.19 in the second half of 1999, and is roughly stable both before and after this period. This effect is economically large. For a large firm with median Tobin's *q* (0.967) and leverage (0.675), a 0.19 increase is implies a 69 percent increase in share price. We find similar results for *ln*(Market/Book).

In addition to the difference-in-difference analysis, we try another specification to capture the impact of reform on the share prices of large firms:

$$\ln(\text{Tobin's } q)_{it} = \alpha + \beta Index_t + \gamma_0 D_t^{\geq 199912} + \gamma_1 D_t^{\geq 200012} + \gamma_2 D_t^{\geq 200112} + \varepsilon_{it} \quad \text{---------- (3)}$$

Here:

- $Index_t$ is the mean of small firm's *ln*(Tobin's *q*) at period *t*.
- $D_t^{\geq 199912}$ is a period-specific dummy variable that takes a value of 1 if the indicated period is Dec. 1999 and thereafter and 0 otherwise.
- $D_t^{\geq 200012}$ is a period-specific dummy variable that takes a value of 1 if the indicated period is Dec. 2000 and thereafter and 0 otherwise.
- $D_t^{\geq 200112}$ is a period-specific dummy variable that takes a value of 1 if the indicated period is Dec. 2001 and thereafter and 0 otherwise.

γ_0, γ_1, and γ_2 are the coefficients of interest. If γ_0 is positive and significant, but γ_1 and γ_2 are both insignificant, it indicates that treatments – the three governance requirements – had an effect exactly when they are supposed to. The predicted effect is indeed observed. The mean *ln*(Tobin's *q*) of the treatment group jumps by around 0.14 in the second half of 1999, and is roughly stable both before and after this period. This effect is economically large. For a large firm with median Tobin's *q* (0.967) and leverage (0.675), a 0.14 increase is implies a 50 percent increase in share price. We find similar results for *ln*(Market/Book).

4.3 Pooled *OLS*, Firm Random Effects, and Firm Fixed Effects Specifications

The *IV* and *DiD* results can evidence that investors assigned positive value to the board structure reforms for "large" Korean firms. They cannot, however, tell us (i) whether similar changes would have similar value at "small" firms (assets < 2 trillion won), or (ii) how much of the value increase is due to 50% outside directors, audit committees, or nominating committee. To address these issues, we also study small firms, which can adopt only one or two of these measures, and do so at different times.

Specifically, we conduct firm fixed effects regressions with year dummies for the full 1998-2004 period. We also report selected results for pooled *OLS* and firm random effects specifications, partly for comparison with the firm fixed effects results, and partly because our two stages least squares (*2SLS*) analysis is limited to pooled *OLS* and firm random effects specifications. Pooled *OLS* results use firm clusters to allow for within-firm temporal correlation between residuals. All regressions use year dummies (to allow for spatial correlation of residuals) and Rogers' (1993) robust standard errors.

A Breusch-Pagan (1980) Lagrange multiplier test rejects pooled *OLS* model compared to the alternative of firm random effects, with a *p*-value close to zero. The choice between random and fixed effects specifications is a closer one. The fixed effects model has the advantage, compared to random effects, of not requiring that the firm effect be uncorrelated with the independent variables. It has the disadvantage of using only information from within-firm variation, while random effects can also use information from between-firm differences. We

conduct Hausman's (1987) test for whether a random effects model is acceptable against the alternative of a fixed effects model. For our sample, this test usually, but not always, rejects random effects. Thus, random effects coefficients may be biased relative to fixed effects coefficients, but hopefully not severely so. In practice, random effects and fixed effects results are similar.

We consider but reject the Fama-MacBeth procedure (Fama and MacBeth, 1973), which is commonly used in finance research.[9] In this procedure, pooled standard errors are computed from cross-sectional coefficients estimated year-by-year. This approach works well if residuals are spatially correlated but not temporally correlated. When residuals are temporally correlated, the standard errors will be downward biased. To address this problem, some studies adjust Fama-MacBeth standard errors in various ways, to address the serial correlation between the yearly estimated coefficients. However, Petersen (2004) finds that these adjustments do not correct for the bias.

The importance of controlling for unobserved firm characteristics in a corporate governance study is well understood. Nonetheless, all prior work on board structure employs either pure cross-sectional data, or at best *OLS* regressions with pooled panel data, typically with year dummies (e.g., Choi, Park and Yoo, 2007). The principal reasons are lack of time-series data and lack of time variation in governance. Especially in developed countries, board structure typically changes slowly over time.

In Korea, in contrast, outside directors were rare prior to the East Asian financial crisis, but were rapidly adopted thereafter. These changes were initially in response both to the legal rules adopted in the second half of 1999 and to investor pressure. Thereafter, it is possible that the prospect of the share price benefits we document below prompted some firms to voluntarily change their board structures. Audit committees, too, were rare prior to the crisis, but have

[9] According to Petersen (2004), among all finance papers using panel data and published in JF, JFE, and RFS in 2001-2004, 34 percent use the Fama-MacBeth procedure. This is followed by papers that use year dummy variables (31%), clustered standard errors (22%), and Newey-West adjusted standard errors (7%). The remaining 45 percent of the papers do not adjust standard errors for either spatial or temporal correlation between the residuals.

since been adopted by a significant number of firms. At year-end 1998, only a few SOE's and banks had 50% outside directors, an audit committee, or an outside director nominating committee. By the end of our sample period, 66 large firms and banks in our sample had all three governance elements. An additional 44 firms had voluntarily adopted 50% outside directors, 67 firms had voluntarily adopted audit committees, and 90 firms had voluntarily adopted an outside director nominating committees. These large changes make it feasible to implement a firm fixed effects specification.

A comparison of our pooled *OLS* and firm fixed effects results confirms the existence of large differences between the two approaches. For example, in the last panel of *Table 8*, elements b2 (> 50% outside directors) and b4 (audit committee) have small, insignificant coefficients, in the pooled *OLS* specification, but have substantially larger and statistically significant coefficients with firm fixed effects. (All references in this paper to statistical significance are to significance at the 5% level in a two-tailed test.) Conversely, element b5 (compensation committee) is significant in pooled *OLS*, but weakens and becomes insignificant with firm fixed effects. These results support theoretical doubts about the reliability of *OLS* estimates in corporate governance research, and underscore the importance of more robust estimation procedures.

4.4 Control Variables

Firm fixed effects can control for omitted variable bias that might arise from time-invariant factors that predict both board structure and Tobin's *q*. To capture time-varying factors that might predict both board structure and Tobin's *q*, We employ an extensive list of control variables to limit the possibility of omitted variable bias. The rationale for each control variable is described briefly below.

As noted earlier, different aspects of governance often correlate with each other. For example, firms that change their board structure may also change board procedures. Firms that adopt independent boards may be more likely to adopt good disclosure practices. And so on. We address this possibility by controlling in all regressions for the portion of *KCGI* that is not

captured by the principal independent variables. Thus, in regressions with Board Structure Index as the principal independent variable, we control for (*KCGI* - Board Structure Index). In regressions with Board Independence Subindex as the principal independent variable, we control for (*KCGI* - Board Independence Subindex). And so on.

Since both board structure and Tobin's *q* may reflect industry factors, we include industry dummies based on 4-digit Korea Standard Industrial Classification (KSIC) codes. Industry dummies are not available in the firm fixed effects model because they are perfectly collinear with firm dummy variables.

As discussed above, we use *ln*(assets) to control for the direct effect of firm size on Tobin's *q*. We include *ln*(years listed) as a proxy for firm age, because younger firms are likely to be faster-growing and perhaps more intangible asset-intensive, which can lead to higher Tobin's *q*. We include leverage (measured as debt/market value of common equity) because it can influence Tobin's *q* by providing tax benefits and reducing free cash flow problems.

We control for firms' growth prospects using geometric average sales growth over the past five years and capital expenditures relative to the historical capital stock (capex/PPE). We control for intangible assets using (R&D expense)/sales and (advertising expense)/sales. As a measure of capital intensity, we include PPE/sales and $(\text{PPE/sales})^2$. We control for profitability measured by *EBIT*/sales. As measures possibly related to profitability or product market constraints, we include exports/sales and market share. Korean policy, especially prior to the East Asian financail crisis, favored export industries; this could affect profitability and Tobin's *q*.

We include share turnover (traded shares as a percentage of public float) as a measure of liquidity, since share prices may be higher for firms with more easily traded shares. We measure ownership as ownership by the largest single shareholder, and include ownership^2 to allow for possible nonlinearity in the relationship between inside ownership and share prices. We include a *chaebol* dummy because firms that belong to a *chaebol* group may have stronger political connections, access to financing, or be more diversified, which could affect Tobin's *q*.

We include fraction of foreign ownership because foreign investors are diversified and may be willing to pay higher prices than domestic investors, thus affecting Tobin's *q*. They may also pressure firms to improve their governance, or invest in better governed firms. We also include *ADR* dummies, which can proxy for foreign investor interest, liquidity, and compliance with U.S. disclosure standards. Firms with level 1 *ADR*s are traded on *NASDAQ* but are not subject to U.S. disclosure rules. Firms with level 2 or 3 *ADR*s must comply with U.S. accounting and disclosure rules. Other studies report that firms with level 2 or 3 *ADR*s have higher Tobin's *q* (Doidge, Karolyi, and Stulz, 2004). We include a dummy variable for a firm's inclusion in the Morgan Stanley Capital International Index for East Asia (*MSCI* dummy), which may proxy for price pressure due to purchases by index funds, greater liquidity, and foreign investor interest. We include a bank dummy because banks face special regulation under the Banking Act.

4.5 Outliers

The raw distributions of Tobin's *q*, market/book and market/sales are highly skewed. To reduce the effect of outlier observations, we take logs of these variables. We also identify and drop outliers for each year based on a studentized residual obtained from a regression of *ln*(Tobin's *q*) (or market/book or market/sales) on the principal independent variable is greater than ±1.96. In robustness checks, we obtain similar results if we do not exclude outliers and if we use Tobin's *q* rather than *ln*(Tobin's *q*) as a dependent variable.

5. Results

5.1 Instrumental Variable Results

Table 5 reports the results of Durban-Wu-Hausman test (*Panel A*) and the results of 2*SLS* (*Panel B*), where Board Structure Index is endogenized and asset size dummy is used as the instrumental. The Durban-Wu-Hausman test result in *Panel A* shows that the coefficient on the residuals obtained from the first stage regression is insignificant in the second stage, failing to reject the null of no endogeneity. This result is robust to the inclusion of (*KCGI* – Board Structure Index), but not robust to different measures of firm value. The Durban-Wu-Hausman

test using *ln*(Market/Book), the result of which is not reported here, rejects the null of no endogeneity.

In *Panel B*, we run 2*SLS* using pooled *OLS* and random effects models, with and without (*KCGI* – Board Structure Index). It shows that the coefficients on the fitted values in the second stage regressions are all positive and statistically significant, indicating that the causality does run from Board Structure to firm value. Also notice that the coefficients in 2*SLS* results are larger than those from single equation models in *Table 8*. In case of the model using random effects with (*KCGI* – Board Structure Index), the coefficient is 0.0179, which is greater than the coefficient of 0.0112 from the random effects model in *Table 8*. The magnitude of the coefficients is also economically meaningful. The worst-to-best improvement in Board Structure Index (from 0 to 20) increases *ln*(Tobin's *q*) by 0.28-0.40, depending on specification, or about a 107-163% increase in share price for a large firm with median *q* and median leverage.[10]

The 3*SLS* results in *Panel C* confirms that causality runs from Board Structure Index to *ln*(Tobin's *q*). We instrument Board Structure Index with asset size dummy, and instrument *ln*(Tobin's *q*) with four imperfect instruments: *ln*(listed years), R&D/sales, advertising/sales, and EBIT/sales. These are the four variables that show up insignificant in the first stage regressions in *Panel A* and *B*, but significant in the *ln*(Tobin's *q*) regressions in *Table 8*. Regardless of which subset of the four variables we use as our instrument for *ln*(Tobin's *q*), we obtain a similar result. Causality runs in both directions. This result is robust to different measures of firm value.

5.2 Difference-in-Difference Results

Table 6 shows the result of difference-in-difference test using semiannual data. Columns (1) and (3) report coefficients from *OLS* regressions of difference in firm value (*ln*(Tobin's *q*) in column (1) and *ln*(Market/Book) in column (3)) from base date to specified future dates on

[10] In the pooled sample, the median value of Tobin's *q* and leverage (debt/assets) are 0.967 and 0.675, respectively for large firms.

period dummies and period dummies interacted with the large firm dummy (= 1 if firm's book asset value is above 2 trillion won as of June 1999 and 0 if firm's book asset value is below 2 trillion won as of June 1999). Columns (2) and (4) report coefficients from *OLS* regressions of firm value (*ln*(Tobin's *q*) in column (2) and *ln*(Market/Book) in column (4)) on period dummies, the large firm dummy (= 1 if firm's book asset value is above 2 trillion won as of June 1999), period dummies interacted with the large firm dummy, and firm fixed effects. Regressions are estimated using a sample that spans from June 1996 to December 2004. Coefficients corresponding to periods before December 1997 and after June 2001 are however suppressed. Banks, SOEs, voluntary adopters, and early adopters are excluded from the analyses

The table shows that the jump in *ln*(Tobin's *q*) and *ln*(Market/Book) takes place exactly when they are expected. The mean *ln*(Tobin's *q*) of the treatment group jumps by around 0.19 in the second half of 1999, and is roughly stable both before and after this period. This effect is economically large. For a large firm with median Tobin's *q* (0.967) and leverage (0.675), a 0.19 increase is implies a 69 percent increase in share price. We find similar results for *ln*(Market/Book).

Table 7 reports the results of event type analysis. Columns (1) and (3) report coefficients from firm fixed effects regressions of large firm's (treatment group's) firm value (*ln*(Tobin's *q*) in case of column (1) and *ln*(market/Book) in case of column (3)) on small firm's (control group's) mean firm value, a period dummy (= 1 from Dec. 1999 and 0 before), and a constant. Regressions in columns (2) and (4) add two additional period dummies, each taking a value of 1 from Dec. 2000 and from Dec. 2001. All regressions include firm fixed effects and use Rogers' robust standard errors. The

The predicted effect is indeed observed. The mean *ln*(Tobin's *q*) of the treatment group jumps by around 0.14 in the second half of 1999, and is roughly stable both before and after this period. This effect is economically large. For a large firm with median Tobin's *q* (0.967) and leverage (0.675), a 0.14 increase is implies a 50 percent increase in share price. We find similar results for *ln*(Market/Book).

5.3 Pooled *OLS*, Firm Random Effects, and Firm Fixed Effects Results

In *Table 8*, we show the results of pooled *OLS* (using firm-clustered standard errors), firm random effects, and firm fixed effects (using unbalanced and balanced panels) models where *ln*(Tobin's *q*) is the dependent variable and Board Structure Index is the principal right-hand side variable. Remaining parts of *KCGI* (*KCGI* – Board Structure Index) and various firm-level variables are used as controls. The coefficients on Board Structure are positive and significant in all four models. The magnitude of the coefficients is also economically meaningful. In case of the firm fixed effects model using unbalanced panel, the worst-to-best improvement in Board Structure Index (from 0 to 20) increases *ln*(Tobin's *q*) by 0.2040, which is equivalent to a share price increase of 54 percent at the median values of Tobin's *q* (0.804) and leverage (0.47).[11]

Another observation is that the impact of (*KCGI* – Board Structure Index) is less robust compared to that of Board Structure Index. In *Table 8*, the coefficients on (*KCGI* – Board Structure Index) are positive and significant in pooled *OLS* and firm random effects models, but insignificant in firm fixed effects models.

5.4 Results on Sub-Indices and Elements

Table 9 reports results on Board Independence and Board Committee Subindices and their individual elements using pooled *OLS* (with firm-clustered standard errors), firm random effects, and firm fixed effects (unbalanced) models. It basically shows that, even under the firm fixed effects model, both subindices have a significant impact on *ln*(Tobin's *q*). When we put both Subindices together, one can see that the impact from Board Independence Subindex is dominant. The coefficient on Board Independence Subindex is 0.0125, while the coefficient on Board Committee Subindex is 0.0071.

When the subindices are broken down into individual elements, however, some of the elements lose their statistical significance. When all five elements are included in the same regression, three elements (50% outside director ratio, >50% outside director ratio, and audit committee) remain significant while the other two turn insignificant (nominating committee and

[11] In the pooled sample, the median value of Tobin's q is 0.804 and the median value of (debt/assets) is 0.47.

compensation committee). Among the three, b1 (50% outside director ratio) is the most significant.

Table 10 investigates whether the presence of foreign directors in the board increases firm value using the firm fixed effects model. When we regress *ln*(Tobin's *q*) on the foreign director dummy (element c7) with controls for the rest of *KCGI* and other control variables, the coefficient on the foreign director dummy is negative and statically significant. This is in contrast to the findings in Choi, Park, and Yoo (2007), Choi and Hasan (2005), and Oxelheim and Randøy (2003). Here we do not claim that the presence of foreign directors decrease firm value. The causality might be running in the opposite direction. It could be that poorly performing firms are more likely to appoint foreign directors.

However, when we include Board Independence Subindex and also interact this subindex with the foreign director dummy, we uncover an interesting result. The coefficient on the interaction term is positive and statistically significant even when controlling for the rest of *KCGI* and other control variables. This suggests that foreign directors do increase firm value at independent boards, but not in dependent boards. Coefficient values suggest that in boards with more than 50% outside director ratio, a presence of foreign director increases *ln*(Tobin's *q*) by 0.075.

Table 11 shows results of an alternative board element, b0, defined as the fraction of outside directors. Results indicate that the fraction of outside directors is strongly associated with firm value (see Panel (i)). But, between the required floor of 25%, which applies to all firms, and 49%, the fraction of outside directors does not predict firm value. When we include b0 and b1 together in the same regression (Panel (ii)), the coefficient on b0 loses its significance. We find similar results when we replace b0 with b-below, which is defined as min(2 x fraction of outside directors, 1), and provides a continuous measure of board composition for firms without 50% outside directors, as in Panel (iii)). We obtain similar results in regressions limited to the subsample of firms with less than 50% outside directors.

5.5 Robustness Checks

In *Tables 12, 13,* and *14*, we conduct a number of robustness checks. In *Table 12* shows the year-by-year *OLS* results using the same set of control variables. The coefficient on Board Structure Index is positive throughout the sample period, but significant only since 2000, which is immediately after the regulation on outside director ratio and board committees came into effect. Also notice that the magnitude of the yearly coefficients is stable over time, ranging between 0.0094 and 0.0134. The coefficients on (*KCGI* – Board Structure Index), however, are only marginal significant in some years, while the coefficients on Board Structure Index is significant throughout the sample period.

In *Table 13*, we show results for various samples: (i) banks and non-banks, (ii) regulated firms (financial firms and SOEs) vs. non-regulated firms, (iii) *Chaebol* firms vs. non-*Chaebol* firms, (iv) large firms vs. small firms, and (v) manufacturing firms vs. non-manufacturing firms. We find that our major board variables (Board Structure Index, Board Independence Subindex, Board Committee Subindex, b1, and b2) are significant within most of the subsamples. The exceptions include the subsamples of banks and large firms, a group of firms that have relatively small within-group variation. In case of banks, which are highly leveraged, Tobin's *q* deviates very little from "1."

In *Table 14*, we use alternative measures of firm value: *ln*(market/book) and *ln*(market/sales). The table shows that our findings in previous subsections remain for Board Structure Index, Board Independence Subindex, b1, and b2. Board Committee Subindex is no longer statistically significant when *ln*(market/book) or *ln*(market/sales) are used as the measure of firm value.

6. Conclusion

Outside directors and audit committees are widely considered to be central elements of good corporate governance. Yet evidence to support this conventional wisdom is limited. Prior work on the connection between board composition and committee structure and overall firm value or performance relies principally on cross-sectional data. Most of this work finds little

association between these governance elements and shares prices or overall firm performance. Even when an association is found, causation is unclear. Performance could predict board composition and committee structure, rather than vice-versa, or optimal board composition and committee structure could be endogenous to other firm characteristics.

Korea provides a unique laboratory for addressing these empirical issues. Based on a combination of instrumental variable analysis that relies on unique features of Korean law to instrument for board structure, a difference-in-difference estimation, and time-series results with firm fixed effects, we report evidence consistent with a positive share price impact of boards with 50% or greater outside directors, and weaker evidence of a positive impact from creation of an audit committee. For board composition, this apparent value exists both for firms which are required by law to have 50% outside directors and for firms which voluntarily adopt this practice. Differences between *OLS* and firm fixed effects results are sometimes large, confirming the unreliability of *OLS* estimates.

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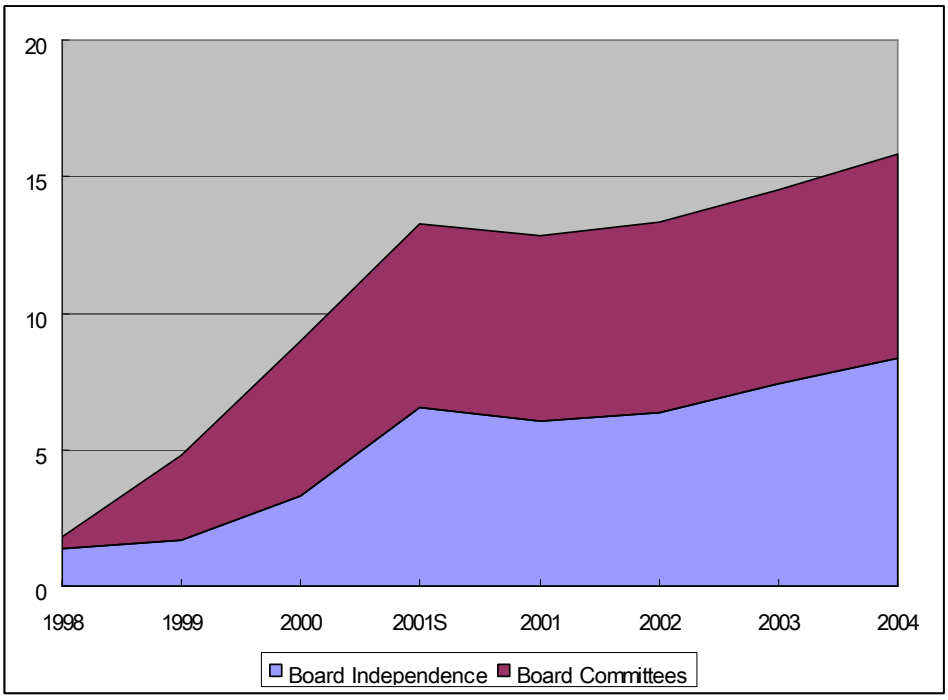
Figure 1: Change in Board Independence and Board Committees Over Time

Figures show mean values of Board Independence Subindex (0~10), Board Committees Subindex (0~10), and remainder of Korean Corporate Governance Index (0~80) from year-end 1998 through year-end 2004, for balanced panels of large Korean public firms (assets > 2 trillion won) and small Korean public firms, respectively.

Large Firms (balanced panel, 33 firms)



Small Firms (balanced panel, 219 firms)

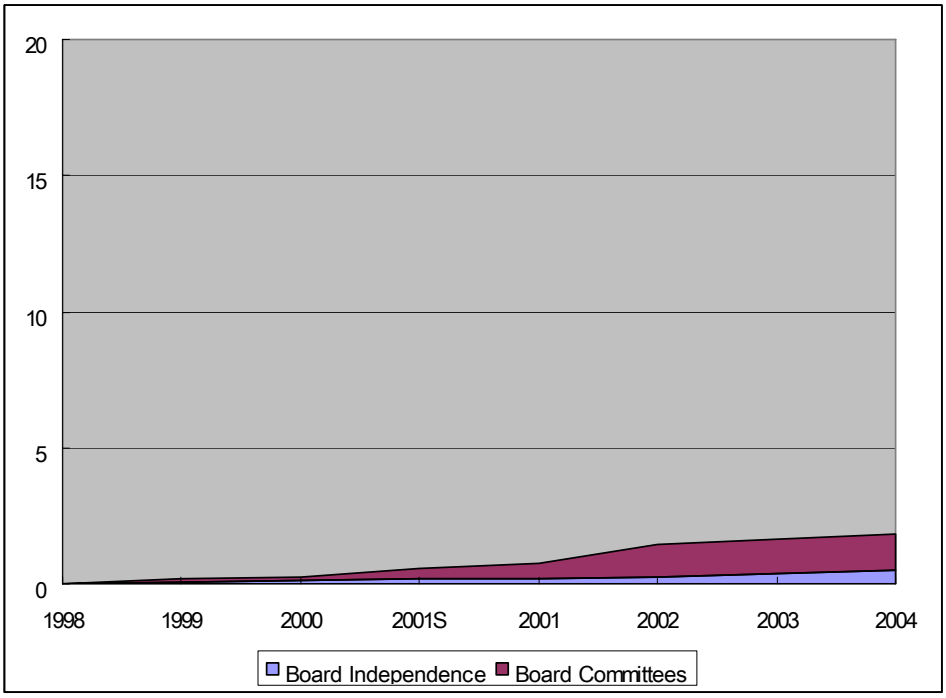
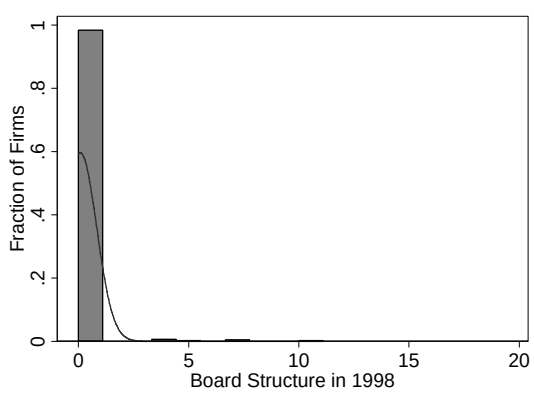


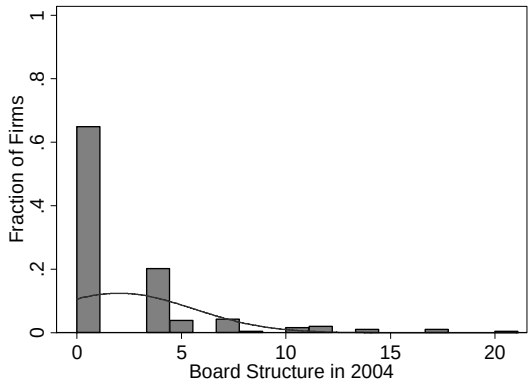
Figure 2: Board Structure Histograms

Fraction of firms with indicated scores for Board Independence and Board Committee Subindices at year-end 1998 and 2004 for small firm (n = 445 in 2004, 443 in 1998) and large firms (n = 67 in 2004, 68 in 1998).

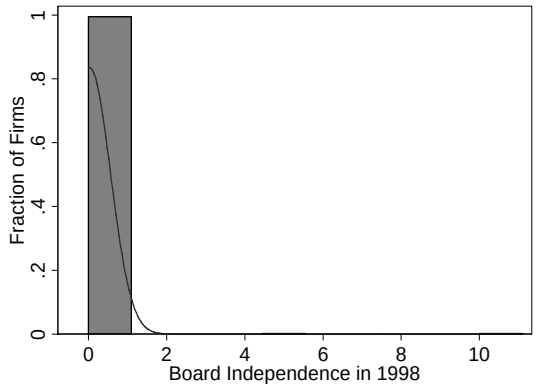
A. Small Firms

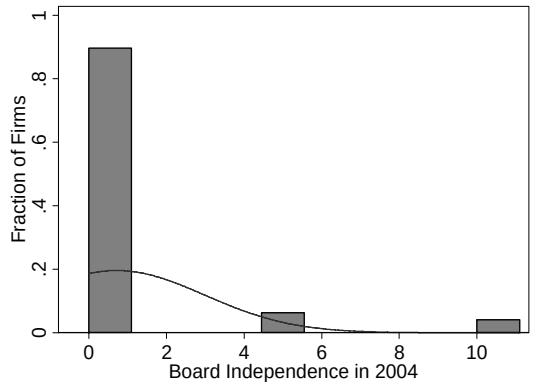
Board Structure



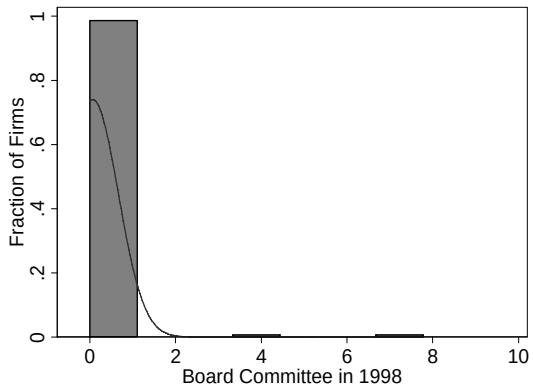


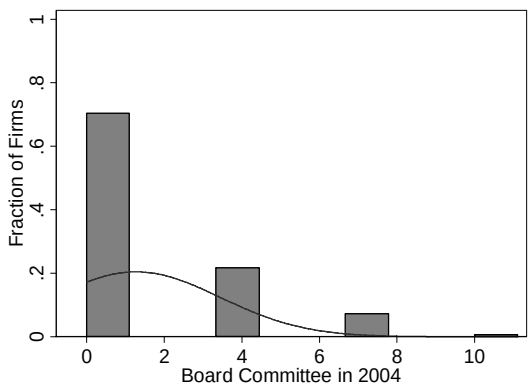
Board Independence





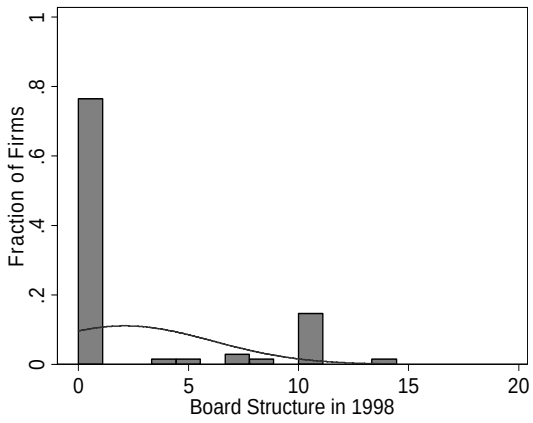
Board Committee

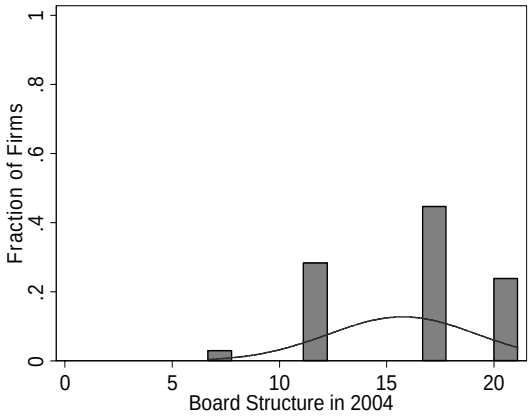




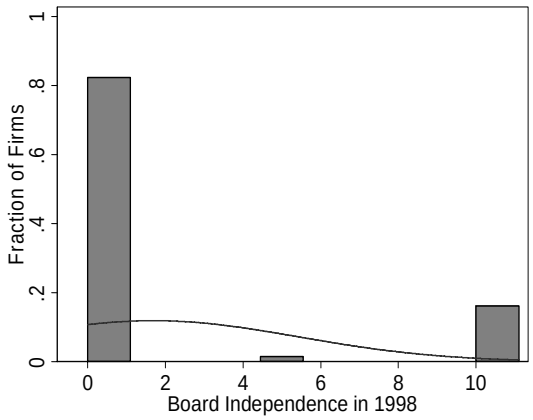
B. Large Firms

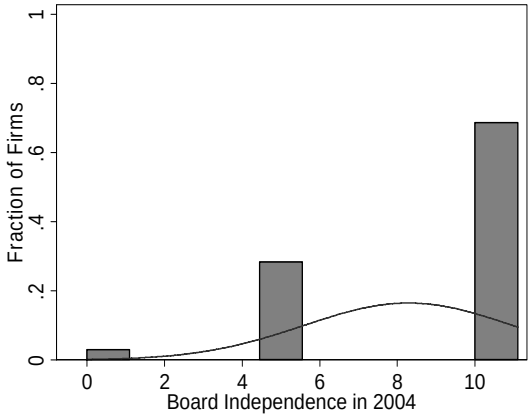
Board Structure



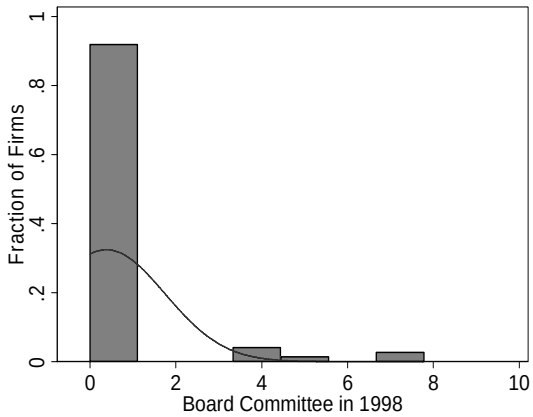


Board Independence





Board Committees



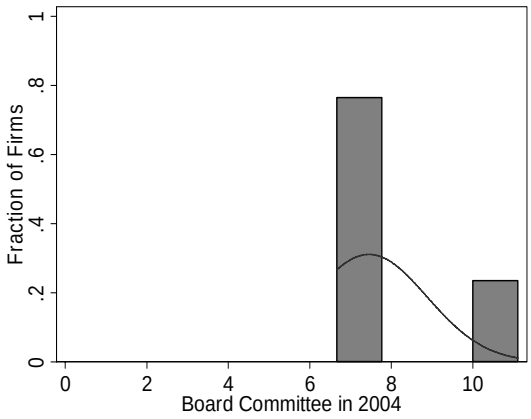


Figure 3: Difference in Tobin's *q*: Firms with 50% Outside Directors versus Other Firms

Solid line: (mean Tobin's *q* for 46 large firms as of June 1999) - (mean Tobin's *q* for 159 small firms as of June 1999), at indicated dates. Dashed line: (mean Market/Book ratio for 46 large firms as of June 1999) - (mean Market/Book ratio for 159 small firms as of June 1999), at indicated dates. The sample excludes Banks, SOEs, voluntary adopters (small, but have 50% outside directors), and early adopters (adopt 50% outside directors before second half of 1999).

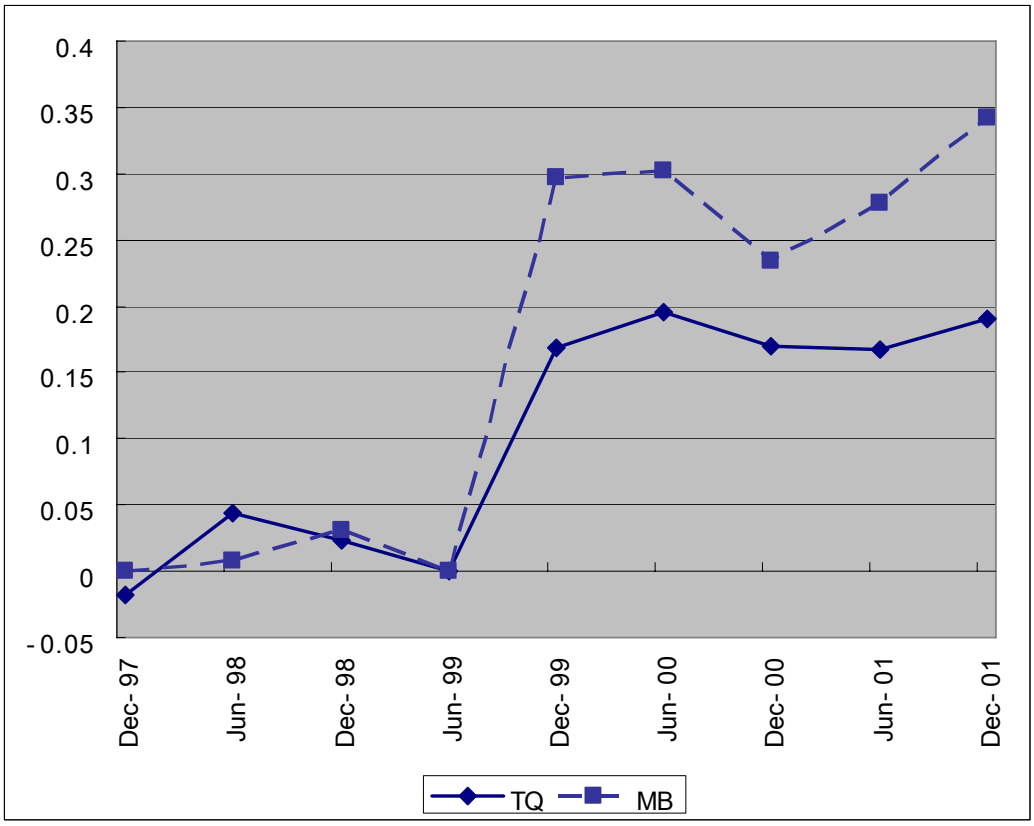


Table 1: Construction of *KCGI*, 1998-2004

This table shows (i) the governance elements used to construct *KCGI*. (ii) data sources; and (iii) the rules we use to fill in missing information. Element labels are consistent with Black, Jang, and Kim (2006) (shown in mid-2001 column). There are three different data sources: (i) hand-collected director database, ownership database, and other information, and (ii) annual surveys by the Korea Corporate Governance Service beginning spring 2001. Survey dates are conducted in spring of each year and provide end-of-prior-year information, except as shown. We ***extrapolate*** for ***missing elements*** using the following rules: (i) if an element is available in year X, but not in year X+1 (X-1), we extrapolate year X value to year X+1 (X-1). We ***interpolate*** for ***missing firms*** and ***missing elements*** using the following rules applied sequentially: (i) if a firm answers the KCGS survey in years X and X+2, but not year X+1, we use in year X+1 the average of the X and X+2 values; and (ii) if an element is available in years X and X+2, but not year X+1, we use in year X+1 the average of the X and X+2 values. We assume elements are present if they are legally required. Large firm rules also apply to banks. *Italics* indicate legally required elements.

For hand-collected values, we generally collect values in year X only for firms which had this governance element in year X+1. Thus, for compensation committee, we have KCGS data starting in 2002. We hand collect data for 2001 for the firms which had this committee in 2002, collect data for 2000 for the firms which had this committee in 2001, etc. For some elements, a change in KCGS methodology led to inconsistency between responses for different years. For these questions, we either replace a 1 value in year X with 0 if the X+1 value is 0, or replace a 0 value in year X with 1 if the X+1 value was 1, as seemed appropriate given the nature of the element. Details on these and other adjustments to the KCGS raw data are available from the authors on request.

Date	1998-2000	mid-2001	2001	2002	2003	2004
Shareholder Rights Index (A)						
Firm permits cumulative voting for election of directors.	hand-collect	A1	I-3-①	1-(16)	1-A-(4)	1-A-(4)
Firm permits voting by mail.	hand-collect	A2	I-3-②	1-(17)	1-A-(5)	1-A-(5)
Firm discloses director candidates to shareholders in advance of shareholder meeting.	hand-collect	A4	I-9-③	*required*	*required*	*required*
Board approval required for related party transactions (*required 2000 for top 10 chaebol, mid-2001 for all chaebol, 2001 on for large and chaebol firms*)	hand-collect	A5	II-2-6-①	same as 2001	same as 2001	same as 2001
Board Structure Index (B)						
Firm has at least 50% outside directors *(required beginning mid-2001 for large firms)*	director database	*B1*	*I-2-③, II-2-1*	*director database*	*2-A-(1)*	*2-A-(1)*
Firm has more than 50% outside directors (director database except as indicated)	director database	B2	I-2-③, II-2-1	1 for large firms if 1 in 2003 or 2-A-(1) ≥ 2	2-A-(1) for large firms	2-A-(1) for large firms
Firm has outside director nominating committee (*required from mid-2001 for large firms*).	hand-collect	*B3*	*II-3-4*	*2-B-(12), 2-B-(13)*	*2-A-(9)*	*2-A-(9)*
Audit committee of the board of directors exists (*required from mid-2001 for large firm*)	hand-collect	*B4*	*I-6-①*	*4-(1)*	*4-(1)*	*4-(1)*
firm has compensation committee	hand-collect	hand-collect	hand-collect	hand-collect	2-A-(10)	2-A-(10)
Board Procedure Index (C)						
Directors' positions on board meeting agenda items are recorded in board minutes.	hand-collect	C2	II-2-6-②	2-B-(4)	2-B-(21)	same as 2003

Date	1998-2000	mid-2001	2001	2002	2003	2004
Board chairman is an outside director or (from 2003) firm has outside director as lead director.	0 firms	C3 (0 firms)	hand collect	hand collect	2-A-(5)	2-A-(5)
A system for evaluating directors exists.	hand-collect	C4	II-2-6-④	same as 2001	2-B-(39)	2-B-(34)
A bylaw to govern board meetings exists.	hand-collect	C5	average of mid-2001 and 2003	2-B-(18)	2-B-(16)	same as 2003
Firm holds four or more regular board meetings per year.	hand-collect	C6	I-4-②, II-2-3-①	2-B-(1)	2-B-(19)	2-B-(20)
Firm has one or more foreign outside directors.	hand-collect	C7	director database	2-A-(10)	2-A-(6)	2-A-(6)
Shareholders approve outside directors' aggregate pay (separate from all directors' pay).	hand-collect	C11	same as mid-2001	same as 2003	2-B-(30)	same as 2003
Outside directors attend at least 70% of meetings, on average	same as mid-2001 [missing if 0 outside directors]	C12	I-1	2-A-(2)	2-B-34	2-B-(30)
Board meeting solely for outside directors exists.	hand-collect	C15	II-3-15-③	2-A-(3)	2-B-(35)	2-B-(31)
100% outside directors on audit committee	same as mid-2001 [if committee exists]	D1	II-4-1	4-(2)	4-(2)	4-(2)
Bylaws governing audit committee (or internal auditor) exist.	hand-collect	D2	average of mid-2001 and 2002	4-(3)	4-(3)	4-(3)
Audit committee includes person with expertise in accounting	hand-collect	D3	II-4-2	average of 2001 and 2003	4-(10)	4-(11)
Audit committee (or internal auditor) approves the appointment of the internal audit head.	hand-collect	D5	average of mid-2001 and 2002	4-(4)	4-(4)	4-(5)
Audit committee meets ≥ 4 times per year	hand-collect	D10	I-6-②, II-4-7-①	4-(7)	4-(7)	4-(7)
Disclosure Index (E)						
Firm conducted investor relations activity in year 2000	same as mid-2001	E1	II-1-5	3-(1)	3-(1)	3-A-(1)
Firm website includes resumes of board members	same as mid-2001	E2	average of mid-2001 and 2002	3-(9)	3-(9)	3-B-(21)
English disclosure exists	same as mid-2001	E3	average of mid-2001 and 2002	3-(15)	3-(14)	3-A-(13)
Ownership Parity (P)						
Ownership Parity = (1 - ownership disparity); disparity = ownership by all affiliated shareholders - ownership by controlling shareholder and family members	ownership database (same as mid-2001 for financial firms)	P (ownership database)	ownership database (same as mid-2001 for financial firms)	ownership database (same as mid-2001 for financial firms)	same as 2002	same as 2002

Table 2: Summary Statistics for KCGI, Selected Indices, and Elements

Summary statistics for indicated governance indices and elements. Dates are year-end. Pooled sample size varies from 4,242 to 4,344.

All Firms

	Mean	Median	Std. Dev	1998	2000	2002	2004
KCGI	35.44	33.48	12.69	24.74	31.92	35.82	42.23
Board Structure Index (BS = BI + BC)	2.44	0.00	4.72	0.36	1.89	2.80	3.33
Board Independence Subindex (BI=b1 + b2)	1.05	0.00	2.69	0.25	0.84	1.20	1.41
b0 (fraction of outside directors)	0.30	0.25	0.13	0.14	0.31	0.33	0.33
b1 (50% outside directors dummy)	0.15	0.00	0.35	0.03	0.12	0.19	0.20
b2 (> 50% directors dummy)	0.06	0.00	0.24	0.02	0.05	0.05	0.09
Board Committee Subindex (BC=b3 + b4 + b5)	1.38	0.00	2.55	0.11	1.05	1.60	1.92
b3 (nominating committee)	0.21	0.00	0.40	0.02	0.12	0.23	0.30
b4 (audit committee)	0.19	0.00	0.39	0.02	0.16	0.22	0.24
b5 (compensation committee)	0.03	0.00	0.16	0.00	0.03	0.03	0.03
c7 (foreign director dummy)	0.09	0.00	0.29	0.07	0.10	0.09	0.10
Number of firms	4344	4344	4344	535	540	558	659

Large Firms

	Mean	Median	Std. Dev	1998	2000	2002	2004
KCGI	53.94	54.54	16.49	34.00	48.93	56.54	66.85
Board Structure Index (BS = BI + BC)	10.96	11.67	5.88	2.11	9.72	13.29	14.75
Board Independence Subindex (BI=b1 + b2)	5.35	5.00	3.93	1.69	4.09	6.30	7.53
b0 (fraction of outside directors)	0.46	0.50	0.17	0.24	0.47	0.53	0.54
b1 (50% outside directors dummy)	0.72	1.00	0.45	0.18	0.53	0.99	0.99
b2 (> 50% directors dummy)	0.35	0.00	0.48	0.16	0.29	0.27	0.52
Board Committee Subindex (BC=b3 + b4 + b5)	5.53	6.67	2.98	0.38	5.63	6.99	7.21
b3 (nominating committee)	0.79	1.00	0.41	0.09	0.70	1.00	1.00
b4 (audit committee)	0.81	1.00	0.39	0.06	0.88	0.97	0.99
b5 (compensation committee)	0.12	0.00	0.32	0.00	0.10	0.12	0.18
c7 (foreign director dummy)	0.19	0.00	0.39	0.16	0.14	0.16	0.22
Number of large firms	584	584	584	74	77	73	73

Small Firms

	Mean	Median	Std. Dev	1998	2000	2002	2004
KCGI	32.77	31.91	9.41	23.46	29.33	32.92	39.25
Board Structure Index (BS = BI + BC)	1.13	0.00	2.73	0.09	0.59	1.23	1.90
Board Independence Subindex (BI=b1 + b2)	0.39	0.00	1.64	0.03	0.30	0.43	0.64
b0 (fraction of outside directors)	0.28	0.25	0.10	0.13	0.29	0.30	0.31
b1 (50% outside directors dummy)	0.06	0.00	0.24	0.00	0.05	0.07	0.10
b2 (> 50% directors dummy)	0.02	0.00	0.13	0.00	0.01	0.02	0.03
Board Committee Subindex (BC=b3 + b4 + b5)	0.74	0.00	1.74	0.07	0.29	0.79	1.26
b3 (nominating committee)	0.12	0.00	0.32	0.01	0.03	0.12	0.21
b4 (audit committee)	0.09	0.00	0.29	0.01	0.05	0.11	0.15
b5 (compensation committee)	0.01	0.00	0.11	0.00	0.01	0.02	0.02
c7 (foreign director dummy)	0.08	0.00	0.27	0.06	0.09	0.08	0.08
Number of small firms	3760	3760	3760	461	463	485	586

Table 3: Principal Variables

Definition and summary statistics for the principal dependent and independent variables used in this paper. Panel A defines each variable. Panel B provides summary statistics. Book asset values are in billion won. Book and market values are measured at year end, except that market values for mid-2001 are measured on the last day of June.

Panel A: Variable Definitions

Governance Variables	**Description**
KCGI	Sum of Board Structure, Shareholder Rights, Board Procedure, Disclosure, and Ownership Parity Indices
Board Structure Index	Board Structure Subindex + Board Independence Subindex
Board Independence Subindex	[(b1 + b2)/no. of non-missing values] x 10
Board Committee Subindex	[(b3 + b4 + b5)/no. of non-missing values] x 10
b1	1 if firm has at least 50% outside directors, 0 otherwise
b2	1 if firm has >50% outside directors, 0 otherwise
b3	1 if firm has outside director nomination committee, 0 otherwise
b4	1 if firm has audit committee, 0 otherwise
b5	1 if firm has compensation committee, 0 otherwise
c7	1 if firm has one or more foreign directors, 0 otherwise
Other Variables	
Tobin's *q*	[Market value of assets / Book value of assets] measured at each year-end. Market value of assets is estimated by [book value of debt + book value of preferred stock + market value of common stock].
Market-to-Book Ratio	[Market value of common stock / Book value of common stock] measured at each year-end. We drop firms with negative book value of common stock.
Market-to-Sales Ratio	[Market value of common stock / Sales] measured at each year-end.
Years Listed	Number of years since original listing on Korea Stock Exchange
Leverage	(Book value of debt)/ (Market value of common stock), winsorized at 1% and 99%
Sales Growth	Geometric average sales growth during past 5 fiscal years (or available period if < five years). If fiscal year changes, we only keep years which cover a full 12 months.
R&D/Sales	Ratio of research and development (*R&D*) expense to sales. Firms with missing data for *R&D* expense are assumed to have 0 values.
Advertising/Sales	Ratio of advertising expense to sales. Firms with missing data for advertising expense are assumed to have 0 values.
Exports/Sales	Ratio of export revenue to sales. Firms with missing data for export revenue are assumed to have 0 values.
PPE/Sales	Ratio of property, plant, and equipment to sales.
Capex/PPE	Ratio of capital expenditures to PPE
EBIT/Sales	Ratio of earnings before interest and taxes to sales.
Market Share	Firm's share of total sales by all firms in the same 4-digit industry listed on KSE.
Share Turnover	[Common shares traded during year / Common shares held by public shareholders]. Denominator = [common shares outstanding x (1 – total affiliated ownership)]
Foreign Ownership	[Common shares held by foreign investors / common shares outstanding]
Sole Ownership	[common shares held by controlling shareholder and family members / common shares outstanding]
Asset Size Dummy	Equals 1 of book value of assets > 2 trillion won at end of prior year, 0 otherwise
Chaebol Dummy	1 if a member of one of the top-30 business groups (based on total group assets) as of April of each year as identified by Korea Fair Trade Commission; 0 otherwise, excluding former state-owned enterprises.
Level 1 ADR Dummy	1 if firm has level 1 American Depository Receipts (ADRs); 0 otherwise.
Level 2/3 ADR Dummy	1 if firm has level 2 or level 3 ADRs; 0 otherwise.
MSCI Index Dummy	1 if firm is in Morgan Stanley Capital International Index; 0 otherwise.
Bank Dummy	1 if firm is a commercial bank or a merchant bank; 0 otherwise

Panel B: Summary Statistics

	No of "1" values	Pooled Mean	Pooled Median	Min.	Max.	S.D.	1998 Mean	2000 Mean	2002 Mean	2004 Mean
Tobin's *q*		0.86		0.21	6.05	0.38	0.93	0.78	0.81	0.85
ln(Tobin's *q*)		-0.21		-1.55	1.80	0.35	-0.11	-0.29	-0.27	-0.24
ln(market/book)		-0.65		-9.23	7.18	0.83	-0.51	-0.99	-0.71	-0.61
ln(market/sales)		-1.33		-11.49	3.85	1.07	-1.34	-1.70	-1.39	-1.21
ln(assets)										
Years Listed		15.33		0.00	48.00	9.69	13.44	14.84	15.87	17.22
Leverage		33.46		0.01	115000	1763	8.05	11.00	5.14	3.47
Sales Growth		0.27		-0.65	541.25	8.46	0.13	0.11	1.30	0.11
R&D/Sales		0.01		0.00	7.69	0.13	0.01	0.01	0.01	0.02
Advertising/Sales		0.01		0.00	0.21	0.02	0.01	0.01	0.01	0.01
Exports/Sales		0.27		0.00	1.00	0.30	0.30	0.27	0.23	0.27
PPE/Sales		0.54		0.00	36.05	1.09	0.54	0.60	0.46	0.49
Capex/PPE		0.14		0.00	7.73	0.20	0.13	0.15	0.14	0.16
EBIT/Sales		0.04		-30.78	0.97	0.51	0.04	0.05	0.05	-0.03
Market Share		0.06		0.00	1.00	0.16	0.06	0.07	0.07	0.07
Share Turnover		19.46		0.00	20650	473	5.61	7.89	7.72	5.85
Foreign Ownership		8.27		0.00	94.11	14.47	6.30	7.12	9.15	11.77
Sole Ownership		20.67		0.00	89.76	16.15	21.64	20.75	21.22	20.53
Asset Size Dummy	573	0.13		0.00	1.00	0.34	0.13	0.14	0.15	0.13
Chaebol Dummy	849	0.20		0.00	1.00	0.40	0.23	0.19	0.21	0.18
Level 1 ADR Dummy	135	0.03		0.00	1.00	0.17	0.02	0.03	0.05	0.04
Level 2/3 ADR Dummy	39	0.01		0.00	1.00	0.10	0.01	0.01	0.01	0.01
MSCI Index Dummy	503	0.12		0.00	1.00	0.32	0.16	0.11	0.13	0.10
Bank Dummy	124	0.03		0.00	1.00	0.17	0.03	0.03	0.03	0.02

Table 4: Correlations

The table below shows selected correlation coefficients which may be relevant in assessing colinearity between variables. All correlations are significant at p = .05 or better.

	IV	b0	b1	b2	b3	b4	b5	BI	BC	BS	KCGI
IV (asset size dummy)	1										
b0 (fraction outside directors)	0.48	1									
b1 (50% outside dummy)	0.64	0.73	1								
b2 (> 50% outside dummy)	0.46	0.59	0.62	1							
b3 (nomination committee)	0.56		0.54	0.34	1						
b4 (audit committee)	0.62		0.59	0.39	0.61	1					
b5 (compensation committee)	0.22		0.24	0.34	0.23	0.23	1				
Board Independence Subindex (BI = b1+b2)	0.63	0.75	0.94	0.86	0.51	0.56	0.31	1			
Board Committee Subindex (BC = b3+b4+b5)	0.64		0.63	0.45	0.88	0.87	0.45	0.62	1		
Board Structure Index (BS = BI + BC)	0.71	0.72	0.87	0.73	0.77	0.79	0.42	0.90	0.89	1	
KCGI	0.55	0.60	0.61	0.49	0.61	0.61	0.33	0.63	0.70	0.75	1
KCGI - BI	0.51	0.54	0.52	0.41				0.53			0.99
KCGI - BC	0.49				0.50	0.50	0.29		0.58		0.99
KCGI - BS	0.42	0.49	0.45	0.37	0.46	0.45	0.27			0.56	0.97
BC - b3	0.60				0.60				0.91		
BC - b4	0.55					0.60			0.91		
BC - b5	0.66						0.26		0.98		

Table 5: Instrumental Variable Results

Instrumental variable results using asset size dummy as an instrument for Board Structure Index, using pooled data form 1999-2004. We exclude 1998 because asset size dummy is a sensible instrument only after the adoption of legal reforms in 2H 1999.

Panel A: Durban-Wu-Hausman test for endogeneity of Board Structure Index.

Panel B: *OLS* and firm random effects regressions of Tobin's *q* on Board Structure Index, estimated using two-stage (*2SLS*) regressions. For first stage, regression (1) regresses Board Structure Index on asset size dummy and other exogenous variables; regression (2) adds *KCGI* - Board Structure Index as an additional control variable. The second stage is estimated using the fitted value for Board Structure Index from the first stage. Other control variables and treatment of outliers are the same as in *Table 8*, except that we exclude *MSCI* Index and *ADR* dummy variables due to high correlation with asset size dummy. *, **, and *** respectively indicate significance levels at 10%, 5%, and 1% levels.

Panel C: Three-stage least squares (3SLS) results, instrumenting for both Board Structure Index and for Tobin's q**.** The three models use different combinations of variables to instrument for Tobin's q. All variables predict Tobin's *q* in pooled OLS regressions (see Table 8), lack a strong theoretical connection to board structure, and do not predict board structure in unreported regressions similar to Table 8 with Board Structure Index as dependent variable.

All regressions use year dummies and Rogers' robust standard errors and other control variables as in Table 8. *OLS* regressions use firm clusters. R^2 is adjusted R^2 for *OLS* regressions and overall R^2 for random effects. *t*-values are reported in parentheses. Significant results (at 5% level or better) are shown in **boldface.**

Panel A: Durban-Wu-Hausman Test for Endogeneity of Board Structure Index

	First Stage Board Structure Index		**Second Stage** *ln*(Tobin's *q*)	
	Without Control	Controlling for Rest of *KCGI*	Without Control	Controlling for Rest of *KCGI*
	(1)	(3)	(2)	(4)
Board Structure Index			**0.0163*** (4.33)**	**0.0139*** (3.59)**
KCGI - Board Structure Index		**0.0562*** (4.91)**		**0.0032*** (3.27)**
Residual From 1st Stage			-0.0047 (1.22)	-0.0031 (0.79)
Asset Size Dummy	**7.4686*** (15.42)**	**7.2659*** (14.95)**		
ln(assets)	**0.4534*** (3.86)**	**0.3596*** (3.12)**	**-0.0271** (2.57)**	**-0.0323*** (3.03)**
Other control variables	yes	yes	yes	yes
Observations	3400	3373	3400	3373
Adjusted R^2	0.6952	0.7001	0.2795	0.2841

Panel B: *2SLS* Results for Board Structure Index

	First Stage Board Structure Index		**Second Stage** *ln*(Tobin's *q*)			
			Pooled OLS		Firm Random Effects	
Control for Rest of KCGI	No	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)
Fitted Value from 1st Stage			**0.0163*** (4.25)**	**0.0139*** (3.52)**	**0.0195*** (3.04)**	**0.0179*** (2.71)**
KCGI - Board Structure Index		**0.0562*** (4.91)**		**0.0032*** (3.22)**		0.0010 (1.39)
Asset Size Dummy	**7.4686*** (15.42)**	**7.2659*** (14.95)**				
ln(assets)	**0.4534***** (3.86)	**0.3596***** (3.12)	**-0.0271** (2.53)**	**-0.0323*** (3.00)**	**-0.0408*** (3.81)**	**-0.0405*** (3.94)**
Other control variables	yes	yes	yes	yes	yes	yes
Observations	3400	3373	3400	3373	3400	3373
R^2	0.6952	0.7001	0.2654	0.2725	0.3045	0.3110

Panel C: *3SLS* Results for Board Structure Index

	3*SLS* Model 1		3*SLS* Model 2		3*SLS* Model 4	
	(1) Board Structure Index	(2) *ln*(*q*)	(5) Board Structure Index	(6) *ln*(*q*)	(7) Board Structure Index	(8) *ln*(*q*)
Board Structure Index		**0.0139*** (5.41)**		**0.0139*** (5.42)**		**0.0139*** (5.41)**
ln(Tobin's *q*)	**4.9906*** (2.98)**		**4.1126*** (3.32)**		**4.3956** (2.06)**	
Asset Size Dummy	**6.7630*** (23.25)**		**6.8475*** (26.32)**		**6.8224*** (22.14)**	
ln(years listed)		**-0.0423*** (6.81)**		**-0.0435*** (7.23)**	-0.0270 (0.23)	**-0.0423*** (6.81)**
R&D/sales	-0.0738 (0.21)	**0.0641** (2.31)**		**0.0637** (2.46)**		**0.0630** (2.43)**
advertising/sales	-0.6117 (0.17)	**1.1782*** (4.86)**		**1.1933*** (5.18)**		**1.1826*** (4.94)**
EBIT/sales	0.1366 (1.40)	**-0.0216*** (2.93)**		**-0.0180*** (2.61)**	0.1259 (1.21)	**-0.0217*** (2.95)**
KCGI - Board Structure Index	**0.0365*** (3.61)**	**0.0032*** (4.91)**	**0.0401*** (4.49)**	**0.0032*** (4.90)**	**0.0388*** (3.44)**	**0.0032*** (4.91)**
ln(assets)	**0.4957*** (5.81)**	**-0.0323*** (5.60)**	**0.4718*** (6.22)**	**-0.0323*** (5.60)**	**0.4796*** (5.52)**	**-0.0323*** (5.60)**
other controls	yes	yes	yes	yes	yes	yes
Observations	3373	3373	3373	3373	3373	3373

Table 6: Difference-in-Difference Test

Columns (1) and (3) report coefficients from *OLS* regressions of difference in firm value (*ln*(Tobin's *q*) in column (1) and *ln*(Market/Book) in column (3)) from base date to specified future dates on period dummies and period dummies interacted with the large firm dummy (= 1 if firm's book asset value is above 2 trillion won as of June 1999 and 0 if firm's book asset value is below 2 trillion won as of June 1999). Columns (2) and (4) report coefficients from *OLS* regressions of firm value (*ln*(Tobin's *q*) in column (2) and *ln*(Market/Book) in column (4)) on period dummies, the large firm dummy (= 1 if firm's book asset value is above 2 trillion won as of June 1999), period dummies interacted with the large firm dummy, and firm fixed effects. Regressions are estimated using a sample that spans from June 1996 to December 2004. Coefficients corresponding to periods before December 1997 and after June 2001 are however suppressed. Banks, SOEs, voluntary adopters, and early adopters are excluded from the analyses. *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use firm clusters and Rogers' robust standard errors. *t*--values are reported in parentheses. Significant results (at 5% level or better) are shown in **boldface**.

	(1)	(2)	(3)	(4)
	difference in *ln*(Tobin's *q*) from June 1999 to indicated date	***ln*(Tobin's *q*)**	**difference in *ln*(Market/Book) from June 1999 to indicated date**	***ln*(Market/Book)**
Dec. 1997 Dummy	-0.0632***	-0.0624***	-0.4574***	-0.4610***
	(3.48)	(3.25)	(8.75)	(8.28)
Jun. 1998 Dummy	-0.1702***	-0.1700***	-0.7875***	-0.7983***
	(8.93)	(8.58)	(15.70)	(15.02)
Dec. 1998 Dummy	-0.0721***	-0.0717***	-0.3011***	-0.3124***
	(4.79)	(4.59)	(7.74)	(7.55)
Jun. 1999 Dummy	-0.1395***	-0.1398***	-0.3890***	-0.3919***
	(9.50)	(9.16)	(13.19)	(12.72)
Dec. 1999 Dummy	-0.2261***	-0.2254***	-0.5990***	-0.5981***
	(13.87)	(13.22)	(16.17)	(15.69)
Jun. 2000 Dummy	-0.2978***	-0.2971***	-0.8139***	-0.8146***
	(15.04)	(14.44)	(21.16)	(20.55)
Dec. 2000 Dummy	-0.2363***	-0.2377***	-0.5455***	-0.5512***
	(11.74)	(11.40)	(12.53)	(12.89)
Jun. 2001 Dummy	-0.2342***	-0.2356***	-0.5168***	-0.5274***
	(10.47)	(10.16)	(10.48)	(10.92)
Dec. 1997 Dummy	-0.0394	-0.0334	-0.1369	-0.1122
X Large Firm Dummy	(0.97)	(0.81)	(1.09)	(0.89)
Jun. 1998 Dummy	0.0583	0.0643	-0.0218	0.0022
X Large Firm Dummy	(1.43)	(1.52)	(0.18)	(0.02)
Dec. 1998 Dummy	0.0176	0.0270	-0.0292	0.0079
X Large Firm Dummy	(0.62)	(0.87)	(0.35)	(0.08)
Jun. 1999 Dummy	**0.1737*** **	**0.1858*** **	**0.2440*** **	**0.3074*** **
X Large Firm Dummy	**(3.70)**	**(3.76)**	**(3.12)**	**(3.29)**
Dec. 1999 Dummy	**0.1960*** **	**0.1950*** **	**0.2777*** **	**0.2931*** **
X Large Firm Dummy	**(5.14)**	**(5.00)**	**(2.78)**	**(2.86)**
Jun. 2000 Dummy	**0.1920*** **	**0.1995*** **	**0.2265** **	**0.2941*** **
X Large Firm Dummy	**(5.21)**	**(5.23)**	**(2.39)**	**(2.80)**
Dec. 2000 Dummy	**0.1760*** **	**0.1856*** **	**0.2323** **	**0.2969** **
X Large Firm Dummy	**(4.58)**	**(4.66)**	**(2.22)**	**(2.58)**
Jun. 2001 Dummy	**0.1893*** **	**0.1989*** **	**0.2927*** **	**0.3339*** **
X Large Firm Dummy	**(4.83)**	**(4.88)**	**(2.84)**	**(3.08)**
Large Firm Dummy		0.0293		-0.1001
		(0.72)		(0.72)
Firm fixed effects	N	Y	N	Y
Observations	3674	3674	3625	3637
R-squared	0.25	0.36	0.28	0.41
within R-sq		0.36		0.41
between R-sq		0.08		0.02
overall R-sq		0.22		0.24

Table 7: Event Type Analysis

Column (1) reports coefficients from firm fixed effects regressions of ln(Tobin's *q*) for large firms (the treatment group) on the mean value of ln(Tobin's q) for small firms (the control group), a post-reform dummy (= 1 beginning year-end 1999, 0 before), and a constant. Regressions in column (2) add additional period dummies, taking respectively a value of 1 beginning year-end 2000 (year-end 2001), and 0 before. Columns (3)-(4) are similar except the dependent variable is ln(market/book). *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use Rogers' robust standard errors. *t*-values are reported in parentheses (suppressed for the constant). Significant results (at 5% level or better) are shown in **boldface**.

	(1)	(2)	(3)	(4)
	ln(Tobin's *q*)		*ln*(Market/Book)	
Post-Reform Dummy	**0.1411*** **	**0.1412*** **	**0.2669*** **	**0.2679*** **
(=1 beginning year-end 1999)	**(3.54)**	**(3.43)**	**(5.40)**	**(5.00)**
Reform Period Dummy		-0.0362		-0.0419
(=1 beginning year-end 2000)		(1.18)		(0.66)
Reform Period Dummy		0.0296		0.0948
(=1 beginning year-end 2001)		(1.09)		(1.09)
Mean of Small Firms' *ln*(Tobin's *q*)	**0.8340*** **	**0.7299*** **		
	(4.32)	**(3.66)**		
Mean of Small Firms' *ln*(Market/Book)			**1.0317*** **	**1.0058*** **
			(10.31)	**(9.47)**
No. of Observations	411	411	402	402
No. of Large Firms	46	46	46	46
Within R-squared	0.07	0.07	0.24	0.24
Between R-squared	0.00	0.00	0.01	0.01
Overall R-squared	0.03	0.03	0.08	0.08

Table 8: Full Sample Results for Board Structure Index

Coefficients from regressions of *ln*(Tobin's *q*) on Board Structure Index, (*KCGI* – Board Structure Index), and control variables. Outliers for each year are identified and dropped if the studentized residual from a regression of *ln*(Tobin's *q*) on Board Structure Index is greater than ±1.96. ADR level 23 dummy and bank dummy are unavailable with firm fixed effects due to lack of within-firm variation over time. *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use year dummies and Rogers' robust standard errors. *OLS* regressions use firm clusters. *t*- or *z*-values are reported in parentheses (suppressed for control variables). R^2 is adjusted R^2 for *OLS*, overall R^2 for random effects, and within R^2 for fixed effects regressions. Significant results (at 5% level or better) are shown in **boldface**.

	Pooled *OLS*	**Random Effects**	**Fixed Effects (Unbalanced)**	**Fixed Effects (Balanced)**
Board Structure Index	**0.0128*** **	**0.0112*** **	**0.0102*** **	**0.0095*** **
	(7.05)	**(10.45)**	**(8.73)**	**(6.85)**
KCGI - Board Structure Index	**0.0042*** **	**0.0018*** **	0.0007	0.0000
	(4.52)	**(2.91)**	(0.98)	(0.05)
ln(assets)	**-0.0311*** **	**-0.0327*** **	**-0.0503*** **	-0.0450*
	(3.42)	**(4.35)**	**(3.19)**	(1.91)
ln(years listed)	**-0.0480*** **	**-0.0582*** **	**-0.0978*** **	**-0.1746*** **
	(4.64)	**(5.80)**	**(4.05)**	**(4.26)**
leverage	-0.0000	-0.0000	-0.0000	-0.0000
	(0.17)	(0.42)	(0.99)	(1.42)
sales growth	**-0.0038*** **	**-0.0034*** **	**-0.0037*** **	-0.0066
	(5.36)	**(4.53)**	**(2.69)**	(0.21)
R&D/sales	**0.0714*** **	**0.0240** **	**0.0182** **	0.0178**
	(5.62)	**(2.07)**	**(2.29)**	(2.23)
advertising/sales	**1.1413** **	**0.9582*** **	0.7862*	0.7170*
	(2.56)	**(2.64)**	(1.83)	(1.76)
exports/sales	-0.0009	-0.0315	-0.0634*	-0.0077
	(0.03)	(1.16)	(1.85)	(0.17)
PPE/sales	**-0.0384** **	**-0.0392*** **	**-0.0520** **	**-0.1858*** **
	(2.15)	**(2.68)**	**(2.57)**	**(5.54)**
$(PPE/sales)^2$	0.0003	0.0006	0.0010	**0.0292*** **
	(0.40)	(1.07)	(1.56)	**(5.22)**
capex/PPE	**0.1106*** **	**0.0646*** **	**0.0513** **	**0.0870*** **
	(3.17)	**(2.71)**	**(2.02)**	**(2.59)**
EBIT/sales	**-0.1229** **	-0.0636*	-0.0245	0.0708*
	(2.37)	(1.75)	(0.61)	(1.77)
market share	0.1054	**0.2900*** **	**0.3665*** **	0.2340
	(1.33)	**(3.26)**	**(3.22)**	(1.55)
share turnover	**0.0000*** **	0.0000	0.0000	0.0000
	(3.33)	(0.96)	(0.32)	(0.35)
foreign ownership	**0.0027*** **	**0.0027*** **	**0.0027*** **	**0.0035*** **
	(4.40)	**(6.53)**	**(5.84)**	**(5.82)**
chaebol dummy	**0.0422*** **	**0.0394*** **	0.0300*	0.0111
	(2.62)	**(2.83)**	(1.74)	(0.53)
sole ownership	**-0.0054*** **	**-0.0024*** **	0.0002	0.0009
	(4.69)	**(2.74)**	(0.17)	(0.59)
$(sole\ ownership)^2$	**0.0001*** **	0.0000	-0.0000	-0.0000
	(3.65)	(0.81)	(1.39)	(1.29)
ADR Level 1 dummy	-0.0438	0.0176	0.0278	0.0263
	(0.99)	(0.61)	(0.87)	(0.56)
ADR Level 2-3 dummy	-0.0794	-0.0386		
	(1.22)	(0.23)		
MSCI index dummy	0.0317	0.0139	0.0073	0.0051
	(1.55)	(0.94)	(0.43)	(0.25)
bank dummy	-0.0521	0.0102		
	(1.44)	(0.28)		
4-digit industry dummies	yes	yes	yes	yes
Observations	3553	3553	3553	1965
No. of firms	581	581	581	267
R^2	0.323	0.31	0.23	0.28

Table 9: Full Sample Results for Board Independence and Board Committee Subindices

Coefficients from regressions of *ln*(Tobin's *q*) on Board Independence and Board Committees Subindices, Board Elements, indicated control for rest of *KCGI*, and other control variables. Outliers for each year are identified and dropped if the studentized residual from a regression of *ln*(Tobin's *q*) on Board Structure Index (for first and last sets) or indicated subindex (for middle sets) is greater than ±1.96. Control variables are same as in *Table 8*. *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use year dummies, unbalanced panels, and Rogers' robust standard errors. *OLS* regressions use firm clusters. *t*- or *z*-values are reported in parentheses. R^2 is adjusted R^2 for *OLS*, overall R^2 for random effects, and within R^2 for fixed effects regressions. Significant results (at 5% level or better) are shown in **boldface**.

	Pooled *OLS*	**Random Effects**	**Fixed Effects (Unbalanced)**
Board Independence Subindex	**0.0158*** **	**0.0136*** **	**0.0125*** **
	(5.80)	**(8.59)**	**(7.49)**
Board Committee Subindex	**0.0096*** **	**0.0081*** **	**0.0071*** **
	(2.83)	**(3.91)**	**(3.21)**
KCGI - Board Structure Index	**0.0043*** **	**0.0019*** **	0.0008
	(4.57)	**(3.05)**	(1.14)
R^2	0.3168	0.31	0.23
b1 (50% outside director dummy)	**0.1139*** **	**0.0917*** **	**0.0819*** **
	(5.13)	**(7.40)**	**(6.48)**
b2 (> 50% outside director dummy)	**0.0462***	**0.0480*** **	**0.0493*** **
	(1.92)	**(3.13)**	**(3.10)**
KCGI - Board Independence Subindex	**0.0044*** **	**0.0023*** **	**0.0013** **
	(5.09)	**(4.18)**	**(2.06)**
R^2	0.32	0.31	0.23
Nominating committee	**0.0518** **	**0.0336*** **	**0.0249** **
	(2.41)	**(2.86)**	**(2.01)**
Audit committee	0.0409*	**0.0508*** **	**0.0511*** **
	(1.75)	**(3.60)**	**(3.32)**
Compensation committee	**0.0706** **	0.0273	0.0215
	(2.03)	(1.36)	(1.01)
KCGI - Board Committee Subindex	**0.0052*** **	**0.0029*** **	**0.0019*** **
	(5.73)	**(4.92)**	**(2.83)**
R^2	0.3065	0.30	0.22
b1 (50% outside director dummy)	**0.0975*** **	**0.0813*** **	**0.0734*** **
	(3.86)	**(5.84)**	**(5.32)**
b2 (> 50% outside director dummy)	0.0200	**0.0364** **	**0.0432*** **
	(0.80)	**(2.27)**	**(2.61)**
Nominating committee	0.0388*	**0.0265** **	0.0202*
	(1.83)	**(2.28)**	(1.67)
Audit committee	0.0095	**0.0283** **	**0.0310** **
	(0.40)	**(2.02)**	**(2.05)**
Compensation committee	**0.0892** **	0.0395*	0.0312
	(2.53)	(1.88)	(1.40)
KCGI - Board Structure Index	**0.0041*** **	**0.0019*** **	0.0008
	(4.40)	**(3.02)**	(1.19)
R^2	0.3165	0.31	0.23
Observations	3553	3553	3553
No. of firms	581	581	581

Table 10: Full Sample Results for Foreign Director Dummy

Coefficients from firm fixed effects regressions of *ln*(Tobin's *q*) on (i) foreign director dummy, Board Independence Subindex, and interaction of these variables, in each case with indicated controls for rest of KCGI and other control variables. Outliers for each year are identified and dropped if the studentized residual from a regression of *ln*(Tobin's *q*) on foreign director dummy is greater than ±1.96. Control variables are same as in *Table 8*. Regressions use year dummies, unbalanced panels, and Rogers' robust standard errors. *, **, and *** indicate significance at 10%, 5%, and 1% levels. *t*-values are reported in parentheses. Significant results (at 5% level or better) are shown in **boldface**.

	Fixed Effects	
c7 (foreign director dummy)	**-0.0366****	**-0.0749*****
	(2.03)	**(3.80)**
Board Independence Subindex		**0.0101*****
		(6.16)
foreign director dummy x Board Independence Subindex		**0.0150*****
		(4.26)
Board Procedure Index - c7	0.0010	0.0010
	(0.68)	(0.71)
KCGI - Board Procedure Index	**0.0034*****	
	(5.76)	
KCGI - Board Procedure Index & Board Independence Subindex		**0.0017****
		(2.46)
Other Controls	Y	Y
Observations	3556	3556
Within R^2	0.22	0.24

Table 11: Alternative Board Independence Elements

Coefficients from regressions of *ln*(Tobin's *q*) on (i) alternate element b0 (fraction of outside directors), (ii) elements b0 and b1 together, (iii) element b-below (defined as {min(2 x fraction of outside directors, 1)} and element b1, and (iv) element b0, for subsample of firms with < 50% outside directors; in each case with indicated control for remainder of *KCGI* and other control variables. Outliers for each year are identified and dropped if the studentized residual from a regression of *ln*(Tobin's *q*) on Board Independence Subindex is greater than ±1.96. Control variables are same as in *Table 8*. All regressions use year dummies, unbalanced panels, and Rogers' robust standard errors. *OLS* regressions use firm clusters. *, **, and *** indicate significance at 10%, 5%, and 1% levels. *t*- or *z*-values are reported in parentheses. R^2 is adjusted R^2 for *OLS*, overall R^2 for random effects, and within R^2 for fixed effects regressions. Significant results (at 5% level or better) are shown in **boldface**.

Panel	Principal independent variables	Pooled *OLS*	Random Effects	Fixed Effects
Alternate specifications for board independence				
(i)	b0 (fraction outside directors)	**0.2990*** **	**0.2014*** **	**0.1721*** **
		(5.29)	**(5.80)**	**(4.70)**
	KCGI - Board Independence Subindex	**0.0050*** **	**0.0029*** **	**0.0018*** **
		(5.77)	**(5.32)**	**(2.96)**
	R^2	0.31	0.30	0.22
(ii)	b0 (fraction of outside directors)	0.0663	0.0182	0.0126
		(1.03)	(0.44)	(0.29)
	b1 (50% outside director dummy)	**0.1127*** **	**0.1008*** **	**0.0925*** **
		(4.71)	**(7.03)**	**(6.23)**
	KCGI - Board Independence Subindex	**0.0044*** **	**0.0023*** **	**0.0013** **
		(5.13)	**(4.26)**	**(2.11)**
	R^2	0.32	0.31	0.23
(iii)	b-below (min(2 x fraction of outside directors, 1))	0.0358	-0.0074	-0.0180
		(0.94)	(0.31)	(0.72)
	50% outside director dummy	**0.1120*** **	**0.1073*** **	**0.1016*** **
		(4.62)	**(7.31)**	**(6.69)**
	KCGI - Board Independence Subindex	**0.0045*** **	**0.0023*** **	**0.0013** **
		(5.16)	**(4.27)**	**(2.10)**
	R^2	0.32	0.31	0.23
	Observations	3549	3549	3549
Subsample of firms with < 50% outside directors				
(iv)	b0 (fraction outside directors)	**0.1700** **	0.0736	0.0388
		(2.20)	(1.34)	(0.67)
	KCGI - Board Independence Subindex	**0.0049*** **	**0.0027*** **	0.0013*
		(4.79)	**(4.02)**	(1.70)
	R^2	0.30	0.29	0.26
	Observations	3031	3031	3031

Table 12: Year-by-Year *OLS* Results for Board Structure Subindex

Coefficients from regressions of *ln*(Tobin's *q*) on Board Structure Index, (*KCGI* – Board Structure Index), and control variables. Outliers for each year are identified and dropped if the studentized residual from a regression of *ln*(Tobin's *q*) on Board Structure Index is greater than ±1.96. Control variables are same as in *Table 8*, except bank dummy is omitted for 1998-1999 due to colinearity with Board Structure Index. *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use Rogers' robust standard errors with firm clusters. *t*-values are reported in parentheses. Significant results (at 5% level or better) are shown in **boldface**.

	1998	1999	2000	Mid 2001	2001	2002	2003	2004
Board Structure	0.0056	0.0002	**0.0115*** **	**0.0134*** **	**0.0103*** **	**0.0122*** **	**0.0115*** **	**0.0094*** **
Index	(1.26)	(0.04)	**(3.54)**	**(4.05)**	**(3.26)**	**(3.50)**	**(3.32)**	**(2.77)**
KCGI - Board	0.0024*	**0.0061*** **	**0.0044*** **	**0.0049*** **	**0.0045*** **	0.0038*	**0.0041** **	0.0037*
Structure Index	(1.75)	**(4.02)**	**(3.13)**	**(3.52)**	**(3.21)**	(1.88)	**(2.12)**	(1.76)
No. of firms	450	418	489	464	501	368	489	374
Adjusted R^2	0.317	0.328	0.344	0.286	0.259	0.328	0.346	0.392

Table 13: Firm Fixed Effects (Subsample Results)

Coefficients from firm fixed effects regressions for indicated subsamples of *ln*(Tobin's *q*) on (i) Board Structure Index, (ii) Board Independence and Board Committee Subindices, and (iii) 50% outside directors dummy and > 50% outside directors dummy, in each case with control for rest of KCGI and other control variables. Control variables are same as in *Table 8*. Outliers for each year are identified and dropped if the studentized residual from a regression of *ln*(Tobin's *q*) on [Board Structure Index for specifications (i)-(ii); Board Independence Subindex for specification (iii)] is greater than ±1.96. *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use year dummies, unbalanced panel, and Rogers' robust standard errors. *t*-values are reported in parentheses. Significant results (at 5% level or better) are shown in **boldface**

Specification			**(i)**	**(ii)**		**(iii)**	
	Subsample	Sample Size	Board Structure	Board Independence	Board Committee	b1 (50% outside directors)	b2 (> 50% outside directors)
(1)	Full Sample	3553	**0.0102*** (8.73)**	**0.0125*** (7.49)**	**0.0071*** (3.21)**	**0.0819*** (6.47)**	**0.0495*** (3.11)**
(2)	Banks	76	-0.0008 (1.47)	-0.0009 (1.40)	-0.0006 (0.69)	-0.0072 (1.10)	-0.0007 (0.13)
(3)	Non-Banks	3477	**0.0105*** (8.40)**	**0.0134*** (7.46)**	**0.0067*** (2.70)**	**0.0839*** (6.38)**	**0.0571*** (3.23)**
(4)	Financial Firms and SOEs	431	**0.0081*** (4.76)**	**0.0069*** (3.57)**	**0.0104*** (3.07)**	**0.0483** (2.39)**	0.0233 (1.36)
(5)	Non-Financial, Non-SOE Firms	3122	**0.0109*** (6.67)**	**0.0143*** (6.14)**	**0.0066** (2.26)**	**0.0811*** (5.09)**	**0.0748*** (3.11)**
(6)	*Chaebol* Firms	760	**0.0083*** (4.15)**	**0.0089*** (3.55)**	0.0072* (1.79)	**0.0626*** (3.02)**	0.0333 (1.48)
(7)	Non-*Chaebol* Firms	2793	**0.0093*** (5.57)**	**0.0110*** (4.52)**	**0.0074*** (2.60)**	**0.0789*** (4.03)**	0.0415* (1.68)
(8)	Large Firms (specific year)	488	0.0035 (1.28)	0.0053* (1.69)	-0.0003 (0.07)	**0.0515** (2.13)**	0.0204 (1.12)
(9)	Small Firms (specific year)	3065	**0.0096*** (4.86)**	**0.0116*** (4.34)**	**0.0074** (2.30)**	**0.0822*** (4.21)**	0.0344 (1.18)
(10)	Non-manufacturing firms	1067	**0.0090*** (6.27)**	**0.0117*** (5.85)**	0.0050* (1.84)	**0.0524*** (3.42)**	**0.0695*** (3.86)**
(11)	Manufacturing firms	2486	**0.0124*** (6.45)**	**0.0136*** (5.08)**	**0.0108*** (2.99)**	**0.1049*** (5.40)**	0.0363 (1.35)

Table 14: Firm Fixed Effects (Alternate Measures of Firm Value)

Coefficients from firm fixed effects regressions of *ln*(Tobin's *q*), *ln*(market/book) and *ln*(market/sales) on (i) Board Structure Index; (ii) Board Independence and Board Committees Subindices; and (iii) element b1 (50% outside director dummy) and b2 (> 50% outside director dummy), in each case with indicated control for rest of *KCGI*, and other control variables. Outliers for each year are identified and dropped if the studentized residual from a regression of the dependent variable on Board Structure Index (for first and second sets) or Board Independence Subindex (for third set) is greater than ±1.96. Control variables are same as in *Table 8*. *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use year dummies, unbalanced panels and Rogers' robust standard errors. *t* -values are reported in parentheses. Significant results (at 5% level or better) are shown in **boldface**.

dependent variable	***ln*(Tobin's *q*)**	***ln*(market/book)**	***ln* (market/sales)**
Board Structure Index	**0.0102*** **	**0.0170*** **	**0.0155*** **
	(8.73)	**(4.63)**	**(4.13)**
KCGI - Board Structure Index	0.0007	0.0017	**0.0048*** **
	(0.98)	(1.00)	**(2.68)**
Within R^2	0.23	0.31	0.42
Board Independence Subindex	**0.0125*** **	**0.0289*** **	**0.0209*** **
	(7.49)	**(5.49)**	**(3.80)**
Board Committee Subindex	**0.0071*** **	0.0015	0.0088
	(3.21)	(0.24)	(1.29)
KCGI - Board Structure Index	0.0008	0.0022	**0.0050*** **
	(1.14)	(1.30)	**(2.76)**
Within R^2	0.23	0.31	0.42
b1 (50% outside dummy)	**0.0819*** **	**0.1514*** **	**0.0994** **
	(6.48)	**(3.74)**	**(2.50)**
b2 (> 50% outside dummy)	**0.0493*** **	**0.1286** **	**0.1148** **
	(3.10)	**(2.32)**	**(2.20)**
KCGI - Board Independence	**0.0013** **	0.0019	**0.0058*** **
	(2.06)	(1.23)	**(3.53)**
Within R^2	0.23	0.31	0.42
Observations	3553	3571	3613
No. of firms	581	582	583