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Ownership structure and risk taking: Comparative evidence from private and state-controlled banks in China

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Abstract

This study examines the impact of ownership structure on Chinese banks' risk-taking behaviours. We classify Chinese commercial banks into three categories based on the different types of controlling shareholder, and find that banks controlled by the government (GCBs) tend to take more risk than those controlled by state-owned enterprises (SOECBs) or private investors (PCBs). This can be attributed to severe political intervention and weak incentives to follow prudent bank management practices for GCBs. We also find that the results are more pronounced among banks with concentrated ownership, presumably because the large controlling power helps to enhance the monitoring of the management and promotes prudent operating procedures. Our findings have important implications for the ongoing reform in the Chinese banking sector.

Keywords: Bank; risk-taking; state ownership; ownership concentration; China

JEL classification: G21; G28; G32; G34

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1. Introduction

The Basel Committee on Banking Supervision (BCBS) recently issued a set of “Principles for enhancing sound corporate governance” (BCBS, 2010) in the banking sector to discuss the link between governance quality and bank failure as well as economic development. Poor corporate governance has been found to motivate excessive risk taking and therefore been blamed as a contributory factor in the recent financial crisis (Laeven and Levine, 2009). The report highlighted some corporate governance challenges, including bank ownership structures that are unduly complex, lack transparency or impede appropriate checks and balances, and pointed out that “*Challenges can also arise when insiders or controlling shareholders exercise inappropriate influences on the bank’s activities*” (BCBS, 2010, p.6). Corporate governance in the banking sector differs from that in the non-financial sectors in terms of transparency, business complexity and regulation (Mehran et al., 2011), and banks have the ability to take on risk very quickly and in ways that are not readily visible to directors or investors, thus posing a broader risk to the economy than non-financial firms. To date, however, corporate governance studies in the literature have largely focused on non-financial firms. Therefore, the issue of corporate governance and risk taking in the banking sector is of particular interest. To shed light on this issue in the under-researched emerging markets, we study the role played by the controlling shareholders of Chinese banks by exploring the impact of controlling shareholder’s nature and ownership concentration on banks’ risk-taking behaviours.

Since 1979, the Chinese authorities have undertaken gradual banking reforms to address the institutional, political and organizational problems faced by its banking industry. The speed of the reforms has accelerated since 2003, and the Chinese banking sector has been dramatically reshaped. The latest round of banking reform measures include financial capital injections, shareholding restructures, the introduction of foreign strategic investors, the listing of banks’ share capital on

foreign and Chinese exchanges, and the establishment of a system for the boards of directors. These reforms have changed the ownership structure of Chinese banks, and are expected to improve the governance quality and to have important implications for their behaviour.

In China and some other emerging market countries the banking sector operates under a two-tier ownership structure including state-owned banks and privately owned (domestic or foreign) banks. Both theoretical and empirical studies in the literature suggest that the performance and risk-taking behaviour of organizations depend on the identity of the controlling shareholders (i.e., the ultimate owners) (e.g., John et al., 2008; Barry et al., 2011). In terms of state ownership, political interference usually comes at the expense of corporate profitability because of politicians' deliberate policy of transferring resources to their supporters (Shleifer and Vishny, 1986; Shleifer, 1998). This suggests that state-owned banks might be seen as vehicles for raising capital to finance projects with high social returns, but possibly high-risk and low-profit financial returns, or to provide finance to favoured groups such as state-owned enterprises (SOEs) (Clarke et al., 2005)¹. State-owned banks find it difficult to resist such harmful government interference, whereas private banks are more able to oppose it, and typically employ more sensible prudential lending policies and/or profit-maximizing strategies as a consequence (Shirley and Nellis, 1991; Shleifer and Vishny, 1994). Moreover, lower performance incentives (Shleifer and Vishny, 1997) and "soft" budget constraints (Sheshinski and Lopez-Calva, 2003) in state-owned banks also result in excessive risk taking and the misallocation of resources.

These theoretical inferences have been supported by some empirical evidence. For example, government-owned banks and a large amount of state ownership are associated with lower efficiency (Fries and Taci, 2005; Bonin et al., 2005), inferior long-term performance (Berger et al., 2005), greater risk taking (Angkinand and Wihlborg, 2010; Iannotta et al., 2007, 2013), and less prudent

¹ Firth et al. (2009) find evidence that political connections play a role in the accessing of bank finance in China.

lending behaviour (Jia, 2009). However, there are also some contradictory results. State-controlled banks have been found to be associated with less risk in Russia (Fungáčová and Solanko, 2009), and higher efficiency in India (Bhattacharyya et al., 1997) and Turkey (Isik and Hassan, 2002). Altunbas et al. (2001) find little evidence that private banks are more efficient than state-owned ones in Germany. Overall, the results are not conclusive, and little is known about the role state controlling shareholders play in Chinese banks' risk-taking behaviour².

Besides the nature of the controlling shareholder, another important dimension of banks' ownership structure is ownership concentration (Iannotta et al., 2007). Theories from the literature predict opposing effects of ownership concentration on firm performance. On the one hand, Shleifer and Vishny (1986) and Admati et al. (1994) argue that concentrated ownership can overcome the free-rider problem and enhance firm performance by improving the monitoring of management. An agency problem is created when ownership is dispersed because atomistic shareholders bear the full cost of monitoring while reaping only a fraction of the benefits, and therefore have less incentive to monitor the firms. On the other hand, other theoretical studies argue that large shareholders may exercise their control rights to pursue private benefits at a cost to the minority shareholders (Shleifer and Vishny, 1997; La Porta et al., 1999). Mixed empirical evidence is also documented in the literature. Concentrated ownership has been found to be associated with higher risks (Laeven and Levine, 2009), higher insolvency risk and greater return volatility (Haw et al., 2010). In contrast, ownership concentration has been found to be associated with a lower level of risk taking in Spanish commercial banks (Garcia-Marco and Robles-Fernandez, 2008), better loan quality, lower asset risk and a lower insolvency risk based on a sample of 181 large banks from 15 European countries (Iannotta et al., 2007), and a lower non-performing loans ratio and better capital adequacy ratio across more than 50 countries (Shehzad et al., 2010). These differences may be attributed partially to

² There are a number of studies assessing the efficiency or other performance aspects of the Chinese banking sector (e.g., Fu and Heffernan, 2007; Shin et al., 2007; Berger et al., 2009), but they do not explore either banks' risk-taking behaviour or the role of controlling shareholders in banks.

the different settings of various countries and regulatory regimes, which include different institutional features.

To perform our analysis, we hand-collect the ownership information of 108 Chinese commercial banks over the period from 2003 to 2011. We regress ownership structure characteristics, including the identity of the controlling shareholder and the ownership concentration and their interaction terms, on the bank's risk-taking proxies. We also incorporate other corporate governance characteristics as control variables, including the independence of the risk committee chair and the proportion of female directors on the board. We use three categories of ownership identity to reflect the nature of the largest shareholder: government-controlled banks (GCBs), SOE-controlled banks (SOECBs), and privately controlled banks (PCBs). For ownership concentration, we use the Herfindahl index, based on the ownership shares of the top ten shareholders and the percentage of shares held by the three largest shareholders. Our findings show that SOECBs tend to take less risk than GCBs. Unlike GCBs, SOECBs have greater incentives to pursue profit-maximizing strategies and to exercise prudential lending practices. We also find that the effect of the controlling shareholders on a bank's risk taking depends on the ownership concentration. More specifically, concentrated ownership can reduce risk taking in SOECBs and PCBs but increase risk taking in GCBs, presumably because of their different objectives. Finally, consistent with Aebi et al. (2012), we also find that the presence of the Chief Risk Officer (CRO) on the executive team, and a greater number of female directors, significantly reduce risk taking.

We believe our study makes an important contribution to the literature in several ways. First, it adds to the literature on banking governance by providing original evidence on the impact of two dimensions of ownership structure (i.e., controlling shareholder type and ownership concentration) on banks' risk taking. Some related studies either focus on the nature of the bank (Nichols et al.,

2009; Barry et al., 2011; Forssbäck, 2011) or on the degree of ownership concentration (Sullivan and Spong, 2007; Laeven and Levine, 2009; Iannotta et al., 2013). To the best of our knowledge, this is the first study to address how ownership concentration affects the role of the controlling shareholders. Second, this study contributes to the growing literature on emerging markets by exploring the rapidly developing banking sector of the largest emerging market in the world, China. The existing Chinese banking literature mainly examines the determinants of banks' (accounting) performance or efficiency (Kumbhakar and Wang, 2007; Fu and Heffernan, 2007, 2010; Lin and Zhang, 2009; Berger et al., 2009; Zhang et al., 2013), while our study focuses on the risk-taking behaviour of Chinese banks using three risk measure proxies, i.e., the Z-score, non-performing loans and the capital adequacy ratio. Finally, our findings have important implications for regulators and investors, suggesting that the transfer of bank ownership from the government to marketized SOEs helps to improve the stability of the banking system.

The remainder of the paper is structured as follows. Section 2 introduces the institutional background of the Chinese banking sector. Section 3 develops our predictions on the impact of the controlling shareholders. Section 4 presents the research design. Section 5 provides the empirical results. Section 6 concludes.

2. Institutional Background

Over the last thirty years, the Chinese authorities have implemented a series of significant reforms aimed at transforming the country's banking sector from policy-driven, wholly state-owned and monopolistic to market-oriented and competitive. One important aspect of the reform has been the ownership restructuring of the Chinese banks through the introduction of foreign strategic investors, listings on stock exchanges, and sales of shares to domestic firms. These gradual reforms have created a banking sector with multiple categories of banking institutions, operating in separate

market segments with (generally) clearly delineated functions. According to the China Banking Regulatory Commission (CBRC), Chinese banks are classified into wholly state-owned policy banks, large-scale (state-owned) commercial banks, joint stock commercial banks (JSCBs), city commercial banks (CCBs), rural commercial banks (RCBs), locally incorporated foreign banks and other financial institutions.

One of the main features of the Chinese banking sector is the dominance of the five largest state-owned commercial banks (SOCBs) (known as the Big Five). These are the Agricultural Bank of China (ABC), the Bank of China (BOC), the China Construction Bank, the Industrial and Commercial Bank of China (ICBC) and the Bank of Communications (BOCOM)³. One of the most important targets of the Chinese authorities is to establish sound corporate governance through the restructuring of the SOCBs. Starting in 2003, the Chinese authorities introduced a partial privatization strategy to encourage the Big Four (later the Big Five) to adopt the shareholding ownership structure. Under this strategy, two approaches were initially undertaken. The first was to sell strategic stakes to foreign investors and the second was to list the banks on foreign and Chinese exchanges. Although a portion of the shares of the Big Five has been transferred to domestic institutions, foreign investors and the public through these measures, the ultimate voting control for the banks remains with the state. Therefore, the government continues to exert significant influence over the lending practices and administration of these banks.

There are currently twelve JSCBs with national operating licences, representing the second tier of Chinese banks. Because the JSCBs were established more recently than the SOCBs, they are not burdened with any historical policy lending (in particular relating to non-performing loans) and,

³ BOCOM used to be classed as a JSCB. However, it is much larger than the other JSCBs, and its share ownership is spread among different state-owned entities. Therefore, in 2006, the CBRC redefined it as a SOCB. Thus, it joined the other four big state-owned banks (previously known as “the Big Four”) to form “the Big Five”. For consistency, we treat BOCOM as a SOCB rather than as a JSCB throughout the entire period of our study.

therefore, tend to be more agile and responsive to market requirements. JSCBs' shares are distributed among the central government, the local government, SOEs, and private and foreign investors⁴. The ownership structure varies widely across JSCBs. In some, such as China Mingsheng Bank and China Zheshang Bank, the majority of the shares are owned by private investors, while in others the majority are held by the state or SOEs. JSCBs are allowed to offer a wide variety of banking services, including accepting deposits, extending loans, and providing foreign exchange and international transaction services. They also regularly finance small and medium-sized enterprises (SMEs), which tend to be ignored by the Big Five.

Since 1995, CCBs – representing the third category of Chinese banks – have been created through the restructuring and consolidation of urban credit cooperatives. Most were originally wholly owned or controlled by local government, the aim being to provide financial support for local economic development. However, since the new millennium, CCBs have gradually been transformed into (private) joint-equity corporations with a more diversified set of shareholders, including the treasuries of local governments, SOEs, private enterprises, foreign investors and individuals. The local government is still the largest shareholder in many CCBs, though. We find that an average of 17.1% of the shares in CCBs was owned by local governments as of 2011. Because of their smaller size, the CCBs have struggled to compete with the Big Five and the JSCBs. However, in recent years, they have made significant progress in upgrading their operational and managerial capabilities, as well as in promoting innovative products and technologies. They have gradually nurtured their own brands and corporate cultures, and have begun to play a pivotal role in underpinning the development of small and micro-enterprises and the consumer finance business.

⁴ SOEs generally invest in JSCBs purely for the expected returns (i.e., dividends and capital gains) and do not engage in management activities.

Starting in 2003, the authorities restructured rural credit cooperatives into RCBs. Over the past few years of development, RCBs have gradually been transformed from policy-driven, rural businesses into market-oriented, urban ones. Following the rapid expansion in recent years, there were 212 RCBs operating in China at the end of 2011, valued at RMB 4.25 trillion, and accounting for 3.75% of the total banking institution assets in the country (CBRC, 2011).

Prior studies on Chinese banks' ownership structure have generally focused on three types of banks in China, namely SOCBs, JSCBs and CCBs (e.g., Garcia-Herrero et al., 2009; Lin and Zhang, 2009; Jia, 2009). However, there are some problems with this classification. For example, China Everbright Bank and China Mingsheng Bank are both categorized as JSCBs, but their ownership structures are very different. The majority of the shares in the former are held by the central government and SOEs, while the latter is fully owned by private investors. In other words, the issued shares could be held by state and private shareholders, or by private ones only, and therefore the category of JSCBs fails to reflect differences in the presence or influence of state shareholders. To address this issue, we classify the banks based on the nature of the largest shareholder, defined as the controlling shareholder that tends to dominate the bank's decision making and control the bank's property by virtue of their superior control rights (see Chen et al., 2009). We classify the Chinese commercial banks into three types, namely GCBs, SOECBs, and PCBs. The GCBs are banks whose largest shareholder is a government agency, such as central or local government, a government bureau, or a state asset operating company. The SOECBs have an SOE as their largest shareholder. For a PCB, the largest shareholder is a private firm, foreign financial institution or individual. Unlike the government agencies, SOEs and private firms are profit-making entities. Our ownership classification better reflects the institutional features of the Chinese banking sector, and in particular captures the influence of the prevailing state-related shareholders in China.

3. Hypothesis Development

3.1 Government-controlled Banks

For historical reasons, a large proportion of Chinese commercial banks are owned or controlled by the state, either directly through central or local government agencies or indirectly through marketized SOEs. These two types of state control are likely to have different impacts on Chinese banks, in particular on their risk-taking behaviour. When a government agency is the controlling shareholder of a bank, its board of directors and senior officers will generally be appointed or approved by the government⁵. Moreover, the promotions and rewards granted to this type of bank's senior managers largely depend on how well they carry out the instructions of the central or local government, and less on the creation of bank value (Chen et al., 2009; Cao et al., 2009). The officials do not bear the consequences of any inappropriate decisions they make. Therefore, senior officers have less incentive to monitor the banks and may not fully comply with prudent bank management practices. The strategies and operations of government-controlled banks are more likely to be subject to political intervention as they generally serve as policy-lending conduits through which the government provides loans to SOEs⁶. Thus, the incentives to follow prudential risk management rules and to adhere to commercial objectives are weak for GCBs.

We find that the total loans issued by Chinese banks grew by 95.3% in 2009, hitting a record high of RMB 9,590 billion, as part of the Chinese economic stimulus programme, and the majority of these bank loans were lent by the state-controlled commercial banks and driven mainly by the policy directives of the central and local government (CBRC, 2010). As Greenwald and Stiglitz (1993) point out, the granting of enormous policy-directed loans during an economic downturn is likely to increase the riskiness of state-controlled banks. Furthermore, government-controlled commercial banks generally enjoy the advantage of either implicit or explicit financial and regulatory support

⁵ The senior bank officers of government-controlled banks are generally members of the Chinese Communist Party. They are also likely to rank highly in the Chinese government's hierarchy (Martin, 2012).

⁶ According to Article 34 of the Commercial Banking Law, a commercial bank shall conduct its loan business in accordance with the need for the development of the national economy and social progress under the guidance of the state industrial policy.

from the government (Faccio et al., 2006). For example, we find that, as part of its efforts to rescue the major state-owned banks, the State Council transferred around RMB 1,245 billion in non-performing loans from the Big Five banks to asset management companies set up by the government during 2003-2005 (Okazaki, 2007). This governmental protection encourages bankers to take excessive risks as the losses and excess costs are invariably covered by the government (Demirgüç-Kunt and Detragiache, 2002).

3.2 SOE-controlled Banks

SOE controlling shareholders are different from government controlling shareholders in many respects. First, SOECBs are more empowered and have greater autonomy as there is less interference from the government (Martin, 2012). Unlike in the case of GCBs, the boards of directors and senior officers of SOECBs are appointed by SOE controlling shareholders rather than being directly appointed by the Organization Department of the Communist Party. Chinese SOEs have become market-oriented and responsible for their own gains and losses since the third round of reforms (Delios et al., 2006). Thus, SOE controlling shareholders are motivated to appoint good managers and to monitor them to ensure that the banks they control operate in a safe and sound manner. Second, SOECBs have strong financial constraints and do not receive as much financial support from the state as GCBs. Therefore, they have greater incentives to pursue profit-maximizing strategies and to exercise prudential lending standards than do GCBs. Finally, SOECBs generally adopt performance-related compensation systems, with the top executives given sufficient incentives to do a good job through monetary rewards. In 2011, for example, the annual report of China CITIC bank, a SOECB, showed an annual CEO remuneration of 49.618 million Yuan, 4.5 times higher than the CEO's annual remuneration at ICBC, the biggest GCB.

3.3 Privately Controlled Banks

The third type of controlling shareholder is the private shareholder. Generally, banks controlled by private shareholders (PCBs) are more profit-motivated than either of the previous two types (GCB and SOECB). Private controlling shareholders are likely to select senior managers with a detailed knowledge of the banking industry and the capability to maximize the wealth of the shareholders. Moreover, unlike SOECBs or GCBs, PCBs face the threat of a hostile takeover or bankruptcy because of the lack of implicit government guarantees. These traits provide a natural incentive for the managers of private banks to install more efficient and prudent operating procedures than may be seen in their state-owned counterparts (Berglöf and Roland, 1998; Sheshinski and Lopez-Calva, 2003). However, PCBs may still allocate loans and resources in ways that deviate from optimal business practices. They may also face pressure from their private shareholders to provide preferential treatment to their companies, families and/or related companies⁷.

3.4 Ownership Concentration

We argue that the degree of ownership concentration also has a significant impact on banks' risk-taking behaviour. Ownership concentration refers to the distribution of the ownership among different institutions and individuals, and is related to the shareholders' controlling power. The previous literature (e.g., Iannotta et al., 2007; Shehzad et al., 2010; Azofra and Santamaría, 2011) suggests that the ownership concentration could significantly affect a bank's performance and riskiness. According to Shleifer and Vishny (1986) and Edwards and Nibler (2000), concentrated ownership enhances corporate control by improving the monitoring of management. Moreover, dispersed ownership may prevent efficient decision making (Shehzad et al., 2010) and create a free-rider problem in corporate control (Gorton and Schmid, 1999). However, greater ownership

⁷ Some of the private shareholders or related companies are SMEs, which are generally difficult to appraise, light on assets and quick to capsize when economic winds change. Therefore, they are perceived as higher risk than larger companies such as SOEs (Martin, 2012).

concentration may not reduce a bank's riskiness because the interests of the large shareholders may conflict with those of the minority ones (Gomes and Novaes, 2005).

4. Research Design

4.1 Data and Sample Selection

To investigate the impact of ownership structure on banks' risk taking, we construct our sample from two sources. We hand-collect the detailed information about the banks' ownership structures and corporate governance, such as the percentage of ownership held by the top ten shareholders or the independence of the risk committee, from the banks' annual reports⁸. The bank-specific accounting data are extracted from the BankScope database and from the banks' annual reports. After eliminating observations with missing values, our final sample comprises 667 yearly observations covering 108 Chinese commercial banks over the period from 2003 to 2011. The sample includes the five large SOCBs, 12 JSCBs, 84 CCBs and 7 RCBs, and represents about 74% of the total assets of Chinese banking institutions at the end of 2011. We explore two major dimensions of ownership structure, namely owner identity and ownership concentration. These two categories of ownership measures incorporate both the owners' incentives and the controlling power of the shareholders. Table 1 shows the ownership structures of the banks in our sample over the period 2003-2011. Based on the detailed ownership data, we categorize the banks – based on the identity of the controlling (largest) shareholder – into three types, namely 349 banks controlled by the state (GCBs), 170 banks controlled by SOEs (SOECBs) and 148 controlled by private shareholders (PCBs).

[Insert Table 1 about here]

⁸ In recent years, most Chinese commercial banks have complied with the People's Bank of China's 2002 Provisional Rules on the Information Disclosure of Commercial Banks, which require banks to disclose financial statements and provide information on their corporate governance and risk management activities in their annual reports. The annual reports are either published on the banks' websites or are available upon request.

4.2 Empirical Models

We employ three proxies to measure the risk taking of Chinese banks. The Z-score, proposed by Boyd and Graham (1986), equals the return on assets (ROA) plus the capital to assets ratio (E/A) divided by the standard deviation of asset returns ($\sigma(\text{ROA})$). It measures the distance to default since it is the inverse of the probability that losses exceed bank capital (i.e., $\text{prob}(-\text{ROA} < E/A)$). A higher Z-score indicates that a bank is more stable and less risky. Since the Z-score is highly skewed, we use its natural logarithm to smooth out the skewness (Laeven and Levine, 2009). The Z-score is commonly used in the literature to measure bank risk (e.g., Laeven and Levine, 2009; Angkinand and Wihlborg, 2010; Demirgüç-Kunt and Huizinga, 2013; Barry et al., 2011).

We also use the non-performing loan ratio (NPL) and the capital adequacy ratio (CAR) by following Demirgüç-Kunt et al. (2006), Shehzad et al. (2010), and Delis and Kouretas (2011). The NPL, calculated as the ratio of non-performing loans to total loans, reflects the quality of a bank's assets⁹. Because non-performing loans cause losses for banks, a higher NPL is associated with higher credit risk (Delis and Kouretas, 2011). The CAR is the ratio of a bank's capital to its risk-weighted assets. The level of bank equity provides a cushion against its portfolio losses and financial distress. Therefore, the CAR is closely related to a bank's insolvency risk (see Mester, 1997; Berger and Mester, 1997; Hughes and Mester, 2012). Moreover, lower capitalization also reflects more severe agency problems between shareholders and managers, and implies higher-risk bank strategies (Shehzad et al., 2010).

⁹ According to the five-category loan classification system that was adopted by Chinese banks in 2002, performing loans include normal and special mention loans and non-performing loans consisting of sub-standard, doubtful and loss loans.

To examine the impact of ownership structure and risk management-related governance factors on the risk taking of banks in China, we use the following model¹⁰:

$$BRT_{it} = \alpha + \beta_1 SOECB_{it} + \beta_2 PCB_{it} + \gamma CONC_{it} + \sum_k \delta_k CONTROL_{it}^k + \varepsilon_{it} \quad (1)$$

where the dependent variable BRT is one of the three bank risk-taking measures: the natural logarithm of the Z-score (LnZ-score), the NPL, or the risk-weighted CAR. The dummy variable SOECB is set equal to 1 for banks whose controlling shareholder is an SOE and 0 otherwise. PCB is set equal to 1 for banks whose controlling shareholder is a private entity or individual, and 0 otherwise. The GCBs serve as the benchmark and omitted category. Because they can obtain political and financial support in the event of a financial crisis, we hypothesize that GCBs will take more risks than other types of banks. We therefore expect the coefficients on SOECB and PCB to be significantly positive in the Z-score and CAR regressions, and significantly negative in the regression model for the NPL. CONC denotes one of the two measures of ownership concentration, namely the ownership Herfindahl-Hirschman index (HHI) or the top three shareholders' concentration ratio (CR3). The HHI equals the sum of the squared ownership shares of the ten largest shareholders of the bank (Demsetz and Lehn, 1985; Hou et al., 2013). The higher is the value of the HHI, the more concentrated is the ownership of the bank. The CR3 variable is defined as the sum of the percentages of shares owned by the largest three shareholders and is used as an alternative ownership concentration measure in the robustness checks (Demsetz and Villalonga, 2001; Omran, 2009).

¹⁰ The models are estimated using ordinary least squares (OLS). However, in robustness checks, we also employ the system Generalised Method of Moments (GMM) to address potential endogeneity problems. Details of the GMM estimation results are given in Section 5.2.

CONTROL denotes a set of control variables including governance, bank-specific and macroeconomic variables that may affect a bank's risk-taking behaviour. We incorporate a dummy variable to capture whether the bank's CRO, who oversees all relevant bank risk, is a member of the executive team and, if this is the case, we expect them to have greater authority and influence to reduce the amount of risk a bank takes (Mongiardino and Plath, 2010; Aebi et al., 2012). We define the risk management committee's independence based on whether the committee's chair is an independent board member (Ellul and Yerramilli, 2012; Aebi et al., 2012), and expect that independent status could enhance the transparency of the bank's risk management information. We also use the proportion of female directors on a bank's board to explore whether a higher representation of women in the board reduces the amount of risk a bank takes (e.g., Almazan and Suarez, 2003; Fields et al., 2012; Berger et al., forthcoming; Pathan, 2009).

With regard to other control variables, bank size is measured by the natural logarithm of the bank's total assets (Laeven and Levine, 2009; Delis and Kouretas, 2011). Large banks could be less risky due to their greater ability to diversify risk across product lines, or they could be more risky due to the implicit assumption that they are "too-big-to-fail" (Demirgüç-Kunt and Huizinga, 2013; Brown and Dinç, 2011). The cost-to-income ratio, defined as the ratio of total expenses to operating income (interest and non-interest income), reflects operations both on and off the balance sheet. It is expected to be negatively related to a bank's risk because less efficient banks are likely to take on greater risk to generate profits (Boyd et al., 2006; Agoraki et al., 2011). The ratio of total loans to total deposits assesses the extent to which customer loans are financed by customer deposits, and is related to the bank's liquidity. As diversification may be related to a bank's risk level, we control for the banks' diversification activities using Laeven and Levine's (2007) asset diversity measure (as defined in the appendix). Berger et al. (2009) and Hasan and Xie (2012) suggest that foreign strategic investment improves the corporate governance of Chinese banks and reduces their risk

taking. We use a dummy variable to capture whether a bank has foreign strategic investment, and expect that it will help a bank to control its risk. At the macroeconomic level, we include the real GDP growth rate to control for the general economic environment in China over the sample period, and a dummy variable for the recent financial crisis (years 2008-2011) to capture its impact (Aebi et al., 2012; DeYoung et al., 2013). The appendix presents a summary of the variable definitions and data sources.

We also argue that the impact of ownership concentration on banks' risk-taking behaviour is conditional on the various types of controlling shareholders, i.e., the type of the controlling shareholder affects the relation between risk taking and the degree of ownership concentration. To explore this issue, we use the following regression model:

$$\begin{aligned} \text{BRT}_{it} = & \alpha + \beta_1 \text{SOECB}_{it} + \beta_2 \text{PCB}_{it} + \gamma_1 \text{CONC}_{it} + \gamma_2 \text{CONC}_{it} \times \text{SOECB}_{it} \\ & + \gamma_3 \text{CONC}_{it} \times \text{PCB}_{it} + \sum_k \delta_k \text{CONTROL}_{it}^k + \varepsilon_{it} \end{aligned} \quad (2)$$

which contains two interaction terms: the products of ownership concentration (CONC) with the ownership type dummy variables SOECB and PCB, respectively. The other variables are as defined previously. If the coefficients of the interaction terms, γ_2 and γ_3 , are statistically significant, this will suggest that the impact of ownership concentration on risk taking varies across ownership type.

Finally, we explore whether the ownership of the largest shareholder has a non-monotonic impact on the bank's risk-taking activity. On the one hand, a controlling shareholder with a greater proportion of shares in a bank would have a stronger incentive and more power to monitor the management and thus reduce the amount of risk the bank takes. On the other hand, a very dominant shareholder may be able to expropriate funds from the bank it controls, increasing the risk for the bank. Some studies in the literature argue that ownership concentration above a certain level allows

larger shareholders to become entrenched and expropriate the wealth of minority shareholders (e.g., Chen et al., 2006; Wei et al., 2005; Loderer and Martin, 1997; Gul et al., 2010). Therefore, there could be a non-linear relation between ownership concentration (the ownership held by the largest shareholder) and bank risk taking. To explore such possibilities, we use the following regression model:

$$\begin{aligned} \text{BRT}_{it} = & \alpha + \beta_1 \text{GCO}_{it} + \beta_2 \text{SOECO}_{it} + \beta_3 \text{PCO}_{it} + \beta_4 \text{GCO}_{it}^2 + \beta_5 \text{SOECO}_{it}^2 + \beta_6 \text{PCO}_{it}^2 \\ & + \sum_k \delta_k \text{CONTROL}_{it}^k + \varepsilon_{it} \end{aligned} \quad (3)$$

where GCO, SOECO and PCO represent the percentage of shares held by the controlling shareholder in GCBs, SOECBs, and PCBs respectively. If the coefficients of the squared terms of each the ownership variables, β_4 , β_5 and β_6 , are statistically significant, this will suggest a non-linear effect of the ownership of the controlling shareholder.

4.3 Descriptive Statistics

Table 3 shows summary statistics for the variables used in the study. The mean (median) of the Z-score is 14.73 (12.24), which is comparable with the figure given by Zhang et al. (2012). The mean (median) NPL is 2.62% (1.46%), with a large degree of variation across banks. The CAR ranges from 52.15% and -21.70%, with an average of 11.52%. Regarding the ownership variables, the average value of the state-controlled banks is 0.5232, indicating that the state is the largest single shareholder in about 52.32% of cases. In our sample, 25.49% and 22.18% of banks are controlled by SOEs and private entities, respectively. 29.53% of our sample banks have strategic foreign investment. The mean (median) of the HHI is 0.1393 (0.0700). The mean (median) of the percentage of shares owned by the top three shareholders is 42.4% (37.46%), indicating a strong ownership concentration in the Chinese banking sector. With regard to the control variables, we find that 12.14% of the banks in our sample have a CRO in their executive team. This figure is comparable to

the figure reported in Aebi et al. (2012) using US data. About 17.69% of the banks in our sample have an independent risk committee. The proportion of female directors is about 10%, which is slightly higher than the figure for US bank holding companies as reported in Pathan and Faff (2013). Finally, only 4.4% of the banks in our sample are listed on stock exchanges.

[Insert Table 2 about here]

5. Empirical Analysis

5.1 OLS Estimation Results

Table 3 presents the regression results from using the natural logarithm of the Z-score as the dependent variable (a higher value of the Z-score indicates less risk taking). All the models are estimated by OLS techniques with clustering at the bank level. Robust standard errors are used to correct potential heteroskedasticity and potential time series autocorrelation within each bank. Column 1 reports the results of Equation 1. The coefficients on SOECB and PCB are significantly positive, indicating that banks controlled by SOEs and private investors tend to take less risk than banks controlled by government agencies. The coefficient on HHI is significantly negative (-0.2764) suggesting that higher ownership concentration could promote risk taking. Furthermore, we find the coefficient on CRO to be significantly positive, indicating that CROs at the executive level help banks to improve their risk control. The coefficient on board gender diversity (FEMALE) is significantly positive, suggesting that including more female directors on boards could help to restrain risk-taking behaviour. Our findings support those of Almazan and Suarez (2003) and Farrell and Hersch (2005). The independence of the risk committee (IRMC) is found to have no impact on the Z-score. Regarding other control variables, the coefficients are significant and negative for bank size (LnTA) and the cost-to-income ratio (EFFICIENCY), showing that larger and more inefficient banks tend to take more risks. The coefficients are significant and positive for the period following the start of the global financial crisis (Post-GFC) and for the banks' listing status dummy, indicating that banks tend to have taken less risk since the global financial crisis, and tend to do so after obtaining a listing (presumably because of market discipline and scrutiny).

As reported for regression 2, the coefficients on HHI*SOECB and HHI*PCB are both significantly positive, showing that concentrated ownership in SOECBs and PCBs enhances risk

control. This is in line with the literature stating that blockholders help to enhance governance quality (e.g., Shleifer and Vishny, 1986; Shehzad et al., 2010). Notably, the coefficient on PCB becomes insignificant in regression 2, implying that the impact of private controlling shareholders in reducing risks is only documented among banks with concentrated ownership. In regressions 3 and 4, we use the ownership ratio of the top three shareholders (CR3) to replace HHI as a robustness check and find that the results remain consistent.

[Insert Table 3 about here]

Table 4 presents the results of the regressions using the NPL as the dependent variable (a lower value of the NPL indicates less risk taking). The coefficients on SOECB (-0.0105) and PCB (-0.0104) are negative, and statistically and economically significant as shown in regression 1. For a typical bank with the median level of non-performing loans (1.46%), the NPL decreases by around 70% to 0.41% when the controlling shareholder in a GCB is replaced by either a SOE or private entity. This is consistent with our prediction that the SOECBs and PCBs tend to take less risk than the GCBs. The coefficients on the ownership concentration measures, HHI and CR3, are significantly positive across all models. The results are also economically significant, suggesting that banks with concentrated ownership tend to pursue risk-taking activities.

When we incorporate the interaction terms between the controlling shareholder's identity and ownership concentration, in regressions 2 and 4, the significant and negative coefficients show that a higher degree of ownership concentration further reduces the non-performing loans of SOECBs and PCBs, leading to higher asset quality. Since the coefficients on SOECB and PCB become insignificant in regressions 2 and 4, we can state that the private and SOE controlling shareholders' impact on reducing risk taking is only pronounced in banks with concentrated ownership. Finally,

the coefficients on IRMC, CRO and FEMALE are negative and significant, showing that the independence of the risk committee, the presence of the CRO on the executive team, and a greater number of women on the board all help improve banks' risk management and reduce their non-performing loans.

[Insert Table 4 about here]

Table 5 presents the results based on the third measure of risk taking, CAR. A higher value of CAR indicates less risk taking. The coefficients on SOECB are significantly positive in regressions 1, 3 and 4, while the coefficients on PCB are not significant. This indicates less risk taking in SOECBs, but not in PCBs, when compared with the GCBs. The coefficients on HHI and CR3 are statistically significant and negative, showing that concentrated ownership helps to increase CAR. When the interaction terms between the controlling shareholder's identity and ownership concentration are incorporated in regressions 2 and 4, the coefficients on HHI*SOECB and CR3*SOECB are significant and positive, while those on SOECB itself become insignificant. This shows that the positive impacts of SOE controlling shareholders in increasing CAR and reducing risk are only pronounced among banks with concentrated ownership. Similarly, we find that the coefficients on HHI*PCB are positive and statistically significant at the 5% level, suggesting that the PCBs with concentrated ownership tend to take less risk than those with dispersed ownership.

[Insert Table 5 about here]

Table 6 reports the results of Equation 3, which examines how the ownership ratios of various types of controlling shareholder affect the banks' risk-taking behaviour. For each of the risk measures, we run two types of OLS regression, one (regressions 1, 3 and 5) intended to capture the

linear impact, and one (columns 2, 4 and 6) intended to capture the non-linear impact by including the squared terms GCO^2 , $SOECO^2$, and PCO^2 . The coefficients on GCO are significantly positive in the regression of NPL (regression 3) and negative in the regression of CAR (regression 5), suggesting that the higher is the ownership ratio of the government controlling shareholder, the higher are the risks taken by the bank. In regressions 4 and 6, the coefficients on the quadratic terms (GCO^2) are statistically significant and positive, while the coefficients on the level terms (GCO) become insignificant. The results suggest that, when the governmental controlling shareholder holds a low share of total ownership, they do not significantly affect the bank's risk-taking behaviour. However, an increase in their ownership concentration may create control ambitions and the capability for them (as the controlling shareholder) to expropriate minority shareholders by taking extra risks. In addition, we find that the coefficients on $SOECO$ are statistically significant but those of $SOECO^2$ are not, suggesting a linear relationship between a controlling SOE shareholder's ownership concentration and a bank's risk taking. Higher ownership concentration increases the incentive and power for a controlling SOE shareholder to monitor management and reduce a bank's risk taking: the larger is the ownership of such a shareholder, the less risk the bank will take. Regarding private controlling ownership, we find that the coefficients on the quadratic terms (PCO^2) are statistically significant and positive only in the Z -score model, suggesting that high levels of ownership by such shareholders help banks to control their risks in terms of the Z -score. Finally, the results also show that foreign ownership could reduce banks' risk taking.

[Insert Table 6 about here]

5.2 Robustness Checks

This section aims to address endogeneity concerns. We first argue that our setting is unlikely to be subject to the endogeneity problem because the type of the controlling shareholder of Chinese

banks is exogenously determined by the Chinese regulatory authorities according to the reform agenda and relevant policies. However, as a robustness check, we apply the system GMM to further mitigate endogeneity concerns. The system GMM estimation results for Equation 1 are presented in Table 7. The results show that SOECBs tend to take less risk than GCBs, and concentrated ownership leads to more risk-taking behaviour. PCBs also tend to control the risk by reducing the amount of non-performing loans. Overall, the GMM results are generally consistent with the main findings¹².

[Insert Table 7 about here]

6. Conclusion

The “Principles for enhancing sound corporate governance” issued by the BCBS (2010) highlighted the possibility of inappropriate influence from the controlling shareholders of banks, and the serious consequences on the economy of excessive risk taking by banks. Additionally, the ongoing reform in the banking sector in China is largely focused on ownership structure in order to improve the efficiency and prudence of Chinese banks. To shed light on this interesting yet under-researched issue, our study examines how ownership structure and risk management-related corporate governance influence the risk-taking behaviour of Chinese banks. Based on the type of the controlling shareholder, we classify Chinese commercial banks into government-controlled, SOE-controlled and privately controlled banks. Our empirical results show that SOECBs and PCBs take less risk than GCBs. The results support our argument that the incentives to engage in prudent lending practices and to adhere to commercial objectives are weak for banks controlled by the government. We also find that the reduction of risk by the SOE and private controlling shareholders is more pronounced in banks with concentrated ownership.

¹² The untabulated GMM estimation results for Equations 2 and 3 are consistent with our main findings and are available upon request.

Our findings should have relevance for the work of policy makers. Market-oriented SOEs seem to be more efficient as controlling shareholders of firms in countries with weak institutional environments (Stiglitz, 1999). Therefore, an important policy implication of this study is that the Chinese government should continue to transfer its bank ownership to marketized SOEs, as this is helping to improve the stability of the Chinese banking system. Secondly, because concentrated ownership has been found to further promote risk control in SOECBs and PCBs, Chinese banking regulators should be cautious about the dispersed ownership of banks. In the weak governance environment of China, investors with a low ownership share could find it difficult to exert an impact on bank management. Finally, this study finds evidence that listing banks on the stock market could enhance their governance procedures and reduce their risk taking. Chinese authorities should encourage banks to list on the stock exchanges, which exert effective discipline over banks' management, in turn restraining bankers from taking excessive risks.

Appendix: Definition of Variables and Data Sources

Variables	Definition
Z-score	$\frac{ROA + E/TA}{\sigma(ROA)}$, where ROA is return on assets, E/TA is the ratio of equity to total assets and $\sigma(ROA)$ is the standard deviation of the return on assets.
Non-performing loan ratio (NPL)	Ratio of non-performing loans to total loans
Capital adequacy ratio (CAR)	Risk-weighted capital adequacy ratio
Bank size (lnTA)	Log of total assets of a bank
Cost /Income (EFFICIENCY)	Ratio of total costs to total income
Asset diversity (ADIV)	$1 - \left \frac{Net\ loans - Other\ earning\ assets}{Total\ earning\ assets} \right $
Loans/deposits (TL/TD)	Ratio of total loans to total funding
Listing status (LIST)	A dummy variable equal to 1 if a bank has been listed as of the end of the year and 0 otherwise
Economic growth (GDP %)	Annual growth rate of GDP
Post-global financial crisis (Post-GFC)	A dummy variable equal to 1 for the period following the start of the global financial crisis (2008-2011) and 0 otherwise
Government-controlled banks (GCBs) (omitted)	A dummy variable equal to 1 if the biggest shareholder is a state bureau or a state asset operating company and 0 otherwise
SOE-controlled banks (SOECBs)	A dummy variable equal to 1 if the biggest shareholder is a state-owned enterprise (SOE) and 0 otherwise
Privately controlled banks (PCBs)	A dummy variable equal to 1 if the biggest shareholder is a private firm or individual and 0 otherwise
Foreign strategic investment (FSI)	A dummy variable equal to 1 if a bank has foreign strategic investment and 0 otherwise
Government-controlled ownership (GCO)	The percentage of shares owned by a state bureau or a state asset operating company if that owner is the largest shareholder
SOE-controlled ownership (SOECO)	The percentage of shares owned by a SOE if that owner is the largest shareholder
Privately controlled ownership (PCO)	The percentage of shares owned by a private company (or an individual) if that owner is the largest shareholder
Foreign strategic ownership (FSO)	The percentage of shares owned by foreign strategic investors
Herfindahl index (HHI)	Herfindahl index based on the ownership held by the ten largest shareholders of the bank
Ownership concentration ratio (CR3)	The percentage of shares owned by the top three shareholders
CRO on the executive team (CRO)	A dummy variable equal to 1 if the Chief Risk Officer (CRO) is a member of the executive team and 0 otherwise
Independent risk management committee (IRMC)	A dummy variable equal to 1 if the chair of the committee is an independent director and 0 otherwise
% Female directors (FEMALE)	The proportion of female directors on the board

Table 1 The ownership structure of Chinese banks, 2003-2011

	State control (Obs.349)				SOE control (Obs.170)				Private control (Obs.148)				ALL (Obs.667)			
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Largest shareholder	0.2730	0.2230	0.042	1	0.2279	0.1549	0.0644	0.87	0.1802	0.1687	0.0481	0.9075	0.2409	0.1993	0.042	1
Second shareholder	0.1085	0.0761	0	0.5	0.1287	0.0563	0.0459	0.2667	0.0959	0.0454	0.0054	0.2267	0.1109	0.0665	0	0.5
Third shareholder	0.0679	0.0338	0	0.1935	0.0795	0.0382	0.0125	0.2	0.0728	0.035	0.0049	0.1778	0.0720	0.0355	0	0.2
Ownership of top three shareholders	0.4495	0.2255	0.0707	1	0.4362	0.1789	0.1616	0.9785	0.3490	0.1653	0.1269	0.9194	0.4238	0.2058	0.0707	1
HHI	0.1593	0.2138	0.0033	1	0.1166	0.1251	0.0141	0.7598	0.0936	0.1549	0.0097	0.8237	0.1338	0.1842	0.0033	1
Total ownership by all blockholders	0.5401	0.2379	0	1	0.5253	0.2258	0.0644	1	0.4623	0.2315	0	0.9075	0.5191	0.2352	0	1
No. of blockholders	4.0516	2.3825	0	10	4.0647	1.8024	1	9	4.3378	2.5270	0	10	4.1184	2.2867	0	10

Notes: This table shows the percentage of a bank's share capital owned by the largest, second largest, third largest, and largest three shareholders. HHI is the Herfindahl index, which is based on the ownership held by the ten largest shareholders of the bank. Blockholders are defined as shareholders that hold 5% or more of the shares of a bank.

Table 2 Summary sample statistics

	Mean	Median	STDEV.	Min.	Max.
Z-score	14.7296	14.2411	5.4247	0.0400	36.6580
Non-performing loan ratio (NPL)	0.0262	0.0146	0.0359	0.0000	0.3066
Capital adequacy ratio (CAR)	0.1152	0.1162	0.0508	-0.2170	0.5215
Bank size (lnTA)	4.8673	4.6654	0.7927	3.3287	7.1760
Cost /Income (EFFICIENCY)	0.6048	0.5986	0.0935	0.32038	1.0738
Asset diversity (ADIV)	0.6468	0.6359	0.1864	-0.0553	1.0000
Loans/deposits (TL/TD)	0.6478	0.6667	0.1178	0.2062	0.9259
Listed bank (LIST)	0.0439	0.0000	0.0778	0.0000	1.0000
Economic growth (GDP)	0.1070	0.1040	0.0170	0.0920	0.1420
Post-global financial crisis (Post-GFC)	0.6192	1.0000	0.4859	0.0000	1.0000
Government-controlled banks (GCBs)	0.5232	1.0000	0.4998	0.0000	1.0000
SOE-controlled banks (SOECBs)	0.2549	0.0000	0.4369	0.0000	1.0000
Privately controlled banks (PCBs)	0.2218	0.0000	0.4158	0.0000	1.0000
Foreign strategic investment (FSI)	0.2953	0.0000	0.4565	0.0000	1.0000
Ownership ratio of the controlling government shareholder (GCO)	0.2730	0.0700	0.2230	0.042	1
Ownership ratio of the controlling SOE shareholder (SOECO)	0.2279	0.0000	0.1549	0.0644	0.87
Ownership ratio of the controlling private shareholder (PCO)	0.1802	0.0000	0.1802	0.1687	0.0481
Herfindahl index (HHI)	0.1339	0.0731	0.1842	0.0033	1.0000
Ownership concentration ratio (CR3)	0.4240	0.3746	0.2061	0.0070	1.0000
CRO on executive team (CRO)	0.1214	0.0000	0.3268	0.0000	1.0000
Independent risk committee (IRMC)	0.1769	0.0000	0.3819	0.0000	1.0000
% Female directors (FEMALE)	0.0977	0.0800	0.0927	0.0000	0.4286

Note: all variables are defined in the appendix.

Table 3 The impact of ownership structure on the Z-score

Dependent variable (ln Z-score)	(1)	(2)	(3)	(4)
Constant	5.0929*** (16.19)	4.9384*** (16.85)	5.1047*** (17.39)	4.7383*** (18.83)
Ln(TA)	-0.2851*** (-3.85)	-0.2555*** (-3.55)	-0.2853*** (-3.96)	-0.2780*** (-3.76)
EFFICIENCY	-1.4722*** (-6.57)	-1.4991*** (-6.79)	-1.470*** (-6.78)	-1.4745*** (-5.63)
ADIV	0.2113 (1.04)	0.2103 (0.99)	0.2108 (1.06)	0.1462 (0.90)
TL/TD	0.1702 (0.86)	0.2595 (1.29)	0.1663 (0.87)	0.0995 (0.48)
GDP growth	-5.6249*** (-4.95)	-5.504*** (-4.85)	-5.6229*** (-5.36)	-5.7084*** (-5.63)
FSI	-0.0105 (-0.09)	-0.0165 (-0.14)	-0.0089 (-0.07)	-0.0314 (-0.25)
LIST	0.2855* (1.70)	0.2630 (1.51)	0.2845* (1.66)	0.4106** (2.11)
Post-GFC	0.2048*** (3.36)	0.2402*** (3.34)	0.2084*** (3.23)	0.1255*** (2.59)
SOECB	0.0368** (2.53)	0.0432* (1.69)	0.0587*** (2.97)	0.0603** (2.10)
PCB	0.0303* (1.92)	0.0218 (1.42)	0.0197 (1.48)	0.0113 (1.36)
HHI	-0.2764** (-2.05)	-0.2357* (-1.86)		
CR3			-0.3182* (-1.80)	-0.2451* (-1.69)
IRMC	0.0649 (0.99)	0.0532 (0.80)	0.0665 (0.95)	0.0929 (1.51)
CRO	0.2243** (2.49)	0.2246** (2.52)	0.2258** (2.50)	0.1754** (2.62)
FEMALE	0.5199** (2.01)	0.5129* (1.95)	0.5236** (1.99)	0.4835* (1.79)
HHI*SOECB		0.8675* (1.74)		
HHI*PCB		0.5877** (1.99)		
CR3*SOECB				0.6879** (2.32)
CR3*PCB				0.4168** (2.02)
No. of observations	667	667	667	667
R ²	0.2070	0.2141	0.2081	0.2336
F-statistic	10.67	9.46	10.63	9.52

Notes: This table reports the results from ordinary least squares (OLS) regressions with clustering at the bank level. All variables are defined in the appendix. Numbers in parentheses are t-statistics, computed using heteroskedasticity-robust standard errors. *, ** and *** indicate estimations that are significant at the 10%, 5% and 1% levels, respectively.

Table 4 The impact of ownership structure on the non-performing loan ratio

Dependent variable (NPL)	(1)	(2)	(3)	(4)
Constant	-0.1185*** (-3.52)	-0.1076*** (-3.86)	-0.1511*** (-3.09)	-0.1505*** (-3.23)
Ln(TA)	0.0189** (2.03)	0.0077* (1.79)	0.0172** (2.14)	0.0150 (2.14)
Efficiency	0.1193*** (5.19)	0.1213*** (5.39)	0.1268*** (4.77)	0.1304*** (4.80)
ADIV	-0.0066 (-0.49)	0.0037 (-0.31)	-0.0109 (-0.79)	-0.0083 (-0.132)
TL/TD	0.0216 (1.25)	0.0167 (0.97)	0.0168 (1.02)	0.0173 (1.01)
GDP growth	0.1869** (2.29)	0.1773** (2.13)	0.2344** (2.13)	0.2171** (2.47)
FSI	-0.0011 (-0.20)	-0.0021 (-0.43)	-0.0056 (-0.87)	-0.0048 (-0.79)
LIST	-0.0174** (-2.24)	-0.0170** (-2.26)	-0.0223** (-2.33)	-0.0231** (-2.40)
Post-GFC	-0.0045* (-1.68)	-0.0049* (-1.69)	-0.0038* (-1.93)	-0.0043* (1.70)
SOECB	-0.0105*** (-2.69)	-0.0051 (-1.24)	-0.0123*** (-2.98)	0.0054 (0.60)
PCB	-0.0104* (-1.92)	-0.0039 (-0.89)	-0.0107** (-2.20)	0.0076 (0.63)
HHI	0.0495* (1.78)	0.0789** (2.18)		
CR3			0.0298** (1.97)	0.0347* (1.80)
IRMC	-0.0153*** (-3.09)	-0.0142*** (-3.14)	-0.0173*** (-2.83)	-0.0172*** (-2.83)
CRO	-0.0092** (-2.31)	-0.015** (-2.55)	-0.0094** (-2.36)	-0.0089** (-2.45)
FEMALE	-0.0381* (-1.76)	-0.0299 (-1.55)	-0.0423* (-1.82)	-0.0376* (-1.73)
HHI*SOECB		-0.0887** (-2.00)		
HHI*PCB		-0.1086*** (-2.75)		
CR3*SOECB				-0.0370* (-1.83)
CR3*PCB				-0.0486** (-2.28)
No. of observations	667	667	667	667
R ²	0.3456	0.3874	0.3129	0.3219
F-statistic	5.38	4.81	4.96	4.32

Notes: This table reports the results from ordinary least squares (OLS) regressions with clustering at the bank level. All variables are defined in the appendix. Numbers in parentheses are t-statistics, computed using heteroskedasticity-robust standard errors. *, ** and *** indicate estimations that are significant at the 10%, 5% and 1% levels, respectively.

Table 5 The impact of ownership structure on the capital adequacy ratio

Dependent variable (CAR)	(1)	(2)	(3)	(4)
Constant	0.3898*** (8.76)	0.3653*** (10.01)	0.4182*** (6.97)	0.4068*** (7.20)
Ln(TA)	-0.0249*** (-3.77)	-0.0201*** (-4.11)	-0.0308** (-3.20)	-0.0267** (-3.22)
Efficiency	-0.1382*** (-4.51)	-0.1425*** (-4.66)	-0.1455*** (-4.29)	-0.1516*** (-4.37)
ADIV	0.0320** (2.04)	0.0559*** (-2.70)	0.0362** (2.21)	0.0359** (2.26)
TL/TD	-0.0698*** (-3.43)	-0.0687*** (-3.25)	-0.0645*** (-3.39)	-0.0571*** (-2.92)
GDP growth	-0.5659*** (-5.19)	-0.541*** (-5.29)	-0.6111 (-5.05)	0.5843*** (-4.99)
FSI	0.0088 (1.39)	0.0079 (1.26)	0.0128* (1.71)	0.0113 (1.60)
LIST	0.0283*** (2.83)	0.0246*** (2.73)	0.337*** (2.82)	0.0340*** (2.90)
Post-GFC	0.0092** (2.10)	0.0105** (2.41)	0.0126** (2.24)	0.0908* (1.85)
SOECB	0.0139** (2.03)	0.0028 (0.41)	0.0126** (1.97)	0.0197* (1.76)
PCB	0.0032 (0.65)	-0.0032 (-0.72)	0.0038 (0.86)	-0.0156 (-1.30)
HHI	-0.0645** (-1.98)	-0.0749** (-2.02)		
CR3			-0.0366* (-1.73)	-0.0371* (-1.80)
IRMC	0.0122* (1.79)	0.0102 (1.63)	0.0137* (1.78)	0.0120 (1.55)
CRO	0.0172** (2.94)	0.0182*** (2.99)	0.0171*** (3.04)	0.0167*** (3.11)
FEMALE	0.0496* (1.87)	0.0422* (1.70)	0.0528* (1.86)	0.0486* (1.82)
HHI*SOECB		0.1389** (2.30)		
HHI*PCB		0.0989** (2.13)		
CR3*SOECB				0.0729*** (2.79)
CR3*PCB				0.0492 (1.53)
No. of observations	667	667	667	667
R ²	0.3416	0.3643	0.3290	0.3406
F-statistic	6.01	7.29	5.64	5.33

Notes: This table reports the results from ordinary least squares (OLS) regressions with clustering at the bank level. All variables are defined in the appendix. Numbers in parentheses are t-statistics, computed using heteroskedasticity-robust standard errors. *, ** and *** indicate estimations that are significant at the 10%, 5% and 1% levels, respectively.

Table 6 The impact of the ownership share of the controlling shareholders on banks' risk-taking behaviour

Models	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variables	Ln(Z-score)		NPL		CAR	
Constant	4.8039*** (16.15)	4.7862*** (15.08)	-0.0975*** (-3.52)	-0.0709*** (-3.22)	0.3379*** (9.14)	0.3152*** (12.06)
Ln(TA)	-0.2019*** (-3.68)	-0.1947*** (-3.70)	0.0048 (1.23)	-0.0013 (-0.38)	-0.0140*** (-3.16)	-0.0103*** (-3.41)
Efficiency	-1.5083*** (-7.12)	-1.4994*** (-7.07)	0.1283*** (4.93)	0.1241*** (5.46)	-0.1470*** (-4.20)	-0.1433*** (-4.53)
ADIV	0.0916 (0.62)	0.0956 (0.0.57)	-0.0019 (-0.16)	0.0046 (0.42)	0.0288* (1.89)	0.0214 (1.54)
TL/TD	0.1425 (0.74)	0.2362 (0.109)	0.0135 (0.80)	0.0102 (0.59)	-0.0548*** (-2.86)	-0.0511** (-2.40)
GDP growth	-5.0587*** (-4.27)	-5.1367*** (-4.37)	0.1495* (1.86)	0.0054*** (3.71)	-0.4963*** (-4.44)	-0.5045*** (-4.73)
Post-GFC	0.1128*** (2.75)	0.0943* (1.90)	-0.0056** (-2.12)	-0.0045* (-1.66)	0.0067* (1.74)	0.0058 (1.52)
GCO	-0.2163 (-0.95)	-0.5366 (-1.03)	0.0614** (2.42)	-0.0704 (-1.57)	-0.0601** (-2.05)	0.0424 (0.79)
SOECO	0.3653* (2.03)	1.1357* (1.86)	-0.0508** (-2.05)	-0.0743** (2.04)	0.0385* (1.92)	0.0351 (0.56)
PCO	0.0688 (0.37)	-0.8191 (-1.40)	-0.084 (-0.38)	-0.0485 (-0.84)	-0.0292 (-1.11)	0.0353 (0.67)
FSO	0.6060* (1.76)	0.7266* (1.92)	-0.0351 (-1.32)	-0.0969 (-1.08)	0.0799** (2.32)	0.0727** (2.18)
GCO ²		0.1896 (0.26)		0.1621** (2.22)		-0.1359* (-1.80)
SOECO ²		1.8186 (1.34)		0.0785 (1.50)		-0.0241 (-0.27)
PCO ²		1.2565** (2.07)		0.0263 (0.43)		0.0471 (0.89)
IRMC	0.0678 (0.98)	0.0669 (1.09)	-0.0157*** (-2.83)	-0.0108*** (-2.98)	0.0117 (1.58)	0.0077 (1.32)
CRO	0.1871** (2.45)	0.1978*** (2.62)	-0.0079* (-1.85)	-0.0074* (-1.93)	0.0143** (2.17)	0.0143*** (2.27)
FEMALE	0.5289** (2.01)	0.5489** (2.09)	-0.0367* (-1.72)	-0.0239 (-1.25)	0.0500* (1.87)	0.0393 (1.58)
No. of observations	667	667	667	667	667	667
R ²	0.1989	0.2095	0.3306	0.3908	0.3292	0.3567
F-statistic	12.16	10.23	4.78	5.3	6.46	9.39

Notes: This table reports the results from ordinary least squares (OLS) regressions with clustering at the bank level. All variables are defined in the appendix. Numbers in parentheses are t-statistics, computed using heteroskedasticity-robust standard errors. *, ** and *** indicate estimations that are significant at the 10%, 5% and 1% levels, respectively.

Table 7 Robustness checks with generalized method of moments (GMM) estimates

Dependent variables	Ln(Z-score)	NPL	CAR
Constant	1.8184 (0.86)	0.2456** (2.04)	0.0158 (0.11)
Ln(TA)	-0.0567 (-0.16)	-0.3174* (-1.78)	0.0671** (2.49)
Efficiency	-0.9491*** (-3.92)	0.1718 (1.20)	-0.0729 (-1.26)
ADIV	0.7500 (0.99)	-0.0645 (-1.30)	-0.0015 (-0.04)
TL/TD	2.5832* (1.67)	-0.2354 (-1.10)	-0.1531** (-1.97)
GDP growth	-7.0498** (-1.98)	0.2182 (1.09)	-0.0901 (-0.34)
FSI	0.0685 (0.16)	-0.0039 (-0.22)	-0.0654 (-1.36)
LIST	0.8512** (2.29)	-0.0443** (-2.13)	0.3619 (1.08)
Post-GFC	-1.518 (-1.39)	-0.0050 (-0.76)	0.0063 (0.73)
SOECB	0.4813** (2.27)	-0.0404** (-2.20)	0.1375*** (3.07)
PCB	1.2715 (1.35)	-0.0750** (-2.08)	-0.1202 (-1.94)
HHI	-0.3268 (-0.89)	0.1462** (2.22)	-0.2382*** (3.67)
IRMC	-0.7489 (-1.39)	-0.1014 (-0.49)	-0.0078 (-0.35)
CRO	0.2986* (1.80)	-0.0431* (-1.74)	0.0536** (1.99)
FEMALE	0.5614 (0.29)	-0.2902*** (-4.73)	0.3015*** (2.86)
AR(1)/AR(2)	0.136/0.497	0.329/0.828	0.136/0.497
Sargan/Hansen tests	0.673/0.969	0.982/0.948	0.908/0.548

Notes: This table reports the results from the two-step system generalized method of moments (GMM). All variables are defined in the appendix. Numbers in parentheses are z-statistics. Sargan and Hansen are the p values of the Sargan and Hansen test statistics of over-identifying restrictions. AR(1)/AR(2) reports the p values of the first- and second-order autocorrelation test statistics. *, ** and *** indicate that an estimation is significant at the 10%, 5% or 1% level, respectively.

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