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Agency Problems in Firms with an Even Number of Directors: Evidence from China[*]

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Abstract

To avoid a tie in voting, most boards have an odd number of directors. We argue that boards with an even number of directors are more likely to be weak monitors because of inefficient decision making and being captured by controlling shareholders. Consistent with this argument, we find that in China boards with an even number of directors have fewer meetings and are more likely to have board members absent from board meetings. Firms with an even number of directors have more tunnelling through intercorporate loans and related party transactions, lower financial reporting quality and higher incidence of accounting

irregularities. This evidence is stronger in firms with weaker external monitoring and for directors with weaker incentives to monitor. Finally, we show that firms with an even number of directors are associated with lower market valuation of equity. Our results suggest that corporate boards with an even number of directors in emerging markets are associated with more agency problems.

JEL Classifications: G32; G34
Key words: Board of directors; corporate governance; agency problems; monitoring; China

1. Introduction

A board of directors is expected to play a critical role in monitoring management and safeguarding minority shareholders' rights, in addition to advising top managers on important issues (Mace, 1986). Based on the idea that independent directors are better able to monitor executives, regulators around the world have stipulated that public firms must have a substantial percentage of independent directors on the board.[1] Prior studies have documented that firm performance is related to various features on the independent directors, including the percentage of independent directors (Liang, Xu, and Jiraporn, 2013; Liu et al., 2015), board hierarchy (Zhu, Tucker, and Chan, 2016), female directors (Liu, Wei, and Xie, 2014; Luo, Xiang, and Huang, 2017), and foreign directors (Giannetti, Liao, and Yu, 2015).[2] In this study, we extend this literature by examining an interesting feature of boards, namely, the odd versus even number of directors sitting on the board. We argue and find evidence that boards with an even number of directors (hereafter, even boards) are weaker monitors and are associated with more agency problems.

There are two reasons to believe that even boards are not effective monitors. First, boards usually make decisions by voting and it makes sense to have an odd number of directors to avoid a voting tie, and many management consultants strongly recommend boards have an odd number of directors.[3] Even boards, therefore, are not efficient in making decisions, including decisions in monitoring managers and curbing agency problems. Consistent with this argument, Deng, Gao, and Liu (2012) find that firms with even boards

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[1] For example, US firms are required to have a majority of directors to be independent, and Chinese firms must have at least one third of independent directors sitting on a board.

[2] See Adams, Hermalin, and Weisbach (2010) for a recent survey of the literature on boards of directors. Jiang and Kim (2015) provide an overview of the research on boards of directors in China.

[3] For example, in an article in *Fortune* magazine, Carl Dorvil, CEO of Group Excellence Holdings and Managing Partner of VICAR Capital Advisors, suggests that one of the five rules for selecting a board of directors is to "have an odd number of board members". He comments that "There's a high probability of a tie occurring if you have an even number of people helping you make a decision. However, there will always be a side, opinion or suggestion that wins out if you have an odd number of votes. If you don't have an odd number of board members, you are setting yourself up for a situation where you end up more confused than you started." The full article is available at https://www.forbes.com/sites/theyec/2014/07/16/five-rules-for-selecting-your-personal-board-of-directors/#16dc05bf685f.

have lower Tobin's Q and operating performance. Similarly, Gao and Huang (2016) show that audit committees with an even number of members are associated with higher likelihood of financial restatements in the US.

Second, directors are often nominated and appointed by executives or controlling shareholders, the very people that independent directors are supposed to monitor and discipline.[4] This raises the concern that the board of directors may be captured and thus fail to effectively perform a governance role (Shivdasani and Yermack, 1999; Coles, Daniel, and Naveen, 2014). The issue of captured boards is particularly concerning in emerging markets where firms have concentrated ownership (La Porta, Lopez-de-Silanes, and Shleifer, 1999; Claessens, Djankov, and Lang, 2000) and controlling shareholders usually handpick independent directors.[5] We argue that an odd number of board members will be chosen if boards are expected to have discussions and dissenting opinions. In contrast, an even board is likely to result from the controlling shareholders' confidence that the board is under the full control of controlling shareholders and dissenting votes will never occur in board meetings. In short, even boards are likely to be captured and unable to constrain agency problems.

To examine the association between even boards and agency problems, we choose China as the setting for three reasons. First, in China almost every firm has controlling shareholders (Jiang and Kim, 2015) and controlling shareholders have almost full control in the selection of board members (Ma and Khanna, 2016). Second, due to the relatively weak investor protection in China, controlling shareholders have strong incentives to consume private benefits of control and expropriate minority investors through tunnelling (Jiang, Lee, and Yue, 2010), related party transactions and loan guarantees to controlling shareholders

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[4] For example, Carl Icahn, an activist investor, asserts that ". . . members of the boards are cronies appointed by the very CEOs they're supposed to be watching" (Business Week Online, November 18, 2005).

[5] For example, in China, a board chair who best represents the controlling shareholders and top management handpicks almost all the independent directors from his social network (Shen and Jia, 2004; Ma and Khanna, 2016). The Shanghai Stock Exchange (2004) reports that 70% of independent directors are nominated by a firm's large shareholders.

(Beckman, Cole, and Fu, 2009; Peng, Wei, and Yang, 2011), and excessive consumption of perquisites or perks (Ang, Cole, and Lin, 2000; Du, 2014). This implies that controlling shareholders in China are more likely to choose a weak board or an even board that does not challenge their opinions and thus an even board is more likely to be associated with more severe agency problems. Third, as a presentative of emerging markets, China has many features that are common to other emerging markets, such as the presence of controlling shareholders in public firms and weak institutions to protect minority investors. This suggests that the evidence from China is likely to be generalizable to other emerging markets, and our study could inform a broad audience including investors, regulators and researchers who are interested in emerging markets.

Our data show that about 17.7% of boards of listed firms in China have an even number of directors in the sample period from 2004 to 2013. Examining board activities, we find that even boards have fewer board meetings than odd boards. In addition, members of an even board are more likely to be absent from board meetings. This evidence suggests that even boards do not work as diligently as odd boards in performing their roles in advising and monitoring. Furthermore, we find that even boards are associated with more tunnelling activities through intercorporate loans. After controlling for various firm characteristics, we show that intercorporate loans in firms with an even board are about 14% higher than the average intercorporate loans for firms with an odd board. Firms with even boards have more related party transactions, more guarantees for loans of controlling shareholders, and larger operating expenses likely associated with perquisite consumption by managers and directors. The results support our argument that even boards are weak boards that cannot constrain agency problems related to controlling shareholders.

We find the association between even boards and tunnelling is stronger in small firms and firms with few analysts following, consistent with the theory that agency problems

become more severe when information asymmetry is high. The association is weaker when board members have a larger share ownership in the firm, implying that share ownership can effectively motivate the directors to perform a proper monitoring and advising role (Vafeas, 1999). We also find the association decreases with board size, suggesting that larger boards are less likely to be fully captured.

Leuz, Nanda, and Wysocki (2003) argue that agency costs can lead to poor accounting quality because corporate insiders are likely to manage accounting numbers to camouflage their consumption of private benefits of control. Consistent with this argument, we find that firms with an even board are more likely to receive a modified audit opinion, implying a poorer quality of financial reporting. Furthermore, firms with an even board are more likely to commit accounting irregularities such as misstatements of accounting numbers and delayed or omitted disclosure of material information. The evidence suggests that even boards are associated with opaque financial disclosure.

Gompers et al. (2003) and Brown et al. (2006) argue and find evidence that firms with poor corporate governance and severe agency problems have lower valuation in equity market. Consistent with their evidence, we find that firms with even boards in China are associated with a lower market value of equity and a smaller Tobin's Q, after controlling for a number of firm characteristics. The results suggest that agency problems related to even boards are likely to result in investors' discounting the share prices and thus lower firm valuation.

While we argue that an even board is likely to be associated with more agency problems, we do not argue that an even board causes agency problems. Rather, we agree with many studies' argument that board structure and corporate decisions are jointly made by controlling shareholders and top managers (e.g., Hermalin and Weisbach, 2002; Coles, Daniel, and Naveen, 2008; Wintoki, Linck, and Netter, 2012). In our setting, we believe that

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the controlling shareholders in Chinese firms choose even boards to maximize their consumption of private benefits of control. Therefore, even boards serve as a signal of captured and ineffective boards that fail to curb severe agency problems. One concern for our empirical results, however, is the possibility of omitted correlated variables that drive both the decisions of controlling shareholders to choose an even board and to exploit minority shareholders. We address this concern in two ways. First, we use propensity score matching to find a matched sample of firms with odd boards but similar to even board firms in other dimensions. We find firms with even boards exhibit more agency problems and poorer accounting quality, compared with matched firms. Second, we select a sub-sample of firms that experienced changes in the number of directors during our sample period and add firm-fixed effects in multivariate regressions to control for unobservable firm characteristics. Firm-fixed effects allow us to focus on within-firm variations in agency problems associated with changes in the number of directors. The results from firm-fixed effects regression suggest that even boards are associated with more agency problems and higher incidence of accounting irregularities.

Our study contributes to the literature in two ways. First, our results show that boards of directors in emerging markets can be captured and fail to perform a governance role to protect minority shareholders since the directors are chosen by controlling shareholders. This echoes many investors' concern that co-opted boards may not be effective monitors. Finkelstein and Hambrick (1989) argue that CEOs prefer to choose 'sympathetic' new directors. Hwang and Kim (2009) find that CEOs like to appoint their friends who share similar views or social ties. Coles, Daniel, and Naveen (2014) find that co-opted boards are less likely to monitor. Ma and Khanna (2016) find that directors who are appointed by the current board chair are less likely to cast dissenting votes in board meetings, consistent with social reciprocity theory that appointees have an intention to return favor to their appointers.

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Together with these studies, our study casts doubt on the degree to which boards of directors can effectively monitor and discipline managers.[6] Our results suggest that, despite regulatory efforts to install independent directors in board rooms in emerging markets, independent directors may be chosen by controlling shareholders to "window dress" the boardrooms to meet the regulations. To effectively protect minority shareholders' interest and constrain agency problems, regulators in emerging markets need to do more than requiring certain number or percentage of independent directors in boardrooms.

Second, we add to the growing literature on board structure. One stream of research examines the determinants of board structure (e.g., Boone et al., 2007; Coles, Daniel, and Naveen, 2008; Linck, Netter, and Yang, 2008). Another stream of research investigates the effects of board structure (for a review, see Adams, Hermalin, and Weisbach, 2010). Unlike prior studies that focus on board size, we examine an interesting feature of boards and compare even boards with odd boards. In the setting of China, research on board structure also features a number of studies investigating board independence (Firth, Fung, and Rui, 2007; Conyon and He, 2011; Liu et al., 2015), board hierarchy (Zhu, Tucker, and Chan, 2016), female directors (Liu, Wei, and Xie, 2014; Luo, Xiang, and Huang, 2017), and foreign directors (Giannetti, Liao, and Yu, 2015). Some of these studies document a positive association between board features and firm performance, likely resulting from directors' advising role. For example, Giannetti, Liao, and Yu (2015) show that directors with foreign experience are able to help Chinese firms improving productivity and overseas expansions, which contributes to firm performance. Our study adds to this literature by showing that boards with an even number of directors are not effective monitors.[7]

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[6] Jiang, Wan, and Zhao (2016) argue that reputation concerns can motivate independent directors to cast dissenting votes to discipline managers. However, dissenting votes are rare, accounting for less than 1% of total votes, and usually are casted when independent directors' appointment is coming to an end (Ma and Khanna, 2016).

[7] We do not, however, recommend a prohibition of boards with an even number of directors. The fundamental reason why even boards do not effectively monitor is that the controlling shareholders select boards to maximize

2. Related Studies

As the largest and representative emerging market, China has attracted a number of studies that examine the development and various features of its financial markets (e.g., Allen, Qian, and Qian, 2005; Jiang and Kim, 2015). In the past two decades, China's financial markets have experienced explosive growth, with over 2,000 companies now listed on the main boards in the Shanghai and Shenzhen Stock Exchanges and total market value of listed firms ranked second in the world. A key feature of Chinese firms is the presence of controlling shareholders. During China's transition from a planned economy to a market economy, a large number of state-owned enterprises became privatized and then listed on stock exchanges. These state-owned public firms account for about half of all the listed firms and the state still remains the largest and controlling shareholder. Non-state-owned firms, or private firms, in China are usually controlled by founders or founding families who own a substantial portion of shares to ensure their control of the firm. Jiang and Kim (2015) report that from 1998 to 2012 in an average listed firm in China the largest shareholder owns over one third of the shares of the firm, and the top five largest shareholders own more than half of the shares.

La Porta, Lopez-de-Silanes, and Sheilfer (1999) argue that the presence of controlling shareholders could result in agency conflicts between the controlling shareholders and minority shareholders. In particular, controlling shareholders can take advantage of their control of the firm and expropriate from minority shareholders through outright theft, intercorporate loans, loan guarantees for related companies, favorable transfer pricing to related parties, dilution of new shares, and other methods. Furthermore, due to the weak legal and judiciary system to protect minority investors' rights in China, controlling shareholders find the cost of expropriation is low, particularly in the early years when governance is weak.

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their private benefits of control. Without addressing this fundamental issue, merely requiring firms to have an odd number of directors will have little effect on reducing agency costs.

Consistent with this view, many studies find that controlling shareholders in China appropriate firms' assets through tunnelling. Jiang, Lee, and Yue (2010) find that controlling shareholders siphon an enormous amount of money from listed firms through intercorporate loans that bear no interest or are not paid back on due dates. Tunnelling results in poor operating performance and financial distress for many firms. Cheung et al. (2009) show evidence of tunnelling through related party transactions including assets sales and acquisitions, trading of goods and services, transfer of cash and loan guarantees. While related party transactions are also used to prop up firms' performance, Cheung et al. (2009) find that there is more tunnelling than propping up. Cheung et al. (2006) and Peng, Wei, and Yang (2011) find that investors react negatively to the announcement of related party transactions that are likely to be tunnelling activities.

Being aware of these agency problems, Chinese regulators have introduced corporate governance codes that are similar to codes in developed markets. In particular, the "Code of Corporate Governance for Listed Companies in China" was issued on January 2, 2002. The code outlines rules for controlling shareholders in Chapter 2 and rules for directors and boards of directors in Chapter 3.[8] The code states that controlling shareholders shall nominate candidates for directors and that directors shall act in good faith, be diligent, be knowledgeable, and be law-abiding. In August 2001, the regulator issued the "Guidance Relating to the Establishment of Independent Director System in Listed Companies" which specified that board size should range between 5 and 19 directors and that at least one third of directors must be independent.[9] The regulation on independent directors is motivated by the argument that independent directors are better able to monitor managers and insiders (Fama, 1980; Fama and Jensen, 1983). To maintain directors' independence, Chinese regulation

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[8] An English version of the code is available at http://www.en8848.com.cn/hangye/law/chinaflfg/93523.html. See Jiang and Kim (2015) for a brief description of each chapter in the code.
[9] Liu et al. (2015) provide a comparison of independent directors between China and the US.

requires that independent directors cannot own more than 1% of the listed firm's shares and cannot be one of the top 10 shareholders of the firm.

The controversy is whether independent directors and corporate boards actually play a role in constraining agency problems.[10] The fact that tunnelling exists in so many Chinese firms despite all these firms having a board and independent directors probably suggests that boards and directors are not very effective in curbing tunnelling.[11] It is also well-known and well-documented that majority of Chinese listed firms only have the minimum number of independent directors as stipulated by regulation (e.g., Jiang and Kim, 2015), implying that controlling shareholders do not have strong incentives to appoint more independent directors to monitor and constrain their consumption of private benefits of control.

Furthermore, since directors are nominated and effectively handpicked by controlling shareholders, it is unlikely that controlling shareholders will choose someone to challenge or confront themselves. Evidence from the US suggests that when CEOs are involved in selecting directors, they prefer grey directors with conflicts of interests over outside independent directors (Shivdasani and Yermack, 1999). Many corporate boards have independent directors who are friends of the CEO and these boards do not effectively monitor CEO performance (Hwang and Kim, 2009). When more board members are appointed by the current CEO, board monitoring decreases (Coles, Daniel, and Naveen, 2014). Using voting data from Chinese firms, Ma and Khanna (2016) show that independent directors rarely cast dissenting votes. Dissenting votes account for less than 1% of total votes and none of the controlling shareholders' proposals have ever been rejected by boards in China.[12]

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[10] See Jiang and Kim (2015) for a summary of the mixed findings on the relation between independent directors and firm performance in China. Adams, Hermalin, and Weisbach (2010) discuss mixed evidence in the US and other countries.

[11] A counter-argument is that tunnelling could be even worse if there were no independent directors and boards in China.

[12] Conversation with some independent directors reveals that independent directors usually consult the controlling shareholders and get their consent before casting dissenting votes.

Following these studies, we suspect that some boards of Chinese firms are captured by controlling shareholders and fail to perform a monitoring role. We conjecture that boards with an even number of directors are more likely to be captured. The reason is that boards usually make decisions by voting, and to avoid voting ties a sensible choice of board size should be an odd number of directors. An odd number of directors ensure voting efficiency in the sense that a decision can be made at the end of the voting. In contrast, it is very possible that a board with an even number of directors can have draws in voting and no decision can be made. However, in our sample of Chinese firms, over 17% have even boards. We conjecture that these even boards are chosen because the controlling shareholders are confident that they have full control of the board so that voting ties will never happen in board meetings.

Finally, even boards are less efficient in making decisions given the potential conflicts resulting from voting ties. Deng, Gao, and Liu (2012) find that even boards in US firms are associated with lower Tobin's Q and operating performance, suggesting inefficient decision making in even boards. The inefficiency could impair boards' ability to curb agency problems and to monitor executives. Gao and Huang (2016) show that audit committees with an even number of members are associated with higher likelihood of financial restatements in the US, implying weak monitoring by teams with even numbers. The lower efficiency and weak monitoring associated with even boards are thus likely to lead to more agency problems.

Based on these arguments, we expect to find that even boards are weak boards and are associated with more agency problems in Chinese firms. We also expect even boards to be associated with lower financial reporting quality because insiders have incentives to manage accounting numbers to camouflage their expropriation of minority shareholders. The low financial reporting quality is likely to lead to more modified audit opinions and more accounting irregularities.

3. Research Design

3.1 Measures of agency problems

We examine a number of measures of agency problems that have been adopted in studies on China. The first one is the other receivables scaled by total assets (*ORECTA*). Jiang, Lee, and Yue (2010) find that intercorporate loans between Chinese firms are typically reported as part of "other receivables" on the balance sheets of lending firms. The borrowing firms, usually also controlled by the controlling shareholders of the lending firms, do not have to pay back the interest or even the principal. These intercorporate loans enable controlling shareholders to siphon billions of cash assets or profits from listed firms and present one of the most brazen forms of corporate abuse. Jiang, Lee, and Yue (2010) show that companies with high *ORECTA* balances have poorer future operating performance and higher likelihood of financial distress. *ORECTA* thus provides a direct measure of tunnelling by controlling shareholders and has been used in a number of follow-up studies including Du (2014) and Qian and Yeung (2015), among many others.

Our second measure of agency problems is the amount of loan guarantee for large shareholders or their related parties scaled by total assets (*GUARANTEE*). Berkman, Cole, and Fu (2009) document that many Chinese listed companies pledge their assets as collaterals to guarantee the loan for a related party which typically is the controlling shareholder or an entity controlled by the controlling shareholder. The loan guarantees allow the related party to obtain loans at a lower cost. The guarantees also offer the related party an option to default on the loans and to have the listed companies pay back the loans. Berkman, Cole, and Fu (2009) show that loan guarantees are negatively associated with firm value and future performance, consistent with these guarantees representing a direct form of tunnelling and expropriation.

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The third measure is the total value of connected transactions with large shareholders or their related parties scaled by total assets (*CONNECT*). Peng, Wei, and Yang (2011) explore five types of connected transactions between listed firms and their controlling shareholders: asset acquisitions, asset sales, asset displacements, equity transfers, and cash payments. These connected transactions allow controlling shareholders to siphon the firm's assets or to prop up the firm's performance to avoid delisting. The market reacts negatively to announcements of connected transactions that are likely to be tunnelling activities. We obtain the value of connected transactions from firms' annual reports.

The fourth measure of agency problems is the expense ratio, calculated as the sum of administrative and sales expenses scaled by revenues (*EXPENSES1*) or the administrative expenses scaled by revenues (*EXPENSES2*).[13] A common form of agency cost is the insiders' excessive consumption of perquisites, or perks. The perk consumption results in higher administrative and/or sales expenses (Ang, Cole, and Lin, 2000; Singh and Davidson 2003). Du (2013) uses the expense ratio to measure the agency costs between owners and managers in China.

To provide corroborating evidence, we consider the number of board meetings and directors' absence from board meetings. The intuition is that directors in a captured board do not have incentives to attend board meetings because they are appointed to "window dress" the board rather than to monitor the controlling shareholders or to advise management. At the same time, controlling shareholders of captured boards also have little incentive to hold board meetings to rigorously discuss corporate decisions. So we expect to find that even boards have fewer board meetings and have a higher likelihood of absence of directors in board meetings. For each firm, we calculate the natural log of the number of board meetings

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[13] Using total assets as the scaler does not change our results.

(*MEETING*) in a year and create an indicator variable equal to 1 if some directors are absent from board meetings (*ABSENCE*) in a year.

We also expect the firms with more agency costs to have poor financial reporting quality because controlling shareholders may want to make their accounting disclosure opaque to camouflage the agency problems. To capture the quality of financial reporting, we use the following two measures. The first one is the probability of receiving a modified audit opinion (*MAO*). Auditors are more likely to issue a modified audit opinion if a firm's financial reporting is of lower quality and contains intentional or unintentional errors. The second measure is the probability of conducting accounting irregularities (*IRREGULARITY*) that breached the rules on corporate disclosure and has been identified and penalized by market regulators. These irregularities include misstatements of accounting numbers, delayed disclosures, failures to disclose material information, and inappropriate accounting treatments. A larger number of accounting irregularities indicate opaque financial disclosure.

3.2 Regression models

In multivariate analyses, we estimate the following regression models:

$$DEP = \alpha + \beta Even + \text{controls} + \varepsilon \qquad (1)$$

where *DEP* is the measure of agency problems or the measure of accounting quality, as described in the above sub-section. *Even* is an indicator variable equal to 1 for firms that have an even number of directors on their board, and 0 for firms with an odd number of directors. We expect β to be positive in all regressions using measures of agency problems and accounting quality, suggesting that firms with an even board have more agency problems and lower financial reporting quality.

We include a number of control variables that are potentially related to firms' agency problems. Following Jiang, Lee, and Yue (2010), we control for firm size (*Size*, the natural log of total assets), profitability (*ROA,* net income scaled by total assets), state ownership

(*SOE,* an indicator variable for state-owned firms), large shareholders' ownership (*Top1,* the percentage of shares owned by the largest shareholder) and regional market development (*MKT,* an index measuring regional development in financial intermediaries and legal enforcement). In addition, we control for other firm characteristics including market to book ratios (*MTB*, market value of equity divided by book value of equity), assets tangibility (*Tangible,* tangible assets scaled by total assets), institutional ownership (*Institutions*, percentage of shares owned by institutional investors), analysts following (*Analysts*, the natural log of the sum of 1 and the number of analysts following the firm), auditor quality (*Big4*, an indicator variable equal to 1 for firms with an international Big 4 auditor), and accounting losses (*ST*, an indicator variable equal to 1 for firms reporting losses in the past two consecutive years[14]), and ownership concentration (*Top2_5*, the percentage of shares owned by the second to the fifth largest shareholders).

We also control for other observable board characteristics including board size (*Board_size*, the natural log of the number of directors), board independence (*Independence*, the percentage of directors who are independent directors), share ownership by directors (*Board_ownership*, the percentage of shares owned by the directors), and CEO duality (*CEO_duality*, an indicator variable equal to 1 for firms whose CEO also serves as the chair of the board). Controlling these board characteristics helps us single out the effect of even boards on agency problems and accounting quality.[15] Finally, we include industry- and year-fixed effects in all regressions. In addition, we winsorize each continuous variable at the 1% and 99% levels to eliminate the influence of extreme values.

3.3 Data and sample

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[14] The regulations in China require firms to be delisted from stock exchanges if they report accounting losses for three years in a row. Firms reporting losses in the past two consecutive years have their stock name prefixed with "ST", standing for "Special Treatment", to warn investors that they have a high risk of being delisted.

[15] There is mixed evidence on whether these board characteristics are associated with agency costs and firm performance. See Jiang and Kim (2015) for a review of the related studies.

We collect financial data and board information for listed firms in China from the CSMAR database. Our sample period starts in 2004 because the regulation in 2003 required all listed firms to have at least one third of directors who were independent and Chinese firms' board size stabilized since then. The sample period ends in 2013 because in 2014 a large number of firms adjusted their boards in response to a new regulation that prohibited government officials from being directors. We require firms to have non-missing data to calculate the variables for the multivariate analyses. There are 13,572 firm-year observations in our final sample.

Table 1 reports the distribution of the sample across years and across industries. The number of observations grows over time, consistent with the growth in China's share market. The distribution across industries is largely consistent with that reported in other studies such as Du (2014).

[Insert Table 1 about here]

Figure 1 shows the distribution of board size in China during our sample period. As required by regulations, the number of directors in Chinese firms ranges from 5 to 19. A majority of firms choose to have an odd number of directors, with 51.3% having nine directors. This is consistent with the idea that firms typically are aware of and try to avoid the problems of voting ties if the board has an even number of directors. However, 17.7% of firms have an even number of directors. Among the even number boards, eight is the most preferred number of directors, followed by 12, 10 and 6 directors.[16]

[Insert Figure 1 about here]

4. Empirical Results

4.1 Even boards and agency problems

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[16] A small number of firm-years have 3 or 4 directors, likely due to the resignation of directors shortly before the fiscal year end and thus a gap between departing directors and newly elected directors. Excluding these firm-year observations does not change our results. We select a sample of firms that always have an even (or odd) number of directors throughout our sample period. Using this sample of firms we redo our analyses and find results (untabulated) very similar to those reported in the tables.

We begin with a univariate comparison between even boards and odd boards in Table 2. The first few rows show that even boards have more agency problems than odd boards. For example, *ORECTA*, which measures tunnelling through intercorporate loans, has a mean of 0.038 for even boards and 0.029 for odd boards. The difference in the mean, 0.009, is statistically significant at the 1% level. Firms with even boards have more loan guarantees for large shareholders or their related parties (*GUARANTEE*), more connected transactions (*CONNECT*) and higher expenses ratios (*EXPENSES1* and *EXPENSES2*), and have a higher likelihood of receiving a modified audit opinion (*MAO*) and engaging in accounting irregularities (*IRREGULARITY*). Even boards hold fewer meetings and have a higher likelihood of director absence from board meetings. The evidence from this univariate comparison supports our conjecture that even boards are captured and are associated with more agency problems.

Table 2 also reveals some differences in firm characteristics between even boards and odd boards. On average, firms with even boards have lower *ROA*, implying poorer operating performance possibly due to higher agency costs. Even boards seem to be more common in state-owned firms. The median number of directors is 8 for even boards and 9 for odd boards, consistent with the result in Figure 1. Even boards have a slightly higher percentage of independent directors, likely due to the regulatory requirement that a minimum one third of directors are independent.[17]

[Insert Table 2 about here]

In Table 3, we examine whether even boards have fewer board meetings and more director absence from board meetings. In Model 1 where the dependent variable is *MEETING*, we find that *Even* has a negative and statistically significant coefficient (coefficient = -0.017, t-stat = -2.605). The estimated coefficient implies that, on average, even boards have 1 ($\approx$

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[17] For example, to meet the regulatory requirement, a nine-member board must have at least three independent directors, or 33.3%. An eight-member board must also have three independent directors, resulting in 37.5% (=3/8) of directors being independent.

e$^{0.017}$) fewer meetings in a year than odd boards. In Model 2 we use logistic regressions to estimate the probability that directors are absent from board meetings in a year. The result shows that *Even* has a positive and statistically significant coefficient (coefficient = 0.276, t-stat = 3.677), suggesting that even boards are more likely to have directors absent from board meetings. Taken together, the results in Table 3 are consistent with our argument that even boards are likely to be weak monitors and their directors do not have strong incentives to hold or attend board meetings.

[Insert Table 3 about here]

For control variables, we find large firms and firms with high leverage ratios have more board meetings, possibly due to complex operations and high financial risk. Firms with high institutional ownership and more analysts following also have more board meetings, suggesting that institutional investors and analysts prefer firms with more board meetings.[18] Interestingly, we find a negative association between board meetings and the ownership of the largest shareholder. This negative association suggests that when the largest shareholders dominate there is less need to have board meetings.

Table 4 reports the results from regressions investigating the association between even boards and various measures of agency problems. Across all the models using different measures, we find consistent results that *Even* has positive and statistically significant coefficients, suggesting that firms with even boards have more agency problems. For example, in Model 1 where the dependent variable is *ORECTA*, the coefficient of *Even* is 0.004, suggesting that firms with even boards have 13.8% more intercorporate loans than firms with an odd board.[19] Results in Models 2 to 5 show that even boards are associated with

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[18] This preference could arise because firms are required to release information following board meetings. Alternatively, institutional investors and analysts could exert pressure on boards to have more meetings. But institutions and analysts do not perform a monitoring role in China (Jiang, Lee, and Yue 2010; Jiang and Kim, 2015).

[19] 13.8% is obtained by dividing the estimated coefficient (0.004) by the mean *ORECTA* of firms with odd boards (0.029, from Table 2).

more loan guarantees for large shareholders, more connected transactions, and higher expenses ratios. These results are obtained after we control for a large number of firm and board characteristics.

[Insert Table 4 about here]

Many control variables in Table 4 do not have consistent signs or statistical significance across models, making it difficult to draw conclusions. Exceptions are *MKT* and *ST*. *MKT* has negative coefficients in all models, suggesting fewer agency problems in regions with more developed intermediaries and stronger legal enforcement. This evidence is consistent with findings in Jiang, Lee, and Yue (2010) that tunnelling is more severe in less developed regions in China. *ST* has consistently positive coefficients in all models, implying that firms in financial distress have more agency problems.

We also expect that even boards are likely to be associated with poor accounting quality because controlling shareholders often manipulate accounting numbers to camouflage the agency problems. In Table 5 we use logistic regressions to examine whether firms with even boards are more likely to receive modified audit opinions (Model 1) and to commit accounting irregularities (Model 2). We find that *Even* has positive and statistically significant coefficients in both models, suggesting that firms with even boards have poorer accounting quality. This evidence is consistent with our conjecture. For control variables, we find a lower likelihood of a modified audit opinion and accounting irregularities for firms with low leverage ratios, higher ROA, higher institutional ownership, higher ownership by the largest shareholders, state ownership, and more analyst coverage. Firms with state ownership and firms located in more developed regions are less likely to receive a modified audit opinion or conduct accounting irregularities.

[Insert Table 5 about here]

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In unreported results, we also explore other types of corporate irregularities that breach various rules and regulations, including irregularities involving insider trading and irregularities concerning corporate decisions. We do not find even boards are associated with these two types of irregularities. The evidence is consistent with the argument in Leuz, Nanda, and Wysocki (2003) that agency problems are likely to cause poor accounting quality and accounting-related irregularities.

4.2 Effect of firm characteristics

After documenting that even boards are associated with more agency problems, we explore cross-sectional variations in this association. First, we examine the effect of information asymmetry. Higher information asymmetry between insiders and outsiders makes it harder for outsiders to observe and discipline insiders' expropriation activities and thus decreases the risk of insiders being punished for expropriating outsiders. This argument suggests that agency costs in firms with even boards are more severe for firms with high information asymmetry. We thus expect that the association between even boards and agency problems to be stronger in firms with high information asymmetry. Following prior literature, we use firm size and analysts following to measure the degree of information asymmetry, and expect to find even boards are associated with more agency problems, particularly in small firms and firms with a smaller number of analysts following.

Second, we consider the share ownership by directors. Vafeas (1999) suggests that share ownership aligns directors' incentives with minority shareholders' interests and motivates directors to work hard and to constrain agency problems. Following this argument, we expect to find the association between even boards and agency costs becomes weaker when directors have a higher ownership of the company's shares.

Lastly, we examine board size. The intuition is that larger boards are more difficult to be captured than small boards. Another reason is large boards usually represent multiple large

shareholders who could effectively monitor each other (Attig, El Ghoul, and Guedhami, 2009). Wang, Xu, and Zhu (2004) find that a balance of power among large shareholders could lead to better firm performance. Following these studies, we expect the association between even boards and agency costs becomes weaker for firms with a larger board.

To test these cross-sectional predictions, we include interaction terms between *Even* and measures of information asymmetry, directors' share ownership, and board size, and re-estimate the regressions. To save space, we only report the results from regressions using *ORECTA* as the dependent variable in Table 6, but results from regressions with other agency problem measures are similar and available on request.

In all models, we find *Even* has positive coefficients, consistent with results in Table 4 that even boards are associated with more agency problems. In Models 1 and 2, we find that the interaction terms between *Even* and *Size* and between *Even* and *Analysts* have negative coefficients, implying that the association between even boards and agency problems becomes weaker in firms with larger size and more analysts following. This evidence is consistent with our expectation that agency problems related to even boards will be more severe in small firms and firms with little analyst coverage where information asymmetry is higher.

In Model 3, we find a negative and statistically coefficient for the interaction term between *Even* and *Board_size*. This result is consistent with our conjecture that large boards are more difficult to be captured and may have fewer agency problems due to the cross-monitoring by multiple large shareholders. Results in Model 4 show that the interaction term between *Even* and *Board_ownership* has a negative and significant coefficient, implying share ownership may motivate directors to monitor and constrain agency problems.

[Insert Table 6 about here]

4.3 Endogeneity

We have documented a robust association between even boards and various measures of agency problems and accounting quality. The evidence supports our conjecture that even boards are likely to be captured and unable to effectively monitor controlling shareholders. We, however, do not argue a causal relation between even boards and agency problems. Rather, we think an even board serves as a signal of agency problems within a firm. In the multivariate analyses, we control for a large number of firm and board characteristics in an attempt to single out the relation between even boards and agency problems. One concern for our tests is the possibility of omitted related variables that are related to both the decision of having an even board and expropriating minority shareholders. In other words, our results could change if these observable or unobservable related variables are included in the regressions.

We address this concern in two ways. First, we find a matched sample of firms that are similar to even board firms on several dimensions but have an odd number of directors. Specifically, we use propensity score matching to find a matched odd board firm for each even board firm. In the first stage, we estimate the probability of having even boards using a probit model with firm size, leverage ratios, board size and industry- and year-fixed effects as explanatory variables. We then select the odd board firms with the higher propensity score as the matched firm for the even board firms. In the second stage, we use the sample of even board firms and matched odd board firms to re-estimate Equation 1 using various measures of agency problems and accounting quality. The results from Stage 2 regressions are reported in Panel A in Table 7. The results show that our main results remain unchanged using this smaller sample of firms. Specifically, we find *Even* is negatively associated with *MEETING*, but positively associated with *ABSENCE*, implying even boards have fewer board meetings and more director absence from meetings. More importantly, we find *Even* is positively associated with *ORECTA*, *MAO* and *IRREGULARITY*, suggesting even boards have more

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intercorporate loans and higher likelihood of receiving modified audit opinions and committing accounting irregularities.

[Insert Table 7 about here]

Second, we add firm-fixed effects to regressions to further control for any unobservable firm characteristics. Firm-fixed effect regressions examine within-firm variations and require some changes in board size over time. We thus select a smaller sample of firms that changed their board size from an odd number to an even number, or vice versa, during our sample period. Panel B in Table 7 reports the results from firm-fixed effect regressions. We find that *Even* is positively related to *ORECTA*, *ABSENCE*, and *MAO*, and negatively related to *MEETING*, consistent with results in Tables 3, 4 and 5. The relation between *Even* and *IRREGULARITY* becomes statistically insignificant, possibly due to the smaller sample size. Overall, the evidence in Tables 7 suggests that our results are unlikely to be explained by omitted correlated variables.

4.4 Even boards and firm valuation

Prior studies argue and document that more agency problems and poor corporate governance lead to a lower valuation of the firms in the equity market (e.g., Gompers et al., 2003; Brown and Caylor, 2006). If even boards are associated with more agency problems, as we argued, we would predict a lower valuation for the equity of firms with an even number of directors. To test this prediction, we investigate whether even boards in year t-1 are related to lower firm valuation measured by the natural log of market value of equity (*MV*) and the ratio of the sum of market value of equity and book value of liabilities to total assets (Tobin's Q) in year t.[20] Following Giannetti et al. (2015) and Zhu et al. (2016), we include a number of firm characteristics in multivariate regressions as control variables. To partially address the

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[20] We thank an anonymous reviewer for suggesting this test.

endogeneity issue, we also include the firm-fixed effects to focus on the time-series variations of firm valuations related to even boards. The results from regressions are reported in Table 8.

[Insert Table 8 about here]

The results show that *Even* is negatively related to both *MV* and *Tobin's Q*, suggesting that even boards are associated with lower firm valuation. The estimates also suggest that the valuation effect of even boards is economic significant. For example, *Even* has a coefficient of -0.077 in Model 1 where the dependent variable is the natural log of market value of equity. The coefficient implies that market value of equity of firms with an even board is about 7.7% lower than firms with an odd board, *ceteris paribus*. Similarly, the coefficient of *Even* in Model 2 suggests that Tobin's Q of firms with even boards is on average 9.3% lower than firms with odd boards. The result in Table 9 thus provides further support to our argument that even boards are weak monitors and associated with more agency problems.

5. Conclusions

In this study, we conjecture that firms with an even number of directors are likely to be captured and thus have more agency problems. This conjecture is based on the intuition that to avoid voting ties in board meetings, boards should have an odd number of directors. Even boards are likely to be selected when the controlling shareholders can dominate and do not expect any dissenting opinion to arise in board meetings. So even boards serve as a signal of the board being captured by the controlling shareholders. Furthermore, even boards are likely to be inefficient in decision making and monitoring due to the conflicts resulting from voting ties.

The empirical evidence from China supports our conjecture. We find that even boards have fewer board meetings and more director absence from board meetings, implying that even boards have less incentive to work hard to monitor executives. Furthermore, even boards are positively associated with various measures of agency problems, including

intercorporate loans, loan guarantees for related parties, connected transactions, and excessive consumption of perks. We also find that firms with even boards are more likely to receive a modified audit opinion and commit accounting irregularities, suggesting controlling shareholders in even board firms aggressively manipulate accounting numbers to camouflage the agency problems. Finally, we show that firms with an even board are associated with a lower market value of equity. Our results are robust after we control for a large number of firm and board characteristics, use propensity score matched samples, and include firm-fixed effects in regressions.

Our results contribute to the literature in two ways. First, our study casts doubt on the effectiveness of boards of directors in monitoring and disciplining managers. By studying China, our evidence is particularly relevant to emerging markets where investor protection is weak and controlling shareholders dominate the appointment of both managers and directors. Despite various regulations on corporate governance, it is questionable to what extent the boards can be effective in protecting minority shareholders if minority shareholders cannot directly nominate and elect directors. Second, we add to the growing literature on the corporate governance and effectiveness of directors in emerging markets such as China. Our evidence suggests that boards may not be effective monitors when they are captured. The results imply that an even number of directors could be a simple and observable characteristic of captured boards.

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Appendix 1: Variable definitions

Variables	Definitions
Variable of interest	
Even	An indicator variable that equals one if an even number of directors are on the board, and zero otherwise.
Dependent variables	
ABSENCE	An indicator variable that equals one if some directors have been absent from board meetings in the year, and zero otherwise.
CONNECT	The ratio of the total value of related party transactions with large shareholders or their related parties divided by total assets.
EXPENSES1	The ratio of the sum of administrative and sales expenses divided by revenues.
EXPENSES2	The ratio of the administrative expenses divided by revenues.
GUARANTEE	The ratio of the amount of loan guarantee (or collaterals) for large shareholders and their related parties divided by total assets.
IRREGULARITY	An indicator variable that equals one if a firm commits a financial disclosure related irregularity in the year at least once, and zero otherwise.
MAO	An indicator variable that equals one if a firm gets a modified audit opinion other than an unqualified audit opinion, and zero otherwise.
MEETING	The natural logarithm of the number of board meetings in the year.
MV	The natural logarithm of market value of equity at the end of year t.
ORECTA	The ratio of other receivables divided by total assets.
Tobin's Q	The ratio of the sum of market value of equity and the book value of total liabilities divided by the book value of total assets at the end of year t.
Independent variables	
Analysts	The natural logarithm of the sum of one and the number of analyst following a firm in the year.
Big4	An indicator variable that equals one if a firm's external auditor belongs to a Big 4 auditor, i.e., Deloitte & Touche (DT), PricewaterhouseCoopers (PWC), Ernst & Young (EY) and KPMG, and zero otherwise.
Board_ownership	The sum of the share percentage of all board directors.
Board_size	The number of board members.
Business_segment	The number of industries in which a focal firm operates in the year t-1, set to one if the information is missing, and set to five if the number if larger than five.
CEO_duality	An indicator variable that equals one if the CEO and the chair of the board are the same person, and zero otherwise.
FCF	The ratio of net operating cash flow divided by total assets in the year t-1.
Independence	The ratio of the number of independent directors divided by the number of total board members.
Institutions	The sum of the share percentage of all institutional investors at the end of year t-1.
Leverage	The ratio of total liabilities divided by total assets at the end of year t-1.
MKT	Regional marketization index from Fan and Wang (2006) which measures the development of the intermediary agencies and legal enforcement in China.
MTB	The ratio of stock price to book value per share at the end of year t-1.
ROA	The ratio of net income divided by total assets at the end of year t-1.
Size	The natural logarithm of the total assets at the end of year t-1.
SOE	An indicator variable that equals one if a firm's ultimate controlling shareholder is the government, and zero otherwise.
ST	An indicator variable that equals one if a firm has reported accounting losses consecutively in the past two years, and zero otherwise.
Stock_volatility	The standard deviation of a focal firm's daily stock returns in the year t-1.
Tangible	The ratio of tangible assets divided by total assets at the end of year t-1.

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Top1	The share percentage of the largest shareholder at the end of year t-1.
Top2_5	The sum of the share percentage of the second to fifth largest shareholders at the end of year t-1.
Young_IPO	An indicator variable that equals one if a firm has listed on the stock market for less than three years, and zero otherwise.

Table 1 Sample distribution by industry and year

Industry name	Industry code	Year										Total by industry
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Agribusiness	A	15	19	16	16	16	19	21	32	36	34	224
Mining	B	42	43	39	31	33	37	40	48	54	52	419
Food and drink	C0	51	53	50	47	48	54	57	71	85	88	604
Textile, clothing and fur	C1	21	25	27	27	32	33	36	47	56	59	363
Wood and furniture	C2	5	5	6	5	6	8	8	10	13	14	80
Papermaking and printing	C3	15	17	16	18	20	23	27	30	34	38	238
Petroleum, chemical and plastic	C4	105	112	111	108	107	131	132	174	215	217	1,412
Electronics	C5	40	44	45	39	52	59	65	96	115	124	679
Metal and nonmetallic industry	C6	88	94	90	87	97	104	109	133	160	164	1,126
Machinery, equipment and instrument	C7	140	154	145	144	164	186	201	312	406	431	2,283
Medicine and biological products	C8	62	72	68	68	74	76	82	106	125	128	861
Other manufacturing industries	C9	4	3	3	4	7	8	7	8	11	12	67
Public utilities	D	62	68	65	61	57	58	62	71	77	77	658
Construction	E	27	26	25	26	26	33	34	40	55	56	348
Transportation	F	43	43	41	43	44	45	45	55	57	55	471
Information technology	G	58	61	58	56	62	72	90	132	175	186	950
Wholesale, retail and trade	H	94	98	97	94	93	96	96	115	128	126	1,037
Real estate	J	96	97	91	74	77	93	96	105	111	105	945
Social service	K	38	42	37	36	47	52	57	67	78	74	528
Communication and culture	L	21	20	18	16	18	21	20	29	36	36	235
Conglomerate	M	26	25	25	18	21	23	22	21	21	22	224
Total by year		1,053	1,121	1,073	1,018	1,101	1,231	1,307	1,702	2,048	2,098	13,752

Table 2 Descriptive statistics and univariate tests

This table reports descriptive statistics for a sample of Chinese listed firms from 2004 to 2013. Firms are divided into subsamples based on whether they have an even number of directors. The last two columns compare the mean and median of the two subsamples. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-tailed), respectively.

Variables	Even = 1 (N = 2,433)			Even = 0 (N = 11,319)			Diff in Mean	Diff in Median
	Mean	Median	S.D.	Mean	Median	S.D.		
ORECTA	0.038	0.013	0.071	0.029	0.011	0.056	0.009***	0.002***
GUARANTEE	0.043	0.001	0.115	0.039	0.001	0.103	0.004**	0.000
CONNECT	0.050	0.001	0.125	0.045	0.001	0.116	0.005*	0.000
EXPENSES1	0.179	0.128	0.185	0.167	0.122	0.166	0.012***	0.006***
EXPENSES2	0.116	0.079	0.148	0.104	0.074	0.128	0.012***	0.005***
ABSENCE	0.122	0.000	0.328	0.088	0.000	0.283	0.034***	0.000***
MEETING	2.215	2.197	0.325	2.239	2.197	0.327	-0.024***	0.000***
MAO	0.070	0.000	0.255	0.052	0.000	0.222	0.018***	0.000***
IRREGULARITY	0.134	0.000	0.341	0.119	0.000	0.324	0.015**	0.000**
Size	21.45	21.320	1.109	21.440	21.330	1.060	0.010	-0.010
Leverage	0.467	0.478	0.225	0.467	0.476	0.221	0.000	0.002
Tangible	0.268	0.225	0.186	0.263	0.235	0.177	0.005	-0.010
ROA	0.049	0.047	0.065	0.052	0.051	0.059	-0.003**	-0.004***
MTB	2.325	1.777	1.633	2.295	1.811	1.493	0.030	-0.034
Top1	0.363	0.336	0.158	0.367	0.348	0.154	-0.004	-0.012*
Top2_5	0.155	0.128	0.115	0.158	0.137	0.113	-0.003	-0.009
Board_size	8.936	8.000	2.224	9.125	9.000	1.749	-0.189***	-1.000***
Independence	0.372	0.375	0.058	0.360	0.333	0.048	0.012***	0.042***
CEO_duality	0.178	0.000	0.383	0.177	0.000	0.381	0.001	0.000
Board_ownership	0.059	0.000	0.147	0.068	0.000	0.158	-0.009	0.000
SOE	0.532	1.000	0.499	0.495	0.000	0.500	0.037***	1.000***
Institutions	0.062	0.024	0.103	0.062	0.028	0.096	0.000	-0.004**
Analysts	1.184	1.099	1.162	1.239	1.099	1.146	-0.055***	0.000***
Big4	0.042	0.000	0.201	0.034	0.000	0.182	0.008*	0.000*
MKT	7.596	7.660	1.889	7.568	7.650	1.918	0.028	0.010
ST	0.081	0.000	0.273	0.073	0.000	0.260	0.008	0.000

Table 3 Meeting activities of even boards

This table reports results from regressions examining board activities using a sample of 13,752 firm-year observations in China. All the variables are defined in Appendix 1. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-tailed), respectively.

Variables	MEETING	ABSENCE
	Model 1	Model 2
Even	-0.017***	0.276***
	[-2.605]	[3.677]
Size	0.039***	0.080*
	[10.137]	[1.694]
Leverage	0.140***	0.292*
	[9.438]	[1.655]
Tangible	-0.239***	-0.564***
	[-13.667]	[-2.688]
ROA	-0.091*	-2.390***
	[-1.758]	[-4.278]
MTB	-0.001	0.061**
	[-0.433]	[2.154]
Top1	-0.056***	-0.975***
	[-2.800]	[-4.000]
Top2_5	-0.005	0.041
	[-0.202]	[0.127]
Board_size	-0.007***	0.087***
	[-4.156]	[5.263]
Independence	0.079	0.074
	[1.434]	[0.106]
CEO_duality	0.001	0.030
	[0.223]	[0.324]
Board_ownership	0.082***	-0.690*
	[4.269]	[-1.771]
SOE	-0.046***	0.106
	[-7.430]	[1.460]
Institutions	0.067**	-0.144
	[2.521]	[-0.465]
Analysts	0.012***	-0.058
	[4.038]	[-1.395]
Big4	-0.005	-0.064
	[-0.375]	[-0.404]
MKT	-0.001	0.005
	[-0.556]	[0.275]
ST	0.018	0.383***
	[1.497]	[3.168]
Constant	1.380***	-5.987***
	[15.653]	[-5.622]
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
No. of observations	13,752	13,752
F/Chi^2 value	48.120	1004.250
Adjusted/Pseudo R^2	0.143	0.125

Table 4 Agency costs in firms with even boards

This table reports results from regressions examining agency problems using a sample of 13,752 firm-year observations in China. All the variables are defined in Appendix 1. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-tailed), respectively.

Variables	ORECTA	GUARANTEE	CONNECT	EXPENSES1	EXPENSES2
	Model 1	Model 2	Model 3	Model 4	Model 5
Even	0.004***	0.005**	0.005*	0.008**	0.006*
	[3.435]	[1.982]	[1.727]	[2.341]	[1.944]
Size	-0.002***	0.003**	0.002	-0.013***	-0.010***
	[-2.822]	[2.090]	[1.386]	[-6.831]	[-6.453]
Leverage	0.043***	-0.001	0.008	-0.052***	-0.024***
	[12.693]	[-0.231]	[1.282]	[-4.918]	[-2.788]
Tangible	-0.051***	0.005	0.011	-0.043***	-0.020**
	[-15.138]	[0.893]	[1.493]	[-4.149]	[-2.341]
ROA	-0.166***	-0.049**	-0.087***	-0.524***	-0.456***
	[-11.011]	[-1.996]	[-3.072]	[-11.196]	[-11.361]
MTB	0.002***	0.004***	0.005***	0.018***	0.015***
	[4.072]	[4.395]	[4.105]	[9.534]	[9.633]
Top1	-0.027***	0.069***	0.071***	-0.110***	-0.086***
	[-8.876]	[9.617]	[8.871]	[-11.843]	[-11.572]
Top2_5	0.010**	-0.035***	-0.036***	0.002	-0.015
	[2.080]	[-3.899]	[-3.544]	[0.132]	[-1.228]
Board_size	-0.001***	0.002***	0.002***	-0.002***	-0.002***
	[-5.259]	[3.722]	[3.374]	[-3.031]	[-2.953]
Independence	-0.024**	-0.030	-0.033	-0.022	-0.009
	[-2.543]	[-1.514]	[-1.457]	[-0.765]	[-0.371]
CEO_duality	-0.001	-0.008***	-0.007***	0.007*	0.002
	[-0.508]	[-3.837]	[-3.059]	[1.959]	[0.886]
Board_ownership	-0.003	-0.044***	-0.052***	-0.004	-0.018***
	[-1.072]	[-9.063]	[-9.471]	[-0.367]	[-2.639]
SOE	-0.008***	0.013***	0.011***	-0.024***	-0.017***
	[-7.020]	[6.059]	[4.671]	[-7.418]	[-6.446]
Institutions	-0.013***	0.065***	0.069***	0.012	-0.004
	[-3.353]	[4.860]	[4.854]	[1.065]	[-0.516]
Analysts	-0.000	-0.003***	-0.004***	0.003**	-0.001
	[-0.223]	[-3.289]	[-3.477]	[2.034]	[-1.022]
Big4	-0.000	-0.000	-0.002	0.031***	0.012***
	[-0.048]	[-0.019]	[-0.425]	[4.672]	[2.604]
MKT	-0.002***	-0.002***	-0.002***	-0.005***	-0.002***
	[-5.960]	[-3.752]	[-2.804]	[-6.346]	[-3.758]
ST	0.027***	0.018***	0.019***	0.077***	0.069***
	[8.323]	[3.712]	[3.376]	[8.110]	[8.531]
Constant	0.126***	-0.052*	-0.038	0.682***	0.487***
	[8.535]	[-1.721]	[-1.127]	[13.612]	[11.604]
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
No. of observations	13,752	13,752	13,752	13,752	13,752
F value	44.585	25.832***	26.275***	74.800***	46.573***
Adjusted R^2	0.304	0.075	0.067	0.265	0.233

Table 5 Financial reporting quality of firms with even boards

This table reports results from regressions examining financial reporting quality using a sample of 13,752 firm-year observations in China. All the variables are defined in Appendix 1. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-tailed), respectively.

Variables	*MAO*	*IRREGULARITY*
	Model 1	Model 2
Even	0.263**	0.205***
	[2.463]	[2.947]
Size	0.211***	-0.022
	[3.018]	[-0.537]
Leverage	2.258***	1.006***
	[9.258]	[6.445]
Tangible	-0.213	-0.205
	[-0.747]	[-1.118]
ROA	-6.408***	-2.361***
	[-9.982]	[-4.833]
MTB	0.225***	-0.039
	[5.973]	[-1.517]
Top1	-1.817***	-0.982***
	[-5.153]	[-4.697]
Top2_5	-0.609	0.162
	[-1.320]	[0.572]
Board_size	-0.026	0.027
	[-0.951]	[1.525]
Independence	-1.277	-0.479
	[-1.200]	[-0.787]
CEO_duality	-0.104	0.270***
	[-0.760]	[3.872]
Board_ownership	0.034	0.594***
	[0.059]	[2.841]
SOE	-0.491***	-0.382***
	[-4.922]	[-5.872]
Institutions	-1.751***	-0.881**
	[-2.653]	[-2.269]
Analysts	-0.718***	-0.172***
	[-9.147]	[-5.361]
Big4	-0.060	-0.048
	[-0.224]	[-0.282]
MKT	-0.043*	-0.073***
	[-1.722]	[-5.034]
ST	1.052***	0.098
	[7.879]	[0.857]
Constant	-7.594***	-1.554
	[-4.866]	[-1.621]
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
No. of observations	13,752	13,752
Chi^2 value	1211.859	648.605
Pseudo R^2	0.318	0.060

Table 6 Effect of firm characteristics

This table reports results from regressions examining the effect of firm characteristics on the association between even boards and agency problems. All the variables are defined in Appendix 1. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-tailed), respectively.

Variables	ORECTA			
	Model 1	Model 2	Model 3	Model 4
Even	0.081***	0.009***	0.024***	0.005***
	[2.832]	[3.999]	[4.217]	[3.610]
Even*Size	-0.004***			
	[-2.751]			
Even*Analysts		-0.004***		
		[-4.088]		
Even*Board_size			-0.002***	
			[-3.797]	
Even*Board_ownership				-0.014**
				[-2.466]
Size	-0.001*	-0.002***	-0.002***	-0.002***
	[-1.779]	[-2.725]	[-2.869]	[-2.841]
Leverage	0.043***	0.043***	0.043***	0.043***
	[12.700]	[12.674]	[12.727]	[12.700]
Tangible	-0.051***	-0.051***	-0.051***	-0.051***
	[-15.091]	[-15.095]	[-15.210]	[-15.141]
ROA	-0.165***	-0.165***	-0.165***	-0.166***
	[-10.998]	[-11.001]	[-10.985]	[-11.013]
MTB	0.002***	0.002***	0.002***	0.002***
	[4.098]	[4.190]	[4.033]	[4.084]
Top1	-0.027***	-0.028***	-0.027***	-0.028***
	[-8.821]	[-8.905]	[-8.667]	[-8.909]
Top2_5	0.010**	0.010**	0.010**	0.010**
	[2.043]	[2.015]	[2.125]	[2.088]
Board_size	-0.001***	-0.001***	-0.001***	-0.001***
	[-5.127]	[-5.234]	[-2.801]	[-5.275]
Independence	-0.024**	-0.023**	-0.023**	-0.024**
	[-2.481]	[-2.377]	[-2.454]	[-2.513]
CEO_duality	-0.000	-0.000	-0.000	-0.001
	[-0.476]	[-0.464]	[-0.440]	[-0.478]
Board_ownership	-0.003	-0.003	-0.003	-0.001
	[-1.082]	[-1.079]	[-1.026]	[-0.244]
SOE	-0.008***	-0.008***	-0.008***	-0.008***
	[-7.039]	[-6.978]	[-7.107]	[-7.010]
Institutions	-0.013***	-0.013***	-0.013***	-0.013***
	[-3.414]	[-3.393]	[-3.386]	[-3.327]
Analysts	-0.000	0.001	-0.000	-0.000
	[-0.228]	[1.286]	[-0.353]	[-0.203]
Big4	0.000	0.000	-0.000	-0.000
	[0.086]	[0.037]	[-0.074]	[-0.048]
MKT	-0.002***	-0.002***	-0.002***	-0.002***
	[-6.074]	[-6.034]	[-6.074]	[-5.977]
ST	0.027***	0.027***	0.026***	0.027***
	[8.305]	[8.276]	[8.244]	[8.312]
Constant	0.112***	0.123***	0.121***	0.126***
	[7.326]	[8.375]	[8.219]	[8.544]
Industry fixed effects	Yes	Yes	Yes	Yes

Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	13,752	13,752	13,752	13,752
F value	43.660	43.722	43.774	43.807
Adjusted R^2	0.304	0.305	0.304	0.304

Table 7 Addressing endogeneity issues

This table reports results from robustness tests addressing endogeneity issues. Panel A reports regression results from propensity score matched samples. For each even board firm, we match it with an odd board firm based on firm size, leverage ratio, board size, industry and year. The matched samples are used to re-estimate Equation 1. Panel B reports results from regression with firm-fixed effects using a smaller sample of firms that changed their board size from an odd number to an even number, or vice versa, during our sample period, to re-estimate Equation 1. All the variables are defined in Appendix 1. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-tailed), respectively.

Panel A: Regressions using propensity score matched samples

Variables	*ORECTA*	*ABSENCE*	*MEETING*	*MAO*	*IRREGULARITY*
	Model 1	Model 2	Model 3	Model 4	Model 5
Even	0.004**	0.182*	-0.012	0.259*	0.175*
	[2.408]	[1.757]	[-1.365]	[1.724]	[1.920]
Control variables	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
No. of observations	4,482	4,482	4,482	4,473	4,482
F/Chi^2 value	18.979	402.543	17.411	452.112	269.665
Adjusted/Pseudo R^2	0.347	0.144	0.141	0.330	0.074

Panel B: Regressions with firm-fixed effects

Variables	*ORECTA*	*ABSENCE*	*MEETING*	*MAO*	*IRREGULARITY*
	Model 1	Model 2	Model 3	Model 4	Model 5
Even	0.004**	0.468***	-0.018**	0.303*	-0.013
	[2.519]	[4.189]	[-2.571]	[1.773]	[-0.123]
Control variables	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
No. of observations	9,352	4,281	9,352	1,975	3,837
F/Chi^2 value	29.236	802.621	20.964	488.373	667.062
Adjusted/Pseudo R^2	0.448	0.193	0.407	0.289	0.165

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Table 8 Firm value of firms with even boards

This table reports results from regressions examining firm value using a sample of 13,744 firm-year observations in China. All the variables are defined in Appendix 1. ***, **, and * denote significance at the 1%, 5%, and 10% level (two-tailed), respectively.

Variables	MV	Tobin's Q
	Model 1	Model 2
Even	-0.077***	-0.093***
	[-4.951]	[-3.052]
Size	0.559***	-0.617***
	[52.570]	[-29.667]
Leverage	-0.165***	1.180***
	[-3.257]	[11.912]
ROA	1.656***	1.426***
	[14.800]	[6.512]
Top1	-0.773***	-2.531***
	[-9.894]	[-16.543]
Top2_5	-0.806***	-2.805***
	[-8.727]	[-15.530]
Board_size	-0.013**	-0.008
	[-2.304]	[-0.713]
Independence	1.243***	1.600***
	[7.966]	[5.239]
CEO_duality	0.065***	0.116***
	[2.989]	[2.739]
Board_ownership	0.547***	1.540***
	[3.131]	[4.501]
SOE	-0.204***	-0.292***
	[-9.040]	[-6.623]
Business_segement	-0.018***	-0.016
	[-2.955]	[-1.382]
FCF	0.217***	0.200**
	[4.341]	[2.048]
Stock_volatility	3.715***	6.495***
	[15.230]	[13.606]
Young_IPO	-0.326***	-0.360***
	[-15.147]	[-8.550]
Constant	9.928***	15.616***
	[42.411]	[34.085]
Firm fixed effects	Yes	Yes
No. of observations	13,744	13,744
F value	360.486	111.791
R^2	0.321	0.128

Figure 1 Distribution of board size

This figure shows the histogram of the number of directors on corporate boards in a sample of 13,752 firm-year observations in China from 2004 to 2013.