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# **How the corporate governance mechanisms affect bank risk taking**

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## **Abstract**

The effectiveness of the management team, ownership structure and other corporate governance systems in determining appropriate risk taking is a critical issue in a modern commercial bank. Appropriate risk management techniques and structures within financial institutions play an important role to ensure the stability of economy. After analyzing 43 Asian banks over the period from 2006 to 2014, I find that banks with strong corporate governance are associated with higher risk taking. More specifically, banks with intermediate size of board, separation of CEO and chairman of board, and audited by Big Four audit firm, are likely higher risk taking. Overall, my findings provide some new perspectives into the governance mechanisms that affect risk taking on commercial banks.

Keywords: Banks, Risk taking, Corporate governance  
JEL Classification: G21, G31, G39.

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## **1 Introduction**

The reason of 2008 financial crisis is to a large extent attributable to excessive risk-taking by financial institution (DeYoung et al., 2013; Minton et al., 2014). In turn, international supervisory authorities propose an array of requirements to monitor and control bank risk. Besides, the forces of technological change contributed to the progressive process of financial integration and increased competition in the banking industry over the last two decades. Therefore, the scope of banks' operations and activities has been completely reshaped, from traditional intermediation products to an array of new businesses. As a result of this process, the intensive competition may lead to greater risk-taking of bank, or possibly excessive risk.

Given that corporate governance is essentially a mechanism for controlling risk within the bank, it is not surprising that the recent academic studies have emphasized the importance of effective corporate governance practices in the banking industry (Elyasiani and Zhang, 2015; Srivastav and Hagendorff, 2015). Some researches argue that banks with better governance have lower risk taking (Ellul and Yerramilli, 2013; De Andres and Vallelado, 2008). Yet, other studies claim that banks with more favorite shareholders governance associate with higher risk taking (Erkens et al., 2012; Wang and Hsu, 2013). Moreover, the same governance may have different effects on bank risk taking depending on the bank's ownership structure (Laeven and Levine, 2009; Adams and Mehran, 2012), and board composition (Pathan, 2009). These mixed empirical evidences motivate my investigation.

I empirically investigate the relationship between bank risk taking and corporate governance using data from listed commercial banks on Great China banking industry in 2006 to 2014 period. My results show that banks with strong corporate governance are associated with higher risk taking. More specifically, banks with no relationship among top 10 shareholders, a meaningful stake holding by managers and audited by Big Four audit firm, are likely taking more risk. These findings are consistent with the

importance of the monitoring role of bank governance in recent papers (Anginer et al., 2016; Bolton et al., 2015).

My chapter complements the existing empirical research on banking governance in several ways. First, my underlying idea is that several characteristics of the corporate governance might reflect shareholders' motivation to effectively monitor and advise managers. Bank governance research on risk taking typically incorporates the information on board compositions alone, such as the board size, the number of board meetings and the percentage of independent board members. However, ownership structure is an essential part of governance, which should be also a significant factor in explaining risk difference for banking sector (Barry, et al., 2011). My research aims to fill this gap by incorporate three characteristics to construct a governance score, which represents the level of corporate governance. In addition, measurement of bank risk can encompass a variety of dimensions; my chapter focus on loan quality and default risk (Z score).

Second, my chapter increases the understanding of banking governance in an emerging economy by involving China's banking sector. This sector is dominated by large state-owned banks that operate under strict government regulations and intervention. Intensive government intervention may reduce the role of corporate governance on effectively monitoring managers. However, my results show that the internal governance is still an effective mechanism to monitor bank risk taking in Chinese market, which consistent with the finding on European and US markets.

The reminder of the chapter is organized as follows. The next section discusses the related literature and hypothesis development. Section 3 outlines the methodology used in this chapter to construct measures of corporate governance and bank risk taking, as well as describes the empirical model used. Section 4 describes my dataset, including descriptive statistics about governance mechanisms and bank risk taking. In section 5 I

discuss my main empirical results on the relation between governance and bank risk taking. Section 6 presents results from additional robustness checks. Section 7 provides concluding remarks.

## **2. Literature review and hypotheses development**

Banking research has devoted tremendous effort to studying the roles of corporate governance in recent years. Some studies emphasize that flaws in corporate governance play a key role in bank risk taking (Srivastav and Hagendorff, 2015; Williams, 2014; Minton et al., 2014). Srivastav and Hagendorff (2015) highlight the need for effective bank governance to mitigate the behavior, harming the interest of different stakeholders and exacerbating risk taking, which reflect the needs of shareholders, creditors and the taxpayer. The idea is generally that strong corporate governance normally associates with better risk management function, which would lead to correctly identify risks and prevent such excessive risk taking. Therefore, my chapter is related to two strands of literature: first, to the extensive literature on corporate governance in the banking sector; and second, to the literature on the effects of bank risk taking.

Corporate governance is significantly related to bank risk taking because there are some observed and unobserved bank characteristics. Such bank characteristics include the functioning of the board, CEO duality, ownership structure, and external monitoring. Follow Srivastav and Hagendorff (2015), I define bank risk-taking as policies that increase risk through governance channels.

Academics have argued that the board is shareholders' first line of defense in governance (Adams and Mehran, 2012; De Andres and Vallelado, 2008). Indeed, the role of the board of directors in overseeing and identifying risk in financial institutions has come under scrutiny after financial crisis. Besides, establishing and implementing risk control systems are also part of the responsibility of boards. Thus, the boards

become one of key mechanisms to monitor managements' behavior on risk taking of the firm. Furthermore, having strong board governance structure is important to ensure that bank managers focus on the right issues. However, the evidence for a beneficial effect of boards' composition on bank risk taking has remained far from convincing. Specifically, extant literatures on boards of directors concentrate on the determinants of the size, board meeting and the fraction of independent board members are still mixed and inconsistent.

The relationship between board size and bank risk taking remains ambiguous. Large boards may add value due to the operational, geographic and financial complexity in banking firms, which need a greater level of advising and monitoring, as well as less easily captured by management. Adams and Mehran (2012) find that board size is positively related to performance. However, free-rider problems may arise in large boards which negatively affect the value of a bank. According to Jensen (1993), increased group becomes less effective because the coordination and process problems. Anginer et al. (2016) find that the form of boards of intermediate size is associated with lower bank risk taking in terms of bank capitalization. Equally, De Andres and Vallelado (2008) also suggest that an inverted U-shaped relation between board size and bank performance. Pathan (2009) finds that a small bank board is associated with more bank risk taking.

The presence of independent directors on bank board is mainly to mitigate the agency cost of equity. More independent directors in a board are expected to better represent the interest of shareholders and effectively monitor a bank's managers. However, the impact of more or less independent board on bank risk-taking is unclear given the mixed nature of the empirical results. For instance, De Andres and Vallelado (2008) find that larger and not excessively independent boards might prove more efficient in monitoring and advising functions, and create more value. Erkens et al. (2012) find that banks with more independent boards raised more equity capital during the crisis, which led to a

wealth transfer from existing shareholders to debtholders. Nevertheless, both Anginer et al. (2016) and Pathan (2009) report a higher fraction of independent directors pursue less risky policies. Minton et al. (2014) find that independent directors with financial expertise support increased risk taking prior to the financial crisis on US banks.

CEO power is also an important factor to affect board's monitoring ability. CEO duality restricts the information flow to other members of the board, which may give rise to riskier bank strategies, and hence negatively affects the independence of board. DeYoung et al. (2013) show that contractual risk taking incentives for CEO increased when industry deregulation expanded banks' growth opportunities. Thus effective separation of the CEO and chairman roles may enable a board to promote the interests of shareholders better (Anginer et al., 2016).

Despite with standard factors on board governance discussed above, Elyasiani and Zhang (2015) examine the association between "busyness" of the board of directors (serving on multiple boards) and bank holding company (BHC) risk. Berger et al. (2014) demonstrate that banks take on more portfolio risk if they are managed by younger executives and as higher proportion of female executives, while board changes increase executives holding PhD degree would reduce portfolio risk.

In addition to the board function, standard agency theories suggest that ownership structure has impact on corporate risk taking. Indeed, analysis without ownership structure may provide an incomplete evidence of bank risk taking. Laeven and Levine (2009) find that the relation between bank risk and capital regulations, deposit insurance policies, and restrictions on bank activities depends on each bank's ownership structure. However, the evidence on the relationship between the ownership of banks and bank risk-taking is still mixed. Lin and Zhang (2009) assess the effect of bank ownership on performance in Chinese market, they find that banks with foreign ownership are more profitable and have better asset quality than state-owned banks. As management of



state-owned bank is not adequately monitored, and there is no private owner with necessary incentives to engage in active monitoring. Iannotta et al. (2013) use cross-country data on a sample of large European banks and find that government-owned banks have lower default risk but higher operating risk than private banks, indicating the presence of governmental protection induces higher risk taking. In addition, institutional ownership of common share of bank has increased substantially over the past two decades, which also implies changes in corporate governance and banks' behavior in terms of risk taking. Both Erkens et al. (2012) and Barry et al. (2011) claim that banks with higher institutional ownership took more risk prior to the crisis, which resulted in larger shareholder losses during the crisis period. Moreover, Konishi and Yasuda (2004) show that the relationship between the stable shareholders ownership and bank risk is nonlinear after examining empirically the determinants of risk taking at Japanese commercial banks.

## **Hypothesis development**

### **H1: Strong corporate governance associated with lower bank risk taking.**

My main hypothesis is motivated by Ellul and Yerramilli (2013), which suggest that banks with strong internal control on governance should have lower tail risk, all else equal. In opposite prospective, the poor governance banks likely engaged in excessive risk taking, causing them to make larger losses. First, for risks to be successfully managed, they must first be identified and measured correctly. A strong risk management function is necessary to correctly identify risks and prevent such excessive risk-taking. The main job of effective risk management at banks is to limit exposure to risk, and hence to the possibility of negative outcomes (Chernobai et al., 2012). DeAngelo and Stulz (2015) suggest that risk management is central to banks' operating policies. Keys et al. (2009) find that strong risk management is associated with less risky subprime loan securitizations. Because only safe debt commands a liquidity premium, banks use risk management to maximize their capacity to include such debt into their operation. In addition, Minton et al. (2014), Ellul and Yerramilli (2013) and

Aebi et al. (2012) all show that risk management governance can affect bank risk taking. There are many tools used by bank to control their portfolio risk and maintain higher level of safe debt, such as diversification, hedging, using derivatives. Ellul and Yerramilli (2013) suggest that banks with better governance (lower G-Index), more independent boards, and less entrenched CEOs have strong risk management function in large US bank holding companies. Moreover, Aebi et al. (2012) document that banks with its chief risk officer (CRO) directly reporting to the board of directors exhibit significantly higher stock returns and return on equity during financial crisis in 2008. Besides, from an asset quality management, better quality credit and reducing excessive share of illiquid loans in asset portfolio will diminish bank risk-taking (Ghosh, 2015).

Second, the risk taking are affected not just by risk management, but also by the taking of private benefits of larger shareholders. Larger shareholder may opt to risk averse investment in order to protect their private benefit. Because there is less fear of expropriation by insiders if the corporate governance improves (Burkart et al., 2003), the dominant shareholders might reduce their holding or direct influencing the decision making by managers. As from a shareholder's perspective, assessing the risk of a bank may be more difficult than other nonfinancial firms. Thereafter, managers would implement conservative investment policies, which lead to reduce risk taking.

The third argument is the managerial incentives matter. Higher executive compensation lead to excessive risk-taking by banks (Bai and Elyasiani, 2013; DeYound et al., 2013; Cunat and Guadalupe, 2009; Bolton et al., 2015), which may improve performance in the short run, but it also can cause significant impairment to the bank when such risk materialize. Specifically, equity-based compensation (EBC) has increased recently for embedded in bank executive compensation packages. The advantage of EBC for executive is to share the benefits from risky investment with shareholders and reduce agency cost. As senior managers' personal wealth is undiversified, they would not support the positive net present value but risky investment, which may lead to risk

aversion. Indeed, it is difficult to directly monitor managers when firms have wide range of investment opportunity sets. However, adopting EBC schemes align the interest of management and shareholders, and also encourage managers to pass up risky investment. A number of studies on financial firms provide evidence consistent with this phenomenon. Specifically, Hagendorff and Vallascas (2011) find the evidence which support for the view that increased EBC leads banks to make riskier choices in their mergers and acquisition decisions. As Core et al. (1999) note, the executives earn greater compensation when governance structures are less effective. Overall, the presence of strong corporate governance may be necessary to control risk exposures of financial institutions.

## **H2: Strong corporate governance associated with higher bank risk taking.**

My second hypothesis is that banks with strong corporate governance attributes may take more risk. Value-maximizing shareholders are likely to choose aggressive strategies, especially for banks, and such risky strategies may lead to significant loss. Thus, firm with better investor protection governance are likely to undertake riskier but value enhancing investments (John et al., 2008). Anginer et al. (2016) find that shareholder-friendly corporate governance associate with lower bank capitalization, such relationship is especially strong for banks located in developed countries. Besides, Fahlenbrach and Stulz (2011) find that CEOs whose incentives were better aligned with the interests of shareholders performed worse and no evidence that they performed better. Pathan (2009) finds that strong banks' board positively affect bank risk taking. Sullivan and Spong (2007) also find that stock ownership by hired managers can increase total risk of a bank.

In addition, deposit insurance scheme is widely applied in many countries as part of a financial system safety net to promote banking stability. However, the scheme may contribute to bank shareholders moral hazard problem by stimulating higher bank risk taking as they enjoy a 'subsidy' which increases in value of leverage. For instance,

Laeven and Levine (2009) find that that deposit insurance is associated with an increase in risk when the bank has a large equity holder with sufficient power to act on the additional risk-taking incentives created by deposit insurance. The scheme also discourages most bank creditors from limiting managers' risk taking. Anginer et al., (2014) find that deposit insurance scheme increases bank risk and systemic fragility in the years leading up to the global financial crisis. Since shareholders have incentives to take higher risk, thus strong corporate governance can be expected to associate with bank risk taking positively.

### **H3: Corporate governance has no impact on bank risk taking.**

My third hypothesis is that the corporate governance does not have any impact on bank risk taking. Several arguments support this hypothesis. First, because risk managers of bank are without any real power, it is merely to satisfy regulatory requirement to appoint them by bank. Beltratti and Stulz (2012) find no relationship between better governance and bank risk taking because the fragility of banks financed with short-term capital market funding. Vazquez and Federico (2015) also find that banks with weaker structural liquidity and higher leverage were more likely to fail afterward.

Second argument relates to regulatory. Stability of the banking sector is a major concern of relevant economic authorities. Indeed, the authorities use several tools to monitor and control bank risk taking, which includes capital requirements, restrictions on bank activities and official supervisory power. As the failure of banking sector would increase systemic risk and cause possible consequent meltdown of whole financial system. Fratzscher et al. (2016) suggest that bank supervision/regulation and institutions tend to be substitutes rather than complements. There is an obvious example showing that many governments' bail-out to stabilize financial institution in the financial crisis of 2008-2009. However, Hakenes and Schnabel (2010) find that government's bail-outs lead to higher risk taking among the protected bank's competitors. Acharya et al. (2014) documents that bailouts triggered the rise of

sovereign credit risk in 2008. Banks' shareholders benefit from 'too big to fail' supported by regulators and gain most from shifting risk to other stakeholders (Hagendorff and Vallascas, 2011). Williams (2014) find the evidence of risk seeking due to 'too big to fail' effects in Asian region.

Third, market discipline is another mechanism in influencing bank risk taking (Bennett et al., 2015; Hilscher and Raviv, 2014; Barry et al., 2011), because the market participants have the incentives to monitor the bank and the ability to process accurately the disclosed information. In addition, The Basel Accord III has highlighted the importance of market discipline and it is one of the three pillars in Basel Accord II. However, empirical evidence on the market discipline is remaining mixed in banking sector. Hilscher and Raviv (2014) conclude that market discipline is an effective tool for stabilizing financial institutions after investigating the effects of issuing contingent capital. Hou et al. (2016) investigates whether the depositor discipline of banking works in the context of an emerging economy under financial repression and implicit government guarantee, and they find that bank risk is negatively associated with the growth of deposit volumes.

Finally, several studies conclude that the managerial incentive on governance does not connect with the risk taking in banking industry. One plausible interpretation is that the board provides their executives the incentives necessary to exploit the growth opportunities in new products, such as insurance underwriting, securities brokerage, and investment banking. But the investment opportunities were limited by regulatory restriction in banking industry. Therefore, EBC are expected to be lower under strict regulation, leading to weaker incentives to take risk.

**H4: Corporate governance has positively impact bank risk taking while bank performance increasing.**

**H5: Corporate governance has negatively impact bank risk taking while bank**

### **performance increasing.**

Banking theory suggests that corporate governance affect the risk taking in different economic environment. Better governed bank can identify risks that are more beneficial to shareholder and encourage managers to take on higher risks in normal time. Strong risk management function can curtail tail risk exposures at banks (Ellul and Yerramilli, 2013). Minton et al. (2014) claim that financial expertise among the boards is associated with more risk taking prior to the financial crisis. However, it is commonly believed that the better governed banks would have limited the excessive risks taken by banks' management and mitigated their fall during the financial crisis. Poor bank governance might be a major cause of financial crisis because banks with more shareholder-friendly boards performed worse during the crisis (Beltratti and Stulz, 2012). Thus, it is an empirical question as to whether the corporate governance is associated with more or less risk taking while bank performance increasing.

## **3 Methodology**

### **3.1 Measures of corporate governance**

Following Hass et al. (2014), I construct a parsimonious index to measure the strength of bank corporate governance. The index contains three aspects of corporate governance, which are the board governance, ownership structure and quality of external auditor.

First, bank board should able to effectively monitor and control bank risk (Minton et al., 2014; Berger et al., 2014). Therefore, banks with boards that are more effective in monitoring and advisory management terms are better governed. A vast of literatures discusses the composition of the board of directors. I argue that three crucial aspects on boards of directors need to emphasis relating to bank risk taking, which are the fraction of independence directors, board size and CEO duality. Adams and Mehran (2012) find that banks have larger and more independent boards than other non-financial firms.

More independent board members would improve the supervision of management and reduce the conflict of interest between shareholders and managers. The skilled independent directors help to improve the strategic decision and risk management control. As a bank grows and diversifies, it faces an increasing demand for specialized outside board members who can perform tasks such as identifying and monitoring risk. Liang et al. (2013) find that the proportion of independent directors has a positive impact on bank asset quality in Chinese banks. In addition, the advantage of large boards is able to assign more people to supervise and advise on managers' decisions. Both Pathan (2009) and Wang and Hsu (2013) find that small boards lead to additional bank risk as reflected in market measure of risk. In contrast, large boards may encounter problems of coordination, control, and decision-making, as well as the concern of free rider. But the small boards may not have enough ability to monitor such complexity of the banking business. De Andres and Vallelado (2008) confirm that a hypothesized inverted U-shaped relation between board size and bank performance. Furthermore, Anginer et al. (2016) show that separation of the CEO and chairman roles associated with higher bank risk in terms of bank capitalization due to a board independence from management. In contrast, Pathan (2009) find that CEO power (CEO's ability to control board decision) negatively affects bank risk taking.

Apart from the board governance, the incentives of managers or directors to take risk should also be considered on banking sector. The managers or directors may have incentive to take less risk when they hold a small share of the banks' ownership. As managers' human capital investment and reputation are non-diversifiable, thus they have incentive to lead a bank better performance. Fahlenbrach and Stulz (2011) find that the banks with managers whose incentives were better aligned with shareholders affect performance. However, Saunders et al. (1990) shows that stockholder controlled banks exhibit significantly higher risk taking behavior than managerially controlled banks during deregulation period. In addition, given the growing significance of financing across countries, foreign ownership is one of the factors that draw

considerable attention from corporate governance. Foreign investors are in the position with informational disadvantage compare to domestic investors (Choe et al., 2005). Besides, foreign investors avoid invest to poorly governed corporation because they suffer from asymmetrical information problems (Leuz et al., 2010; Ferreira and Matos, 2008). Therefore, they are normally acting more risk adverse.

Large controlling shareholders are suggested by concentrated their stakes to monitor managers and directly intervene in investment decisions (Porta et al., 1999), which may help to mitigate the agency costs. However, ownership concentration stimulates shareholders' incentives to seek private benefit of control (Faccio et al., 2001; Peng et al., 2011), which could negatively affect firms' corporate governance. The first reason is that relational large shareholders have incentive and opportunity to gain access to critical information which benefit for them. Second, the relational of shareholders provides facility for expropriating benefit from dispensed small shareholders. Thus, the presence of the relation between larger shareholders is likely affect firms' corporate governance.

The regulatory environment can constrain the excessive bank risk taking. More specifically, a high quality audit is expected to affect firms' governance. The level of monitoring and control imposed by external audits and supervisory actions can improve the governance and constrain opportunistic of excessive risk-taking (Bouvatier et al., 2014).

Based on above discussion and consistent with Hass et al. (2014), I filter seven relevant characteristics, which are the percentage of total directors who are independent (1INDIV); the number of directors serving on the bank's board (2BS); CEO power is whether or not the CEO also chairs the board (3DUAL); whether there are any relational of the largest ten shareholders (4TOP10); the percentage of shares owned by directors, supervisors, and executives (5MH); the percentage of shares owned by foreign



shareholders (6FOREIGN); and who is their external auditor (7AUDIT). Thereafter, in light of the findings previous studies (e.g. Bouvatier et al., 2014; Adams and Mehran, 2012; Anginer et al., 2016; DeYoung et al., 2013), I apply specific criteria for each characteristic. According to Hass et al. (2014), a dummy variable is being constructed for each characteristic that meets certain criteria. Seven criteria are specifying as following: whether the board consist 50% of independent board members; whether the board size greater than 6 but less than 13; whether separation of the role of CEO and board chairman; whether there is no relation among the top 10 largest shareholders; whether there is any holding of executive greater than 1% but less than 30%; whether there have any foreign ownership; whether the bank audited by the joint ventures of the Big Four<sup>1</sup> internal audit firms and domestic audit firms. Finally, I add the seven criteria into a total score that represent the overall governance quality, donated as CG. Higher score indicates strong corporate governance for individual bank in a particular year.

### 3.2 Measures of bank risk taking

A traditional measure of banks' risk is the standard deviation of either return on equity or return on assets. However, this type measure has been criticized imprecision as based upon small samples. Two proxies of bank risk are selected to show whether strong corporate governance have any impact on the bank risk taking. I primarily measure bank risk using the Z-score, which is widely used in the bank literature as a bank risk-taking indicator (see, for instance, Beltratti and Stulz, 2012; Fu et al., 2014; Williams, 2014; Minton et al., 2014; Laeven and Levine, 2009). Z-score calculated as follows:

$$Z_{it} = \frac{ROA_{it} + E_{it}/TA_{it}}{\sigma ROA_{it}} \quad (\text{Equation 1})$$

where ROA is the return on assets, E/TA is the ratio of equity to total assets, and  $\sigma ROA$  is the standard deviation of return on assets. As the Z-score is highly skewed, following Laeven and Levine (2009) and Fu et al. (2014), I use natural logarithm of the Z-score, which is normally distributed.

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<sup>1</sup> The Big Four audit firms are Deloitte, Ernst & Young, KPMG and PwC.

The Z-score measures the distance from insolvency because a bank becomes insolvent when its assets value less than its debts. As it shows the number of standard deviations below the average a bank's return on assets has to fall in order for that bank's capital reserves to be depleted. So the larger Z-score indicates that the bank is more stable as away from bankruptcy. Elyasiani and Zhang (2015) use Z-score as insolvency risk and find that banks with a greater number of busy directors exhibit lower insolvency risks. and Beltratti and Stulz (2012) find that Z-score are positively associated with shareholder-friendly boards. Minton et al. (2014) suggest that boards consisting of higher amount of financial experts were positively associate with bank risk, which measured by Z-score. Fu et al., (2014) investigate the influence of bank competition, concentration, regulation and national institutions on individual bank fragility as measured the bank's Z-score.

My second measure of risk is the reserve of impairment loans, which reflects credit quality of banks and the overall attitude of the banking system. Bank with poor credit quality would associate with the risky loan portfolio, which in turn results in higher risk-taking. This risk measure is commonly applied in recent banking study. For instance, Haq and Heaney (2012) use loan loss provision as a measure to examine the determinants of bank risk.

### **3.3 Other explanatory variables**

Following Elyasiani and Zhang (2015), Fu et al. (2014), Laeven and Levine (2009) and Williams (2014), I include a range of bank specific variables to explain bank risk taking and obtain consistence parameters. These measures are common and well accepted in recent banking literature.

One of the most debatable questions is whether size affects bank risk taking. Large banks are benefit from diversification and economies of scales, which would be more stable than smaller banks. Pathan (2009) shows that bank size lower insolvency risk. Haq and Heaney (2012) also find that large banks reflect lower credit risk. Besides, smaller banks are easier to be liquidated or the target of unfavorable takeovers when

they are in financial distress. However, banks are becoming larger and arguably more complex, which may increase difficulty to monitor their risk effectively. Fu et al., (2014) find that smaller banks tend to be less risky in a recent study of Asian banks. In addition, the concept of ‘too big to fail’ is important to the national banking system as the government are likely seek to prevent bank failure (Williams, 2014). Given the skewness of the size distribution, the logarithm of its total assets (LNTA) is being employed as proxy for a bank’s size, which consistent as Fu et al. (2014), Pathan (2009) and Laeven and Levine (2009).

Diversification provides a credible signal of bank’s ability to minimize risk. In contrast, increased non-interest income also generates agency conflicts and increased complexity. Broad activities may lead to the bank extremely large and complex that are extraordinarily difficult to monitor and “too big to discipline” (Laeven and Levine, 2007). In addition, diversification might intensify moral hazard problem and present more opportunities for banks to take higher risk. As diversification relates to both bank risk taking and corporate governance, I additionally control for the banks’ diversification activities. Following Fu et al. (2014), I employed the return on average asset (ROAA) to track the profitability of a bank’s operating activities.

Theory suggests an important role for capital in mitigating agency problems and the attendant uncertainty for outsider stakeholders, especially depositor in particular on banking sector. Bank capital is the main source to act as buffer to against unexpected default, but the effect of bank capital on risk is ambiguous. Greater equity capital encourages prudent behavior and improves the survival probability of bank (Beltratti and Stulz, 2012; Fratzscher et al., 2016). Both Fratzscher et al. (2016) and Haq and Heaney (2012) find that the higher capital buffer the lower the bank risk, which consistent with the argument that facilitate stability the banking system. Besides, Lee and Hsieh (2013) also find that a negative relation between capital and bank risk. Konishi and Yasuda (2004) find that the implementation of the capital adequacy

requirement reduced risk taking at commercial banks. Yet, moral hazard hypothesis suggest that banks' manager have incentive to increase risk taking. Highly capitalized bank may take more risk as the deposit being guaranteed. Ghosh (2015) find a positive relationship between the level of capital and bank risk. Moreover, Williams (2014) find a U-shaped relationship between bank risk and capital. I use the ratio of total equity to total asset to measure capitalization, muck like Ghosh (2015) and Beltratti and Stulz (2012).

In additional to bank-specific variables, the impact of state-level economic conditions on bank risk also needs to take into account (Ghosh, 2015). Banks may fail to internalized risks stemming from overheated macroeconomic and loose monetary conditions (Vazquez and Federico, 2015). Thus, I include three measures of economic performance to control for different macroeconomic conditions.

First, the rate of real GDP growth (RGDP), the most natural indicator of the business cycle of an economy, is used as a proxy for the fluctuations in economic activity. Ghosh (2015) shows that higher state real GDP reduce nonperforming loans. The GDP growth is expected to have a negative effect on bank risk because the demand for revenue increases during cyclical upswings. Alternatively, positive relationship is expected if the level of bank risk is lower in business upturns given a countercyclical materialization. Both Williams (2014) and DeYoung et al. (2013) find that banks in better economic environments are more likely to implement risk-increasing investment strategies.

Second, inflation rate also has an ambiguous role in determinant on bank risk taking. Inflation variability causes lenders to estimate incorrectly the value of loan collateral and borrowers' loan repayment. Thus, stable and constant inflation rate would reduce the real value of debt, in turn lower bank risk. However, excessive inflation rate may deplete borrowers' real income and booming bank risk, especially when the income

does not raises compare with inflation. Ghosh (2015) find a positive relationship between inflation rate and bank risk taking.

Third, lending interest rate is being employed as proxy for the term structure of borrowing. Banks normally use short-term deposits to finance long-term lending. Rising in interest rate may increases the real value of borrowers' debt, stimulates debt servicing more expensive, as well as increase loan defaults. Thus, bank risk may be positively impacted by the lending interest rate. However, Ghosh (2015) show that interest rate has no effect on bank risk, in terms of nonperforming loans.

### 3.4 Empirical models

Panel data analysis is the most efficient instrument to use when the sample is a mixture of time series and cross-sectional data. So the following regression equation is formulated to test empirically the hypotheses 1 to 3,

$$\begin{aligned}
 RISK_{it} = & \alpha + \beta_1 CG_{it} + \beta_2 LNTA_{it} + \beta_3 ETA_{it} + \beta_4 PE_{it} + \beta_5 ROAA_{it} + \beta_6 DEP_{it} \\
 & + \beta_7 GDP_{it} + \beta_8 INF_{it} + \beta_9 INT_{it} + \varepsilon_{it}
 \end{aligned}
 \tag{Equation 2}$$

where t and i denote time period and banks, respectively.  $\varepsilon_{it}$  is the error term with a mean of zero. RISK refers to the i th bank's risk-taking in year t, proxied by two risk variables: Z-score (ZS) and loan loss provision (LLP). CG is the score of corporate governance. In addition, four internal control variables are set as the bank specific characteristics: the logarithm of total assets (LNTA), equity to assets ratio (ETA), price to earnings ratio (PE), return on average asset (ROAA), and the logarithm of total deposit (DEP). Furthermore, three macro control variables are set as the related external control variables: GDP growth rate (GDP), inflation rate (INF), and lending interest rate (INT).

To test the hypotheses 4 and 5, the interaction term of GG and ROAA is being included

in the equation 3,

$$\begin{aligned}
 RISK_{it} = & \alpha + \beta_1 CG_{it} + \beta_2 LNTA_{it} + \beta_3 ETA_{it} + \beta_4 PE_{it} + \beta_5 ROAA_{it} + \beta_6 DEP_{it} \\
 & + \beta_7 CG * ROAA_{it} + \beta_8 GDP_{it} + \beta_9 INF_{it} + \beta_{10} INT_{it} + \varepsilon_{it}
 \end{aligned}$$

(Equation 3)

The definition of the above bank risk proxies and explanatory variables are summarized in Table (1).

<b>Table 1: Definition of variables</b>			
<b>Variables</b>	<b>Symbol</b>	<b>Description</b>	<b>Sources</b>
<i><b>Corporate governance</b></i>			
Independent members	<b>1NDIV</b>	Whether board is controlled by more than 50% independent directors	Manual collection
Board size	<b>2BS</b>	Whether board size is greater than 6 but fewer than 13	Manual collection
CEO chairman duality	<b>3DUAL</b>	The chairman and CEO are not the same person	Manual collection
Relationship	<b>4TOP10</b>	There are no relationships among the top ten shareholders	Manual collection
Managerial holding	<b>5MH</b>	Management ownership (directors, supervisors, and executives) is greater than 1% but less than 30%	Manual collection
Foreign ownership	<b>6FORE</b>	Foreign investor ownership is greater than zero	Manual collection
Bi4 4 Audit firm	<b>7AUDIT</b>	Audited by one of the Big 4 audit firm or their joint ventures	Manual collection
Internal corporate governance	<b>CG</b>	Internal corporate governance score	Aggregate above seven attributes
<i><b>Bank risk-taking</b></i>			
Z-score	<b>ZS</b>	[Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets)	Use original Bankscope data to calculate
Loan loss provision	<b>LLP</b>	The natural logarithm of the amount of loan loss reserve	Bankscope
<i><b>Bank specific characteristics</b></i>			
Bank size	<b>LNTA</b>	The natural logarithm of total assets in thousands of USD.	Bankscope
Capitalization	<b>ETA</b>	The ratio of equity to assets.	Bankscope

PE ratio	<b>PE</b>	The ratio of market price to earnings per share.	Bankscope
Return on assets	<b>ROAA</b>	The ratio of profit to average assets.	Bankscope
Depositor	<b>LNDEP</b>	The natural logarithm of the amount of deposit in thousands of USD.	Bankscope
<i><b>Macroeconomics</b></i>			
GDP growth rate	<b>GDP</b>	Yearly real GDP growth (%)	International Monetary Fund
Inflation rate	<b>INF</b>	Inflation rate	International Monetary Fund
Lending interest	<b>INT</b>	Lending interest rate	International Monetary Fund

### **3.5 Endogeneity and Generalized Method of Moments (GMM)**

Base on the discussions of the dependent and explanatory variables, I employ Generalized Method of Moments (GMM) estimator as robustness to test my hypotheses and estimate the model parameters. The GMM estimator is proposed by Blundell and Bond (1998) and being applied by several recent banking literatures, such as Hou et al. (2016) Ghosh (2015), and Bouvatier et al. (2014). As most empirical corporate finance research, the analysis of the relationship between corporate governance and bank risk-taking faces the challenge of endogeneity, which can arise from unobserved heterogeneity, simultaneity, and reverse causality. The GMM estimator enables us to tackle these particular econometric problems: (i) the autoregressive process in the data relating dependent variables; (ii) the presence of unobserved firm-specific effects; and (iii) and the likely endogeneity of the independent variables.

I employ the AR (1) and AR (2), and Hansen test to check the validity of my estimates. AR (1) and AR (2) are the Arellano–Bond tests for first and second order autocorrelation of the residuals. AR (1) test should reject the null hypothesis of no first order serial correlation, while AR (2) test should not reject the null hypothesis of no second order serial correlation of the residuals. Hansen test is the checking the validity of the entire set of instruments as a group.

## 4 Data

### 4.1 Data sources

The sample examined in my chapter includes the largest commercial listed banks in three markets, Mainland China, Hongkong and Taiwan, cover 9 years from 2006 to 2014. The requirement of my observation is that the bank must be publicly traded made it possible to collect data on board governance as well as other internal governance characteristics of the firms from published statements. My sample period 2006-2014 is carefully chosen to avoid the impact of the 2005 reform in Mainland China<sup>2</sup>. In addition, most of the banks in Mainland are starting listing in the Shanghai Stock Exchange and the Shenzhen Stock Exchange from 2006. These banks pillar contains large nationwide banks and regional banks. Moreover, aggregate data for cross-market are considered preferable as the risk of non-representativeness of the sample is reduced. Meanwhile, studies based on bank-by-bank are useful in a micro-prudential context. Therefore, exploiting cross-market variation in risk-taking trends is likely to produce more robust results than the analysis of individual market.

The data used in my chapter comes from three sources. My first source is the Bankscope, which is a leading information source for global financial institutional. All variables sourced from Bankscope are in US dollars, using year ended date exchange rate. Second, information on bank governance is particularly difficult to construct. I hand-collect information on various aspects of the institution structure of the corporate governance function at each bank each year, and use this information to construct a score to measure the strength of governance. These governance data are measured on the date of the proxy at the ending of the corresponding fiscal year<sup>3</sup>. Third, macroeconomic data are obtained from the International Monetary Fund's International Financial Statistics with

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<sup>2</sup> The authority of China initiated a reform to make non-tradable shares becoming tradable in 2005. The non-tradable shares originally held by the State or by politically connected investors that were issued at the early stage of financial market development.

<sup>3</sup> Following Adams and Mehran (2012), we also adjust our data collection procedures to account for the fact that statements disclose some governance characteristics for the previous fiscal year and others for the following fiscal year.



the exception of Taiwan<sup>4</sup>.

As discuss on Section 3, I obtain the score of corporate governance by taking the principle component of the following seven governance variables: independent directors, the board size, CEO duality, relationship of top 10 shareholders, managerial shareholding, foreign ownership and external audit firm. These components analysis effectively performs a singular value decomposition of the strength of bank governance. The main advantage of using the sum of all components analysis is that I do not have to subjectively eliminate any characteristics of governance, or make subjective judgements regarding the relative importance of these characteristics (Tetlock, 2007).

Table (2) reports the number of banks and the number of bank-year observations for each market. Banks from Mainland China account for 36% of the total observations, while banks of Hongkong and Taiwan represent 15% and 49% respectively. The dataset thus comprises countries with different levels of development as well as different legal, political, and institutional environments. However, my data set is comparable with Sun and Chang (2011) database, they investigate the role of risk in eight emerging Asian countries. There are several advantages associated with my data set. The first advantage is that the sample includes different prospective over corporate governance, and thus providing potentially more complete tests of the importance of governance structures. Second, the managers of these banks have similar culture background in these markets, thus it offers a unique regional set of data for each year over the 2006-2014 period. Third, using panel data allows us to capture the market-specific effects and the unobservable differences between markets. While it is true that I examine corporate governance at only the very largest banks in these markets and those banks hold the vast majority of industry assets. Consequently, these banks command great interest among investors, regulators and other stakeholders.

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<sup>4</sup> Taiwanese data is sourced from either the website of the Central Bank of the Republic of China (interest rates) or the website of the National Statistics of the Republic of China (all other data).

	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Mainland	7	14	14	14	16	16	16	16	16	129
Hongkong	6	6	6	6	6	6	6	6	6	54
Taiwan	21	21	21	21	21	21	21	21	21	189
	34	41	41	41	43	43	43	43	43	372

I present summary statistics for the risk measures, governance score, bank financial characteristics and macroeconomic variables in Table (3). The mean Z-score of 3.13 is close to that mean Z-score (3.25) reported by Beltratti and Stulz (2012). The mean of loan loss provision is 13.113. The mean score of governance is 3.429, and the minimum and maximum value ranges between 1 and 6. My governance score is higher than 2.01 from Hass et al. (2014). As the sample of Hass et al. (2014) excludes the financial sector, it is reasonable to believe that the governance of financial sector is stronger than other industries. Regarding the bank characteristics variables, bank capital ranges from 2.53% to 38.97% with an average 7.38%. Bank size, the logarithm of total assets ranges from 15.42 to 21.72 with an average 18.12.

Variable	N	Mean	Std. Dev.	Min.	Max.
Panel A: Corporate governance attributes					
<b>1NDIV</b>	372	0.074	0.263	0	1
<b>2BS</b>	372	0.483	0.500	0	1
<b>3DUAL</b>	372	0.925	0.263	0	1
<b>4TOP10</b>	372	0.302	0.459	0	1
<b>5MH</b>	372	0.147	0.354	0	1
<b>6FORE</b>	372	0.622	0.485	0	1
<b>7AUDIT</b>	372	0.868	0.338	0	1
<b>CG</b>	372	3.429	0.939	1.000	6.000
Panel B: Main model variables					
<b>ZS</b>	372	3.138	0.771	-1.442	5.308
<b>LLP</b>	372	13.113	1.948	9.603	18.466
<b>ETA</b>	372	7.384	5.038	2.530	38.970
<b>LNTA</b>	372	18.128	1.572	15.429	21.729
<b>PE</b>	372	5.227	0.739	2.838	6.602
<b>ROAA</b>	372	0.761	0.665	-2.020	2.630

<b>LNDEP</b>	372	17.888	1.630	14.624	21.781
<b>GDP</b>	372	5.918	4.195	-2.459	14.16
<b>INF</b>	372	2.205	1.784	-0.860	5.864
<b>INT</b>	372	4.625	1.526	2.560	7.900

Note: This table contains means, standard deviations, minimum and maximum values on the variables included in the main model. ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. 1NDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

Pearson pairwise correlation coefficients are also calculated and reported in Table (4). The correlation coefficients are usually small (less than 0.4), suggesting that the correlation between variables has weak association. Pointedly, governance score exhibits a negative correlation with Z-score and loan loss reserve. The Pearson pairwise correlation analysis can only provide some preliminary information to the following regression analysis because of the ambiguous causality of the correlation coefficients and the omission of key control independent variables.

	ZS	LLP	CG	LNTA	ETA	PE	ROAA	LNDEP
<b>ZS</b>	1.0000							
<b>LLP</b>	0.3908*	1.0000						
<b>CG</b>	-0.1656*	-0.3809*	1.0000					
<b>LNTA</b>	0.0123	-0.2776*	0.0016	1.0000				
<b>ETA</b>	0.4027*	0.9400*	-0.3659*	-0.2499*	1.0000			
<b>PE</b>	0.4313*	0.7247*	-0.4085*	-0.0754	0.7577*	1.0000		
<b>ROAA</b>	0.3122*	0.3146*	-0.1604*	0.2676*	0.4007*	0.4143*	1.0000	
<b>LNDEP</b>	0.4149*	0.9497*	-0.3578*	-0.3116*	0.9814*	0.7469*	0.4001*	1.0000
<b>GDP</b>	0.2462*	0.5207*	-0.3951*	-0.1803*	0.4423*	0.4138*	0.2551*	0.4718*
<b>INF</b>	0.1727*	0.2438*	-0.1875*	-0.0467	0.2771*	0.2436*	0.2182*	0.3008*
<b>INT</b>	0.3052*	0.4709*	-0.4020*	-0.1470*	0.4871*	0.4384*	0.3546*	0.5303*
	<b>GDP</b>	<b>INF</b>	<b>INT</b>					
<b>GDP</b>	1.0000							
<b>INF</b>	0.3198*	1.0000						
<b>INT</b>	0.6077*	0.5529*	1.0000					

Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP

is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. 1NDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

## 5 Empirical results

### 5.1 Governance and risk taking - OLS estimation

The empirical evidence of the relationship between bank performance and governance are presented in this section. Table (5) reports the estimation results of Equation (2) to test the relationship between the corporate governance (CG) and bank risk taking (Z-score) by OLS estimation. In specifications (1) and (2) of Table (5), macroeconomic control variables are excluded from the estimations because it is statistically insignificant in most specifications. The regression results are reported in columns (3) and (4) of Table (5) are consistent with those in columns (1) and (2) of Table (5).

	(1)	(2)	(3)	(4)
<b>Dependent variable</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>
CG	-1.244** (-2.53)	-1.355** (-2.42)	-1.337** (-2.55)	-1.360** (-2.43)
ETA	2.006*** (15.76)	1.926*** (13.21)	1.976*** (14.45)	1.936*** (13.30)
LNTA	-8.188*** (-2.77)	-9.708*** (-2.94)	-8.053*** (-2.58)	-9.541*** (-2.92)
PE	-0.564 (-1.10)	0.223 (0.36)	-0.291 (-0.51)	0.455 (0.72)
ROAA	1.091*** (2.90)	1.010** (2.20)	1.180*** (2.84)	0.979** (2.12)
LNDEP	9.716*** (3.28)	10.86*** (3.31)	10.02*** (3.21)	11.09*** (3.4)
GDP			0.027 (0.42)	0.104 (0.73)
INF			0.167 (1.29)	0.575* (1.96)
INT			0.322	-0.171

			(1.15)	(-0.33)
Constant	-1.004	3.668	-11.79	-5.061
	(-0.10)	(0.24)	(-1.07)	(-0.30)
Year effect	No	Yes	No	Yes
Observation	372	372	372	372
F test	0.000	0.000	0.000	0.000
R	0.547	0.588	0.550	0.590
<p>Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. INDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.</p>				

With regard to the determinant of Z-score as dependent variable, I find relatively strong evidence that the coefficient estimates on corporate governance are negative and significant on all specifications in Table (5). This finding confirms the Hypothesis (2). This illustrates that, after controlling for other bank characteristics and macro-economic factors, a bank with strong governance is associated with a higher risk taking. More specification, a 1-standard deviation increase in CG is associated with around 1.22 to 1.36 increase in the bank risk taking. This result is consistent with the evidence by Pathan (2009) and Elyasiani and Zhang (2015).

The board of directors is widely recognized as the cornerstone of an effective governance framework. The board could evaluate whether the current and future risk-exposure is consistent with risk appetite by monitoring and advising bank operation. Most banks can be viewed as complexity and opacity based on revenue diversification and debt intensity. Thus, banks are likely to require more advising from their boards. My result confirms that an intermediate board with a greater number of independent directors is more effectively monitor and advise bank's management team (Liang et al., 2013), in turn leads bank to undertake riskier but value-enhancing investment. From an opposite direction, my results support the claim of both Pathan (2009) and Wang and

Hsu (2013), who finds that a small board associated with higher risk of bank. Besides, larger boards are also less effective more susceptible by influencing from CEO. In addition, as independent directors pay more attention to the regulatory and statutory issue, therefore, managers would act more conservatively to avoid any lawsuits (Pathan, 2009). Bank directors are likely exposed to high penalties imposed by regulators for violating fiduciary duties. Besides, recent discussion suggests that independent board may become less effective as they attend ‘too many’ boards. However, Elyasiani and Zhang (2015) suggest that many directors serve on too many boards to fulfill their duties adequately and the relation between bank risk and busyness board is negative. Besides, Wang and Hsu (2013) also suggest that banks with a higher proportion of independent directors are less likely to suffer from fraud or failure to comply with professional obligations to clients. Thus, my result is consistent with the finding of Elyasiani and Zhang (2015) and Wang and Hsu (2013), which are the board with more outside member lead to higher risk taking. Moreover, separated CEO and chair could be one of explanation for the strong governance and lower bank risk-taking. As individual has a more complex job and merits a higher equilibrium wage if CEO and chair duality, I might expect increases in the level of job complexity and monitoring quality falls. Thus, these CEOs may slack to monitor and advise on bank risk taking.

Second, another possible explanation might be that banks with managerial shareholding and foreign ownership can serve as catalyst to control bank risk taking. Agency problems and risk preference behavior are different depending on the nature and incentive of the shareholder (Barry et al., 2011; Saunders et al., 1990). If a bank is managed to maximize investor return, it will choose a level of risk that is consistent with that objective. This because managers seeking to improve the profitability might implement certain strategies that raise the uncertainty of the firms' income, such as introducing new production technologies, cutting expenses and tightening controls on production. Besides, shareholders may not be able to commit to monitor such complex contracts and projects (Bolton et al., 2015). Sullivan and Spong (2007) find that

managerial shareholding is positively linked with bank risk, meaning that under certain conditions, hired managers operate their bank more closely in line with stockholder interests. The limited liability shareholders have great incentive to increase the risk taking of the bank by increasing leverage to maximize their wealth. In contrast, managers may act in a risk-averse rather than chasing risk due to non-diversifiable human capital. Therefore, bank with part managerially shareholding exhibit higher risk taking behavior than stockholder controlled banks (Saunders et al., 1990). My result is consistent with the finding of Saunders et al. (1990). In addition, foreigners have ownership structures that are conducive to governance problems (Leuz et al., 2010). Given the financial resources and managerial know-how, foreign investors are more likely to improve the level of corporate governance through monitoring managers effectively. As the consequence, bank with foreign shareholders would be more efficient due to the strength of governance, while operating in higher risk.

Third, DeAngelo and Stulz (2015) claim that risk management is central to banks' operating policies as banks with risky assets use risk management to maximize their capacity. The risk management function is performed by the asset and liability management committee of the board of directors. The main function of risk management at banks is to limit exposure to risk, and hence to reduce the possibility of significant losses. Most operational losses in bank can be characterized as consequences of a weak internal control environment (Chernobai et al., 2012). Thus, risk management system can ensure that the bank has the appropriate risk level, for example, ceiling increases risk or eliminating uncover risk. Indeed, risk management system would strike the balance between helping bank take risks efficiently and ensuring not take excessive risks that destroy value. For instance, bank with a greater percentage of financial experts among management team can engage in higher risk-taking activities because they have better understanding of more complex investments (Minton et al., 2014). Besides, the presence of a chief risk officer in a bank's executive board and whether the CRO reports to the CEO or directly to the board of directors, are associated

with a better bank performance (Aebi et al., 2012). Therefore, consistent with my finding, banks with strong corporate governance normally associated with better risk management system, in turn raising risk-taking (Ellul and Yerramilli, 2013).

Fourth, depositors discipline could also be one of the reasons to explain the positive relationship between corporate governance and bank risk taking. Deposit insurance protects the interests of unsophisticated depositors and helps prevent bank failure. The banking sector is dominated by large state-owned banks in those emerging economy, especially in China. Those commercial banks are under strict government regulations and guaranteed by government safety net. However, Demirgüç-Kunt and Detragiache (2002) finds that explicit deposit insurance tends to increase the likelihood of banking crises. Anginer et al. (2014) suggest that the moral hazard effect of deposit insurance dominates in good times, while the stabilization effect of deposit insurance dominates in turbulent times. Thus, strong governance bank may focus on maximize shareholders' wealth mainly and neglect the interest of depositor, which would to take on excessive risk in normal time.

Summing up, as my sample represent all major banks in the three markets, my result is consistent with the conjectural on corporate, which in turn allow these banks to monitor and control their risk taking in an appropriate level. My result is in line with corporate firm evidence by Core et al. (1999), who suggest that board and ownership structure are associated with the level of firm risk in term of managerial compensation. Besides, my result also consistent with the finding of John et al. (2008), they conclude that corporate risk-taking is positively related to the quality of investor protection. The results support the hypothesis (2), better corporate governance increased bank risk taking. This finding is in line with other published papers using data from other markets (e.g. Pathan, 2009 and Elyasiani and Zhang, 2015).

Concerning the control variables, not surprisingly, size is an important determinant of



bank risk-taking. From table (5), I find that the coefficients of bank size are positively and statistically significant. This indicates that larger banks have lower risk than smaller banks, which consistent with the finding of Pathan (2009). The results do not support the argument for ‘too big to fail’, where large banks have greater incentive to take higher risk (Haq and Heaney, 2012; Elyasiani and Zhang, 2015; Bai and Elyasiani, 2013). A possible explanation for this relation is that the larger banks likely to have strong risk management function (Ellul and Yerramilli, 2013).

The coefficients on the ratio of equity to asset are negative and statistically significant for all specifications. More specifically, a 1% rise in equity to assets, capturing the extent of capitalization, decreases Z-score by 1–15%. These findings suggest that an increase in bank capital associated with rise in bank risk taking, which consistent with the argument that careful management of bank capital can control bank risk taking. My result is in accordance with some of the prior studies such as Haq and Heaney, (2012). However, my results are contrary to the results obtained in Konishi and Yasuda (2004), who found a positive correlation between the capital equity and the level of bank risk.

Some-what surprisingly, greater price to earning ratio negatively influences Z-score, suggesting a higher share price increases bank risk taking. This implies that banks in favorite stock market engaged in less prudent lending and not carefully originate their loans, in turn increasing risk. The possible explanation is that excess bank risk taking is induced by management compensation base on the stock price performance (Bolton et al., 2015).

Turning to the regional economic determinants, the coefficients on the GDP growth are negative and statistically significant for two specifications. This suggests that increased economic growth is found to be associated with increased bank risk.

Overall, my economic model has strong predictive power: R-square of the regression

implies that the variables explain between 11.1% and 17.3% of the variation in risk taking, net of any effect they may have through the other independent variables. In addition, the F-test rejects the null hypothesis that the coefficients on both instruments are jointly zero. However, the joint determination of corporate governance and risk taking raise concern that the result could bias. For instance, high risk banks might from better governance structure if disperse shareholders have difficulty monitoring risky investment. In the estimation equation  $R = b * C + u$ , R represent bank risk taking variable, C the matrix of all independent variables, u the error term, and b the vector of estimated coefficients. OLS is consistent only if no unobservable factors affect both governance and risk. I attempt this concern using a variety of strategies in following sections.

## 5.2 Governance and risk taking - Fixed-effect within estimation

The OLS estimation may not consistent due to it does not consider the unobservable and constant heterogeneity of the bank. Therefore, in the presence of unobserved bank fixed-effect, panel ‘Fixed-effect’ (FE) estimation is commonly suggested (Wooldridge, 2002, pp. 265–291, for details on FE estimation). By including bank fixed effects, I limit both omitted variables bias and the effect of potential outliers caused by the fact that the number of cross-sectional units in my sample is small. FE estimation is consistent only if the independent variables are exogenous, which is not the case in the analysis of corporate governance and bank risk taking. Many other previous papers use either this estimation in research on corporate governance or risk (Adams and Mehran, 2012; Pathan, 2009; De Andres and Vallelado, 2008; Laeven and Levine, 2009). Finally, Hausman test is used to identify the optimal model compare with random effect. The result shown in Tables (6) suggest that the fixed effects model is the optimal one.

	(1)	(2)	(3)	(4)
<b>Dependent variable</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>
CG	-1.155**	-0.970**	-1.173**	-1.054**

	(-2.36)	(-2.06)	(-2.40)	(-2.22)
ETA	2.027***	1.971***	2.017***	1.962***
	(16.01)	(16.02)	(15.79)	(15.77)
LNTA	-7.998***	-9.854***	-7.799***	-9.697***
	(-2.69)	(-3.41)	(-2.62)	(-3.35)
PE	-0.622	-0.0683	-0.479	0.0443
	(-1.22)	(-0.14)	(-0.92)	-0.08
ROAA	1.087***	0.812**	1.151***	0.885**
	(2.93)	(2.16)	(3.02)	(2.31)
LNDEP	9.358***	9.225***	9.335***	9.426***
	(3.14)	(3.21)	(3.13)	(3.26)
GDP			0.017	-0.075
			(0.29)	(-0.61)
INF			0.164	0.279
			(1.38)	(1.12)
INT			0.171	-0.526
			(0.65)	(-1.20)
Constant	-1.168	31.68**	-6.207	28.33*
	(-0.13)	(2.23)	(-0.62)	-1.77
Year effect	No	Yes	No	Yes
Observation	372	372	372	372
F test	0.000	0.000	0.000	0.000
R	0.548	0.598	0.552	0.602

Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. 1NDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

Table (6) reports the estimation results of Equation (3) to test the relationship between CG and Z-score using the FE estimation. As before, the coefficients on the CG is not significantly different from zero. I still find relatively strong evidence that the coefficients on CG are negative and significant on all specifications in Table (6). This illustrates that, after controlling for unobserved bank fixed effect, a bank with strong governance is associated with a higher risk taking. Thus, the second Hypothesis (H2) is also supported. A 1-standard deviation increase in CG is associated with around 0.97 to 1.16 increase in the bank risk taking, which is little smaller than OLS estimation.

Corporate governance plays a proactive role through directors' meetings to discuss and exchange ideas on how to monitor and advise managers, which could subsequently influence bank risk taking.

### 5.3 Governance and risk taking - GMM estimation

The OLS and fixed effect estimators are neither econometrically consistent nor related with the theoretical postulates of corporate governance literature. Besides, those estimators could be problematic because risk-taking can be endogenous. The endogeneity concern arises because greater risk-taking may be likely in banks operating in markets with higher growth rates, that is, risk-taking and growth could be driven by a potential variable. Thus, I need other econometric technique able take account at the same time the individual characteristics of each bank together with the potential endogeneity of governance characteristics.

The two step system GMM estimator with adjusted standard errors considers the unobservable heterogeneity transforming the original variables into first differences and the endogeneity of independent variables using instruments. Table (7) present the two step system GMM results of bank risk measure as Z-score. I present estimated coefficients whether they are statistically different from zero (p-value). Besides, the diagnostics tests in Table (7) show that the model is well fitted with statistically insignificant test statistics for both second-order autocorrelation in second differences (AR 2) and Hansen J-statistics of over-identifying restrictions. Besides, the residuals in the first difference (AR 1) are statistically significant, which is serially correlated by way of construction.

<b>Table 7: The relationship between bank corporate governance and risk taking (Z-score) - GMM</b>				
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
	<b>DIFF</b>	<b>SYS</b>	<b>DIFF</b>	<b>SYS</b>
<b>Dependent variable</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>

Lag.ZS	0.045*** (4.22)	0.737*** (21.76)	0.143*** (6.16)	0.966*** (42.46)
CG	-0.400** (-2.04)	-0.652 (-1.46)	-1.002** (-2.18)	-0.159* (-1.82)
ETA	2.323*** (11.10)	0.177*** (3.37)	1.476*** (12.25)	-0.118* (-2.00)
LNTA	-5.010*** (-3.63)	0.31 (0.29)	-4.330** (-2.68)	-0.479 (-1.58)
PE	-0.526*** (-5.62)	-5.251*** (-6.12)	0.905 (0.98)	-0.941** (-2.68)
ROAA	2.258*** (16.13)	0.471 (0.68)	1.144*** (9.18)	0.092 (0.23)
LNDEP	6.402*** (4.56)	2.896** (2.40)	4.274*** (3.42)	1.516*** (4.26)
GDP			-0.275*** (-4.98)	-0.416*** (-13.15)
INF			0.507*** (5.60)	1.199*** (9.49)
INT			-1.180*** (-4.93)	-0.643*** (-3.84)
Constant		-21.73*** (-5.20)		-7.331*** (-2.75)
Observation	279	321	279	321
F test	0.000	0.000	0.000	0.000
AR1	0.001	0.000	0.001	0.000
AR2	0.294	0.946	0.805	0.371
Hansen	0.998	0.828	1.000	0.682

Note: ZS is the Z-score, calculate as  $[\text{Average (Returns)} + \text{Average (Equity/Total assets)}] / \text{Standard deviation (Equity/Total assets)}$ . LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. 1NDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

With regard to the determinant of Z-score as dependent variable, I find relatively strong evidence that the coefficient estimates on corporate governance are negative and significant on all columns. This illustrates that, after controlling for other bank characteristics and macro-economic factors, a bank with strong governance is associated with higher risk taking. This result supports the hypothesis (2) that bank

governance play a role that is more proactive than reactive. In addition, the results in Table (7) provide at least some assurance that the negative association between bank governance and risk taking is not being induced by obvious model misspecification.

#### **5.4 Governance components and risk taking - OLS estimation**

As corporate governance components tend to be highly correlated, correlated omitted variables remain a concern in this chapter. I attempt to mitigate this concern by focusing on how the individual components affect risk taking. In Table (8), I replace the aggregate governance score with individual components to test the relationship between bank governance and risk taking. The coefficients on these bank attributes variables offer some important insights. Among seven attributes of corporate governance, board size (2BS) has a negative coefficient across different specifications, which supports that intermediate board bank boards (greater than 6 but fewer than 13) involve with more risk-taking. This result is consistent with the evidence by Pathan (2009) and De Andres and Vallelado (2008) in banking sector.

The governance literature argues that the optimal board size should balance advisory needs with the costs of decision-making. More directors in boards are able to assign more people to supervise and monitor on management decisions. Especially for independent directors, they should be endowed with the knowledge, incentive and abilities to discipline and advise managers, thus enabling to reduce the conflicts of interest between insiders and shareholders. Large banks have many subsidiary boards makes the role of the parent board in dealing with complexity less clear. Adams and Mehran (2012) argue that large boards may be beneficial due to additions of directors with subsidiary directorships may add value as complexity increases. Small board may not able to monitor the complexity organization. Nevertheless, larger boards are not more valuable over time. Complexity can explain the positive relation between board size and risk taking due to banks engage diversify activities while increase risk exposure over time. In addition, negative relation between bank performance and board size is

commonly finding in previous literatures due to less communication and coordination. Elyasiani and Zhang (2015) find a negative relationship between BHC market based risk measures and busy boards, indicating that BHCs with more busy directors have lower total, market, and idiosyncratic risk. Therefore, since shareholders have incentives to take more risk, strong bank boards (measured by board size) can be expected to associated with bank risk taking positively.

<b>Table 8: The relationship between the composition of corporate governance and risk taking (Z-score) - OLS</b>								
<b>Dependent variable</b>	<b>(1)</b> <b>ZS</b>	<b>(2)</b> <b>ZS</b>	<b>(3)</b> <b>ZS</b>	<b>(4)</b> <b>ZS</b>	<b>(5)</b> <b>ZS</b>	<b>(6)</b> <b>ZS</b>	<b>(7)</b> <b>ZS</b>	<b>(8)</b> <b>ZS</b>
1INDIV	-0.017 (-0.01)							0.628 (0.45)
2BS		-1.996*** (-2.77)						-1.390** (-1.99)
3DUAL			6.619*** (3.61)					6.821*** (3.73)
4TOP10				18.61*** (2.95)				19.50*** (2.74)
5 MH					-5.644 (-0.73)			1.996 (0.24)
6FORE						0.086 (0.07)		0.659 (0.53)
7AUDIT							-2.474 (-1.58)	-3.378** (-2.22)
ETA	1.881*** (13.09)	1.844*** (13.04)	1.825*** (13.07)	1.889*** (13.28)	1.881*** (13.22)	1.884*** (13.19)	1.896*** (13.35)	1.832*** (13.44)
LNTA	-9.277*** (-2.90)	-8.572*** (-2.71)	-9.662*** (-3.11)	-10.41*** (-3.25)	-9.544*** (-2.98)	-9.292*** (-2.91)	-9.138*** (-2.88)	-9.864*** (-3.23)
PE	0.190 (0.30)	0.209 (0.34)	0.227 (0.38)	0.155 (0.25)	0.176 (0.28)	0.190 (0.31)	0.168 (0.27)	0.215 (0.37)
ROAA	0.961** (2.11)	1.004** (2.26)	0.933** (2.13)	0.915** (2.03)	0.956** (2.13)	0.959** (2.13)	0.931** (2.07)	0.889** (2.09)
LNDEP	8.704***	8.091**	8.224***	9.366***	8.882***	8.722***	9.150***	8.897***



	(2.69)	(2.54)	(2.62)	(2.91)	(2.76)	(2.71)	(2.85)	(2.90)
GDP	-0.0604	-0.0971	-0.133	-0.0776	-0.0638	-0.0593	-0.0704	-0.183
	(-0.42)	(-0.68)	(-0.94)	(-0.54)	(-0.44)	(-0.41)	(-0.49)	(-1.32)
INF	0.243	0.290	0.0610	0.205	0.236	0.245	0.247	0.0652
	(0.82)	(1.00)	(0.21)	(0.70)	(0.81)	(0.83)	(0.85)	(0.23)
INT	-0.519	-0.536	-0.757	-0.458	-0.508	-0.520	-0.477	-0.658
	(-0.99)	(-1.05)	(-1.50)	(-0.89)	(-0.99)	(-1.01)	(-0.93)	(-1.34)
Constant	20.95	21.13	31.07*	19.28	23.90	20.84	13.16	15.84
	(1.23)	(1.26)	(1.85)	(1.14)	(1.37)	(1.21)	(0.75)	(0.89)
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	372	372	372	372	372	372	372	372
F test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R	0.594	0.605	0.616	0.594	0.594	0.594	0.601	0.634
<p>Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. 1NDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.</p>								

An alternative explanation for why banks with more board members experienced high risk taking is that board members encouraged managers to raise equity capital during the crisis period to avoid regulatory intervention. However, raising equity capital is costly during the crisis period and may cause a wealth transfer from shareholders to debtholders. Erkens et al. (2012) find that the wealth transfer from existing shareholders to debtholders due to equity capital raisings was substantial. Non-equity stakeholders such as debtholders and regulators, which often prefer conservative investment, may influence investment policy for their own benefit. The conflicts between bank manager and shareholders would lead to risk taking varies within different corporate governance structure (Laeven and Levine, 2009). Strong governance dampens the magnitude and the importance of private benefit to those stakeholders, resulting in less forgoing of positive net present value risky investment.

The coefficient on board independence is insignificant, which is consistent with the finding of Erkens et al., (2012). If a bank with more independent board members, strategic decisions should improve due to the counseling skills of the members complement those of the CEO. Adams and Mehran (2012) also find that board independence is not related to bank performance. My result is in contrast to the work of Minton et al. (2014), they find that the fraction of independent financial experts is positively related to several measures of risk for U.S. commercial bank. Besides, Liang et al. (2013) also suggest that the proportion of independent director has significantly positive impacts on bank asset quality. However, I focus exclusively on the markets where data about insolvency risk is widely available.

In addition, the Big 4 Audit firm (7AUDIT) also has a negative coefficient across different specifications, which supports that banks with audited by Big 4 audit firm involve with more risk-taking. Agency theory suggests that managers have incentives to avoid risk, while shareholders prefer excessive risk. Firms with weaker governance

structures have greater agency problems, as a result perform worse (Core et al., 1999). If a bank is audited by an industry specialist for the controlling accounting quality, which may encourage shareholder-focused corporate risk-taking. Shareholders are reluctant to monitor the complex accounting information due to a commitment problem that may be exacerbated by unobservable tail risk (Bolton et al., 2015). Banks audited by a Big 4 audit firm display a high financial stability than banks audited by non-Big 4 audit firm. My result thus in line with Bouvatier et al. (2014), they find that Big 4 firms do not contribute to improving the quality of banks' financial statement. Thus, high quality auditing could enhance bank governance and thus act as one of mechanisms to associated with higher bank risk-taking.

Furthermore, the relationship between top 10 shareholders (4TOP10) has a positive coefficient across different specifications. These findings suggest that banks with no relationship among top 10 shareholders associated with lower risk taking. The results largely consistent with the findings in Laeven and Levine (2009), who find that bank risk is generally higher in banks that have large owners with substantial cash flow rights. Larger shareholders have power and incentives to reduce the discretions enjoyed by managers. Besides, other stakeholders have less incentive in monitoring bank risk taking for their self-interest (Bolton et al., 2015). Better corporate governance mitigates the risk of taking of private benefits from larger shareholder (Morck et al., 2000). Furthermore, the dominant shareholders may instruct lower-layer departments to take less risks and tunnel gains to upper-layer departments in a pyramid of banks. Therefore, bank with strength of corporate governance, represent as no relationship among top 10 shareholders, associated with lower risk taking.

### **5.5 Governance components and risk taking - GMM estimation**

Following De Andres and Vallelado (2008) and Liang et al. (2013), the generalized method of moments (GMMs) is being used to control for the potential endogeneity problem for each governance components and risk taking. Table (9) reports the result

from two-step system estimator with adjusted standard error for potential heteroskedasticity proposed by Blundell and Bond (1998).

It is well recognizing that the GMM estimation can take accounts for the unobserved heterogeneity and the dynamic nature of panel data. I use lagged governance component variables and lagged other control variables as instruments. The intuition is that governance variables in earlier years could not have resulted from bank risk taking in subsequent years. Therefore, endogeneity concern is unlikely. Since out sample size is not large, I use the adjustment for small sample as in Windmeijer (2005).

The column (2) of Table (9) shows that board size (2BS) has a significantly negative relationship with Z-score at the 1% level across different specifications, which is consistent with above OLS finding and a number of empirical studies (e.g. Anginer et al., 2016; Pathan, 2009; and De Andres and Vallelado, 2008). The strong negative relationships suggest that intermediate boards represent efficient governance and align with the shareholder's preference on bank risk taking.

**Table 9: The relationship between the composition of corporate governance and bank risk (Z-score) - GMM**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent	ZS	ZS	ZS	ZS	ZS	ZS	ZS	ZS
Lag.ZS	0.950*** (200.32)	0.943*** (81.87)	0.955*** (237.00)	0.949*** (196.44)	0.952*** (158.54)	0.952*** (167.11)	0.949*** (163.89)	0.895*** (24.30)
1INDIV	-0.139 (-0.28)							-0.394 (-0.23)
2BS		-0.463* (-1.76)						-2.243* (-1.89)
3DUAL			-2.003*** (-4.38)					-2.221 (-0.75)
4TOP10				0.166 (0.77)				2.683 (1.65)
5MH					-0.461 (-1.17)			-2.244 (-1.51)
6FORE						0.295 (1.00)		4.302* (1.71)
7AUDIT							0.167 (0.66)	1.705 (1.21)
ETA	-0.099*** (-4.76)	-0.129*** (-3.47)	-0.104*** (-2.90)	-0.096*** (-3.82)	-0.100*** (-4.95)	-0.113** (-2.67)	-0.076*** (-3.37)	0.131*** (5.48)
LNTA	0.635*** (2.78)	0.144 (0.66)	0.702*** (2.88)	0.537* (1.99)	0.544* (2.00)	0.813** (2.69)	0.655** (2.50)	-1.548 (-1.56)
PE	-4.045*** (-15.50)	-3.009*** (-4.79)	-4.128*** (-23.03)	-3.954*** (-13.99)	-4.101*** (-16.44)	-3.974*** (-16.91)	-3.825*** (-13.97)	-2.042*** (-3.19)
ROAA	1.946*** (8.26)	1.833*** (5.16)	1.783*** (10.00)	1.923*** (7.84)	1.869*** (8.46)	1.816*** (6.87)	1.592*** (6.29)	1.139*** (3.97)

<b>LNDEP</b>	1.089*** (4.87)	1.165*** (5.42)	1.017*** (4.24)	1.130*** (4.36)	1.148*** (4.46)	0.896*** (2.99)	1.028*** (4.56)	2.558** (2.52)
<b>GDP</b>	0.006 (0.40)	0.046** (2.39)	0.016 (0.96)	0.004 (0.28)	0.006 (0.40)	0.007 (0.50)	0.007 (0.39)	0.017 (0.81)
<b>INF</b>	0.079*** (5.12)	0.141** (2.70)	0.064*** (4.30)	0.072*** (4.35)	0.066*** (3.52)	0.069*** (2.84)	0.054** (2.70)	0.248*** (2.75)
<b>INT</b>	-0.179** (-2.53)	-0.429*** (-3.13)	-0.194** (-2.28)	-0.164** (-2.14)	-0.174** (-2.06)	-0.167* (-1.94)	-0.0957 (-0.86)	-0.493*** (-5.34)
<b>Constant</b>	-8.068*** (-6.87)	-4.483 (-1.31)	-5.549*** (-3.95)	-7.585*** (-5.94)	-7.120*** (-5.37)	-8.345*** (-6.73)	-8.817*** (-6.59)	-5.304 (-1.09)
<b>Observations</b>	321	321	321	321	321	321	321	321
<b>F test</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Ar1</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Ar2</b>	0.564	0.382	0.565	0.559	0.573	0.539	0.505	0.319
<b>Hansen</b>	0.746	1.000	0.764	0.738	0.760	0.752	0.732	1.000

Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. 1NDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

The column (3) of Table (9) illustrates the effects of CEO chairman duality (3DUAL) on bank risk taking. The result shows that the CEO chairman duality has a significantly negative effect on the bank risk taking, meaning that banks operating in non CEO chairman duality are more risk taking than those operating in CEO chairman duality structure. The result is consistent with the evidence of Pathan (2009), which find that CEO power (CEO's ability to control board decision) negatively affects bank risk taking. The presence of CEO chairman duality may result in greater managerial discretion to implement conservative investment strategy. This can give rise to a negative relation between governance and risk taking. In addition, Anginer et al. (2016) also find that banks with shareholder-friendly corporate governance, in terms of separation of the CEO and chairman roles, is associated with higher risk taking, and the relationship is especially strong for banks located in developed countries. A board not chaired by the CEO is less easily captured by management, and expected to choose riskier investment as the risk taking incentives of shareholders. More risky investments may increase the expected value of shareholders' wealth, analogously to the positive effect on stock market valuation.

### **5.6 Interactive effects: corporate governance and bank performance**

So far, I have investigated the effect of corporate governance on bank risk taking controlling for other control variables. I follow up with additional investigation with possible interaction effects of corporate governance and bank performance on risk taking. To do this analysis, I have defined variables to measure the interaction effects. I construct one main variables CG\*ROAA, which is constructed by the interaction between the score of governance and the return on average asset. Table (10) reports the estimation results of Equation (3) to test the relationship between the interaction term (CG\*ROAA) and bank risk taking by OLS estimation.

<b>Table 10: The relationship between the interaction term and risk taking (Z-score) - OLS</b>				
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<b>Dependent variable</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>
CG	-0.257 (-0.42)	-0.415 (-0.59)	-0.392 (-0.60)	-0.473 (-0.67)
ETA	2.010*** (15.98)	1.921*** (13.30)	1.978*** (14.63)	1.933*** (13.41)
LNTA	-8.617*** (-2.94)	-10.21*** (-3.11)	-8.479*** (-2.74)	-10.02*** (-3.08)
PE	-0.392 (-0.77)	0.344 (0.56)	-0.164 (-0.29)	0.53 (0.85)
ROAA	4.734*** (3.31)	4.467*** (2.66)	4.666*** (3.02)	4.187** (2.51)
LNDEP	10.08*** (3.43)	11.03*** (3.39)	10.32*** (3.34)	11.23*** (3.47)
CG*ROAA	-0.962*** (-2.64)	-0.921** (-2.14)	-0.923** (-2.34)	-0.857** (-2.00)
GDP			0.025 (0.38)	0.108 (0.76)
INF			0.179 (1.40)	0.508* (1.74)
INT			0.238 (0.85)	-0.15 (-0.29)
Constant	-4.400 (-0.45)	5.235 (0.34)	-13.42 (-1.22)	-2.88 (-0.17)
Year effect	No	Yes	No	Yes
Observation	372	372	372	372
F test	0.000	0.000	0.000	0.000
R	0.557	0.599	0.560	0.600

Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. INDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

The coefficients of CG\*ROAA variable in Table (10) regressions were negative and significant at least at the 5% level. These results indicate that the increase in bank governance level while having a better performance enhanced bank risk taking



significantly, and the results remain significant even after controlling for the size and other bank characteristics. This finding confirms hypothesis (4). Results were consistent in the risk estimates i.e., in the Table (5), (6) and (7) regressions with the expected sign and significant statistical significance.

In Table (11), I present the firm fixed effects estimates (with t-statistics adjusted for firm level clustering). The fixed effects estimations go a long way toward dismissing omitted variables explanations as sources of endogeneity. As the result, there is still evidence of a negative relation between the interaction term (CG\*ROAA) and bank risk taking.

<b>Table 11: The relationship between the interaction term and risk taking (Z-score) - FE</b>				
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<b>Dependent variable</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>	<b>ZS</b>
CG	-0.172 (-0.28)	0.114 (0.19)	-0.201 (-0.33)	-0.002 (-0.00)
ETA	2.030*** (16.20)	1.963*** (16.16)	2.017*** (15.94)	1.956*** (15.89)
LNTA	-8.454*** (-2.87)	-10.53*** (-3.68)	-8.280*** (-2.80)	-10.35*** (-3.61)
PE	-0.447 (-0.88)	0.0709 (0.14)	-0.342 (-0.66)	0.132 (0.25)
ROAA	4.725*** (3.34)	4.735*** (3.44)	4.734*** (3.32)	4.617*** (3.33)
LNDEP	9.754*** (3.30)	9.471*** (3.33)	9.699*** (3.28)	9.605*** (3.36)
CG*ROAA	-0.961*** (-2.66)	-1.046*** (-2.96)	-0.949*** (-2.61)	-0.998*** (-2.80)
GDP			0.0154 (0.25)	-0.073 (-0.60)
INF			0.177 (1.50)	0.194 (0.78)
INT			0.088 (0.34)	-0.495 (-1.14)
Constant	-4.67 (-0.54)	34.36** (2.44)	-8.071 (-0.81)	32.22** (-2.02)

Year effect	No	Yes	No	Yes
Observation	372	372	372	372
F test	0.000	0.000	0.000	0.000
R	0.558	0.609	0.562	0.612

Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. 1NDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

In Table (12), I present the GMM estimates (with difference and system GMM). Again, there is evidence of a negative relation between the interaction term (CG\*ROAA) and bank risk taking. The investigations of the combined impact of corporate governance and performance on bank risk taking strengthened my previous findings of individual effects of corporate governance on bank risk. Most of the other bank-level characteristics enter with their expected signs and are usually consistent with the literature on bank risk determinants.

Dependent variable	(1)	(2)	(3)	(4)
	DIFF	SYS	DIFF	SYS
	ZS	ZS	ZS	ZS
Lag.ZS	-0.100*** (-5.84)	0.907*** (181.90)	0.084*** (3.76)	0.915*** (18.51)
CG	-1.415* (-1.74)	0.123 (0.47)	2.790*** (7.71)	0.631 (1.12)
ETA	3.942*** (22.49)	-0.189*** (-7.26)	1.630*** (8.04)	-0.192** (-2.68)
LNTA	5.650*** (3.18)	-0.231 (-0.74)	-12.53*** (-4.35)	-1.489* (-1.85)
PE	0.069 (0.62)	-1.474*** (-17.99)	1.138 (1.61)	1.477 (1.02)
ROAA	6.605*** (3.95)	6.575*** (12.12)	10.26*** (7.06)	5.574** (2.11)
LNDEP	-2.877** (-2.03)	1.457*** (4.41)	10.99*** (3.81)	1.844** (2.15)
CG*ROAA	-1.634***	-1.261***	-2.218***	-1.107*

	(-3.48)	(-6.82)	(-5.39)	(-1.87)
GDP			-0.065	-0.461***
			(-1.58)	(-3.09)
INF			0.430***	1.083***
			(3.28)	(5.25)
INT			-1.594***	-0.791**
			(-5.92)	(-2.29)
Constant		-11.33***		-8.409
		(-8.24)		(-0.77)
Observation	279	321	279	321
F test	0.000	0.000	0.000	0.000
Ar1	0.033	0.003	0.027	0.000
Ar2	0.552	0.631	0.581	0.474
Hansen	0.732	0.562	1.000	1.000
<p>Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. INDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.</p>				

Overall, the estimations presented above were relatively robust under different specifications. I concern the fact that the endogeneity problem associated with governance variable in the regression may be a potential limitation to make any conclusive comments. I attempt to correct this problem by using the GMM estimation and the result is very close of the OLS and FE estimation. Also the chapter may suffer from self-selectivity bias and again lack of data did not give us the opportunity to provide further detailed robustness test. I mitigate this selection bias problem by using the alternative risk taking variable and the results were similar to those of the Z-score regressions.

## 6 Robustness test

I have conducted several additional tests to check the robustness of my results. First, I

re-estimate equation (2) using pooled-OLS with clustered standard errors on an alternative risk taking measure, loan loss provision (LLP), while controlling for the effect bank characteristics and other macroeconomic factors. In addition, the F-test rejects the null hypothesis that the coefficients on both variables are jointly zero. The results of Table (13) shows that governance still has a significant effect on bank risk taking.

<b>Table 13: The relationship between bank corporate governance and risk taking (Loan loss provision) - OLS</b>				
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<b>Dependent variable</b>	<b>LLP</b>	<b>LLP</b>	<b>LLP</b>	<b>LLP</b>
CG	-0.106*** (-3.08)	-0.041 (-1.42)	-0.102*** (-2.87)	-0.046* (-1.69)
ETA	0.015* (1.83)	0.018*** (2.84)	0.017** (2.06)	0.017*** (2.62)
LNTA	0.656*** (3.62)	0.347*** (2.95)	0.388*** (2.59)	0.358*** (3.03)
PE	-0.029 (-0.75)	-0.015 (-0.42)	-0.007 (-0.17)	-0.025 (-0.68)
ROAA	-0.087*** (-3.02)	-0.064** (-2.26)	-0.111*** (-3.25)	-0.054* (-1.89)
LNDEP	0.376** (2.08)	0.637*** (5.22)	0.707*** (4.72)	0.614*** (4.99)
GDP			-0.001 (-0.23)	-0.018** (-2.03)
INF			-0.007 (-0.68)	-0.027 (-1.47)
INT			0.029 (1.41)	-0.026 (-0.79)
Constant	-5.070*** (-8.75)	-4.424*** (-7.89)	-6.365*** (-11.61)	-3.927*** (-6.54)
Year effect	No	Yes	No	Yes
Observation	372	372	372	372
F test	0.000	0.000	0.000	0.000
R	0.692	0.718	0.685	0.725

Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. INDIV is 1 if board controlled by more than 50%

independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

Second, I re-estimate equation (2) using fixed effect estimation on the loan loss provision in Table (14) as the pooled-OLS specification could be problematic because risk taking can be endogenous. The results are unchanged after the inclusion of firm fixed effects, suggesting that time invariant unobserved firm characteristics cannot explain my empirical findings. My results are robust to the alternative risk taking measure in terms of economic and statistical significance. Results show that a negative correlation between corporate governance and bank risk taking remains strong after controlling for a long list of possible covariates.

**Table 14: The relationship between bank corporate governance and risk taking (Loan loss provision) - FE**

	(1)	(2)	(3)	(4)
Dependent variable	LLP	LLP	LLP	LLP
CG	-0.078** (-2.13)	-0.065* (-1.85)	-0.083** (-2.32)	-0.066* (-1.90)
ETA	0.012 (1.34)	0.011 (1.26)	0.010 (1.10)	0.008 (0.87)
LNTA	1.065*** (4.75)	0.944*** (4.33)	1.051*** (4.75)	0.925*** (4.29)
PE	-0.041 (-1.08)	-0.009 (-0.24)	-0.027 (-0.72)	-0.023 (-0.59)
ROAA	-0.070** (-2.51)	-0.060** (-2.13)	-0.052* (-1.83)	-0.050* (-1.77)
LNDEP	-0.112 (-0.50)	-0.060 (-0.28)	-0.116 (-0.52)	-0.122 (-0.57)
GDP			-0.015*** (-3.31)	-0.025*** (-2.80)
INF			-0.001 (-0.12)	-0.040** (-2.19)
INT			0.032 (1.65)	-0.003 (-0.11)
Constant	-3.800*** (-5.82)	-2.699** (-2.52)	-3.578*** (-4.80)	-0.92 (-0.77)

Year effect	No	Yes	No	Yes
Observation	372	372	372	372
F test	0.000	0.000	0.000	0.000
R	0.698	0.730	0.709	0.739

Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. INDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

Third, to further control for path dependence in the series of the loan loss provision, remove the strict exogeneity assumption for independent variables, and eliminate the unobserved bank-specific effects, I employ the GMM estimator for hypothesis testing. Table (15) presents the dynamic panel regression results of corporate governance and alternative risk taking, LLP. All specifications can pass, at the 5% significance level, the Arellano-Bond test for zero autocorrelation in the first-differenced errors and the Hansen test of over-identifying restrictions. The evidence in Table (15) suggests that the strong corporate governance is still associated with higher bank risk taking.

	(1) DIFF LLP	(2) SYS LLP	(3) DIFF LLP	(4) SYS LLP
Lag.LLP	0.270*** (4.34)	0.622*** (13.23)	0.354*** (4.95)	0.862*** (11.13)
CG	-0.138*** (-7.70)	-0.016* (-1.81)	-0.060** (-2.21)	-0.096** (-2.39)
ETA	-0.032** (-2.16)	0.009*** (2.96)	-0.021 (-1.31)	-0.009** (-2.32)
LNTA	2.201*** (7.10)	0.042 (0.86)	1.796*** (3.53)	-0.059 (-1.58)
PE	-0.128*** (-2.80)	-0.094 (-1.54)	0.0845** (2.58)	0.026 (0.56)
ROAA	-0.062** (-2.57)	-0.082** (-2.51)	-0.026 (-0.54)	0.001 (0.02)

LNDEP	-1.375*** (-5.40)	0.394*** (10.14)	-1.309** (-2.69)	0.147 (1.47)
GDP			-0.013*** (-3.33)	0.010** (2.04)
INF			-0.013* (-1.94)	-0.018* (-1.71)
INT			0.022 (0.84)	0.010 (0.59)
Constant		-2.249*** (-9.64)		0.673 (0.76)
Observation	279	321	279	321
F test	0.000	0.000	0.000	0.000
Ar1	0.002	0.001	0.002	0.001
Ar2	0.051	0.235	0.224	0.375
Hansen	0.603	0.718	1.000	1.000

Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. INDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.

Fourth, I turn to empirically assess the relationship between governance individual components and loan loss provision (LLP) in Table (16), while controlling for the effect bank characteristics and other macroeconomic factors. Consistent with above, I find that my results continue to be qualitatively similar to those reported in previous. Thus, my conclusion on the relation between risk taking and governance is not sensitive to an alternative measure of risk.

**Table 16: The relationship between the composition of corporate governance and risk taking (Loan loss provision) - OLS**

<b>Dependent variable</b>	<b>(1) LLP</b>	<b>(2) LLP</b>	<b>(3) LLP</b>	<b>(4) LLP</b>	<b>(5) LLP</b>	<b>(6) LLP</b>	<b>(7) LLP</b>	<b>(8) LLP</b>
1INDIV	-0.247*** (-2.82)							-0.260*** (-2.94)
2BS		0.005 (0.13)						-0.006 (-0.15)
3DUAL			-0.217** (-1.99)					-0.238** (-2.16)
4TOP10				-0.123 (-1.22)				-0.107 (-0.96)
5 MH					0.078 (0.66)			0.092 (0.71)
6FORE						0.033 (0.53)		-0.033 (-0.49)
7AUDIT							-0.077 (-0.94)	-0.039 (-0.46)
ETA	0.0192*** (2.99)	0.0180*** (2.76)	0.0188*** (2.87)	0.0171*** (2.63)	0.0183*** (2.78)	0.0178*** (2.73)	0.0172*** (2.62)	0.0198*** (2.98)
LNTA	0.363*** (3.13)	0.362*** (3.08)	0.369*** (3.13)	0.397*** (3.29)	0.385*** (3.17)	0.377*** (3.14)	0.368*** (3.11)	0.414*** (3.36)
PE	-0.028 (-0.77)	-0.021 (-0.57)	-0.027 (-0.72)	-0.018 (-0.49)	-0.019 (-0.52)	-0.021 (-0.56)	-0.023 (-0.62)	-0.032 (-0.85)
ROAA	-0.062** (-2.16)	-0.054* (-1.89)	-0.053* (-1.86)	-0.051* (-1.77)	-0.054* (-1.89)	-0.054* (-1.90)	-0.055* (-1.92)	-0.058** (-2.03)
LNDEP	0.620***	0.611***	0.610***	0.591***	0.592***	0.598***	0.612***	0.596***



	(5.15)	(5.01)	(4.98)	(4.82)	(4.76)	(4.83)	(4.98)	(4.77)
GDP	-0.016*	-0.016*	-0.015*	-0.016*	-0.016*	-0.016*	-0.017*	-0.014
	(-1.79)	(-1.83)	(-1.70)	(-1.80)	(-1.83)	(-1.81)	(-1.93)	(-1.61)
INF	-0.022	-0.02	-0.024	-0.026	-0.027	-0.027	-0.028	-0.016
	(-1.20)	(-1.51)	(-1.30)	(-1.42)	(-1.49)	(-1.46)	(-1.54)	(-0.90)
INT	-0.039	-0.027	-0.017	-0.029	-0.028	-0.028	-0.025	-0.028
	(-1.18)	(-0.84)	(-0.52)	(-0.90)	(-0.85)	(-0.86)	(-0.76)	(-0.85)
Constant	-4.238***	-4.145***	-4.085***	-4.338***	-4.242***	-4.195***	-4.186***	-4.454***
	(-7.32)	(-6.99)	(-6.94)	(-7.21)	(-6.80)	(-6.93)	(-7.04)	(-6.94)
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	372	372	372	372	372	372	372	372
F test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R	0.727	0.722	0.726	0.721	0.722	0.722	0.723	0.732
<p>Note: ZS is the Z-score, calculate as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithm. LNNTA is total assets in natural logarithm. ETA is the ratio of equity to asset. PE is the ratio of market price to earnings per share. ROAA is the ratio of profit to average assets. LNDEP is natural logarithm of the amount of deposit. GDPG is GDP growth rate. INF is the inflation rate. INT is the lending interest rate. 1NDIV is 1 if board controlled by more than 50% independent directors and 0 otherwise. 2BS is 1 if the board size greater than 6 but less than 13 and 0 otherwise. 3DUAL is 1 if the chairman and CEO are not the same person and 0 otherwise. 4TOP10 is 1 if there are no relationships among the top ten shareholders and 0 otherwise. 5MH is 1 if management ownership is greater than 1% but less than 30% and 0 otherwise. 6FORE is 1 if foreign investor ownership is greater than zero and 0 otherwise. 7AUDIT is 1 if external audited by one of the Big 4 audit firm or their joint ventures and 0 otherwise. CG is the score of internal corporate governance by aggregate seven attributes.</p>								

## **7 Conclusions**

Banking crises are crucial not just because of the destruction on a particular sector, but also typically the shock waves strike the entire economy. Thus, the substantial portions of banks' wealth should be operated in a safe and sound manner. However, the relative opacity of banks provides some justification for regulator and investor suspicion. Therefore, the effectiveness of the top management team and ownership structure, and its corporate governance systems in determining appropriate risk-taking is a critical issue in a modern commercial bank.

This chapter examines the relationship between bank corporate governance and risk taking, using 43 Asian banks with the latest and a wider range of panel data that cover 372 bank observations over the period from 2006 to 2014. The empirical results indicate that the effect of strong corporate governance on bank risk is significantly negative, which suggest that corporate governance that favors the interests of their shareholders, is associated with higher levels of bank risk taking. Despite with OLS and fixed effect estimations, my chapter also applies recent two-step system GMM dynamic panel data techniques as the robustness test.

While my sample is unique in terms of the prudential regulation and similar cultural background, so the financial incentives analyze may also play a role in explaining risk in other businesses and stock markets. Other businesses are likely to face many of the same governance issues, such as board composition, designing appropriate incentive to top managers and ownership structure. All of these issues are need to take account when establish the appropriate governance structure of other banks and businesses. In addition, given the differences in institutions and business environment, it is certainly possible that the governance provisions may work differently in nonfinancial firms. Further exploration of nonfinancial firms' specific governance attributes and criteria may be useful.

In response to the financial crisis, global authorities were tightened to strengthen corporate governance and resilience of the banking industry. Thus, improved understanding of bank risk is essential for a range of financial market participants. My findings highlight several important issues for policymakers in relevant economic authorities. First, to prevent excessive risk taking, regulators should adopt a more cautious approach to evaluate and approve bank engaged activities at the national level. If banking regulators are committed to safeguarding banks' asset quality, elimination of explicit protection might be a sufficient condition. Second, to promote the stability of economy, regulators should encourage banks building a high standard of risk management system. Third, regulator should consider using a recent innovation in financial markets to reduce risk taking of banks' executive (Bolton et al., 2015). The push for increased market discipline of banks may shed light on limiting risk taking. Indeed, market forces rather than regulation may have been more effective in mitigating moral hazard problem (Keys et al., 2009).

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