The effect of board structure on firm value: a multiple identification strategies approach using Korean data

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ABSTRACT

Outside directors and audit committees are widely considered to be central elements of good corporate governance. We use a 1999 Korean law as an exogenous shock to assess how board structure affects firm market value. The law mandates 50% outside directors and an audit committee for large public firms, but not smaller firms. We study how this shock affects firm market value, using event study, difference-in-differences, and instrumental variable methods, within a regression discontinuity approach. The legal shock produces large share price increases for large firms, relative to mid-sized firms; share prices jump in 1999 when the reforms are announced.

Key words: Korea, outside directors, audit committees, corporate governance, board of directors
JEL classification: G32, G34, G38

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1. Introduction

A minimum number of outside directors (perhaps a majority), and an audit committee staffed principally or solely by outside directors, are standard corporate governance prescriptions. Both are prescribed by law in many countries, and are central components of most "comply or explain" corporate governance codes. Yet convincing empirical strategies that can address the likely endogeneity of governance and let us assess how these prescriptions affect firm value are often not available.

The principal advance in this paper is to use a legal shock to governance as a basis for identification for a connection between board structure and firm market value, proxied by Tobin's *q*. In 1999, in response to the 1997–1998 East Asian financial crisis, Korea adopted governance rules, effective partly in 2000 and partly in 2001, which require "large" firms (assets greater than 2 trillion won, around $2 billion) to have 50% outside directors, an audit committee with an outside chair and at least two-thirds outside members, and an outside director nominating committee. Smaller firms must have 25% outside directors.

Prior papers that seek to address endogeneity include Wintoki, Linck, and Netter (2009), who use Arellano-Bond "internal" instruments and find no connection between board composition and firm performance in the US. Dahya and McConnell (2007) report that UK firms which comply with the voluntary Cadbury Committee recommendation to have at least three nonexecutive directors experienced improved performance. Black, Jang, and Kim (2006a), a predecessor to this paper (henceforth BJK), use the same legal shock as we do and find that firms subject to these rules have higher Tobin's *q*'s than smaller firms.

BJK use cross-sectional data from 2001. In contrast, we build a panel data set which includes board structure data from 1996–2004 and full governance data from 1998–2004,

covering almost all public companies listed on the Korea Stock Exchange (KSE). We seek to identify a change in the market value of large firms, relative to mid-sized firms, both in *size* (is there a jump in Tobin's *q* at the 2-trillion-won threshold) and in *time* (does the value of large firms jump when the reforms are announced). We conduct event study and difference-in-differences (DiD) estimation of the effect of adopting these rules, with large firms as the treatment group and mid-sized firms as the control group. We support the event study and DiD analyses with firm fixed effects and instrumental variable (IV) analyses. We report consistent evidence across approaches for a connection between board structure (outside directors and audit committees) and firm market value.

A central empirical challenge is to assess whether large firms rose in value for reasons unrelated to the legal shock. We do so in a number of ways. First, we use a regression discontinuity framework to control for a possible continuous effect of firm size on firm market value. Second, the share prices and Tobin's *q*'s of large firms jump relative to mid-sized firms *when* they should—during the mid-1999 period when the main legislative events occur. Third, we find no near-term changes in large firms' profitability or growth which might explain the 1999 jump. Fourth, we conduct event studies in six comparable East Asian countries and find no evidence that large firms outperform mid-sized firms there during our event period. Fifth, smaller firms which voluntarily adopt the principal reforms have similar value increases to those we observe for large firms.

The estimated effects are economically important. In our event study, large firms' share prices rise by an average of 15% relative to mid-sized firms over a broad window covering our principal events. Our DiD results suggest a roughly 0.13 increase in *ln*(Tobin's *q*) from June 1, 1999 through the end of 1999 (this period captures the full legislative process).

The event study and DiD results cannot tell us how much of the value increase reflects each of the reforms. To assess this question, we study both large and small firms, using firm fixed effects. We find evidence supporting separate value from having (a) 50% outside directors, (b) having more than 50% outside directors, and less strongly (c) an audit committee.

Some limitations of this research: First, the results may not generalize beyond Korea. Second, we cannot assess to what extent large firms' market value gains reflect increases in overall firm value (which implies that these firms were out of equilibrium before the reforms), versus a transfer of value from insiders to outside investors. In related work (Black, Kim, Jang and Park, 2011; henceforth BKJP), we find evidence for both sources. Large firms opposed the reforms, which suggests that firm controllers did not expect net gains *for them*. Third, our empirical strategy does not let us study how different aspects of board structure affect firm market value.

Section 2 of this paper reviews the related literature and discusses the principal empirical challenges. Section 3 describes our data sources and our governance indices. Section 4 presents event study results. Section 5 presents DiD results. Section 6 presents firm fixed effects results. Section 7 presents IV results, and Section 8 concludes.

2. Literature review and empirical issues

Section 2.1 reviews the principal challenges for empirical research on the valuation effects of board structure or corporate governance more generally. Section 2.2 discusses our multiple identification strategies approach.

2.1. Empirical challenges

The literature on boards of directors is large, but most studies lack a sound basis for causal inference (often, if imprecisely, called identification). For a recent review, see Adams, Hermalin, and Weisbach, 2010).[1] Board structure is usually chosen by the firm and thus could be endogenous to other firm characteristics (see, e.g., Hermalin and Weisbach, 1998, 2003; Lehn, Patro, and Zhao, 2009; Harris and Raviv, 2008). One problem is reverse causation, with firm performance influencing board composition. In developed countries, firms respond to poor performance by increasing board independence (Bhagat and Black, 2002; Erickson, Park, Reising, and Shin, 2005). Thus, one cannot infer causation from studies which find an association between board independence and firm performance – whether negative (Agrawal and Knoeber, 1996; Bhagat and Black, 2002; Yermack, 1996, all studying the US)—or positive (Choi, Park and Yoo, 2007(Korea); Dahya, Dimitrov, and McConnell, 2008 (multicountry); Yeh and Woidtke, 2005 (Taiwan)). Optimal governance could also depend on firm characteristics. There is evidence that board structure adapts to firm-specific circumstances (see, e.g., Agrawal and Knoeber, 2001; Boone, Field, Karpoff, and Raheja, 2007; Coles, Daniel, and Naveen, 2008; Gillan, Hartzell, and Starks, 2006; Linck, Netter, and Yang, 2007).[2] Several articles contend that due to these problems, we know little about how corporate governance affects firm value or performance (see, e.g., Chidambaran, Palia, and Zheng, 2006; Lehn, Patro, and Zhao, 2007; Listokin, 2007).

[1] The Korean reforms have two central components—outside directors and audit committees. We discuss in the text the prior research on board composition. Research on the connection between audit committees and overall firm value is limited, and does not offer convincing identification. 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 UK.

[2] Similar concerns with this "optimal differences" flavor of endogeneity arise for studies of the effect of managerial ownership on firm performance (e.g., Demsetz and Lehn, 1985; Himmelberg, Hubbard, and Palia, 1999).

Several prior studies address identification, but all have limitations. Wintoki, Linck, and Netter (2009) (US) find that board independence predicts Tobin's *q* with firm fixed effects, but significance disappears if they use Arellano-Bond GMM "internal instruments" for board independence. This could, however, reflect the limited power of the Arellano-Bond procedure. Dahya and McConnell (2007) find improved operating performance for UK firms which increase their number of nonexecutive directors to three to comply with the Cadbury Committee "comply or explain" governance recommendation. However, this study has potential selection bias, both in which firms had fewer than three nonexecutive directors prior to the Cadbury report, and which firms chose to comply after the report was issued.[3] Black and Khanna (2007) use an event study of a broad Indian corporate governance reform, which emphasizes but is not limited to board independence and audit committees. BJK is the most similar to this article and use the same legal shock, but have only cross-sectional data in 2001; thus the main empirical strategies used here, which focus on the time of the shock, are not available.

2.2. Multiple causal inference strategies approach

This paper builds on BJK. We seek to address the principal limitations of BJK and strengthen the evidence for a causal connection between the 1999 reforms and the market values of large Korean firms.[4] We extend the BJK data, which is from mid-2001, back to 1996 and forward to 2004, thus covering the period before, during, and after the 1999 reforms and the

[3] Arcot and Bruno (2007) and MacNeil and Li (2006) report that well-performing UK firms are more likely to explain rather than fully comply with the current UK Combined Code of Corporate Governance, a successor to the Cadbury Code.

[4] In our view, the most important limitations of BJK, addressed here, are: (i) large-firm share prices could be higher than small-firm prices for a non-governance reason, that is merely associated with the large-firm instrument used there in an IV analysis; (ii) investors' initial enthusiasm for the reforms, observed in 2001 just after the reforms came into effect, might fade after investors gain experience with the reforms; (iii) BJK are agnostic on whether their instrument is best seen as instrumenting for governance generally, or only for board structure.

2000–2001 effective dates of those reforms. We then use event study and DiD analyses to estimate the effect of the reforms on firm market value in time (when the reforms were adopted) as well as in size. We confirm that large firms in other similar East Asian countries did not experience a similar price rise at the same time as large Korean firms, that the value effect of the reforms persists through the end of 2004, and that voluntary board changes by small firms produce similar price effects to the large firm reforms. We search for, and do not find, evidence to support a non-governance explanation for the mid-1999 jump in large firm prices. IV analysis provides a robustness check on the DiD results. We use a regression discontinuity approach (see, e.g., Angrist and Lavy, 1999; Imbens and Lemieux, 2008), in which we control for a smooth effect of firm size on firm market value, and also limit the size range for control and treatment firms, to the extent our sample size permits. We find consistent results across approaches.[5]

We cannot assess here whether the shock-related increase in large firms' market values reflects an initial out-of-equilibrium position, in which the legal shock improves firm efficiency; wealth transfer from insiders to outsiders (which would increase market value but not unobserved total value); or both. In a companion paper, BKJP find evidence for both broad channels. The existence of plausible channels through which board structure could affect firms' market values further supports a causal link between board structure and firm market value.[6]

[5] Our identification strategy complements an alternate means of addressing endogeneity, by developing a structural model. Examples include Coles, Lemmon and Meschke (2007) for managerial ownership; Harris and Raviv (2008) for board structure; and Himmelberg, Hubbard, and Love (2002) for investor protection rules.

[6] It may help some readers to provide an overview of our papers on Korean governance. BJK (2006a) is an initial identification paper, using cross-sectional data from 2001. Black, Jang, and Kim (2006b) examine what predicts firms' governance choices. This paper extends BJK by providing stronger causal inference using panel data. BKJP examine the channels through which governance may affect firm market value or performance.

3. Data and governance index construction

3.1. Event dates

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). Corporate law did not permit an audit committee or other board committees. Following the 1997–1998 East Asian financial crisis, Korean firms elected more outside directors and introduced other governance reforms, partly voluntarily and partly due to legal changes. Legal reforms in 1998 required all public firms to have at least 25% outside directors. The corporate law was amended in 1999 to permit board committees. The large-firm rules we focus on here (50% outside directors, audit committee, and outside director nominating committee) were adopted in 1999, with the principal legislative event dates in June-August, legislative action in December, and the rules coming into force at firms' annual shareholder meetings in spring 2000 (audit committee and outside director nominating committee) and 2001 (50% outside directors).[7]

We search Korean newspapers for news announcements related to the 1999 legal reforms, and extract four potential event dates, summarized in Table 1.[8] Announcements on June 2–3, 1999 (event 1) indicated that the government would amend Korea's corporate governance rules, focusing on *chaebol* reform. Prior news stories made it clear that the reforms would focus on audit committees and on outside directors. A June 25, 1999 announcement provides detail, but nothing significantly new, so we omit this date in the analysis below. On July 2, 1999, the government announced that the rules would apply to "large" firms (rather than *chaebol* firms as

[7] Large firms were required to have at least three outside directors by their 2000 meeting. This was primarily a transition rule, but also acted as a minimum board size requirement: A firm which wanted exactly 50% outside directors needed to have at least six directors.

[8] A more complete list of events is available from the authors on request.

such) but did not specify a size threshold (event 2). The first specification of the size threshold came on August 25, 1999, when the Ministry of Finance circulated a draft law which specified a 1 trillion won threshold, and required large firms to have 50% outside directors and an audit committee with at least two-thirds outside directors (event 3). There were conflicting announcements over whether the size threshold would be raised to 2 trillion won during Sept. 21–29; the threshold was stated at 2 trillion won on October 20, but this was likely anticipated due to the prior announcements. Legislative action was unlikely to be significant. There was little doubt that the legislature would adopt the government's proposal and it did so, without significant change, a few weeks after the government bill was introduced.

Given this history, we must decide which firms belong to the treatment group for each event. The government's early public statements stressed *chaebol* reform, rather than large-firm reform, so we treat *chaebol* firms as the treatment group for event 1. Event 2 included the first statement that the reforms threshold would be size-based, but the size threshold was not stated. The size threshold was first stated as 1 trillion won in August (event 3). The reforms were developed by a public-private Corporate Governance Reform Committee, which surely consulted informally with major Korean firms. Thus, market participants likely had a rough sense for the likely size threshold before it was announced. For events 2 and 3, we use 1 trillion won in assets at year-end 1998 as the dividing line between treatment and control firms. By the time of legislative adoption, the threshold was raised to 2 trillion won. We therefore use a 2 trillion won threshold for our DiD and IV results, for which the “after” date is December 1999, after the reforms are complete. We refer to over-1-trillion (2-trillion) won firms as "large-plus" (large) firms.

The Federation of Korean Industry (FKI), the principal *chaebol* trade group, opposed the

reforms.[9] The *chaebol* were able to get the threshold raised to 2 trillion won and delay full implementation until 2001, but could not block the reforms. The government also announced some less significant reforms, limited to *chaebol* firms, during August 1999. We confirm in horserace regressions that a large-plus dummy is significant, and a *chaebol* dummy is not, for event periods that include these announcements.[10]

3.2. Sample, governance index, and variables

We study Korean companies listed on the Korea Stock Exchange, excluding banks and SOEs (our sample would otherwise include 14 banks and six SOEs). We determine board composition at six-month intervals from 1998–2004, relying on books published annually by the Korea Listed Companies Association (KLCA).

To limit omitted variable bias, we want to control for other attributes of firm governance, which often correlate with board structure and could separately predict firm market value. We rely on a Korean corporate governance index (KCGI) from 1998–2004, developed and described in BKJP, and summarized in Table 2. Observations of KCGI are at year-end, except for 2001, when we also have mid-year data. KCGI (0 ~ 100) consists of five equally weighted indices: Board Structure; Board Procedure; Shareholder Rights; Disclosure; and Ownership Parity.

Board Structure index is composed of Board Independence subindex (2 elements, 0 ~ 10), and Board Committee subindex (3 elements, 0 ~ 10), defined as:

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

[9] See, for example, Ikwon Lee, FKI asks government to repeal outside director ratio, Korean Economic Daily (Sept. 7, 1999).

[10] We are not aware of other regulatory changes during this period that differentially affected large and small firms. Dewenter, Kim, Lim, and Novaes (2006) discuss changes in Korean stock exchange listing rules during 1999–2002. The only relevant change in 1999 simply requires firms to comply with the new legal rules.

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.

The 1999 law requires large firms to have elements b1, b3, and b4. For a firm which previously had none of these elements, Board Structure Index will rise from zero to 11.67, out of 20 possible points. The large-firm mean in fact rises from 0.20 in 1998 (one large firm had 50% outside directors, none had audit or other committees) to 12.47 in spring 2001. Figure 1 shows the mean Board Independence and Board Committee subindex values over time for balanced panels of large and small Korean public firms, respectively.

We use an extensive set of control variables, listed in Table 7, to further limit omitted variable bias. Data come from various sources. Financial data, foreign ownership, and listing year is from the KLCA's TS2000 database; information on *chaebol* firms is from annual press releases by the Korean Fair Trade Commission; stock market data are from the KSE; American Depository Receipt (ADR) data are from JP Morgan and Citibank websites; and industry classifications are the Korea Statistics Office. Table 3, Panel A defines the principal variables we study in this paper; Panel B provides summary statistics for these variables.

4. Event study

If the 1999 rules for large-firm governance affect market value, investors anticipate this effect when the legislation is proposed, and key legislative dates can be determined; an event study can help to identify a causal impact of the reforms on market value.

4.1. Event study methodology

We use two principal event study methods. First, we use a regression approach to estimate the returns to treatment group firms, relative to a control group, over each event period. Recall from Section 3.1 that the treatment group is *chaebol* firms for event 1, and large-plus firms (assets greater than 1 trillion won) for events 2 and 3. Consider events 2 and 3 first. Ideally, to strengthen causal inference, one would want the treatment (control) group to include only firms just above (below) the size threshold. This reduces the risk that firm size, rather than governance reforms, explains our results. But narrow bands limit the number of sample firms, thus reducing statistical power and raising the risk of a spurious result driven by non-governance returns to a modest number of treated firms. We address these competing concerns by using mid-sized firms with assets from 0.5–1 trillion won (n = 47) as the control group; and two alternate treatment groups: a "main" treatment group of firms with assets from 1–4 trillion won (n = 54), and a "narrow" group with assets from 1–1.5 trillion won (n = 18).

For event 1, the distinction between treatment and control groups is not size-based, but most *chaebol* are large.[11] We again exclude small firms from the sample entirely, as not comparable to the treatment group. We also exclude very large *chaebol* firms (assets greater than 8 trillion won) because there are no very large non-*chaebol* firms. Thus, the control group

[11] Of 78 firms with assets greater than 1 trillion won, 57 are *chaebol* firms.

is non-*chaebol* with assets from 0.5 to 8 trillion, and the treatment group is *chaebol* in this size range.[12]

We compute cumulative market adjusted returns (CMARs) to the treatment firms during the event period, relative to a "Mid-sized index"—an equally weighted index of control group returns. The *CMARs* are the sum of daily market-adjusted returns over the event period. Size is measured at year-end 1998.We regress the CMARs on a treatment group dummy variable and control variables of interest. A typical regression is:

$$CMAR_i = \alpha + \gamma * D_{treatment} + + \sum_j (\lambda_j * X_j) + \varepsilon_i \qquad (1)$$

Here, $D_{treatment}$ is the treatment group dummy and $\mathbf{X}_j$ is a vector of control variables. The coefficient γ captures the predicted CMAR for treatment group firms over the event period.

The event period is common to all firms in our sample. This makes it likely that individual firm returns violate the usual regression assumption of independent observations. Firms in the same industry could move together, or large-plus (small) firms could move with other large-plus (small) firms. We therefore compute standard errors using industry-group clusters, with industries based on four-digit Korea industry codes. We return to the problem of cross-sectional correlation of returns below. We drop outlier observations for which a studentized residual obtained by regressing the dependent variable (CMAR or CAR) on *chaebol* dummy (for

[12] In robustness checks, we obtain similar results if we expand the sample for event 1 to go down to 0.25 trillion won or narrow it to go up only to 4 trillion won. In an unreported "horserace" regression with separate *chaebol* and large-plus (assets greater than 1 trillion won) dummies, similar to Table 4, Panel A, regression (2), the coefficient on *chaebol* dummy is positive and significant (0.0382, t = 2.65); while the coefficient on large-plus dummy is small and insignificant (-0.0028, t = 0.16). We further confirm that investors saw event 1 as about *chaebol* reform by studying smaller firms (assets less than 1 trillion won). Small *chaebol* firms earn abnormal returns relative to non-*chaebol* firms for event 1 (coefficient on *chaebol* dummy = 0.0299, t = 3.38) in a regression similar to Table 4, Panel A, regression (2).

event 1) or large-plus firm dummy (for other events) is greater than ±1.96. These returns likely reflect firm-specific events rather than governance rules.

Our second event study approach uses a standard event study of abnormal returns over each event period (Brown and Warner, 1985; MacKinlay, 1997). For each firm, we compute cumulative abnormal returns (CARs) based on the market model, using the Mid-sized index as the market index. We estimate the market model during January–May and September–December, 1999. We exclude the June–August 1999 event period.

4.2. Graphical overview of event study results

Figure 2 provides a graphical overview of returns to an equally weighted index of large-plus versus a similar index of mid-sized firms during 1999. Each index is set to 100 at year-end 1998. The two indices move together through 1998 and the first five months of 1999. They diverge, beginning in June, around the time of event 1, and remain separated thereafter. This is consistent with our story: Large-plus firms gain relative to mid-sized firms *when* they should, if governance changes are driving share price changes. The divergence is not related to overall market movements. There is little divergence in late 1998 and early 1999, when prices rise strongly. The divergence appears instead during a period when an equally weighted index of all firms' share prices (dominated by smaller firms) is slightly declining.

Figure 3 narrows the time period and shows the cumulative difference between the large-plus and mid-sized indices from April 30, 1999 (roughly one month before event 1) to the end of 1999. Each index is renormalized to 100 at April 30, 1999. There is an overall rise, consistent with gradual release of information, or gradual investor assessment of the implications of the governance reform, during June-August, covering the period from event 1 through event 3, and

no significant trend thereafter. If one focuses more narrowly on the event dates, which are shown with vertical lines in the figure, there is a rise prior to event 1, consistent with potential leakage of information (though we interpret event 1 as being about *chaebol* firms, rather than large-plus firms as such), and a rise around events 2 and 3.

4.3. CMAR regression results

Table 4, Panel A reports regression results for market-adjusted returns. We report results for a (-2,+3) window around each event, and also for two long windows, one window covering the period from day -2 preceding event 2 through day +3 for event 3, and one which goes from day -2 preceding event 1 through day +3 for event 3.[13] Regression sets (1)–(3) use our "main" treatment group (assets from 1-4 trillion won). In regression set (1), the short window returns for each event are positive, economically meaningful, and statistically significant, for *chaebol* firms relative to non-*chaebol* firms for event 1, and for large-plus firms relative to mid-sized firms for events 2 and 3 and the long windows. The cumulative return over events 2–3 is 13.69% ($t = 3.16$). These results are consistent with investors reacting positively to the large-firm rules.

A central issue for this paper is whether we are observing a size-based effect, which is correlated with but unrelated to the regulatory threshold. We address this question in several ways. First, the narrower the event window, the less likely is this alternate explanation. Yet we obtain positive returns over narrow event windows around all three events. Second, we search for and do not find news announcements during the event period, or during the rest of 1999, suggesting that economic times are unusually good for large firms or *chaebol* firms.

[13] In unreported robustness checks, we obtain similar results for narrower (-1,+2) windows around each event, for other intermediate windows, and for long windows which begin earlier than day -2 before event 1, or end later than day +3 following event 3.

Third, in regression set (2) we control for a smooth parametric effect of firm size on Tobin's *q*, by adding *ln*(market capitalization) as a control variable. For the size-based events, the returns to large-plus firms are somewhat *larger* with this control; *t*-statistics also increase despite some loss of statistical power due to the 0.48 correlation between large-plus dummy and *ln*(market cap). In regression set (3), we address the possibility that the relation between event period returns and firm size might not be captured by a simple *ln*(market cap) specification, by including the first six powers of *ln*(market cap) as additional independent variables, to provide a flexible form for this relation.[14] Large-plus dummy remains positive and significant for the size-based events, and *t*-statistics again increase for the size-based windows. For the events 2–3 long window, the estimated gain for large-plus firms is 15.8% ($t = 3.34$) with the full six-powers control. Here and in later tables, we obtain similar results in robustness checks with other polynomial forms for our firm size control.

Fourth, in regression set (4), we obtain similar results for size-based events (events 2 and 3 and long windows including these events) with the "narrow" treatment group, limited to assets from 1–1.5 trillion won. Set (4) is otherwise similar to set (2), and controls for *ln*(market cap). For event 3—the first time the government specified the size threshold at 1 trillion won—share prices for large-plus firms jump by 6.4% ($t = 4.64$), relative to mid-sized firms. Large-plus dummy is also economically large and statistically significant for longer windows including event3. For event 2, the return to large-plus firms is positive but not significant; insignificance is not surprising since the treatment group includes only 18 firms and this announcement did not specify a size threshold. The coefficient for event 2 becomes significant (coefficient = 4.1%, $t = 2.09$) if we expand the treatment group to cover firms with assets from 1–2 trillion won ($n =$

[14] The 6-powers functional form was originally suggested by Steven Levitt in comments on BJK. In unreported robustness checks for this and other tables, we obtain similar results with other polynomial forms.

31).

The coefficients in regression sets (2) and (4) for windows including event 3 are virtually the same. The *t*-statistics are lower for the narrower group, as expected due to the smaller number of treatment group firms. Thus, the jump at the threshold remains roughly constant as one approaches the discontinuity. This supports a causal interpretation (Imbens and Lemieux, 2008).[15]

The final regression in each set is a "horserace" regression with two treatment groups: *chaebol* firms and large-plus, non-*chaebol* firms; the control group is mid-sized non-*chaebol* firms. This tests our interpretation of event 2 and 3 as being principally about large firm reform, rather than *chaebol* reform. *Chaebol* dummy is positive but insignificant in all sets; large-plus dummy is similar in size to the event 2-3 regression without *chaebol* dummy, and is significant with a firm size control (sets (2)-(4)) and marginally significant without this control. For the narrow treatment group, large-plus dummy takes a 0.18 coefficient (t = 2.32), while *chaebol* dummy takes a small .01. This is consistent with our interpretation of events 2 and 3.

In Figure 4, we return to graphical depiction. The left-hand figure shows a scatter plot of CMARs over the events 1-3 window, for firms with assets from 0.5–4 trillion won, a vertical line at 1 trillion won, and horizontal lines on either side of the vertical line. The line to the left of the vertical line shows mean returns to control firms (= 0 by definition). The longer line on the right shows the mean return to the main treatment group; the shorter line shows the mean return for the narrow treatment group. The right-hand figure is similar, for a window covering events 2–3. Each figure shows an economically and statistically significant jump for the main

[15] In robustness checks, we obtain similar results if we include firms with assets from 0.25–0.5 trillion in the control group, use alternate size bands for the treatment group, including 1–2 trillion won, 1–8 trillion won, or 2–4 trillion won (using the later-chosen threshold of 2 trillion won as the lower bound).

treatment group at the threshold (equivalent to Table 4, Panel A, regression set (1)), and a similar, marginally significant jump for the narrow treatment group. The jump for the narrow group becomes significant if we control for *ln*(market cap) or use CARs instead of CMARs.

4.4. CAR (event study) results

In Table 4, Panel B, we switch to a classic event study methodology, and do not exclude outliers. The index is non-*chaebol* firms for event 1 and mid-sized firms for other events. We report results based on two sets of firm groupings: First, we use industry portfolios. This allows for cross-sectional correlation within industry, but assumes independence across industries (Brown and Warner, 1980, 1985). These results are the most comparable with Panel A, where we use industry-group clusters to address intra-industry and intra-group correlations. The *CAR* results are consistent with the CMAR results. Using the main treatment group, the CAR for combined event 2–3 CAR is 14.3% (z = 4.78). For individual events, the *CARs* are positive and significant for events 1 and 2, and become so for event 3 if we exclude the outliers from the CMAR analysis, or include firms with assets from 0.25–0.5 trillion won in the control group. In regression set 3, which uses the narrow treatment group, the results are significant for all windows.

A further response to the risk of cross-sectional correlation in returns is to combine all treatment group firms into a single, equally weighted portfolio. This fully controls for cross-sectional dependence at the cost of lower statistical power. We implement this approach in the second set of results in Panel B. The z-statistics generally weaken, as expected, but remain reasonably strong. All events that were significant with industry portfolios remain significant, for both the main and narrow treatment groups. For the main treatment group, the CAR for

event 3 increases to 3.7% and is marginally significant (z = 1.69).[16]

We apply a battery of robustness checks to our results, in addition to those described above. We obtain similar results if we: (i) use log returns instead of fractional returns, (ii) use "jump" (buy-and-hold) returns for the entire window instead of summing daily returns; (iii) vary the estimation period for the CAR results;[17] (iv) do not exclude outliers in the CMAR results, exclude them for the CAR results, or winsorize returns at 1%/99% instead of excluding outliers; and (viii) add the firm-level control variables used in Table 7 (other than *ln*(assets), which we omit since we control for *ln*(market cap)). As is expected when returns are positive over a period of time, the long-window buy-and-hold returns exceed the CMAR or CAR returns. For example, in the buy-and-hold equivalent of Panel A, regression set 2, the predicted return to large-plus firms over the event 2–3 window is 0.1547% (t = 2.79).

4.5. Comparison to other East Asian countries

If June-August 1999 was a good period for large Korean firms, for reasons unrelated to governance, it may have been good for large firms in similar countries. We therefore study the returns to large firms in six other East Asian countries: Hong Kong, Indonesia, Malaysia, Singapore, Taiwan, and Thailand. We conduct an event study of the daily returns to large public firms in these six countries over 1999 (n = 428), using different size thresholds, including the large plus threshold (local currency equivalent of 1 trillion won) and the large-firm threshold

[16] In unreported regressions, firm-level CARs are similar to the industry results; the t-statistics are larger, as expected. On the choice between industry portfolios and a single treatment group portfolio, industry portfolios are often a reasonable compromise between test power and the potential for cross-sectional correlation to produce biased standard errors. Brown and Warner (1985, p. 22) suggest that there can be "gains from procedures assuming independence [across industries] . . . even when . . . all [firms] have the same event date." Bernard (1987, p. 11 and Table 1) concurs with Brown and Warner that *intra*industry correlation can be important but finds that "interindustry cross-sectional correlation is small relative to intraindustry correlation."

[17] Standard errors increase if we extend the estimation period back earlier than September 1998, due to three outlier returns during August and September 1998, related to the East Asian financial crisis.

(2 trillion won), relative to an index of mid-sized firms (0.25–1 trillion won). There is no evidence of positive returns to large firms. Figure *5* shows results for a pooled sample of all six countries, for large-plus relative to mid-sized firms. The two groups move together. In a pooled regression similar to Table 4, regression set (1), the returns to large-plus firms over the long window covering events 1–3 is close to zero (coefficient = 0.0051; $t = 0.24$).[18]

We obtain similar non-results for individual countries. In regressions similar to Table 4, Panel A, regression set (1), the returns to large-plus firms over the events 1–3 window are insignificant for four countries, positive for Taiwan, and negative for Indonesia. Over the events 2–3 window, the returns are insignificant for four countries, positive for Singapore, and negative for Thailand. For none of the countries are the returns significant for both of these windows. The positive returns for Taiwan over the 1–3 window and for Singapore over the 2–3 window change sign and become insignificant if we control for *ln*(market cap), similar to regression set (2). Thus, there is no evidence of gains for large firms relative to mid-sized firms in these other countries, and no evidence of a break in returns around the large-plus threshold.

5. Difference-in-differences analysis

Difference-in-differences analysis offers an alternative way to assess whether the governance reforms predict a value increase for large firms, *at the right time* (when the reforms are adopted). If investors assign higher value to firms with 50% outside directors and an audit committee, then the Tobin's *q*'s of large firms should rise, relative to mid-sized firms, between May 1999 (just before the legislative reforms began) and the end of 1999, when the legal rules requiring these governance elements are adopted, controlling for other factors that affect Tobin's

[18] The pooled regression includes country fixed effects and industry-country-group clusters.

q. One has no reason to expect similar relative gains for large firms at other times. DiD analysis, extended for a period after the reforms take effect, can also let us assess whether investors' initial views persist or fade, once they see the reforms' actual results.

5.1. DiD methodology

We again exclude small firms from the sample. Our control group is mid-sized firms with assets from 0.5–2 trillion won at May 1999 ($t = 0$). We use large firms with assets from 2–8 trillion won at year-end 1999 ($n = 39$) as the main treatment group, and large firms with assets from 2–4 trillion won ($n = 19$) as the narrow treatment group.[19] We compute Tobin's *q* at six-month intervals from June 30, 1996, through Dec. 31, 2004, except that June 30, 1999 lies in the middle of the legal reform period, so we move the measurement date back to May 31, 1999, which precedes the reforms.[20] We use Tobin's *q* as our principal measure of firm value, but obtain similar results for market/book.

We take logs of Tobin's *q* (or market/book) to address skewness in non-logged values. We also drop outliers for each year if a studentized residual, obtained from a regression of *ln*(Tobin's *q*) (or *ln*(market/book)) on large-firm dummy is greater than ±1.96.[21] Equation (2) provides our main *DiD* specification. All regressions use robust standard errors.

[19] We exclude from the treatment group one firm that alre ady had 50% outside directors at May 1999. In robustness checks, we obtain similar results if we drop firms from the control group if they voluntarily adopt 50% outside directors. The logic behind this specification is as follows. We find evidence below that small firms who voluntarily adopt the reforms experience similar price increases to large firms; thus, including the voluntary adopters in the control group could bias against finding an effect of the reforms.

[20] We use six-month periods because we have financial data available every six months. In robustness checks, we obtain similar results if we measure firm size at year-end 1998 or year-end 1999. To measure firm size, Tobin's *q*, and market/book at May 31, 1999, we interpolate between December 1998 and June 1999.

[21] In robustness checks, we obtain similar results if we do not exclude outliers, do not take logs, or both (though weaker for non-logged market/book, which has some extreme outlier firms with low book values of equity).

$$\Delta[\ln(\text{Tobin's } q)_i]_{\tau\text{-}0} = \alpha_\tau + \lambda_\tau L_i + \delta_\tau \ln(assets)_{i,t=0} + \sum_j \beta_{\tau,j} \Delta X_{i,j,\tau-0} + \varepsilon_{\tau,i} \quad (2)$$

Here τ is a date from June 1996 through Dec. 1994 (other than the base date of May 1999), the dependent variable is the change in *ln*(Tobin's *q*) from time 0 to time τ; L_i is a large-firm dummy variable (= 1 if firm *i* is large at both date 0 and date τ, 0 otherwise); and **X** is a vector of control variables. Since we difference our dependent variable, we also difference the control variables. The exception is ln(assets), which captures a potential direct influence of firm size on the change in Tobin's *q*, which might otherwise be captured by large-firm dummy.

For each date τ, the constant α_τ gives the predicted change in *ln*(Tobin's *q*) for mid-sized firms from date 0 to τ. The coefficient of interest is λ_τ, which gives the predicted *additional* change in *ln*(Tobin's *q*) over this period for large firms. If the governance reforms positively affected Tobin's *q*, these coefficients should be positive beginning in December 1999, but insignificant before that. Also, if large firms and small firms otherwise generally move together, there should not be large jumps in λ_τ between adjacent time periods, except at December 1999.

5.2. DiD main results

We begin in Figure 6 with a graphical presentation. Figure 6A shows, for the main treatment group, the λ_τ coefficients from a simple regression of Δ(*ln*(Tobin's *q*)) on a constant term and large-firm dummy, for December 1997 through December 2001, together with dotted lines showing 5%–95% confidence bounds around these point estimates. The estimates are small and insignificant prior to May 1999, zero by construction for May 1999, jump in December 1999, and remain positive, statistically significant, and roughly flat thereafter. An extended graph covering the full period from June 1996 through December 2004 would be similar. The December 1999 point estimate is 0.130 (t = 2.51). For a large firm with median

Tobin's q (0.97) and leverage (0.68), this increase in ln(Tobin's q) implies a 46% increase in share price.[22] These results are consistent with investors revaluing large firms relative to mid-sized firms at the time of the reforms, and not at other times. The lack of significant movement after 1999 is consistent with investors retaining their initial beliefs about the value of the governance reforms, and not making large reassessments of their value, in either direction.[23]

Figure 6B uses the narrow treatment group (2–4 trillion won). Standard errors increase, as expected due to smaller sample size. The point estimate for December 1999 increases to 0.168 (t = 2.31). Overall, point estimates are similar for both treatment groups. These figures visually support the view that something happened to large firms during the treatment window of May-December 1999. Changes in Tobin's q for large and mid-sized firms are similar at other times.

In Table 5, we turn to regression analysis and focus on the core treatment period from May to December 1999. Panel A shows results for Tobin's q. Odd- (even)-numbered regressions use the main (narrow) treatment group. Regression (1) is equivalent to the December 1999 estimate in Figure 6A. Regression (2) is similar to regression (1), but uses the narrow treatment group. The coefficient on large-firm dummy is 0.13 (0.17) for the main (narrow) treatment group and is significant for both groups.

[22] Tobin's q = (debt/assets) + (market value of equity/assets). A shock to share price affects only the second term: Let T be the fractional increase in Tobin's q and S be the fractional share price increase. S = [New (market equity/assets)]/[Old (market equity/assets)] – 1 = [New q – (debt/assets)]/[Old q – (debt /assets)] – 1 = [(Old q)*(1+T) – (debt/assets)]/[Old q – (debt /assets)] – 1. This equation can be solved for S if we know debt/assets, old q, and the fractional change T.

[23] The insignificant results prior to the base date do not support one competing explanation for our results—large firms suffered more than small firms in the East Asian financial crisis, which was concentrated in the second half of 1997 and the first half of 1998, and then rebounded with a lag in the second half of 1999.

In regressions (3)–(6), we implement the regression discontinuity approach, by adding *ln*(assets) as a control variable.[24] In regressions (3)–(4), we control for *ln*(assets). This has only a minor effect on the coefficient on large-firm dummy. This coefficient is about 0.15 and marginally significant for both groups. The lower significance level likely reflects colinearity between large-firm dummy and *ln*(assets); the Pearson correlation coefficient is 0.76 (0.84) for the main (narrow) treatment group (see last row of Panel A). In regressions (5)–(6), we address this colinearity issue by expanding the control group to include all small firms. The correlation coefficient drops, as expected, and large-firm dummy is again statistically significant.

In regressions (7)–(8), we again limit the control group to mid-sized firms (0.5–2 trillion won), and add controls for first differences in the first six powers of *ln*(assets). The coefficient on large-firm dummy rises to 0.17 (0.18) for the main (narrow) treatment group. the *t*-statistics drop, similar to regressions (3)–(4); we retain marginal significance for the narrow treatment group and barely lose it for the main treatment group. Finally, in regressions (9)–(10), we add a battery of first differences in control variables, and also expand the control group slightly to extend down to 0.25 trillion won. The coefficients on large-firm dummy are 0.12 (0.17) for the main (narrow) treatment group and are statistically significant.[25] In robustness checks, we vary control variables, treatment group range, and control group range. The coefficients on large-firm dummy are consistently within the 0.12–0.19 range shown in Panel A. They are also usually, as in Panel A, somewhat larger if we use the narrow treatment group or more extensive

[24] In our event study, we used *ln*(market cap) as a size measure. In the DiD analysis, we use Tobin's *q* as dependent variable and *ln*(assets) as the size control. We need a different size control, because Tobin's *q* is a scaled version of market capitalization. In robustness checks, we obtain similar results with *ln*(sales) as a size measure. We measure *ln*(assets) at May 1999. We have semiannual data for assets, and interpolate between December 1998 and June 1999 to estimate *ln*(assets) at May 1999.

[25] For control variables other than ln(assets), we have only annual data, so the first differences are from December 1999 to December 1998.

controls; are statistically significant except when we use both extensive controls and a narrow control group; and are marginally significant, or nearly so, throughout.[26]

In Panel B, we use market/book as a dependent variable, with consistent results. *Ln*(Market/book) is economically large in all regressions, with both the main and narrow treatment groups. It is significant or marginally significant in all regressions except regressions (9)–(10), where we use a limited control group, thus creating strong colinearity between large-firm dummy and *ln*(assets), and extensive controls. We can recover significance in these regressions by using a broader group of control firms.

In both panels, the coefficient on *ln*(assets) is small, always insignificant, and of varying sign. Thus, there is no evidence of a smooth size effect on firm market value, separate from the discontinuous effect at the treatment threshold.

The treatment time period in our DiD analysis is common to all large firms, which could lead to cross-sectional correlation in the treatment effects. Thus, customary DiD standard errors could be biased downward. In the event study, we addressed cross-sectional correlation by studying returns to a portfolio of all large firms. For the DiD analysis, we use a bootstrap approach. We compute the coefficient on large-firm dummy for all seven-month periods between June 1996 to December 2004, excluding the treatment period (May-December 1999). This provides 81 DiD coefficients for partly overlapping periods. For the main treatment group, none equal or exceed the 0.130 coefficient in Table 5, regression (1); the largest is 0.107. For the narrow treatment group, the largest bootstrap coefficient is 0.102, well below the 0.168

[26] In unreported results, we assess "covariate balance"—do control variables take on similar values for large and mid-sized firms? For the narrow treatment group, levels are statistically different (at the 5% level) only for R&D (higher for treatment firms) and sole ownership (lower for treatment firms). The DiD regression design should control for the effect of differences in levels on Tobin's *q*, unless that effect changes at the time of the 1999 reforms, which we have no reason to expect. First differences (December 1999 minus May 1999) are statistically different only for leverage (larger decline for treatment group), and only for the median, not the mean.

coefficient in Table 5, regression (2).[27]

The DiD results are consistent with the event study. Large firms gain, relative to small firms, when the legal changes are adopted. They do not gain or lose relative to small firms at other times. The regression discontinuity approach provides evidence that we are not simply capturing a size effect which coincides with but is unrelated to the governance reforms. The gain to large firms remains stable, and perhaps even grows, as we shrink the size band for the treatment group.

5.3. DiD for other East Asian countries

As a further check on whether our results are likely to be causal, we assess in Table 6 whether large firms gained relative to mid-sized firms in other East Asian countries during May-December 1999. If regional factors (such as recovery from the crisis, or exports to China) disproportionately benefited large firms, this might be reflected in these other countries. This check is similar in spirit to a triple-difference analysis; the third difference is Korea versus comparable countries.

Table 6, Panel A presents simple results, with $\Delta[ln(\text{Tobin's } q)]$ as dependent variable, and constant term and large-firm dummy (local currency equivalent of 2 trillion won) as independent variables. The control group is mid-sized firms with assets at year-end 1998 of 0.5–2 trillion won; the treatment group is large firms with assets from 2–8 trillion won. The first three columns present separate results for Hong Kong, Singapore, and Taiwan. Column (4) presents pooled results for Indonesia, Malaysia, and Thailand. These countries are the most similar to Korea in the intensity of the East Asian crisis, but have too few large firms to make single-

[27] We thank Andrew Metrick for raising this concern with DiD standard errors, and Jon Klick for suggesting the bootstrap analysis.

country regressions meaningful. Column (5) pools all six countries. Regressions that cover more than one country include country dummies.

There is no evidence of positive returns to large firms, relative to mid-sized firms. The coefficients on large-firm dummy are small, more often negative than positive, and negative and marginally significant in the pooled regression (5). If we expand the control group down to 0.25 trillion won, and expand the treatment group to include all firms over 2 trillion won, to increase the chance that we would find relative gains to large firms if they exist, the coefficient for Hong Kong becomes significant and *negative* [-0.0191 (t = 2.38)], as does the pooled coefficient [-0.0117 (t = 2.13)].

In Table 6, Panel B, we assess whether there is any evidence of relative gains for larger firms, by replacing large-firm dummy with *ln*(assets). The coefficients on *ln*(assets) are insignificant and of mixed sign. If we expand the sample size range to 0.25 trillion and up, the coefficients on *ln*(assets) are negative for all countries and significant for Hong Kong and for all six countries together. Thus, the multicountry DiD results, like the event study results above, show no evidence of gains to large firms in other East Asian countries during our event period.

5.4. Post-reform trends in profitability and growth

As a further plausibility check on the governance explanation for our results, we assess whether large-firm profitability or growth changed after the reforms, relative to mid-sized firms. The governance rules adopted in 1999 came into force partly in 2000, and fully only with spring 2001 annual shareholder meetings. Also, a change in board structure is likely to affect firm behavior with a lag of uncertain duration. Thus, if governance affects large firms' performance, we would expect any effect to show up in 2002 or later. Conversely, if large firms' prospects

improved in the second half of 1999, relative to mid-sized firms, for reasons unrelated to governance, performance measures might show different trends for the two groups during 1999-2000, which is *too early* for the changes to be explained by governance. Figure 7, Panel A shows profitability trends for large firms, relative to mid-sized firms. Panel B shows sales growth trends. The DiD specification is similar to that for Figure 6, with different dependent variables and annual instead of semiannual data.

The relative profitability of large firms, measured as earnings before interest and taxes (EBIT)/assets, drops in 1999, and then gradually returns to its 1998 level by 2002. The further rise in 2003, to above the 2002 level, could plausibly be partly because of the governance reforms. Sales growth is flat in 1999, and then drops beginning in 2000. For both variables, the lack of a favorable trend in 1999 or soon thereafter is consistent with a governance rather than a performance explanation for the 1999 rise in large firms' share prices. In unreported regressions, we also find no evidence of a change in dividends, capital expenditures, or other measures of firm-level outcomes, which occurs during or soon after the 1999 share price rise, yet *too soon* for the reforms to contribute to a change in firm-level outcomes.

6. Firm fixed effects and random effects regressions

We next examine the reaction of both large and small firms to governance reforms, using a firm fixed effects framework. This analysis has three main goals. First, the inference that investors assigned value to *mandatory* board reforms for *large* firms will be stronger if investors assign similar value to *voluntary* changes at *smaller* firms. Conversely, the large-firm results will be less convincing if voluntary adopters see no share price reaction. Since small-firm reforms are voluntary and hence possibly endogenous, we lack an identification strategy for

these firms. Thus, the small-firm results are a robustness check on the large-firm results, and do not provide a separate basis for causal inference.

Second, the firm fixed effects regressions let us estimate how much of the value increase is due to each of the three requirements: 50% outside directors; audit committees; and outside director nominating committees. Small firms can choose which of these measures to adopt, and can adopt different measures at different times. We use this variation to estimate the separate association between each reform and Tobin's *q*. The fixed effects regressions also let us assess board structure elements which are not legally required—more than 50% independent directors or a compensation committee.

Third, these results provide evidence on the within-firm, across-time association between governance and firm market value for smaller Korean firms.[28]

6.1. Methodology

Although we lack an identification strategy for small firms, we have several reasons to believe that endogeneity concerns for these firms are likely to be limited. First, we use firm fixed effects to control for time-invariant firm characteristics, year dummies to control for time trends, and extensive control variables to control for time-varying firm characteristics. Table 3 defines our control variables. Second, we find in separate work (Black, Jang, and Kim, 2006b) that firm characteristics only weakly predict small firms' governance choices. Third, in unreported results, we assess the extent of endogeneity using three-stage least squares (3SLS) regressions, and find only mild evidence that Tobin's *q* predicts governance. Our 3SLS

[28] Much of the prior research on boards of directors in emerging markets uses only cross-sectional data. Choi, Park, and Yoo (2007) have time series data, so they can potentially use firm fixed effects, but they report that their results on the value of outside directors disappear with this specification.

specification is discussed in section 7.

A separate concern is that different aspects of governance often correlate with each other. For example, firms that change board structure may also change board procedures; firms with independent boards may have better disclosure practices; and so on. This could introduce omitted variable bias if one studies board structure without controlling for other aspects of governance. To address this risk, in regressions with Board Structure Index as an independent variable of interest, we control for (KCGI - Board Structure) or sometimes separately for Ownership Parity and (KCGI - Board Structure - Ownership Parity). In regressions with Board Independence Subindex as the independent variable of interest, we control for (*KCGI* - Board Independence) and so on.[29]

In Korea, outside directors were rare prior to the East Asian financial crisis, but firms rapidly adopted them thereafter, partly due to the legal rules discussed above, but also voluntarily. Audit committees were not permitted prior to the crisis, but once they were authorized, a significant number of small firms adopted them. By the end of our sample period, 44 small firms (10% of our sample) had voluntarily adopted 50% outside directors, 59 firms (9% of our sample) had more than 50% outside directors, 67 small firms (15% of our sample) had voluntarily adopted audit committees, and 90 small firms (21% of our sample) had voluntarily adopted an outside director nominating committee. These changes provide enough time variation to make a firm fixed effects specification feasible.

6.2. Results for board structure

[29] We obtain almost identical results if we control for (KCGI - Board Structure Index), or for both Ownership Parity and (KCGI - Board Structure Index - Ownership Parity). We obtain similar results but somewhat larger standard errors if we control for Board Procedure, Disclosure, and Shareholder Rights indices separately, instead of grouping them together. The larger standard errors are expected due to colinearity, because the Shareholder Rights, Board Procedure, and Disclosure indices all correlate positively with Board Structure Index.

In Table 7, we report OLS, firm random effects, and firm fixed effects (with an unbalanced panel) regressions; results are similar in all cases. All regressions use year dummies, robust standard errors, and firm clusters.[30] Regressions (1)–(3) show full sample results. Regression (4) reports fixed effects results for small firms. The coefficient on Board Structure Index is economically and statistically significant, and is similar for all firms and for only small firms. The predicted increase in Tobin's *q* for a small firm that adopts the three large-firm reforms is 0.0088 * 12-point increase in Board Structure Index = 10.6%, which is comparable to the large firm increase shown in the DiD results in Section 5. This is consistent with governance driving the large-firm results, rather than an omitted factor associated with firm size.[31]

6.3. Results for components of board structure

In Table 8, we examine the components of Board Structure Index. We show firm random effects and firm fixed effects results.[32] In Panel A, we use Board Independence and Board Committee Subindices as separate independent variables. Each is significant for the full sample.

[30] We obtain similar fixed effects results with a balanced panel, and similar results with ln(market/book) as dependent variable. With regard to regression method, a Breusch-Pagan test strongly rejects pooled *OLS* compared to firm random effects. The choice between random and fixed effects is closer. A Hausman test usually, but not always, finds a significant difference in coefficients. For Table 7, regression (2), the λ coefficient, which expresses whether random effects is closer to OLS (λ=0) or fixed effects (λ=1) (see Wooldridge, 2008, chapter 14.2) is 0.71, indicating similarity to fixed effects. Thus, any bias in random effects coefficients is likely to be limited.

[31] Commenters suggested the following story for our large-firm results: The 1999 reforms signaled that the government would monitor and regulate large firms; the price rise is due to the signal, rather than the specific reforms adopted in 1999. In DiD terminology, the treatment applied to large firms was board structure reform plus other unspecified government oversight, and we cannot untangle the effects of each. If this story is right, and board structure reforms do not explain our large-firm results, we might expect to find no or smaller effects for smaller firms which voluntarily change board structure, because there is no reason for these firms to face increased government oversight. We instead find similar value increases for large and small firms. This provides evidence that investors expecting other unspecified government oversight of large firms does not drive our large-firm results.

[32] Full sample results are similar with pooled OLS, and with firm fixed effects with balanced panel.

The next two panels in Table 8 break down each subindex into its individual elements. In Panel B, the components of Board Independence—element b1 (50% outside directors) and element b2 (> 50% outside directors)—are separately positive and significant. Getting to 50% outside directors predicts 8% higher Tobin's *q*, while going beyond 50% predicts an additional 6% increase. In Panel C, we study the components of Board Committee Index. Audit committee is significant and predicts a 4% increase in Tobin's *q*, director nominating committee is marginally significant, and compensation committee is positive but insignificant.[33]

In each panel, regression (3) is limited to small firms. The board independence results are similar to those for all firms. The board committee results for small firms are weaker and are not statistically significant, but are not statistically distinguishable from the large-firm results.

In sum, we find for small firms strong evidence that 50% outside directors predicts higher market value; reasonably strong evidence that having more than 50% outside directors also does so; and some evidence that having an audit committee separately predicts higher market value. This evidence is consistent with the investment strategy of the Korea Corporate Governance Fund, managed by Lazard Asset Management. This fund invests in small firms, pressures them to add outside directors and an audit committee, and sells after the reforms are adopted.[34]

[33] In robustness checks with *ln*(market/book) as dependent variable, Board Independence Subindex remains significant. Board Committee Subindex as a whole is positive but insignificant; audit committee (in Panel C) is marginally significant. We also study various subsamples: (i) financial vs. non-financial firms (our sample already excludes banks), (ii) *chaebol* firms vs. non-*chaebol* firms, and (iii) manufacturing vs. non-manufacturing firms. Board Structure Index, Board Independence Subindex, and 50% outside directors are positive and significant across all subsamples**.**

[34] Hasung Jang, our coauthor in Black, Jang, and Kim (2006a, 2006b), is an advisor to this fund. The Korean Center for Good Corporate Governance (CGCG), with which Woochan Kim is affiliated, is a consultant to this fund**.**

7. Instrumental variable analysis

Our final methodological approach is instrumental variable analysis. Our instrument for board structure is "large-firm IV," defined to equal large-firm dummy during 1999-2004, but zero in 1998 regardless of firm size.[35] We place the IV analysis last not because it is least important, but because it is least new, for two reasons. First, BJK relies on a similar analysis using this instrument, with cross-sectional data from 2001, Second, the mathematical structure of two-stage least squares (*2SLS*) analysis is closely similar to a DiD analysis in which we use the full post-reform period to estimate the impact of the reforms (rather than the period-by-period approach we adopt in Part 5).[36] The IV analysis can be seen as providing a robustness check on the DiD results.

7.1. IV validity

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 and only through the instrumented variable, and not directly. We address each requirement in turn.

7.1.1. Exogeneity

Large-firm IV is likely to be exogenous. The large firm rules do not correspond to voluntary firm behavior prior to the 1999 adoption of the rules. At year-end 1998, only one of the 51 large firms in our sample with available data had 50% outside directors; none had an audit committee or an outside director nominating committee. There is no evidence that firms reduce

[35] We confirm in unreported regressions that large-firm dummy predicts Tobin's *q* beginning at year-end 1999, but not before. We thank Oghuzan Ozbas for suggesting this form for our instrumental variable.

[36] We thank the referee for noticing this. Once the referee did so, it was obvious, but it had not been so to us or other readers of the paper.

or limit their size to avoid compliance with the rules. We have heard no anecdotal evidence of this, there is no clustering of firms at a size just below the regulatory threshold, and of the four firms which become subject to the rules but later drop below the threshold, three retain 50% outside directors and all retain an audit committee.[37]

7.1.2. Correlation between instrument and instrumented variable

Large-firm IV correlates strongly with Board Structure Index. The overall correlation over 2000–2004 is $r = 0.69$; annual correlations are at least 0.70 in each year during this period.[38]

7.1.3. Direct or indirect prediction of Tobin's q?

The harder questions for instrument validity are first, whether large-firm IV predicts Tobin's *q* directly or only indirectly; and second, whether indirect prediction is only through Board Structure Index, or also partly through the rest of *KCGI*.

With regard to direct prediction of Tobin's *q*: First, in all regressions, we control for the continuous effect of *ln*(assets) on Tobin's *q*. Second, the coefficient on *ln*(assets) is negative and significant, both for all firms and for subsamples of large and small firms. This implies that larger firms are worse at turning asset dollars into market value dollars. Yet large-firm IV is large and positive. It would be a remarkable coincidence for the ability of firms to turn assets

[37] We examine the shrinkers individually and confirm that three of the four shrinkers suffer business reversals. The fourth conducts a spinoff, but this firm retains the large firm governance elements and promptly grows to become large again; thus the spinoff could not have been intended to avoid the governance rules. There are also three firms which shrink from large to small during the period of adoption of the reforms (June-December, 1999). Two later become large again; the third continues to shrink.

[38] At year-end 1999, the correlation between large-firm dummy and Board Structure Index is only 0.08 (not significant), because large firms have not yet had time to comply with the newly adopted rules. We nonetheless treat large-firm IV as an appropriate instrument in 1999, because share values anticipate a future change in board structure, even though board structures have not yet changed. Thus, large-firm IV predicts the dependent variable (Tobin's *q*) through its *future* effect on the instrumented variable (Board Structure Index), which has a *current* effect on firm value.

into market value to decline with size both below and above 2 trillion won; jump at precisely the point where governance rules kick in, and do so beginning in 1999, when the governance rules were adopted, for a reason other than governance. Third, if we add large-firm IV as an independent variable in the regressions in Table 7, the coefficient on Board Structure Index is similar to that in Table 7, while large-firm IV is insignificant, consistent with large-firm IV predicting Tobin's *q* only indirectly through Board Structure Index, rather than directly. Fourth, although we control for *ln*(assets), large-firm IV could proxy for higher-order terms in the functional form of a direct relation between size and Tobin's *q*. We address this concern in unreported robustness checks by using a six powers of *ln*(assets) to control for firm size. The IV results survive this test.

7.1.4. Predict Tobin's q only through Board Structure Index?

In BJK, it was not clear whether we should treat large-firm dummy as an instrument for all of KCGI, or only for Board Structure Index. The concern with instrumenting only for Board Structure Index is that, even with a separate control for *ln*(assets), large-firm IV could predict other components of KCGI (for example, Disclosure Index), which in turn could separately predict Tobin's *q*. If we omit Disclosure Index from the 2SLS regression, we will impute the predicted effect of large-firm IV on Tobin's *q* entirely to the Board Structure channel, and thus might overstate the impact of a change in Board Structure on Tobin's *q*. A partial solution is to add Disclosure Index as an independent variable in the 2SLS regressions. However, if Disclosure is endogenous to Board Structure and Tobin's *q*, we could still get a biased coefficient on instrumented Board Structure. If we instead use large-firm IV to instrument for all of KCGI, we avoid this problem, but lose the ability to assess from the IV analysis which components of

KCGI are responsible for the estimated effect. A further complication is that large firms, having changed board structure, might then change their disclosure practices. One might see this effect as properly attributable to the initial board structure change.

Fortunately, for our dataset, these potential complications are not important. We first separate KCGI into Board Structure Index (*BS*); Ownership Parity Index (*OP*), and the rest of KCGI (*KCGI – OP – BS*). Ownership Parity is weakly correlated with large-firm dummy (r = -.06) and so is not of concern. The remainder of KCGI is correlated with large-firm IV (r = 0.41). However, the coefficient on (*KCGI – OP – BS*) is insignificant and economically small (see Table 7, regression (3)). Thus, if we use large-firm IV to instrument for Board Structure Index, any bias in the 2SLS coefficient should be small, whether or not we separately control for *OP* and (*KCGI – OP – BS*). If large-firm dummy predicts (*KCGI – OP – BS*), which then predicts Tobin's *q*, the coefficient on instrumented Board Structure Index should be larger if we do not control for (*KCGI – OP – BS*). In practice, the coefficients on instrumented Board Structure Index are similar both ways.

7.2. 2SLS results

In Table 9, we present 2SLS results, using large-firm IV to instrument for Board Structure Index. We present two models. In Model (A), we control for Ownership Parity and the rest of KCGI. In Model (B) we omit these controls.[39] In the second stage regressions, instrumented Board Structure Index strongly predicts *ln*(Tobin's *q*). The 2SLS coefficient is similar in both

[39] Other control variables as the same as in Table 7 except that we exclude the MSCI Index and ADR dummy variables due to high correlation with large-firm dummy. In robustness checks, pooled OLS results are similar, as are firm random effects results (though we cannot combine clustering with random effects), and results with *ln*(market/book) as the dependent variable.

models, and is somewhat larger than in Table 7 (at 0.0144 for Model (A), versus 0.0101 in Table 7).

7.3. Assessing the extent of endogeneity

The Durbin-Wu-Hausman test for endogeneity (Wooldridge, 2008) is available for pooled OLS with firm clusters. This test *assumes* large-firm IV is a valid instrument for Board Structure Index. It is similar to 2SLS, with the same first stage. In the second stage, we regress *ln*(Tobin's *q*) on Board Structure Index, control variables, and the *residual* from the first-stage regression. A significant coefficient on the residual is evidence of endogeneity. In unreported regressions, a Durbin-Wu-Hausman test based on Model (A) from Table 9 does not reject the null of no endogeneity with *ln*(Tobin's *q*) as dependent variable (coefficient = -0.0040, $t = 1.11$), but does reject the null with *ln*(market/book) as a measure of firm value, thus providing mild evidence of endogeneity.

If we had a valid instrument for Tobin's *q*, in addition to our (here, assumed valid) instrument for Board Structure Index, we could use three stage least squares regressions to assess whether within-firm change in Tobin's *q* predicts board structure, and thus whether reverse causation is an important concern. We have no strong instrument for *ln*(Tobin's *q*), but have several respectable instruments, in R&D/sales, advertising/sales, and EBIT/sales. Theory predicts that these variables should predict Tobin's *q* and they in fact do so (see Table 7). They have no obvious theoretical connection to board structure; and do not predict board structure in unreported regressions similar to Table 7 with Board Structure Index as dependent variable.[40] The *3SLS* equations are:

[40] A Hansen overidentification test (which assume one valid instrument) suggests that these instruments are appropriate (p = 0.485 for *ln*(Tobin's *q*); p = 0.999 for *ln*(market/book)).

$$ln(\text{Tobin's } q) = f(\text{Board Structure Index, instruments for Tobin's } q, \text{ other variables}) + \varepsilon \quad (3)$$

$$\text{Board Structure Index} = g(ln(\text{Tobin's } q), \text{ large-firm IV, other variables}) + \eta \quad (4)$$

The 3SLS procedure is available with firm fixed effects, but not with firm clusters. In unreported 3SLS regressions, we find some evidence of reverse causation. Instrumented *ln*(Tobin's *q*) is a marginally significant, and instrumented *ln*(market/book) is significant, as a predictor of Board Structure Index. However, statistical significance would likely disappear if we could use firm clusters. A one-standard-deviation (0.35) change in *ln*(Tobin's *q*) predicts about a one- point increase in Board Structure Index.

Thus, the Durbin-Wu-Hausman test and 3SLS provide consistent evidence. There is mild evidence of overall endogeneity and of reverse causation, in which a within-firm change in *ln*(Tobin's *q*) predicts modestly higher Board Structure Index.

8. Conclusion

Outside directors and audit committees are widely considered to be central elements of good corporate governance. Yet compelling evidence to support this conventional wisdom is limited. We offer here evidence that board structure reforms can positively affect firm market values, and perhaps firm performance, in an emerging market. We rely on Korea's 1999 adoption of legal rules which apply to large but not small Korean firms, as a shock to governance. We use a combination of event study, DiD, and IV approaches to provide evidence that these reforms predict firm value *when* they should (large firms' market values increase, relative to mid-sized firms, when the reforms are adopted) and *where* they should in size (firm values jump at the regulatory threshold). We use a regression discontinuity framework to control for a possible

direct effect of firm size on market value. Although each of our empirical strategies has potential flaws, their combined use provides stronger evidence than any one alone.

There is no comparable jump at other times in the value of large firms, relative to mid-sized firms, and no value jump at other sizes. We find no evidence that the adoption period was an especially good one for large firms, for non-governance reasons. We confirm, with firm fixed effects, that value increases for small firms, which voluntarily reform, are similar to those for large firms. The increased value comes primarily from board independence, and perhaps also from audit committees.

The effect of the reforms is economically large—a roughly 13% increase in Tobin's q, or about a 46% increase in share price. The value increase persists over time. Thus, Korean investors valued the reforms when they were adopted, and did not change their views later, after experience with the reforms' actual effects. Over time, an increasing number of small firms reform their own boards and obtain similar value increases.

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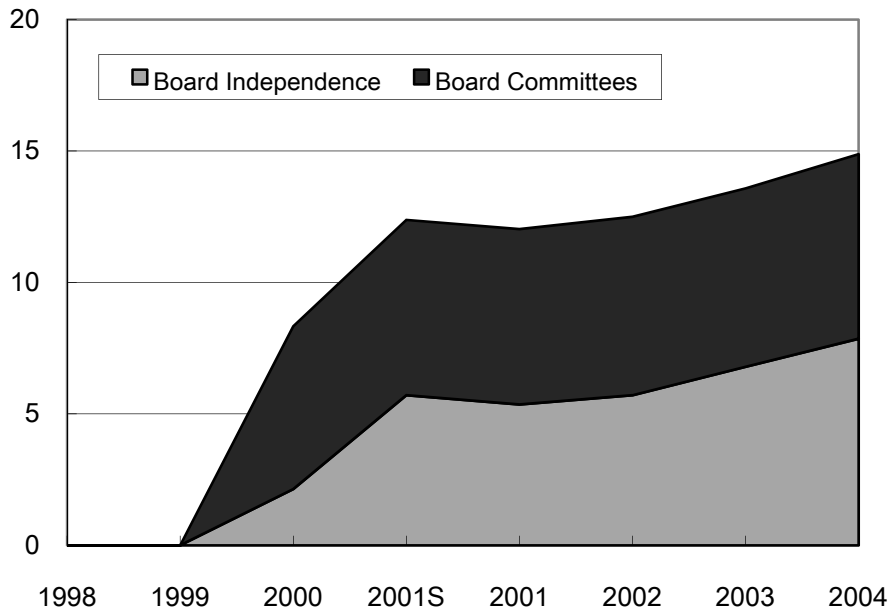
Large firms (balanced panel, 28 firms)



Mid-sized firms (balanced panel, 64 firms)

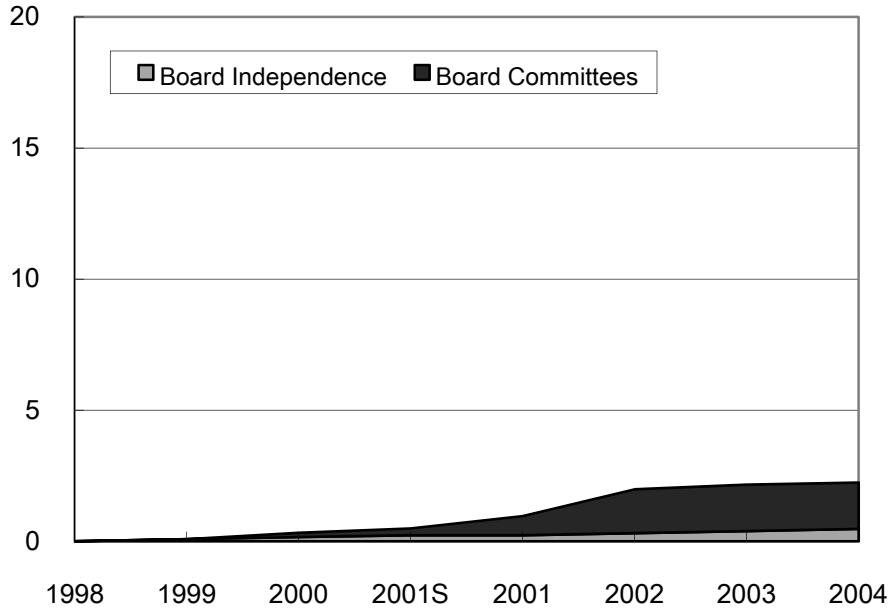


Figure 1. Board Independence and Board Committees Subindices. Figures show mean values of Board Independence Subindex (0~10) and Board Committees Subindex (0~10) from year-end 1998 through year-end 2004, for balanced panels of large Korean public firms (assets > 2 trillion won) and mid-sized Korean public firms (0.25 trillion won < assets < 2 trillion won), respectively.

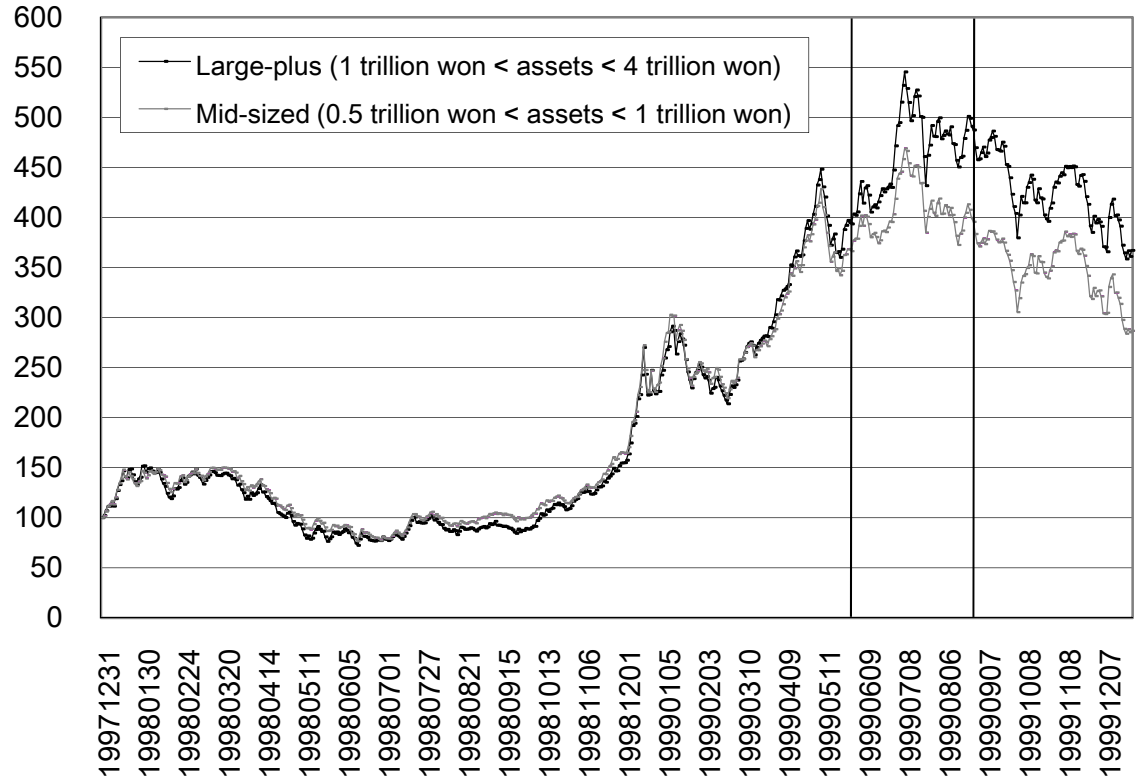


Figure 2. Cumulative returns for large-plus and mid-sized firms, 1998–1999. Cumulative returns to "large-plus" Korean firms (assets from 1–4 trillion won at year-end 1998), and mid-sized firms (assets from 0.5–1 trillion won) during 1998 and 1999. Base level for each group is set to 100 at December 31, 1997. Vertical lines indicate event 1 minus 2 days (June 1, 1999) and event 3 plus 3 days (August 30, 1999). Events are described in Table 1.

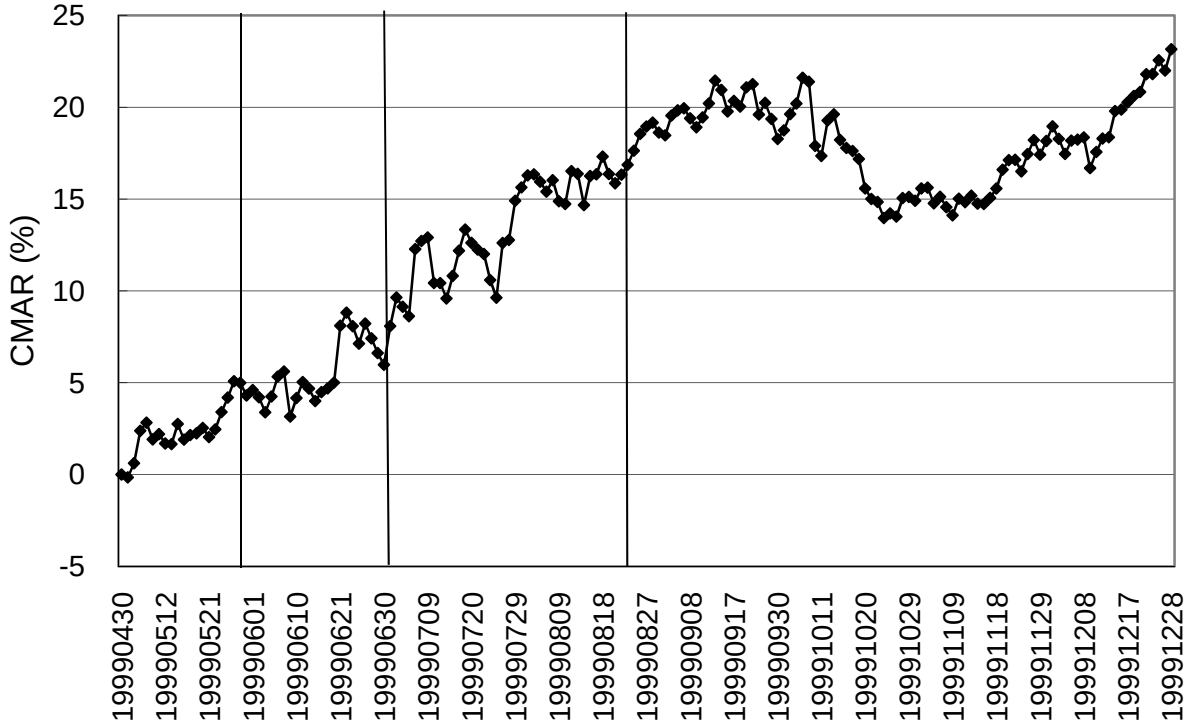


Figure 3. Cumulative market-adjusted returns for large-plus firms. Percentage cumulative market-adjusted returns (CMAR) to equally weighted portfolio of 47 "large-plus" Korean firms (assets from 1–4 trillion won at year-end 1998), relative to Mid-sized Index (equally weighted index of 54 firms with assets from 0.5–1 trillion won), from April 30-December 31, 1999 (in percentage terms). CMAR is set to zero at April 30, 1999. Vertical lines show day 0 for event 1 (June 3), event 2 (July 2), and event 3 (August 25). Events are described in Table 1.

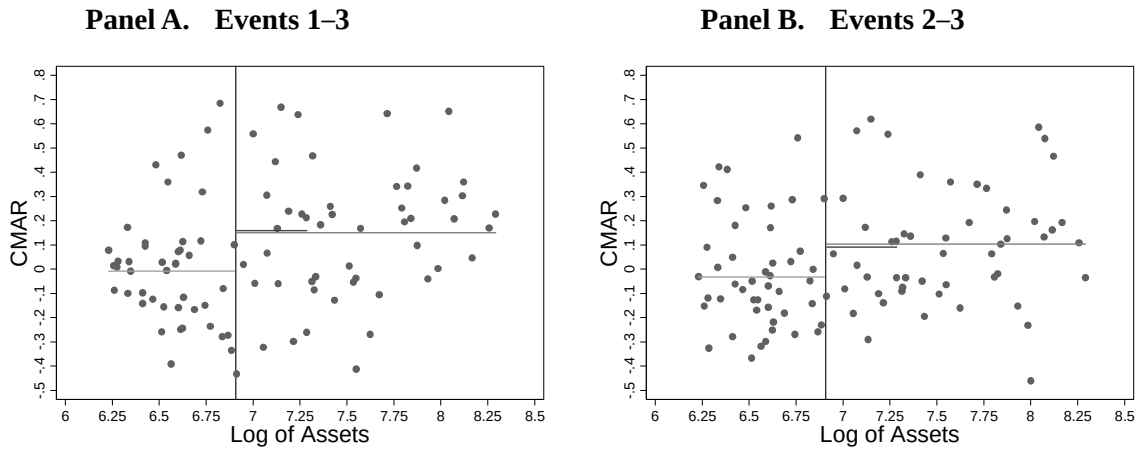


Figure 4. Scatter plot of CMAR versus firm size. Scatter plot of cumulative market-adjusted return (CMAR) relative to Mid-Sized Index (firms with assets from 0.5–1 trillion won) versus *ln*(assets), for Korean firms with assets from 0.5–4 trillion won. Panel A shows CMAR over a [-2, +62] event window relative to event 1 (covering events 1–3). Panel B shows CMAR over a [-2, + 41] event window relative to event 2 (covering events 2–3). In each figure, vertical line indicates 1 trillion won; horizontal line below 1 trillion won shows mean CMAR for control firms with assets from 0.5–1 trillion won (mean = 0 by construction), longer (shorter) horizontal line above 1 trillion won shows mean CMAR for firms with assets from 1–4 trillion (1–1.5 trillion won). Panel A: Change in CMAR at 1 trillion won = 0.1594 (t = 2.24 from pooled regression of CMARs on constant and large-plus dummy (=1 if assets > 1 trillion won) for broader treatment group and 0.1678 (t =1.86) for narrower treatment group. Panel B: change in CMAR at 1 trillion won = 0.1363 (t = 3.16) for broader treatment group and 0.1230 (t 1.72) for narrow treatment group. Regressions exclude firms for which a studentized residual from regressing CMAR on large-plus dummy exceeds ±1.96. t-Statistics are computed using industry-group clusters. Scatter plots suppress outliers with CMAR < -0.5 or > +0.7. Events are described in Table 1.

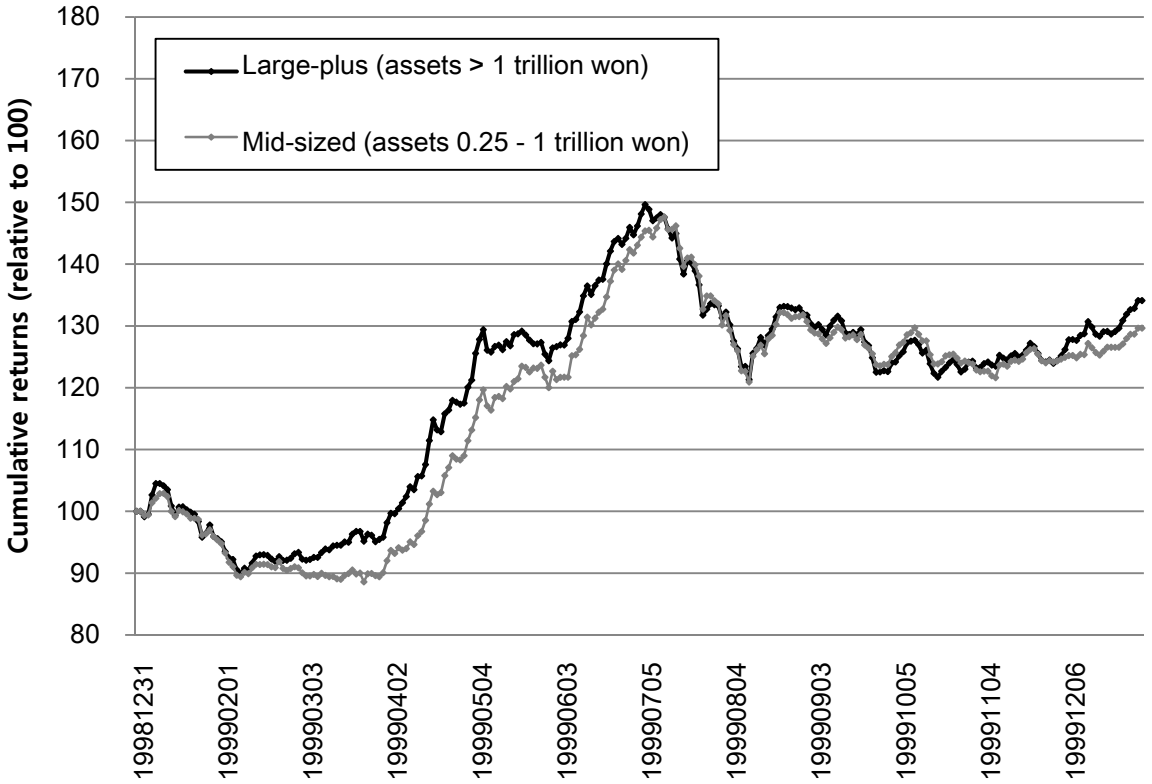
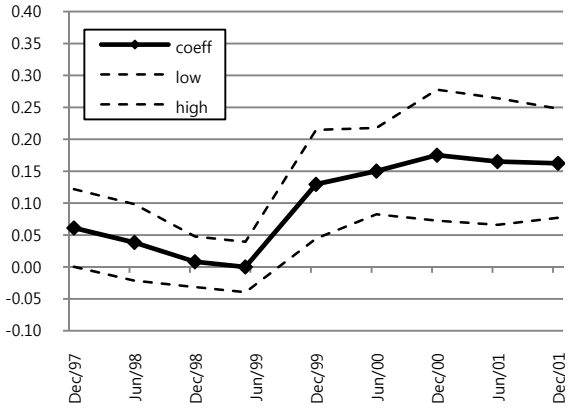


Figure 5. Cumulative returns for large-plus and mid-sized firms in other Asian countries. Cumulative returns to "large-plus" firms (assets > 1 trillion won at year-end 1998), and mid-sized firms (assets from 0.25–1 trillion won) during 1999, for Hong Kong, Indonesia, Malaysia, Singapore, Taiwan, and Thailand, based on currency exchange rates at December 31, 1998. Base level for each group is set to 100 at December 31, 1998. Number of large-plus (mid-sized) firms = 268 (1,110); of which 81 (240) are for Hong Kong; 19 (146) are for Indonesia; 47 (321) are for Malaysia; 46 (137) are for Singapore; 53 (114) are for Taiwan; and 22 (152) are for Thailand.

Panel A: Main treatment group (2–8T)



Panel B: Narrow treatment group (2–4T)

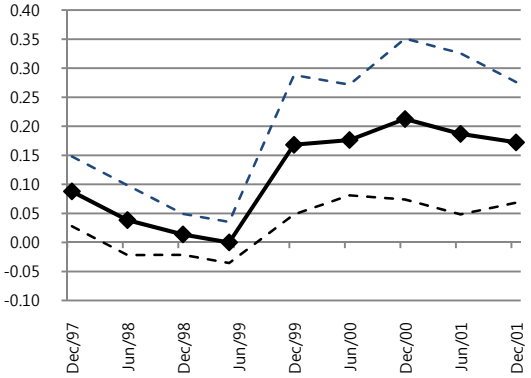


Figure 6. Difference-in-differences using *ln*(Tobin's *q*). Panel A: Solid line depicts the coefficients on large-firm dummy (=1 if assets > 2 trillion won) from cross-sectional regressions of Δ*ln*(Tobin's *q*) from May 1999 to indicated period on large-firm dummy and constant term, run every six months from December 1997 through December 2001 (we replace June 1999 with May 1999 because the principal legislative events begin in early June 1999). Dashed lines show 5%–95% confidence interval around the point estimates, using robust standard errors. Control group in each period is mid-sized firms (assets from 0.5–2 trillion won) at May 1999; treatment group is large firms with assets from 2–8 trillion won at May 1999, but excludes one firm with 50% outside directors at this date. At December 1999, sample is 45 large firms and 110 mid-sized firms. Panel B: Same as Panel A, except treatment group is limited to large firms with assets from 2–4 trillion won at May 1999 (n = 28 at December 1999).

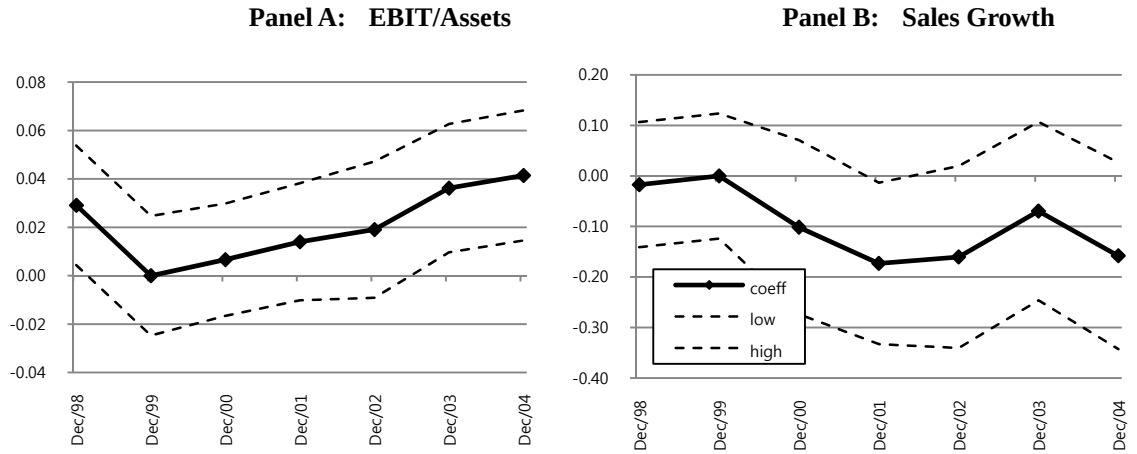


Figure 7. Difference-in-differences for profitability and growth. Panel A: Solid line depicts the coefficients on large-firm dummy (=1 if assets > 2 trillion won) from cross-sectional regressions of $\Delta(\text{EBIT/Assets})_{\tau,0} = [(\text{EBIT/Assets})_{\tau} - (\text{EBIT/Assets})_{\text{Dec. 1999}}]$ on large-firm dummy and a constant term, from December 1998 through December 2004. Dependent variables are winsorized at 1% and 99%. Dashed lines show 90% confidence interval. Control and treatment groups are same as in Figure 6, Panel A. At December 2000, sample is 44 large firms and 103 mid-sized firms. Panel B: Similar to Panel A except variable of interest is sales growth.

Table 1

Key announcement dates for 1999 Korean governance reforms.

Key announcements for 1999 reforms to rules governing outside directors, audit committees, and nominating committees for listed Korean firms, from search of KINDS (Korean Integrated News Database System) database, which includes all major Korean newspapers. Announcements used in event study are in **boldface**.

Event	Dates	Information
	1998: various	1998 reforms, effective starting with 1999 annual meetings, require all listed firms to have a minimum of 25% outside directors.
	March 18, 1999	Corporate Governance Reform Committee created to recommend reforms.
	May 24–26, 1999	President appoints new Minister of Finance and Economy and other economic ministers; instructs them to focus on *chaebol* reform, they so report to the press.
1	**June 2, 1999**	**News articles: government economic policy will shift from "lower leverage" to "corporate governance reform" (understood to include independent directors and audit committees).**
	June 3, 1999	**Speech by new Minister of Finance and Economy: *chaebol* reform will focus on corporate governance reform.**
	June 25, 1999	Ministry of Finance and Economy says some provisions in the Korean Corporate Governance Code will be mandated by law, mentions higher outside director ratio, audit committees, and minority shareholders' rights.
2	**July 2, 1999**	**Government announces that audit committee, dominated by outside directors, will be mandated for large firms (size threshold is not specified).**
3	**Aug. 25, 1999**	**Government announces plans to require large firms (news stories speculate that threshold will be 1 trillion won) to have 50% outside directors and a director nomination committee, dominated by outside directors. Ministry of Justice announces a reform bill to allow companies to adopt board committees, including an audit committee with at least three members, including at least 2/3 outside directors, instead of an internal auditor. Proposal also includes more details on previously announced *chaebol* reforms, of which the most significant were limits on investments by one *chaebol* member in another and board approval and disclosure of large related party transactions.**
	Aug. 26, 1999	**Corporate Governance Reform Committee releases first draft of proposed Corporate Governance Code. For large firms (over 1 trillion won), the Code recommends 50% outside directors. For all firms, it recommends (i) an audit committee, with at least one member having expertise in auditing; (ii) an outside director nominating committee; (iii) a board with at least eight directors; (iv) cumulative voting for directors.**
	Sept. 21–29, 1999	Government announces that it is considering raising the size threshold to 2 trillion won.
	Nov. 22, 1999	Government submits a bill to require large firms to have: (i) at least 50% outside directors; (ii) at least three outside directors; (iii) an audit committee composed of at least 2/3 outside directors; (iv) an outside director nomination committee composed of at least 50% outside directors.
	Dec. 16, 1999	National Assembly passes a bill to revise the Securities Transaction Act to require large firms to have 50% outside directors, an audit committee, and an outside director nomination committee. The supplementary provisions clarify effective dates. Audit committee, outside director nomination committee, and a minimum of three outside directors are required as of the first annual general meeting of shareholders (AGM) after January 21, 2000. The 50% outside director ratio should be met on the first AGM after fiscal year 2000.

Table 2

Construction of Korea Corporate Governance Index (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 (2006a) (shown in mid-2001 column). Data sources are: director database, ownership database, annual surveys by the Korea Corporate Governance Service (KCGS) beginning spring 2001, and hand-collection. KCGS surveys are in spring of each year and provide end-of-prior-year information, except as shown. We *extrapolate* for *missing elements* as follows: (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. *Italics* indicate legally required elements. For hand-collection, 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 firms which had this committee in 2002, collect data for 2000 for 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 in 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(rule adopted 1999 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 (rule adopted 1999, 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 (rule adopted 1999, 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
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 2002	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 is ownership by all affiliated shareholders – ownership by controlling shareholder and family members.	ownership database	P	ownership database	ownership database	ownership database	ownership database

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 June 30, 2001.

Panel A: Variable definitions

Variables	Description
Governance variables	
KCGI	Korean Corporate Governance Index: Sum of Board Structure, Shareholder Rights, Board Procedure, Disclosure, and Ownership Parity Indices
Board Structure Index	Sum of Board Structure Subindex + Board Independence Subindex
Board Independence Subindex	BI = (b1 + b2)/10
b1	1 if firm has at least 50% outside directors, 0 otherwise
b2	1 if firm has >50% outside directors, 0 otherwise
Board Committee Subindex	(b3 + b4 + b5)/10
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
Other variables	
Mid-sized Firm Index	Return to equally weighted index of 142 small Korean public firms with assets from 0.5–1 trillion won at year-end 1998.
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, winsorized at 1% and 99%. We drop firms with book value < 0.
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 five fiscal years (or available period if < five years). If fiscal year changes, we 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].
Large-firm dummy	Equals 1 if book value of assets > 2 trillion won at end of prior year, 0 otherwise.
Chaebol dummy	1 if member of top-30 business groups (based on group assets) identified annually by Korea Fair Trade Commission; 0 otherwise.
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.

Panel B: Summary statistics

Variables	No of "1" values	Pooled mean	Pooled median	Min.	Max.	Std. Dev.	1998 Mean	2000 Mean	2002 Mean	2004 Mean
Governance variables										
KCGI		34.27	32.43	7.03	91.76	11.69	23.65	30.47	41.35	43.65
Board Structure Index		1.95	0.00	0.00	20.00	4.00	0.11	1.40	3.14	3.34
Board Independence		0.75	0.00	0.00	10.00	2.20	0.02	0.49	1.04	1.46
b1	481	0.12	0.00	0.00	1.00	0.32	0.00	0.08	0.18	0.19
b2	138	0.03	0.00	0.00	1.00	0.18	0.00	0.02	0.03	0.10
Board Committee		1.21	0.00	0.00	10.00	2.33	0.09	0.91	2.09	1.88
b3	762	0.19	0.00	0.00	1.00	0.39	0.01	0.12	0.35	0.29
b4	678	0.17	0.00	0.00	1.00	0.37	0.01	0.14	0.26	0.24
b5	62	0.02	0.00	0.00	1.00	0.12	0.00	0.01	0.02	0.03
Other variables										
Tobin's *q*		0.86	0.80	0.21	6.05	0.39	0.93	0.77	0.81	0.85
ln(Tobin's *q*)		-0.22	-0.23	-1.55	1.80	0.35	-0.11	-0.30	-0.28	-0.25
ln(Market/book)		-0.67	-0.73	-9.23	7.18	0.83	-0.53	-1.00	-0.73	-0.63
ln(Assets)		5.53	5.33	0.70	10.69	1.44	5.47	5.60	5.62	5.51
Years listed		2.56	2.64	0.00	3.89	0.78	2.40	2.53	2.59	2.71
Leverage		33.62	2.37	0.01	115000	1797	7.08	9.17	4.57	3.25
Sales growth		0.27	0.08	-0.65	541.25	8.63	0.12	0.11	1.36	0.11
R&D/Sales		0.01	0.00	0.00	7.69	0.13	0.01	0.01	0.01	0.02
Advertising/Sales		0.01	0.00	0.00	0.21	0.02	0.01	0.01	0.01	0.01
Exports/Sales		0.28	0.15	0.00	1.00	0.31	0.31	0.28	0.23	0.28
PPE/Sales		0.54	0.39	0.00	36.05	1.11	0.54	0.59	0.45	0.49
Capex/PPE		0.14	0.09	0.00	7.73	0.20	0.14	0.15	0.13	0.16
EBIT/Assets		0.05	0.05	-1.03	0.55	0.08	0.05	0.05	0.05	0.04
EBIT/Sales		0.04	0.06	-30.78	0.97	0.52	0.05	0.05	0.05	-0.04
Market share		0.06	0.01	0.00	1.00	0.15	0.06	0.06	0.06	0.06
Share turnover		14.93	4.65	0.03	17332	332	5.55	8.02	7.92	7.71
Foreign ownership		7.59	0.91	0.00	94.11	13.56	5.89	6.62	8.21	10.84
Sole ownership		19.97	19.85	0.00	78.81	16.46	20.83	19.93	20.06	20.41
Large-firm dummy	429	0.10	0.00	0.00	1.00	0.31	0.10	0.11	0.12	0.11
Chaebol dummy	833	0.20	0.00	0.00	1.00	0.40	0.23	0.19	0.21	0.19
Level 1 ADR dummy	114	0.03	0.00	0.00	1.00	0.16	0.01	0.03	0.04	0.03
Level 2/3 ADR dummy	13	0.00	0.00	0.00	1.00	0.06	0.00	0.00	0.00	0.00
MSCI Index dummy	449	0.11	0.00	0.00	1.00	0.31	0.16	0.10	0.12	0.09

Table 4

Basic event study results

Events are described in Table 1; variables are defined in Table 3. For event 1: Sample is firms with assets between 0.5–8 trillion won, measured at year-end 1998. Firms are excluded if a studentized residual from regressing event period return on *chaebol* dummy exceeds ±1.96. For other events: Sample is firms with assets between 0.5–4 trillion (0.5–1.5 trillion) won for regression sets 1–3 (4–5). Firms are excluded if a studentized residual from regressing event period return on large-plus dummy (=1 if assets > 1 trillion won) exceeds ±1.96. All regressions include constant term (suppressed in table, insignificant in all cases). Sample size (after excluding outliers) is shown for set 1; similar for other sets. *, **, and *** indicate significance at 10%, 5%, and 1% levels. Significant results (at 5% level or better) are in **boldface** (suppressed for constant term).

Panel A. cumulative market-adjusted returns: Regression results

Chaebol event (Event 1): Cumulative market-adjusted returns (CMARs) to *chaebol* firms relative to Non-*chaebol* Index (equally weighted index of non-*chaebol* firms). Size events: CMARs to large-plus firms (assets > 1 trillion won) relative to Mid-Sized Index (equally weighted index of mid-sized firms with assets from 0.5–1 trillion won). Horserace (over events 2–3): Control group is non-*chaebol* firms with assets from 0.5–1 trillion won. Independent variables in regression set 1 are constant term and *chaebol* or large-plus dummy. Set 2 adds *ln*(market cap); set 3 adds first six powers of *ln*(market cap). *t*-Statistics, using industry-group clusters, are in parentheses. Event window for events 2–3 (1–3) is relative to event 2(1). Correlation between large-plus dummy and *ln*(market cap) = 0.48.

Panel B. Classic event study

Event 1: Cumulative abnormal returns (CARs) for event study of 64 *chaebol* firms in 17 industries relative to Non-*chaebol* Index. Other events: CARs for 54 large-plus firms in 16 industries relative to Mid-Sized Index. Market model estimation period is January-May and September-December 1999. Industry CARs treat all firms in each industry as a single observation; portfolio CARs group all treatment firms together. z-Statistics are in parentheses.

Regres-sion set	Treatment group	Event type	*Chaebol*	Size	Size	Size	Size	Horserace
		Event	1	2	3	2–3	1–3	2–3
		Event window	(–2, +3)	(–2, +3)	(–2, +3)	(–2, +41)	(–2, +62)	(–2, +41)
		Calendar dates	6/1– 6/8	6/30–7/7	8/23–8/30	6/30–8/30	6/1–8/30	6/30–8/30
Panel A. CMARs								
1	*Basic regression*							
	Chaebol	*Chaebol* dummy	**0.0472*** **					0.0555
			(3.38)					(0.89)
	Main	Large-plus dummy		**0.0423****	**0.0412****	**0.1363*****	**0.1594****	0.1043*
				(2.52)	**(2.57)**	**(3.16)**	**(2.24)**	(1.86)
		Control firms	50	46	44	48	43	33
		Treated firms	60	48	52	48	49	68
		Adjusted R^2	0.0846	0.0537	0.0877	0.0792	0.0902	0.037
2	*Adding control for ln(market cap)*							
	Chaebol	*Chaebol* dummy	**0.0378****					0.0532
			(2.60)					(0.90)
	Main	Large-plus dummy		**0.0596****	**0.0460*****	**0.1673*****	**0.1972****	**0.1473****
				(2.74)	**(2.87)**	**(3.49)**	**(2.61)**	**(2.55)**
		ln(Market cap)	**0.0137****	-0.0178	-0.0051	-0.0351	0.1770	
			(2.28)	(-1.36)	(-0.75)	(-1.24)	(1.27)	
		Adjusted R^2	0.1100	0.0723	0.0816	0.0860	0.0996	0.046
3	*Adding controls for six powers of ln(market cap))*							
	Chaebol	*Chaebol* dummy	**0.0388****					0.0402
			(2.52)					(0.68)
	Main	Large-plus dummy		**0.0653*****	**0.0475*****	**0.1585*****	**0.1935****	**0.1458****
				(3.32)	**(3.24)**	**(3.34)**	**(2.33)**	**(2.67)**
		Adjusted R^2	0.0713	0.1540	0.0978	0.1251	0.0670	0.048

Regres-sion set	Treatment group	Event type Event Event window Calendar dates	*Chaebol* 1 (–2, +3) 6/1– 6/8	Size 2 (–2, +3) 6/30–7/7	Size 3 (–2, +3) 8/23–8/30	Size 2–3 (–2, +41) 6/30–8/30	Size 1–3 (–2, +62) 6/1–8/30	Horserace 2–3 (–2, +41) 6/30–8/30
4	*Narrow treatment group with control for ln(market cap)*							
	Chaebol	*Chaebol* dummy						0.0110
								(0.15)
	Narrow	Large-plus dummy		0.0354	**0.0643*** **	**0.1684** **	**0.2120** **	**0.1811** **
				(1.48)	**(4.64)**	**(2.42)**	**(2.21)**	**(2.32)**
		Treated firms		14	17	17	16	
		Adjusted R^2		0.0626	0.1624	0.0895	0.0985	0.052

Regres-sion set	Treatment group	Event	1	2	3	2–3	1–3
Panel B. CARs							
Using industry CARs							
1	*Chaebol*	*Chaebol* dummy	**0.0354*** **				
			(3.50)				
2	Main	Large-plus dummy		**0.0728*** **	0.0158	**0.1425*** **	**0.1732*** **
				(7.19)	(1.60)	**(4.78)**	**(4.69)**
		No. of industries	17	16	16	16	16
3	Narrow	Large-plus dummy		**0.0686*** **	**0.0484*** **	**0.1510*** **	**0.1452*** **
				(5.45)	**(4.68)**	**(3.66)**	**(3.00)**
		No. of industries		11	11	11	11
Using portfolio CARs							
4	*Chaebol*	*Chaebol* dummy	0.0372*				
			(1.85)				
5	Main	Large-plus dummy		**0.0724*** **	0.0371*	**0.1365** **	**0.1733*** **
				(3.30)	(1.69)	**(2.30)**	**(2.40)**
6	Narrow	Large-plus dummy		**0.0718*** **	**0.0601*** **	**0.1415*** **	**0.1667** **
				(3.27)	**(2.74)**	**(2.38)**	**(2.31)**

Table 5

Difference-in-differences: market value

Cross-sectional OLS regressions of Δ*ln*(Tobin's *q*)[*ln*(Tobin's *q*) in December 1999 minus *ln*(Tobin's *q*) in May 1999] or Δ*ln*(market/book) (similarly defined) on large-firm dummy (=1 if assets > 2 trillion won at May 1999), constant, and other controls. In regressions (1-2), independent variables are large-firm dummy and constant term. Regressions (3)–(10) add *ln*(assets) (at May 1999); regressions (7)–(10) add Δ(*ln*(assets)) from May-December 1999 and Δ(other control variables) during 1999 (mid-year data not available).Treatment and control group size ranges (based on assets in trillion won at May 1999) as shown. All regressions exclude one large firm which had 50% outside directors at year-end 1998. *, **, and *** indicate significance at 10%, 5%, and 1% levels. *t*-Statistics, based on robust standard errors, are in parentheses. Significant results (at 5% level or better) are in **boldface**.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Dependent variable - Δln(Tobin's q) from May-Dec. 1999										
Large-firm dummy	**0.1295****	**0.1682****	0.1520*	0.1484*	**0.1490****	**0.1863****	0.1695	0.1840*	**0.1201****	**0.1713****
	(2.51)	**(2.31)**	(1.77)	(1.77)	**(2.56)**	**(2.46)**	(1.62)	(1.66)	**(1.97)**	**(2.45)**
ln(Assets)			-0.0163	0.0180	0.0063	0.0075	-0.0229	0.0044	0.0128	0.0267
			(-0.41)	(0.55)	(0.62)	(0.73)	(-0.49)	(0.11)	(0.62)	(1.23)
Δ(1^{st}–6^{th} powers of *ln*(assets))	N	N	N	N	N	N	Y	Y	Y	Y
Δ(Other control variables)	N	N	N	N	N	N	N	N	Y	Y
Treatment group	2–8T	2–4T	2–8T	2–4T	2–8T	2–4T	2–8T	2–4T	2–8T	2–4T
Control group	0.5–2T	0.5–2T	0.5–2T	0.5–2T	< 2T	< 2T	0.5–2T	0.5–2T	0.25< 2T	0.25< 2T
No. of large firms	45	28	45	28	45	28	45	28	45	28
No. of control firms	110	110	110	110	561	561	110	110	161	161
Adjusted R^2	0.06	0.09	0.06	0.08	0.03	0.03	0.05	0.08	0.27	0.32
r (large-firm dummy, ln(assets))			0.76	0.84	0.47	0.59	0.76	0.84	0.81	0.71
Panel B: Dependent variable - Δ*ln*(market/book) from May-December 1999										
Large-firm dummy	**0.2851*****	**0.3954*****	**0.4026****	**0.3904****	**0.3263*****	**0.4266*****	**0.4030****	0.3878*	0.2688	0.2721
	(2.63)	**(2.85)**	**(2.20)**	**(2.17)**	**(2.68)**	**(2.93)**	**(2.01)**	(1.93)	(1.25)	(1.61)
ln(assets)			-0.0849	0.0047	0.0007	0.0046	-0.0612	0.0150	0.0481	0.0994
			(-0.84)	(0.05)	(0.03)	(0.20)	(-0.54)	(0.13)	(0.36)	(1.53)
Δ(1^{st}–6^{th} powers of *ln*(assets))	N	N	N	N	N	N	Y	Y	Y	Y
Δ(Other control variables)	N	N	N	N	N	N	N	N	Y	Y
Treatment group	2–8T	2–4T	2–8T	2–4T	2–8T	2–4T	2–8T	2–4T	2–8T	2–4T
Control group	0.5–2T	0.5–2T	0.5–2T	0.5–2T	< 2T	< 2T	0.5–2T	0.5–2T	0.25< 2T	0.25< 2T
No. of large firms	42	25	42	25	42	25	42	25	42	25
No. of control firms	100	100	100	100	492	492	100	100	155	155
Adjusted R^2	0.06	0.09	0.05	0.08	0.02	0.02	0.03	0.06	0.14	0.21
r (arge-firm dummy, ln(assets))			0.83	0.74	0.61	0.48	0.83	0.74	0.84	0.69

Table 6

Difference-in-differences: market value of other Asian countries

OLS regressions of Δ*ln*(Tobin's *q*) [*ln*(Tobin's *q*) in December 1999 minus *ln*(Tobin's *q*) in June 1999] on large-firm dummy (=1 if assets > local currency equivalent of 2 trillion won at year-end 1998), constant, and other controls as shown for firms from six other Asian countries (Hong Kong, Indonesia, Malaysia, Singapore, Taiwan, Thailand). Exchange rate is measured at year-end 2008. In each panel, regression (4) combines three countries severely affected by the 1997-1998 East Asian crisis (Indonesia, Malaysia, Thailand). We combine these countries because each has only a few large firms. Sample excludes banks. *, **, and *** indicate significance at 10%, 5%, and 1% levels. *t*-Statistics, based on robust standard errors, are in parentheses. Significant results (at 5% level or better) are in **boldface**. Panel A control group is mid-sized firms (0.5 trillion won < assets < 2 trillion won); treatment group is large firms with assets from 2–8 trillion won. Panel B size range is 0.5–8 trillion won.

	(1)	(2)	(3)	(4)	(5)
	Hong Kong	Singapore	Taiwan	Indonesia, Malaysia, Thailand	All 6 countries
Panel A: Independent variables – large-firm dummy, constant, country dummies as appropriate					
Large-firm dummy	-0.0183	-0.0278	-0.0117	0.0006	-0.0122*
	(1.46)	(1.15)	(0.61)	(0.40)	(1.80)
Country dummy	N	N	N	Y	Y
Treatment group	2–8T	2–8T	2–8T	2–8T	2–8T
No. of large firms	53	33	26	38	150
Control group	0.5–2T	0.5–2T	0.5–2T	0.5–2T	0.5–2T
No. of control firms	83	46	80	131	340
Adjusted R^2	0.00	–0.00	–0.00	–0.00	0.01
Panel B: Replace large-firm dummy with ln(assets)					
ln(Assets)	-0.0138	-0.0243	0.0011	0.0015	-0.0064
	(1.37)	(1.53)	(0.13)	(1.50)	(1.50)
Country dummy	N	N	N	Y	Y
Size range	0.5–8T	0.5–8T	0.5–8T	0.5–8T	0.5–8T
Adjusted R^2	0.00	-0.00	-0.00	-0.00	0.01

Table7

Panel regressions for Board Structure Index

Coefficients from regressions of *ln*(Tobin's *q*) on Board Structure Index, (KCGI – Board Structure Index – Ownership Parity), Ownership Parity Index, and control variables. Regressions include all firms, except regression (5) is limited to small firms. 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. Fixed effects regressions omit ADR, MSCI index, and industry dummies due to minimal or no within-firm variation over time. *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use year dummies, unbalanced panels, and firm clusters. *t*- or *z*-statistics 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 in **boldface**.

	(1)	(2)	(3)	(4)
	Pooled OLS	Random effects	Fixed effects (unbalanced)	
			All	Small
Board Structure Index	**0.0124*** **	**0.0109*** **	**0.0101*** **	**0.0088*** **
	(6.87)	**(7.53)**	**(6.58)**	**(3.68)**
KCGI – Board Structure Index – Ownership Parity	**0.0025** **	0.0014	0.0011	0.0010
	(2.31)	(1.61)	(1.09)	(0.95)
Ownership Parity	**0.0091*** **	0.0038	0.0005	0.0000
	(3.77)	(1.60)	(0.17)	(0.02)
ln(Assets)	**-0.0305*** **	**-0.0394*** **	**-0.0566*** **	**-0.0688*** **
	(3.31)	**(4.29)**	**(2.70)**	**(-2.89)**
ln(Years listed)	**-0.0520*** **	**-0.0574*** **	**-0.0974*** **	**-0.1003*** **
	(5.24)	**(5.71)**	**(2.86)**	**(-2.69)**
Leverage	-0.0000	**-0.0000** **	-0.0000	-0.0000
	(1.01)	**(2.35)**	(1.31)	(-1.42)
Sales growth	-0.0001	-0.0000	-0.0001	-0.0000
	(0.64)	(0.31)	(0.51)	(-0.27)
R&D/Sales	**0.0672*** **	**0.0224*** **	**0.0184*** **	**0.0182*** **
	(5.94)	**(4.03)**	**(3.37)**	**(3.33)**
Advertising/Sales	**1.2596*** **	**1.0291** **	0.8610	0.9712
	(2.80)	**(2.04)**	(1.35)	(1.41)
Exports/Sales	-0.0050	-0.0335	-0.0745*	-0.0711*
	(0.16)	(1.20)	(1.95)	(-1.80)
PPE/Sales	-0.0238	-0.0268*	**-0.0417** **	-0.0440*
	(1.42)	(1.73)	**(1.98)**	(-1.85)
$(PPE/Sales)^2$	0.0007	0.0005	0.0008	0.0009
	(1.20)	(1.04)	(1.28)	(1.19)
Capex/PPE	**0.1292*** **	**0.0698** **	0.0541*	**0.0653** **
	(3.59)	**(2.55)**	(1.91)	**(2.06)**
EBIT/Sales	**-0.0199*** **	**-0.0153*** **	**-0.0087** **	**-0.0086** **
	(2.86)	**(3.21)**	**(2.19)**	**(-2.14)**
Market share	0.1322	**0.2695*** **	**0.3072*** **	0.1999*
	(1.59)	**(3.09)**	**(2.70)**	(1.96)
Share turnover	**0.0000*** **	0.0000	0.0000	0.0000
	(3.23)	(1.04)	(0.56)	(0.63)
Foreign ownership	**0.0022*** **	**0.0024*** **	**0.0026*** **	**0.0028*** **
	(3.19)	**(3.87)**	**(3.82)**	**(3.27)**
Sole ownership	**-0.0047*** **	**-0.0030** **	-0.0014	-0.0017
	(3.56)	**(2.09)**	(0.76)	(-0.84)
$(Sole\ ownership)^2$	0.0000	0.0000	-0.0000	0.0000
	(1.20)	(0.14)	(0.11)	(0.04)
Chaebol dummy	**0.0555*** **	0.0439**		
	(3.05)	(2.43)		
Year dummies	yes	yes	yes	yes
ADR, MSCI, 4-digit industry dummies	yes	yes	no	no
Observations (no. of firms)	3693 (656)	3693 (656)	3693 (656)	3305 (611)
Random effects λ		0.71		
R^2	0.2832	0.2788	0.2201	0.2374

Table 8

Panel regressions for Board Independence and Board Committee Subindices

Coefficients from regressions of *ln*(Tobin's *q*) on Board Independence and Board Committees Subindices, board structure elements, indicated control for rest of KCGI, and other control variables as in Table 7. Regressions include all firms, except regression (3) is limited to small firms. Outliers for each year are identified and dropped if the studentized residual from a regression of the dependent variable on Board Structure Index (Panel A), Board Independence Subindex (Panel B), or Board Committee Subindex (Panel C) exceeds ±1.96. *, **, and *** indicate significance at 10%, 5%, and 1% levels. All regressions use year dummies, unbalanced panels, and firm clusters. *t*- or *z*-statistics are reported in parentheses. R^2 is overall R^2 for random effects and within R^2 for fixed effects. Significant results (at 5% level or better) are in **boldface**.

	(1)	(2)	(3)
	Random effects	Fixed effects (unbalanced)	
		All	Small
Panel A			
Board Independence Subindex	**0.0133*** **	**0.0122*** **	**0.0118*** **
	(6.32)	**(5.48)**	**(4.19)**
Board Committee Subindex	**0.0079*** **	**0.0074** **	0.0056
	(2.65)	**(2.48)**	(1.30)
KCGI - Board Structure Index	**0.0018** **	0.0010	0.0009
	(2.28)	(1.12)	(0.94)
R^2	0.2771	0.2206	0.2380
Panel B			
b1 (50% outside director dummy)	**0.0864*** **	**0.0791*** **	**0.0717*** **
	(5.39)	**(4.85)**	**(2.84)**
b2 (> 50% outside director dummy)	**0.0570*** **	**0.0588*** **	0.0605*
	(2.73)	**(2.69)**	(1.69)
KCGI - Board Independence Subindex	**0.0021*** **	0.0012	0.0009
	(2.82)	(1.45)	(0.91)
R^2	0.2742	0.2213	0.2374
Panel C			
Nominating committee	**0.0380** **	0.0340*	0.0272
	(2.25)	(1.95)	(1.37)
Audit committee	**0.0437** **	**0.0439** **	0.0298
	(2.13)	**(2.08)**	(1.11)
Compensation committee	0.0431	0.0379	0.0271
	(1.09)	(0.90)	(0.59)
KCGI - Board Committee Subindex	**0.0027*** **	**0.0017** **	0.0011
	(3.42)	**(1.99)**	(1.11)
R^2	0.2646	0.2087	0.2270
All regressions			
Year dummies, other control variables	yes	yes	yes
Observations	3,708	3,708	3,305
No. of firms	658	658	611

Table 9

Two-stage least squares regressions

Two-stage least squares regressions using large-firm IV (=1 if firm is large and year is 1999 or later, 0 otherwise) as an instrument for Board Structure Index, using pooled data from 1998-2004. Both stages use firm fixed effects, year dummies, and other control variables as in Table 7. Treatment of outliers is the same as in Table 7. Model (A) controls for Ownership Parity and KCGI – Ownership Parity – Board Structure; model (B) omits these controls. R^2 is adjusted R^2 for first stage and within R^2 for second stage. *t*-Statistics, with firm clusters, are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels. Significant results (at 5% level or better) are in **boldface.**

	First Stage		Second Stage	
Dependent variable	Board Structure Index		*ln*(Tobin's *q*)	
Model	(A)	(B)	(A)	(B)
Instrumented Board Structure Index			**0.0144*** **	**0.0149*** **
			(3.15)	**(3.69)**
Ownership Parity	0.0307		0.0010	
	(0.72)		(0.34)	
KCGI - Board Structure Index – Ownership Parity	**0.0517*** **		0.0006	
	(3.20)		(0.55)	
Large-firm IV	**5.7742*** **	**6.1176*** **		
	(8.48)	**(9.53)**		
ln(Assets)	-0.1896	-0.2419	**-0.0593*** **	**-0.0645*** **
	(-0.48)	(-0.63)	**(2.73)**	**(-3.04)**
Year dummies, other control variables	yes	yes	yes	yes
No. of observations	3,693	3732	3,693	3732
No. of firms	656	656	656	656
Within R^2	0.3463	0.2061	0.3616	0.2008