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By *Philip Molyneux, Linh H. Nguyen, Xiaoxiang Zhang*

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Executive compensation, board independence and bank efficiency in China: the effects of the financial crisis

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Abstract

This paper investigates how executive compensation affects bank efficiency in China. Using commercial bank data from 2004 and 2011, this study captures the period of major change in terms of bank compensation in the country and the effects of the financial crisis. It is found that higher compensation to executives reduces bank efficiency and this negative impact becomes more severe during the financial crisis. In contrast, a higher number of unpaid non-executive directors in the boardroom improves bank efficiency. However, this positive influence becomes weaker when banks face financial crisis. By further focusing on the board composition in the listed banks using propensity score matching, we find a difference between the treatment effects of non-executive directors of listed and those of non-listed banks. This result reveals that non-listed banks would have benefited from listing by having monitoring and advisory services of non-executive directors. Such a benefit, nevertheless, might have been converted into private benefits of control once non-listed banks had become listed.

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Keywords: Executive compensation, board independence, financial crisis, bank efficiency, China

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1. Introduction

In banking, many studies have explored how executive compensation and board independence impact on performance (Adam and Mehran, 2012; Andres and Vallelado, 2008; Erkens et al., 2012; Fahlenbrach and Stulz, 2011; Pathan and Faff, 2013). However, most of them focus on developed countries, particularly the US, while studies in developing countries are limited (Mehran, 2004).

There are two theories which suggest conflicting relationships between compensation and bank efficiency. The alignment theory claims that higher compensation should improve efficiency because bank managers are motivated by higher pay associated with better bank performance (Jensen and Murphy, 1990). During financial crisis, compensation increases in order to reward bank managers for coping with a more volatile environment. The entrenchment theory, in contrast, suggests that higher compensation leads to lower efficiency because bank managers abuse their power to design compensation packages that maximise their own benefits at the expense of banking firms (Crystal, 1991). This expropriatory behaviour becomes more prevalent during financial crisis as managers face more uncertainties. Empirical research, however, shows mixed evidence. For example, Mehran and Rosenberg (2007) suggest that incentive compensation decreases bank leverage, while Fehlenbrach and Stulz (2011) find that the performance of banks with CEOs whose incentives are more aligned with the interests of shareholders is worse. In addition, most previous studies appear to focus on equity-connected CEO compensation but few have addressed non-equity-connected pay (Hagendorff, 2014).

Moving on to the independence of the board, one stream views external directorship as an incentive for banking experts to promote their prestige. Therefore, independent directors will try to provide good monitoring and advisory services in the boardroom for shareholders in order to protect their reputational capitals (Fama and Jensen, 1983; Mace, 1986). Consequently, more independent directors will increase the efficiency of banks. Conversely, another stream argues that external directors may lack familiarity, first-hand information and experience to offer monitoring and advisory services, particularly in the changing complex banking environment (Adams and Ferreira, 2007; Mehran et al., 2011). More independent directors, therefore, may be associated with lower efficiency. Research evidence, prior to the 2007 financial crisis, supports the positive role of independent directors (Brickley and James, 1987; Brewer et al., 2000; Jenter and Llewellyn, 2010), whereas post-2007 crisis studies appear to go against these beliefs, revealing that banks with more independent directors perform worse (Adams, 2009; Aebi et al., 2012; Beltratti and Stulz, 2012).

Nevertheless, most of these results are found in developed countries and any inferences regarding developing countries from the aforementioned (still ambiguous) results could be

misleading because of contextual differences in political, economic and institutional conditions (van Essen et al., 2012). In this paper, we investigate executive compensation, board independence and bank efficiency in China. The country is interesting because Chinese banks are different with regard to corporate governance and ownership structure. First, after the banking reform, even though the structure of listed banks in China is very similar to those in developed markets, it carries a unique feature: the dominance of the government in owning and controlling listed banks in China (Lin and Zhang, 2009). Government ownership of banks is a special case that deserves isolated discussions relating to governance and performance since in most cases profit-making could not be the key objective associated with government investment (Hagendorff, 2014).

Board compensation, as a result, reflects a reward system which includes many state-oriented performance indicators rather than those aligned with the efficiency maximization preference of private investors (Kato and Long, 2005). In other words, compensation is designed to align bank managers with social objectives rather than shareholders' interests. Third, external directors who do not receive financially incentivised compensation are, to a large degree, independent financially. However, they might be socially and politically dependent because of their connections with CEOs prior to becoming external directors.

Our results show that the compensation paid to the executive directors in listed banks has a negative impact on the bank efficiency, especially during the period of financial crisis. In contrast, non-executive directors who do not receive financially incentivised compensation can improve bank efficiency in the normal business period, but with a weakening positive role during periods of financial crisis. In addition, the treatment effects of non-executive directors receiving no financial compensation in listed and non-listed banks differ. This reveals that non-listed banks might have benefited from listing by having non-executive directors' monitoring and advisory services, but such benefits could have been converted into private benefits of control once non-listed banks had become listed.

The results are robust to alternative econometric techniques, including robust tests using Tobit panel regressions (Delis and Papanikolaos, 2009; Simar and Wilson, 2007) and propensity score technique (Caliendo and Kopeinig, 2008) that matches a sample of publicly listed with non-listed banks. In order to establish the casual relationship in a more reliable way, we further follow Chaney et al. (2004) and Xie et al. (2011) to separate the treatment effects of the Treated (TT) in the listed banks and treatment effects of the Untreated (TUT) in the non-listed banks. Such an approach reveals different treatment effects for listed and non-listed banks. After these robust tests, similar results are obtained.

The paper is structured as follows. Section 2 reviews the literature and develops hypotheses. Section 3 introduces the methodology used. Section 4 describes the sample and data sources. Section 5 reports the empirical results. Section 6 presents robustness tests through random-effects panel Tobit regressions and then, propensity score matching. Finally, section 7 contains the conclusions.

2. The related literature

2.1. Background on Chinese compensation reform

In 1992, the State Council gave its approval for the first firm, Shanghai Hero Pen Company, to try out the pilot yearly salary system for its top executives and this was followed by the national pilot program implemented in 100 large state-owned companies throughout the country. After the pilot experiment, the yearly salary system has become the most important form of executive compensation reform in China since 1997. The compensation for top executives in the yearly salary system consists of two parts: a fixed component (known as the base salary) that depends on both the average wage for ordinary employees and the size of the enterprise; and a variable component (known as the risk or performance-based salary) that is linked to both the base salary and the performance of the firm in the year (Kato and Long, 2005). Consequently, the yearly salary system in China corresponds to a typical cash compensation package in western firms. The introduction of this compensation scheme by policymakers in China is another important step forward to improve efficiency, which is a main concern in the reform.

The listed firms are among the first to adopt such a yearly salary system for top managers. In terms of performance indicators, many state-owned companies evaluate performance using non-financial indicators such as the growth rate of state-owned assets, public utilities, and occupational health and safety. This reduces the weighting assigned to financial measurements. In the banking sector, in 2012, the average salary for executive directors was much higher than that of other sectors (Phoenix Finance, 2012).

Effective from 2006, the new rule allows publicly traded firms that have successfully completed ownership structural reforms to offer stock options or restricted stocks to their senior management and board directors, excluding independent board members (CSRC, 2005). However, such equity-based incentive compensation in the banking sector was stopped by the Ministry of Finance in 2008 and very few Chinese banks have adopted such a scheme (Chinese Ministry of Finance, 2008). Therefore, executive compensation in the banking sector in China has been dominated by cash payment.

2.2. Executive directors' compensation and bank efficiency

As mentioned, the alignment perspective suggests that the executive compensation package is designed to clearly align executives' actions with firms' business strategies and objectives. This is done in order to motivate executives to maximize firm performance and shareholders' wealth (Jensen and Murphy, 1990; Murphy, 1999). Therefore, higher compensation to executive directors will improve the efficiency of banks. The increasing demand for responsibilities after bank deregulation (Becher et al. 2005), increasing executive mobility and risk of turnover (Hermalin, 2005), as well as the increasing value of executives' services to companies (Edmans et al., 2009) all explain higher compensations in order to align executive directors' interests with those of shareholders. This also reflects the product of arm's-length transaction between executives selling managerial services and the boardroom to secure the best deal for their shareholders.

The entrenchment perspective, in contrast, suggests that higher compensation to executive directors is normally associated with lower efficiency because executive directors abuse their power to design compensation packages for their own benefits, which is not economically optimal for firms. However, the boardroom fails to prevent such compensation arrangements to protect shareholders' interests (Bedchuk et al., 2009; Crystal, 1991). Crystal (1991) argues that boards of directors are ineffective in setting appropriate levels of compensation because outside directors are essentially hired and can be removed by CEOs. Consequently, outside directors as board members may be unwilling to take positions adversarial to CEOs, especially CEOs' compensation. Bebchuk and Fried (2004) claim that there have been flaws in compensation arrangements and these have become persistent and systemic.

The empirical evidence is still ambiguous. For example, Fehlenbrach and Stulz (2011) find that CEOs' incentive-oriented compensation leads to worse performance measured both by market- and accounting-based indicators. In contrast, Mehran and Rosenberg (2007) find that incentive compensation for banks' CEOs decreases bank leverage (but increases the bank asset volatility). Thus, it is not clear whether the higher aggregative compensation for executive directors reflects the alignment or entrenchment effects on bank efficiency. In emerging economies with different agency conflicts from those that already exist in the western world because of less dispersed ownership structure, executive entrenchment is more likely to be the case due to the dominating agency conflicts between controllers and minority shareholders (Zhang et al., 2013). Also, as previously discussed, the compensation scheme in many Chinese listed banks under state control actually reflects the reward system aligning managers' interests with socially desired objectives of the government, at the cost of the efficiency maximization preference of private investors (Kato and Long, 2005). If the entrenchment effects are dominating, it is suggested that:

Hypothesis 1: Executive directors' compensation is negatively related to bank efficiency

2.3. Executive directors' compensation in financial crisis periods and bank efficiency

Since the onset of the financial crisis in 2007, more research has been done to examine the link between corporate governance and performance in the banking and financial services sectors. The alignment perspective explains the higher compensation paid to executives during the period of financial crisis as the optimal compensation for rewarding the management of shareholders' wealth in a highly uncertain environment. On the other hand, the entrenchment view explains the higher compensation to executive directors as excessive expropriatory behaviour of executive directors who face less favourable economic prospects.

For example, Chesney et al. (2012) find that financial institutions whose CEOs have strong risk-taking incentives have the highest write-downs both in absolute and relative terms to total assets. Fahlenbrach and Stulz (2011) also find that banks having CEOs with high incentive-based packages perform worse during the financial crisis. In China, top bankers are normally party members who were recruited when they were young for their merits and ethical behaviour. Through their careers, they are normally motivated by higher social status gained through promotion. In many cases, there is no pay for performance although thorough evaluation systems allow career paths to reward the most effective individuals. Consequently, the compensation paid to executive directors in Chinese banks reflects the preference of the government. During the current financial crisis, the state-oriented performance indicators are more likely to be diverted into public utilities and other non-financial measures, including maintaining social stability and maximizing employment, to the cost of the efficiency maximization preference of private investors (Kato and Long, 2005). If the entrenchment incentives associated with government are dominant during the financial crisis, it is expected that:

Hypothesis 2: The higher compensation for executive directors in the listed banks during the period of financial crisis leads to lower bank efficiency than in the non-listed banks.

2.4. Non-executive directors and bank efficiency

The literature which focuses on non-executive or outside directors argues that executive or inside directors do not monitor management effectively because of their dependence (Fama and Jensen,1983). Even though many studies on board independence focus on these non-executive directors, limited research has investigated their incentives in providing monitoring and advisory services to shareholders, particularly in emerging markets.

Unlike CEOs and other executive directors, non-executive directors are not official employees in the companies. Therefore, compensation to non-executive directors is not typically based on some unique characteristics that a particular director brings to the board, but on serving different committees, such as serving as chair of a committee, a lead director and a meeting attendant. As a result, compensation is not a type of financial incentive but reflects some fixed levels such as an annual retainer, meeting fees, and committee fees (very few with equity rewards or option grants). Consequently, there are concerns as to whether non-executive directors have sufficient incentives to fulfil their monitoring and advisory duties for many listed banks (Hahn and Lasfer, 2011).

Fama (1980) and Fama and Jensen (1983) argue that the market for outside directorships serves as an important source of incentives for external directors to develop their reputations as monitoring and advising specialists. Mace (1986) suggests that outside directorships are perceived to be valuable because they provide executives with prestige, visibility, and commercial contacts. The reputation argument suggests reputational effects can be important incentives for non-executive directors to be independent of management and to provide their monitoring and advisory services in the boardroom for shareholders. Therefore, without receiving financially-incentivised compensation, non-executive directors can also perform well in order to protect their reputation capitals. Based on this reputation theory, there have been several relevant studies exploring how board independence impacts on bank performance (Adam and Mehran, 2012; Aebi et al., 2012; Andres and Vallelado, 2008; Liang et al., 2013).

One of the earliest studies of this type was conducted by Brickley and James (1987) who find that for banks operating in US states that do not allow acquisitions, greater participation of outsiders on the boards reduces managerial consumption of perquisites. This result suggests that outside directors can act as influential controlling devices where there is a lack of market forces, for instance, threats from acquisitions. This implies that non-executive directors are associated with higher bank efficiency. In addition, Brewer et al. (2000) examine the role of independent boards during takeover activities in the 1990s. Using 189 merger deals in the US, the authors find that independent boards help to accumulate wealth for shareholders of target banks during takeovers. Also focusing on the US, Byrd et al. (2001) investigate the impact of board structure on the performance of 86 failed and non-failed publicly traded thrifts during the period from 1983 to 1990. Byrd et al. (2001) find that failed thrifts have more affiliated but fewer independent directors than those which survive, which supports the view that independent boards protect shareholders' wealth. Jenter and Llewellyn (2010) present additional evidence consistent with this conclusion. They find that the turnover-performance sensitivity increases significantly with board quality (boards with more independent directors and more director stock ownership). In

China, Liang et al. (2013) also support this strand of literature in developed countries with the evidence that an independent board positively impacts on bank performance and quality of assets.

However, there are a growing number of studies which reveal the weak role of board independence (Jensen, 1993). This could raise further concerns about the fact that compensation to non-executive directors is insufficient to incentivise their monitoring and advisory services (Perry, 2000). Perry (2000) suggests that the ineffectiveness of non-executive directors in monitoring and advising may simply be due to the lack of incentives. In addition, agency conflicts and information asymmetries between executive directors and shareholders make this problem more severe. Thus the market often reacts positively to the adoption of equity-based incentive plans for non-executive directors (Fich and Shivdasani, 2006; Gerety et al., 2001). Adams and Mehran (2012) examine the relationship between bank board structure and performance in 35 publicly traded bank holding companies in the US from 1965 to 1999 and find that board independence is not related to performance. Based on the above analysis, if the reputational effects are the dominating factors which can provide sufficient incentives for non-executive directors, it is expected that:

Hypothesis 3: The number of non-executive directors not receiving financially-incentivised compensation positively affects bank efficiency.

2.5. Non-executive directors without financially-incentivised compensation in financial crisis and bank efficiency

Post-2007 crisis studies generally find that banks with more independent boards perform worse during the crisis. The aforementioned evidence, which is fairly consistent across different bank samples (Adams, 2009; Aebi et al., 2012 for the US and Beltratti and Stulz, 2012 for other developed countries) and performance indicators (Wang et al., 2012 used accounting-based indicators while Erkens et al., 2012; Minton et al., 2011 used market-based measurements), may challenge those who argue that poor bank governance is a major cause of the crisis, as documented by Adams (2009)[1], and may also require policymakers to take into account other interactions with corporate governance when motivating banks to have more independent boards (Andres and Vallelado, 2008; Mehran and Mullineaux, 2012).

The difference between executive and non-executive directors lies in their familiarity with a company's daily management, first-hand information and related experience in running that company. Such a difference has raised concerns that lack of expertise, knowledge and

[1] In non-financial firms, Gupta et al. (2013) also show that well-governed companies do not outperform poorly-governed firms during the financial crisis in the US and 22 developed nations.

information will force non-executive directors to reach a compromise with CEOs when conducting their duties (Adams and Ferreira, 2007; Kirkpatrick, 2009). In particular, when such a demand for monitoring and advisory capabilities becomes stronger in the complex banking sector during the financial crisis (Aebi et al., 2012; Cornett et al., 2010; Mehran et al., 2011). For example, Andres and Vallelado (2008) used a sample of 69 large commercial banks from six developed countries from 1995 to 2005 to analyze the role of the board directors on bank performance. They find that board independence also has an inverted U-shaped relationship with bank performance. This suggests that when there are too many non-executives directors in the boardroom, the costs can actually outweigh the benefits, which, in turn, damages bank performance.

The negative effects of non-executive directors on bank performance during financial crisis are largely due to their poor understanding of risk management. In an attempt to maximize shareholders' wealth, boards with more non-executive directors forced management to take more risks before the crisis, which would ultimately destroy returns after the onset of the financial crisis (Aebi et al., 2012; Erkens et al. 2012). Even banks with a higher proportion of independent financial experts perform worse and have lower bank values during the crisis (Minton et al. 2011). In addition, Minton et al. (2011) find that banks with a higher number of independent financial experts take on more risk and such relationships are particularly stronger for large banks. This reveals that even experienced non-executive directors might struggle to cope with the extremely challenging and far more complex environment in which large banking institutions are operating[2]. Pathan and Faff (2013) find that wider gender diversity can enhance the benefits of the board with more non-executive directors. Such positive effects become weaker in the post-Sarbanes-Oxley Act and crisis periods.

Given the concerns that non-executive directors without performance-based financial compensation do not have sufficient incentives and expertise to fulfil their monitoring and advisory duties for many listed banks (Hahn and Lasfer, 2011), particularly when banks face challenging environments during the financial crisis period, it is expected:

Hypothesis 4: the positive effects associated with non-executive directors without financially-incentivised compensations on bank efficiency are weaker in this financial crisis.

3. Methodology

3.1. First-stage DEA efficiency

[2] A study focusing on non-financial companies by Francis et al. (2012) finds that when outside directors are less connected with current CEOs, companies perform better during the crisis.

Previous research focuses on corporate governance effects on performance measured by either accounting indicators or stock market returns but relatively few studies use the frontier approach. The use of the frontier approach may be more appropriate than accounting profitability ratios and stock market performance in order to evaluate the effectiveness of privatization because it captures several multi-dimensions of bank activities through the inclusion of different inputs and outputs in the estimation. In China, the officially stated reason for Chinese regulators to encourage banks to become publicly listed is for efficiency improvements (Brean, 2007; Yao et al, 2007). Because of this, DEA analysis is employed to measure the efficiency of Chinese banks. One of the biggest advantages of DEA compared to SFA is that the former can effectively deal with small sample size (Fethi and Pasiouras, 2010). DEA has been widely applied in several empirical banking studies such as Casu and Molyneux (2003), Chortareas et al. (2013) and Luo et al. (2011).

The efficiency of the decision-making unit (DMU)/bank is estimated by the ratio of the sum of weighted outputs to the sum of weighted inputs. In the first stage, the model suggested by Banker et al. (1984) is employed to estimate the efficiency of all commercial banks in China on a yearly frontier.

The efficiency estimation requires the solution to Equation (1):

$$\min_{\lambda} z_0 = \theta_0 \qquad (1)$$

$$\text{s.t} \quad \sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{rj_0}, r = 1,2,...,s$$

$$\theta_0 x_{ij_0} \geq \sum_{j=1}^{n} \lambda_j x_{ij}, i = 1,2,...,m$$

$$\lambda_j \geq 0$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

where x_{ij0} is the input i_{th} and y_{rj0} is the output r_{th} of the bank j_{th} respectively. The first and second constraints are in place to ensure that the data are enveloped both from above and below. The third restricts all inputs and outputs to be non-negative and the last one allows variable return-to-scale.

Results generated from Equation (1) are referred to as technical efficiency. This reflects the capacity of banks to produce the same level of outputs as other banks but with a lower level of inputs or to use the same quantity of inputs but generating more outputs. The intermediation approach for bank production is adopted and fixed assets, deposits and personnel costs are

selected as the three outputs while net loans and other earning assets are the two outputs. All of these inputs and outputs are scaled by total bank assets.

3.2. Second-stage estimations

In the second stage, these technical efficiency scores are used as dependent variables. This two-stage methodology has been widely employed in the banking literature (Ariff and Can, 2008; Casu and Molyneux, 2003; Gardener et al., 2011; Staub et al., 2010; Williams and Gardener, 2003) but has also been subject to criticism because of the independence of the scores (Delis and Papanikolaos, 2009; Simar and Wilson, 2007) and endogenerity issues in the second-stage estimation (Berger and Mester, 1997; Mester, 1996). In order to reduce the bias caused by these limitations, following Simar and Wilson (2007) and Chortareas et al. (2013), in the second stage, the truncated model with bootstrap standard error, which has been found to perform better than the traditional Tobit regression, is used. The impact of board compensation on bank efficiency is estimated through the equation shown in (2).

$$\theta_{jt} = \alpha_0 + \alpha_1 B4 + \alpha_2 SZ + \alpha_3 EQ + \alpha_4 RK + \alpha_5 PF + \alpha_6 BP_t + \alpha_7 CT_t + \alpha_8 TE + \alpha_9 NP + \alpha_{10} CD + \alpha_{11} ITR1 + \alpha_{12} ITR2 + \omega_{jt} \quad (2)$$

where θ_{jt} is the technical efficiency of bank j in year t (efficiency is estimated based on yearly efficiency frontier); B4 is the dummies for the four largest banks in the country by assets; SZ is the bank size measured by total assets; EQ is the bank capital measured by equity; RK is the bank risk measured by loan loss provisions over total loans; PF is the bank profit measured by net income over total assets; BP is the country-level deposit money banks' credit extended to the private sector; CT is the banking system concentration; TE is the top three executive compensation; NP is the number of nonpaid non-executive directors; CD is the dummies for the financial crisis period; ITR1 is the interaction between the top three executive compensation and financial crisis dummies; ITR2 is the interaction between the number of nonpaid non-executive directors and financial crisis dummies; α_0 is the constant, α_1 to α_{12} are the coefficients and ω_{jt} is the error term.

The bank-level control variables included in this model are similar to those used in previous efficiency studies (Altunbas et al., 2007; Fiordelisi et al., 2011). The country-level variables are used to control for macroeconomic changes that could have an influence on bank efficiency. Credit from deposit-taking banks granted to the private sector reflects the transformation of funds to private corporate sector and the dynamic behaviour of commercial banks (Barth et al., 2006), which is believed to improve bank efficiency. The concentration ratio is also included to reflect the nature of competition in the banking industry, which is shown to

impact on bank efficiency (Casu and Girardone, 2009; Schaeck and Čihák, 2008)[3]. Finally, a set of variables relating to board compensation and financial crisis is used as the key variables of interest in order to investigate how public listings and board compensation[4] impact on efficiency of banks in the period of financial crisis (Beltratti and Stulz, 2012; Erkens et al, 2012; Adams and Mehran, 2012).

4. Data and sources

The time scale of this study is from 2004 to 2011 in order to cover Chinese commercial banks' IPO wave period between 2006 and 2007 and in order that the potential controller-minority agency conflicts stimulated by Chinese banking reform could be investigated. Meanwhile, the three years from 2007 to 2009 are commonly classified as the period of financial crisis. The period selected provides opportunities to evaluate how listed and non-listed banks perform differently and how board compensation affects bank efficiency during normal and financial crisis periods. Chinese listed banks are ultimately controlled by the government but also have minority investors to whom managers are accountable. Thus, public listing effects on bank efficiency from minority investors' perspectives are an important research issue.

The bank-level data for all Chinese banks for the period between 2004 and 2011 come from Bankscope for our first step in bank efficiency estimation. In order to maintain consistency in terms of business nature, efficiency is estimated based on a sample of commercial banks only and do not include investment banks or other specialized financial intermediaries. Country level data are from Beck and Demirgüc-Kunt (2009).

The corporate governance and board compensation data are collected from Shenzhen GTA data for Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) listings, some of the most used data for studying Chinese listed corporations (Sun and Tong, 2003). The final sample consists of 131 banks with 576 un-balanced bank observations between 2004 and 2011. For detailed definitions of variables and sources, please see Table 1.

<Table 1 here>

[3] Competition in banking markets can also be measured by the non-structural approach through the H-statistic or Lerner index (Berger et al., 2009). Because of the small sample on a yearly basis, H statistic is not computed as a proxy for competition but use the traditional structural concentration ratio.

[4] Compensation disclosure is different in China compared to the US. The Chinese Securities Regulation Committee (CSRC) regulates the disclosure of executive compensation information. Early regulation did not require listed firms to disclose complete executive compensation information in their annual reports (CSRC, 1998). Since 2001 the top three highest-paid executives have been required to disclose their compensation, not individually, but collectively as the sum of total compensations including their salary, bonus, stipends, and other benefits (CSRC 2001, 2002, 2005).

5. Empirical results

5.1. Summary statistics and univariate tests

Table 2 presents the descriptive statistics and correlation matrix. Regarding bank efficiency, the average score of the sample is 0.66, which is lower than the estimation of 0.86 reported by Luo et al. (2011) but consistent with the typical results found in emerging markets of 0.68 (Fu and Heffernan, 2007). It is worth noting that Luo et al. (2011) examine the efficiency of only 14 listed commercial banks in China while, in this estimation, all commercial banks were pooled to construct the efficiency frontier. Also, the sample covers the financial crisis period, which could increase the inefficiency of banks as shown in Figure 1. These factors have been reflected in the bank efficiency scores.

The correlation analysis shows that financial crisis is negatively and significantly related to bank efficiency in China. This is consistent with the descriptive analysis (Figure 1) which shows that bank efficiency decreased considerably during the period between 2007 and 2009. In contrast, the number of non-executive directors receiving no incentive financial compensation is significantly and positively related to bank efficiency, suggesting that increasing the number of this type of director improves board monitoring and advisory capabilities, and thus improves bank efficiency. However, the coefficient of executive compensation is not significant even though it is positive.

All coefficients are smaller than 0.8, which indicates that there are no multi-collinearity issues among independent and control variables. Further analysis using VIF<5 criteria confirms this as all VIFs are smaller than 5 and the mean VIF is 2.24.

<Table 2 here>

Table 3 presents the difference in mean tests between non-listed and listed banks, and in non-crisis and crisis periods. There are 67 listed and 509 non-listed bank observations in the sample. Non-listed and listed banks differ in a number of aspects. Non-listed banks tend to be larger in size, less well-capitalised but more profitable. Listing status tends to be more prevalent when bank concentration level is higher. In addition, listed banks appear to be less efficient than their non-listed counterparts.

When the sample is segregated into non-crisis and crisis period, there are 165 non-crisis and 411 crisis bank observations. Bank observations in the non-crisis period differ from those in the crisis period. Bank observations in the non-crisis period tend to be smaller in size (22.069 versus 23.166), less capitalised (0.062 versus 0.078) and less profitable (0.006 versus 0.010) than those in the crisis period. Deposit-taking banks' credit to the private sector (113.671 versus

107.067) and bank concentration level (61.689 versus 55.742) are higher in bank observations in the non-crisis than those in the crisis period, indicating so-called crowding-out effects in the increased government intervention in China and the diversification effects of banking assets in financial crisis periods. After crisis, bank efficiency decreases as shown by the t-test. This is consistent with the negative correlation between crisis and efficiency revealed by the previous correlation analysis.

<Table 3 here>

5.2. Multivariate analysis

Table 4 reports the truncated regression results on the impacts of board compensation and financial crisis on bank efficiency, using 50-times bootstrap standard error[5]. In Table 4 Model 1, the focus is on the direct impact of board compensation on bank efficiency. In Table 4 Model 2, the interaction effects between the top three executive directors with the highest incentive financial compensations and financial crisis on bank efficiency is investigated, while Table 4 Model 3, the interaction effects between non-executive directors without incentive financial compensation and financial crisis on bank efficiency is explored.

As Table 4 Model 1 shows, well-paid executive directors are significantly and negatively related to bank efficiency. This finding provides supporting evidence for Hypothesis 1 and is consistent with the results reported by Fehlenbrach and Stulz (2011). This indicates that the increasing compensation for board executive directors fails to align their interests with shareholders in enhancing bank efficiency (Bedchuk et al., 2009). Rather, it shows that well-paid executive directors often fail to maximize bank efficiency for all investors, which may be in line with state controllers' political objectives, but to the cost of minority investors. Table 4 Model 1 also shows that the number of non-executive directors without incentive financial compensation is significantly and positively related to bank efficiency. This evidence supports Hypothesis 3 and is in line with several studies prior to the recent financial crisis, mainly in the US (Brewer et al., 2000; Brickley and James, 1987; Byrd et al., 2001) and recent empirical evidence shown by Liang et al. (2013). This indicates that increasing the number of unpaid non-executive directors strengthens the board directors' monitoring and advisory roles on bank management, enhancing bank efficiency. We also replace our number of non-executive directors without incentive financial compensation with number of independent non-executive directors to see whether independent non-executive directors or unpaid non-executive directors strengthen the board monitoring and advisory functions for enhancing bank efficiency. It is found that although there

[5] We also run 150 times bootstrap and the results remain consistent.

is a high and positive correlation of 0.82 between the number of independent non-executive directors and the number of non-executive directors without incentive financial compensation, the number of unpaid non-executive directors rather than the number of independent non-executive directors is significant in improving bank efficiency (not reported in the Table 4).

As Table 4 Model 2 shows, there is a significant and negative interaction between financial crisis and well-paid executive directors, supporting Hypothesis 2. This suggests that publicly listed banks with well-paid executive directors on the board have higher efficiency loss in financial crisis periods than non-listed banks. As Table 4 Model 3 shows, there is a significant and negative interaction between financial crisis and non-executive directors not receiving incentive financial compensation, supporting Hypothesis 4. This finding is consistent with studies in the post-crisis period in industrialised countries (Adams, 2009; Aebi et al., 2012, Beltratti and Stulz, 2012; Erkens et al., 2012; Wang et al., 2012). This suggests that the positive effects associated with unpaid non-executive directors on the board for listed banks become weaker in the financial crisis period.

In terms of control variables, Table 4 indicates that big-four banks have lower bank efficiency, indicating the four biggest state-owned banks may put state political objectives as their priorities but to the cost of minority investors, in line with previous research by Lin and Zhang (2009), and Fu and Heffernan (2006). Banks that are bigger in size measured by total assets and have more capital tend to be more efficient. The results confirm those reported by Hasan and Marton (2003) and Fries and Taci (2005)[6], revealing the benefits of economic of scale and scope for bank efficiency (Laurenceson and Zhao, 2008). With regard to macro-market level factors, credit extended to the private sector shows a negative relationship with bank efficiency. This result is somewhat surprising because it is believed that credit granted to private firms reflects the dynamic behaviour of banks (Barth et al., 2006) and more private sector credit could increase bank efficiency. This relationship, however, becomes positive in the robustness tests using propensity score matching (Table 6). Unlike private sector credit, the concentration ratio is positively related to bank efficiency and the result is consistent across different models and specifications. Under the structural approach, this may indicate that banks in China can gain efficiency thanks to their market power because of the limited competition in the banking system[7].

[6] Some studies show the opposite: bigger (Allen and Rai, 1996) and well-capitalised (Altunbas et al., 2007) banks are less efficient.

[7] The competition and efficiency nexus is much more complex due to various competition indicators used by empirical studies (Casu and Girardone, 2009; Schaeck and Čihák, 2008) and the relationship between concentration and competition (Bikker and Haaf, 2002; Claessens and Laeven, 2004)

<Table 4 here>

6. Robustness tests

Although truncated regression with bootstrap standard error has been found to perform better than the traditional Tobit regression when the bank efficiency is estimated in the first stage, and then the estimated efficiencies are regressed on environmental variables in the second stage (following Chortareas et al., 2013; Delis and Papanikolaos, 2009; Simar and Wilson, 2007), the DEA approach, as one of the nonparametric techniques to estimate bank efficiency, has its own assumption of no random errors influencing bank efficiency performance (Berger and Humphrey, 1997). Given the fact that a panel data of banks covering eight years from 2004 to 2011 is used, there will be significant variations of efficiencies across different kinds of banks in different time periods. Also, fixed-effects models are technically unavailable in non-linear models such as Tobit (Greene, 2004), therefore, Tobit panel regression with random-effects is employed to re-test the hypotheses. Results, reported in Table 5, are mostly consistent with previous results from Table 4. Only the relationship between top-three executive compensation and bank efficiency becomes insignificant even though the coefficient still shows a negative sign.

<Table 5 here>

Although we control a variety of bank-specific characteristics and market-wide environment characteristics, robustness tests to compare listed banks with similar non-listed banks are carried out by constructing a propensity score matched sample. Using a logit model with the listed bank dummy as the dependent variable, we match listed to non-listed banks based on bank size, capital, risk, profit, private/GDP, and bank concentration. Following Caliendo and Kopeinig (2008), the propensity score model uses one to one matching, a radius/caliper of 0.1, and a common support range of (0.01 to 0.90). Finally, we allow observations to be used as a match more than once, thus making the order of matching irrelevant and removing sample size constraints. We do not only address the self-selection bias to reveal the average treatment effects when we compare listed with non-listed banks, but also recognize the heterogeneous treatment effects across listed and non-listed banks, following Chaney, Jeter and Shivakumar (2004) and Xie, Brand, and Jann, (2011). The matching process yields a sample of 67 listed banks and 67 non-listed banks, and 509 non-listed banks with 509 listed banks. The results using the propensity score matched samples are presented in Tables 6a and 6b. Table 6a focuses on the Treatment effects of the Treated (TT) sample in the listed banks and 6b on the treatment effects of the Untreated (TUT) sample in the non-listed banks.

Table 6a shows that, for listed banks, the coefficient between the number of unpaid non-executive directors and bank efficiency is not statistically significant. This suggests that listed banks do not benefit from the positive effects of unpaid non-executive directors on bank efficiency. Rather, the efficiency of the listed banks declines during the financial crisis period when there are more unpaid non-executive directors, compared with the efficiency they would have gained if they had not chosen to go public. Also, these listed banks have lower efficiency when the compensation paid to their top executive directors increases, compared with the efficiency they would have had if they had not decided to go listed.

<Table 6a here>

For non-listed banks, Table 6b shows a different, even conflicting result from Table 6a. This indicates heterogeneous treatment effects between listed and non-listed banks on bank efficiency. Apart from the similar results associated with well-paid executive directors on bank efficiency, the insignificant treatment effects associated with unpaid non-executive directors on listed banks' efficiency become significant and positive in non-listed banks' efficiency. This suggests that the monitoring and/or advisory services provided by the non-paid non-executive directors could have been observable and thus shareable among all shareholders in non-listed banks, in line with Andres and Arranz (2010), who suggest the advantages of finding an adequate mix between executives and non-executives on the board. However, Table 6b Model 3 also shows a weakening positive role for non-executive directors without incentive financial compensation in financial crisis periods. The treatment effects of non-executive directors on listed and non-listed banks differ, revealing that the observable and shareable benefits of non-executive directors' monitoring and advisory services to all shareholders in non-listed banks become unobservable and thus un-sharable to all shareholders in listed banks. Given the conflicts between state controllers and minority shareholders in listed banks, the results here further suggest that the benefits of non-executive directors are more likely due to their advisory service only, rather than monitoring service, as their potential monitoring role fails to prevent state controllers from exclusively enjoying their advisory service without benefiting other minority shareholders in listed banks.

<Table 6b here>

7. Conclusions

Using a sample of commercial bank data from 2004 to 2011, we have investigated how bank executive compensation and board composition measured by the number of unpaid non-

executive bank directors on board impact on bank efficiency. The period studied allows us to capture the effects of changes in bank board compensation policies in China and in the financial crisis. We find that higher compensation for executives reduces bank efficiency and this negative impact becomes more severe during financial crisis. In contrast, a higher number of unpaid non-executive directors on the board improves bank efficiency. However, this positive influence becomes weaker when banks face financial crisis. This evidence suggests that either compensation for executive board directors failed to create values for shareholders through improving bank efficiency (alignment hypothesis) or executive board directors abused power through compensation arrangements in their own interests at the expense of shareholders (entrenchment hypothesis) in China during the period from 2004 to 2011.

By further focusing on the board composition in the listed banks using propensity score matching as another robustness test, it is found that in non-listed banks a higher number of unpaid non-executive directors on board improves bank efficiency, which is consistent with earlier results revealed though truncated and panel Tobit estimations. This positive relationship, nevertheless, becomes insignificant when banks are listed. The evidence indicates that non-listed banks could have benefited from listing through efficiency improvements by having more unpaid non-executive directors on the board if this benefit had not been converted into private benefits of control once non-listed banks had become listed.

The results raise important implications for policymakers. First, the governments should be cautious when encouraging banks to go public with more unpaid non-executive directors on the board. Also, regulations need to be in place in order to reduce the conversion of public into private benefits through listing so as to protect minority shareholders and fairly share the benefits of the financial reforms.

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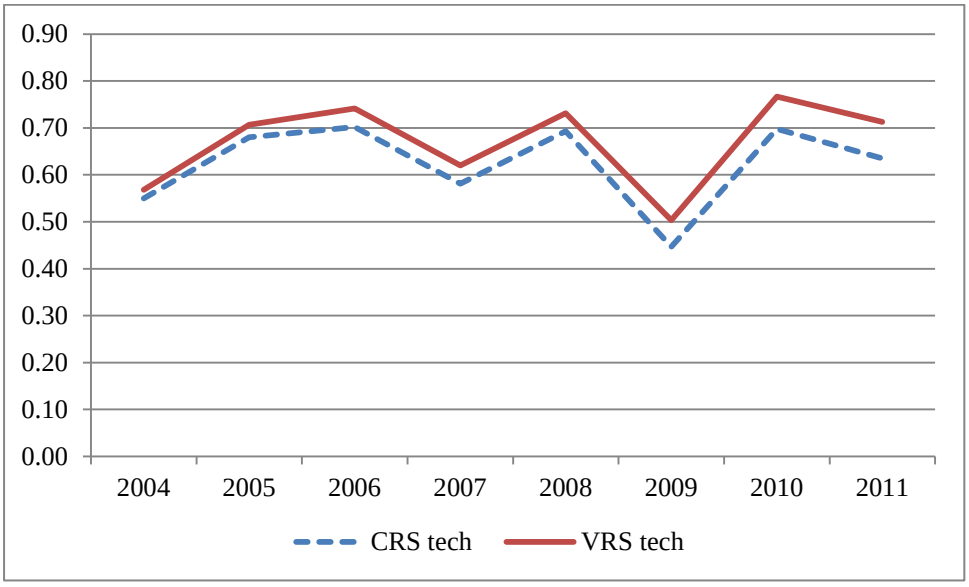
Figure 1. *Technical efficiency of commercial banks in China 2004-2011*



Note: The efficiency scores are estimated using DEA technique as shown in Equation (1) through yearly frontiers. Data come from Bankscope database.

Table 1. *Definition of variables and sources*

Variables	Abbreviations	Definitions	Sources
Technical efficiency	θ_{jt}	The efficiency of bank j at time t, estimated based on yearly frontier and using DEA technique as shown in equation (1)	Bankscope
Big 4 bank Dummy	B4	The dummies for the four largest banks in the country by assets	Bankscope
Bank Size	SZ	The bank size measured by natural logarithm of total assets	Bankscope
Capital	EQ	The bank capital measured by equity over total assets	Bankscope
Risk	RK	The bank risk measured by loan loss provisions over total loans	Bankscope
Profit	PF	The bank profit measured by net income over total assets	Bankscope
Private/GDP	BP	The country-level deposit money bank credit extended to the private sector	Beck and Demirgüc-Kunt (2009)
Bank concentration	CT	The banking system concentration	Beck and Demirgüc-Kunt (2009)
Financial crisis dummy	CD	The dummies for the financial crisis period	
Number of unpaid non-executive directors	NP	The natural logarithm of the number of unpaid non-executive directors	Shenzhen GTA data for Shanghai Stock Exchange and Shenzhen Stock Exchange
Top three executives compensation	TE	The natural logarithm of the amount of the top three executives' compensation	Shenzhen GTA data for Shanghai Stock Exchange and Shenzhen Stock Exchange
Top three executive compensation* Financial crisis dummy	ITR1	The interaction between the executive compensation and financial crisis dummies	Shenzhen GTA data for Shanghai Stock Exchange and Shenzhen Stock Exchange
Number of unpaid non-executive directors* Financial crisis dummy	ITR2	The interaction between the natural logarithm of number of unpaid directors and financial crisis dummies	Shenzhen GTA data for Shanghai Stock Exchange and Shenzhen Stock Exchange

Table 2. *Descriptive Statistics and Correlation Matrix*

	1	2	3	4	5	6	7	8	9	10	11
1. θ_{jt}	1.00										
2. CD	-0.46***	1.00									
3. NP	0.10***	-0.01	1.00								
4. TE	0.06	-0.003	0.72***	1.00							
5. B4	0.06	-0.03	0.40***	0.26***	1.00						
6. SZ	0.05	-0.08*	0.54***	0.53***	0.55***	1.00					
7. EQ	0.34***	0.04	-0.06	-0.06***	-0.08**	-0.41***	1.00				
8. RK	-0.11***	-0.01	-0.02	-0.01	0.14***	0.12***	-0.14***	1.00			
9. PF	0.14***	-0.001	0.05	0.04	0.04	0.01	0.12***	0.04	1.00		
10. BP	0.21***	-0.58***	0.01	-0.02	0.04	0.11***	-0.07**	-0.03	-0.02	1.00	
11. CT	-0.12***	0.38***	-0.12***	-0.13***	0.00	-0.31***	-0.08**	-0.02	-0.14***	-0.16***	1.00
Mean	0.66	0.71	7.38	8953651	0.06	21287883	0.08	0.01	0.01	109.14	57.17
Standard deviation	0.17	0.46	4.61	5821126	0.24	288901	0.09	0.03	0.01	7.27	6.48
No. of observations	576	576	576	576	576	576	576	576	576	576	576

Note: *p<0.01 All VIF<5, AND THE MEAN VIF=2.24. Please see Table 1 for definitions of variables.

Table 3. *Difference of Means Tests for Key variables*

		Mean			T-test	
Variable	Listed	Non-listed	Non-Crisis	Crisis	Non-listed vs Listed	Non-Crisis vs Crisis
					(1)	(2)
No. of observations	67	509	165	411		
B4	0.02	0.34	0.066	0.056	-11.85***	0.44
SZ	22.347	26.150	22.069	23.166	-18.94***	-6.26***
EQ	0.074	0.060	0.062	0.078	1.34*	-2.06**
RK	0.023	0.024	0.023	0.024	-0.16	-0.81
PF	0.008	0.009	0.006	0.010	-1.92**	-10.83***
BP	109.15	109.27	113.671	107.067	-0.12	11.41***
CT	58.01	55.01	61.689	55.742	3.71***	11.363***
NP	0	1.82	0.084	0.290	-45.13***	-3.43***
TE	0	16.75	0.789	2.666	-31.02***	-3.84***
θ_{jt}	0.65	0.69	0.678	0.649	-1.79**	1.96**

Note: *p<0.01 All VIF<5, AND THE MEAN VIF=2.24. Please see Table 1 for definitions of variables.

Table 4. *Board compensation, crisis, and bank technical efficiency: truncated regression results*

	Model 1	**Model 2**	**Model 3**
Constant	-0.23 [-1.03]	-0.23 [-1.06]	-0.23 [-1.18]
B4	-0.11*** [-4.28]	-0.10*** [-3.06]	-0.10*** [-3.74]
SZ	0.03*** [5.48]	0.03*** [4.59]	0.03*** [5.73]
EQ	1.19*** [7.72]	1.19*** [7.13]	1.19*** [9.01]
RK	-0.47 [-0.31]	-0.47 [-0.28]	-0.47 [-0.29]
PF	1.94 [1.32]	1.91 [1.11]	1.92 [1.27]
BP	-0.003*** [-2.56]	-0.003*** [-2.78]	-0.003*** [-3.11]
CT	0.01*** [7.47]	0.01*** [5.77]	0.01*** [7.74]
NP	0.04*** [3.18]	0.04*** [3.06]	0.05*** [4.40]
TE	-0.01*** [-2.94]	-0.01*** [-2.56]	-0.01*** [-3.46]
CD	-0.25*** [-14.75]	-0.24*** [-13.74]	-0.24*** [-13.64]
ITR1	---	-0.003*** [-2.70]	---
ITR2	---	---	-0.03*** [-3.46]
Model χ^2	565.80***	1142.12***	690.45***
$\Delta\chi^2$		576.32	124.65
Number of observations	576	576	576

Note: The results shown are estimated via truncated regression with bootstrap treatment, applied to Equation (2). The dependent variable is the technical efficiency estimated using DEA technique as stated in Equation (1). *, **, and *** denote significance at 0.1, 0.05 and 0.01 level, respectively. Please see Table 1 for definitions of variables. Model 1 is estimated without the interactions, Model 2 is similar to Model 1 but adds the interaction between Ln top three executives' compensation and Financial Crisis Dummy, Model 3 is Model 2 with the addition of another interaction between Ln Number of unpaid directors and Financial Crisis Dummy.

Table 5. *Board compensation, crisis, and bank technical efficiency: robustness check using random-effects Tobit panel regression*

	Model 1	**Model 2**	**Model 3**
Constant	-0.41** [-1.96]	-0.40* [-1.91]	-0.40* [-1.89]
B4	-0.16** [-2.48]	-0.15** [-2.43]	-0.15** [-2.44]
SZ	0.04*** [5.29]	0.04*** [5.24]	0.04*** [5.22]
EQ	0.84*** [8.52]	0.84*** [8.50]	0.84*** [8.49]
RK	-0.32 [-0.76]	-0.32 [-0.77]	-0.32 [-0.78]
PF	4.38*** [3.55]	4.33*** [3.53]	4.33*** [3.53]
BP	-0.002*** [-3.13]	-0.002*** [-3.16]	-0.002*** [-3.19]
CT	0.01*** [7.04]	0.01*** [7.05]	0.01*** [7.05]
CD	-0.24*** [-17.98]	-0.23*** [-17.06]	-0.23*** [-17.16]
NP	0.03* [1.54]	0.03* [1.44]	0.03** [1.98]
TE	-0.002 [-0.90]	-0.001 [-0.51]	-0.002 [-0.81]
ITR1	---	-0.003** [-1.53]	---
ITR2	---	---	-0.03** [-1.96]
Model χ^2	462.39***	467.17***	470.13***
Number of observations	576	576	576
Number of groups	131	131	131

Note: The results shown are estimated via random-effects panel Tobit regression. The dependent variable is the technical efficiency estimated using DEA technique as stated in Equation (1). *, **, and *** denote significance at 0.1, 0.05 and 0.01 level, respectively. Please see Table 1 for definitions of variables. Model 1 is estimated without the interactions, Model 2 is similar to model 1 but adds the interaction between Ln top three executives' compensation and Financial Crisis Dummy, Model 3 is Model 2 with the addition of another interaction between Ln Number of unpaid directors and Financial Crisis Dummy.

Table 6a. *Board compensation, crisis, and bank technical efficiency: robustness check using propensity score matching sample for listed banks*

LISTED	**Model 1**	**Model 2**	**Model 3**
Constant	-3.24*** [-8.61]	-3.26*** [-8.36]	-3.25*** [-11.81]
B4	-0.22*** [-6.82]	-0.22*** [-6.11]	-0.22*** [-6.71]
SZ	0.09*** [7.20]	0.09*** [7.34]	0.08*** [8.40]
EQ	2.32** [2.48]	2.29*** [2.79]	2.35*** [2.60]
RK	11.23*** [4.12]	11.25*** [3.61]	11.21*** [4.73]
PF	22.76*** [3.34]	22.27*** [4.01]	22.29*** [4.07]
BP	0.01*** [4.40]	0.01*** [3.63]	0.01*** [4.87]
CT	0.01*** [4.76]	0.01*** [5.33]	0.01*** [6.40]
CD	-0.19*** [-5.08]	-0.10 [-0.18]	-0.11** [-2.43]
NP	0.02 [1.16]	0.02 [1.03]	0.03 [1.17]
TE	-0.01*** [-2.66]	-0.01*** [-2.56]	-0.01*** [-2.73]
ITR1	---	-0.01 [-0.18]	---
ITR2	---	---	-0.05*** [-2.30]
Model χ^2	492.66***	443.80***	620.64***
$\Delta\chi^2$	81.98	33.12	209.96
Number of observations	134	134	134

Note: Following Caliendo and Kopeinig (2008), the propensity score model uses one-to-one matching, a radius/caliper of 0.1, and a common support range of (0.01 to 0.90). We do not only address the self-selection bias to reveal the average treatment effects when comparing listed with non-listed banks, but also recognize the heterogeneous treatment effects across listed and non-listed banks, following Chaney et al. (2004) and Xie et al. (2011). The matching process yields a sample of 67 listed banks and 67 non-listed banks, and 509 non-listed banks with 509 non-listed banks. The results reported focus on the Treatment effects of the Treated (TT) in the listed banks.

Table 6b. *Board compensation, crisis, and bank technical efficiency: robustness check using propensity score matching sample for non-listed banks*

UN-LISTED	Model 1	Model 2	Model 3
Constant	-0.33* [-1.82]	-0.36* [-1.78]	-0.39** [-2.04]
B4	-0.17*** [-4.65]	-0.18*** [-5.60]	-0.20*** [-5.50]
SZ	0.04*** [7.27]	0.04*** [7.06]	0.04*** [6.47]
EQ	1.17*** [9.46]	1.17*** [9.54]	1.17*** [8.86]
RK	-1.12 [-0.74]	-1.08 [-0.59]	-0.97 [-0.50]
PF	2.53* [1.66]	2.67 [1.48]	2.83** [2.09]
BP	-0.004*** [-3.96]	-0.004*** [-4.62]	-0.004*** [-5.05]
CT	0.01*** [11.05]	0.01*** [9.97]	0.01*** [12.14]
CD	-0.26*** [-15.57]	-0.26*** [-14.69]	-0.25*** [-15.62]
NP	0.09*** [9.23]	0.11*** [6.19]	0.13*** [7.34]
TE	-0.02*** [-14.34]	-0.02*** [-13.10]	-0.02*** [-11.78]
ITR1	---	-0.003* [-1.32]	---
ITR2	---	---	-0.05*** [-3.46]
Model $\chi 2$	1455.42***	1731.33***	1840.45***
$\Delta\chi 2$	774.34	1050.25	1159.37
Number of observations	1018	1018	1018

Note: Following Caliendo and Kopeinig (2008), the propensity score model uses one-to-one matching, a radius/caliper of 0.1, and a common support range of (0.01 to 0.90). We do not only address the self-selection bias to reveal the average treatment effects when comparing listed with non-listed banks, but also recognize the heterogeneous treatment effects across listed and non-listed banks, following Chaney et al. (2004) and Xie et al. (2011). The matching process yields a sample of 67 listed banks and 67 non-listed banks, and 509 non-listed banks with 509 listed banks. The results reported focus on the Treatment effects of the Untreated (TUT) in the non-listed banks.

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