# The role of bank governance: Evidence from market discipline, capital structure, ownership structure, risk taking and political connection

Chaoke Wang

Thesis submitted for the Degree of Doctor of Philosophy
University of Sussex
March 2018

Department of Finance
University of Sussex

WORK NOT SUBMITTED ELSEWHERE FOR EXAMINATION

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature:…….

# The role of bank governance: Evidence from market discipline, capital structure, ownership structure, risk taking and political connection


## Abstract

Banks, like other business firms, must attract outside funding within competitive capital markets, must face competition in product, and must deal with corporate governance issues deriving from agency problems and asymmetric information. Corporate governance in banks is unique compared to non-financial firms, with factors such as higher opaqueness, heavy regulations, and government interventions, which thus require distinct analysis. Although it is well recognised that corporate governance can affect bank value, in this thesis I combine external and internal corporate governances by considering board composition and ownership structure, as well as trading behaviour on stock markets. The main objective of this thesis is to study empirically the impact of various governance mechanisms on bank stability, in terms of capital strategy, risk-taking and performance.

The finding is that there exists a significantly positive relationship between market discipline and bank capital structure. In addition, over-performing banks attract a high level of informed trading, which in turn leads to a higher level of capital buffer held by a bank. Also, banks with strong corporate governance are associated with higher risk-taking. More specifically, banks that have an intermediate board size, a separation between the CEO and the chairman of board, and are audited by the Big Four audit firm, are likely to take higher risks. Banks with more state shareholders also tend to have poorer performances, and banks with higher domestic and private shareholders generally operate more profitably. Ownership type diversity is associated with better

bank performance, while banks with concentrated ownership are worse performing. Finally, banks with political connections distribute more credit than nonpolitically connected banks. The results have certain policy implications for understanding the role of governance in affecting bank operations that, in turn, could improve bank prudency and assist the design of an enhanced regulation framework. Regulators should reduce protection, improve banks' asset quality, and strengthen market discipline.

**Acknowledgement**

There are so many people to thank for helping me during my PhD study. First and foremost, I would like to express the deepest appreciation to my two supervisors, Professor Emmanuel Mamatzakis and Dr Xiaoxiang Zhang. Professor Mamatzakis continually and convincingly conveyed a spirit of adventure with regard to research and scholarship. Dr Xiaoxiang Zhang provided me with valuable guidance, not only on conducting high quality research but also on expanding my academic networks, which is crucial for my future career in academia. Without their guidance and persistent help this thesis would not have been possible.

My sincere thanks go to the panel of my annual review and other discussions, and to Professor John Forker, Dr. Jie Wen and Dr. Mike Osborne for their helpful recommendations and constructive criticisms, which challenged me to deeply explore my research topics and further refine my ideas. I am also grateful for other academic staff at the Business and Management Department at the University of Sussex, and the Business and Management Ph.D. conference at the University of Sussex (2015, 2016).

Last, but not least, I am grateful to my wife Ting Guo and my other family members, for all their genuine love and encouragement.

# Contents

# Chapter 1: Introduction

## 1.1 Background and motivation

The concept of corporate governance is relevant to all firms globally, but it still has no generally accepted definition. Corporate governance can be defined as the system of laws, rules and factors that control operations in a company (Gillan and Starks, 1998). Shleifer and Vishny (1997) define corporate governance as the ways in which investors supply finance to corporations to ensure a return on their investment. Thus, corporate governance can act as a group of mechanisms used by stakeholders to ensure managers maximise shareholder wealth. These mechanisms refer to the methods used by shareholders to reduce managerial agency costs, such as board composition, voting rules and mangers shareholding. Gillan (2006) develops a corporate governance framework that separates two aspects of governance systems: internal and external corporate governance. Internal governance is related to the role of the board (such as CEO duality and the proportion of independent directors, and shareholding of executives), capital structures, antitakeover measures, internal control systems and management compensation. These internal mechanisms used by shareholders would motivate and constrain management's behavior to mitigate the conflict between managers and shareholders. External governance covers regulations and laws, capital markets and product market competition. Therefore, the effectiveness of corporate governance is largely determined by these internal and external factors, which in turn, affects firm value.

Banks, as with other business firms, must attract outside funding in competitive capital markets, face competition with regard to products, and deal with corporate governance issues deriving from agency problems and asymmetric information. In addition, banks impact economic growth, poverty, entrepreneurship, labour market conditions, and the economic opportunities that are available to people. Because of these impacts, financial institutions are more able to cause a systemic event with possibly catastrophic market

effects. Indeed, healthy banking systems exert a significant impact on economic growth and development. The subject of corporate governance is of enormous practical importance in the banking sector. A typical modern commercial bank engages in securities, insurance and real estate activities, or owns other nonfinancial firms, so that neither private nor public official entities can effectively monitor such a complex entity. These idiosyncrasies make it more difficult to be monitored by outsider stakeholders. In addition, the qualities of a bank's loan assets are not always clearly perceived and are often obscure, as are the financial statements, which often prove to be complicated and not transparent with regard to information. Furthermore, as compared with non-financial corporations, banks' financial statements reflect significantly higher leverage. For instance, the debt component commonly comprises around 90 per cent of a bank's capital structure, and the existence of government-backed financial safety nets can significantly reduce incentives for depositors to monitor a bank's risk-taking behavior. Thus, the role and the profile of risk management in financial institutions have been put under scrutiny. All these are confirmed by Morgan (2002), who argues that banks are extraordinarily complex and opaque. Hence, corporate governance would play a special role in the banking sector due to these opaque or complex organisational structures.

Corporate governance in banks is unique in a manner not applied to non-financial firms. Banks have their own particularities, such as higher opaqueness, heavy regulations and interventions by governments (Levine, 2004), which require a distinct analysis of corporate governance issues. Thus, public policy makers around the world have started to question the appropriateness of the current corporate governance that is applied and exercised in financial institutions. For instance, the Basel Committee on Banking Supervision has paid attention to the need to study, understand and improve corporate governance in banks (Principles for Enhancing Corporate Governance, BCBS, 2010). The Committee believes that good corporate governance is crucial to guaranteeing a stable financial system and, consequently, a country's economic development. These

proposals were designed to strengthen bank governance with a view to promoting a more resilient banking sector. In addition, with recent calls from regulators and the ensuing banking reforms, the world corporate governance landscape has changed dramatically during the past few years. As the banking reforms take hold and new regulations evolve, information on these changes are becoming available and it is the time to ask new questions and explore unresolved issues. Furthermore, the wave of bank collapses and scandals in the last decade has stimulated the drive for improved corporate governance. However, the majority of the existing body of literature tends to focus more on governance for non-financial companies and excludes financial firms from its sample. Therefore, we know little about the effectiveness of corporate governance in the banking sector. As a result, it is an opportune moment for governance researchers to add to our understanding of governance systems.

The purpose of this thesis is to contribute to the assessment of the types of reforms in bank governance that work best to achieve well-functioning banking systems. I classify my research into four streams based on the questions and the underlying economic issues being studied in banking sector. Specifically, I focus on research examining: (1) how the market discipline affects bank capital; (2) the relationship between bank corporate governance bank risk taking; (3) how the ownership structure affects bank performance and (4) the relationship between political connection and bank lending behavior. In short, this thesis spans several aspects of governance systems within the banking sector.

## 1.2 Market discipline and bank capital

Bank capital can be interpreted as equity, as the holders have the right to liquidate; it can also be interpreted as debt, where holders exercise their right only if there is a default. A lower survival probability bank can be defined as one that has insufficient capital. Therefore, bank capitalisation strategies are the fundamental issues in

determining the survival of a bank, both at the individual bank level and at the systemic level.

In banking, the presence of supervisions reduces the need for governance from other stakeholders. Due to the increasing complexity and opacity of banking organisations, however, regulators have recently begun to draw attention to market discipline. Bank supervisors have focused more intensely on using market information to enhance the process of identifying risks in the banking sectors. In addition, the standard corporate finance determinants have little explanatory power relative to regulation determinants over the bank capital structure. Furthermore, bank safety systems are difficult to design and implement because they have the conflicting objectives of protecting depositors while reducing bank incentives to engage in risky activities.

A general financial market is the production and aggregation of information. The role of financial market investors in disciplining listed banks is not straightforward. This occurs through the trading process that transmits information produced by investors for their own speculative trading into market prices. In addition, financial markets may enhance investment efficiency because they provide valuable information to managers. The trading results in the formation of the stock price that is informative about the investor's activity. Managers can thus learn from the information in stock prices about the prospects of their decision-making. Surprisingly, market discipline from informed trading has not played a central role in the empirical bank capital literature, despite the potentially fertile ground for studying the effects of the credit market on bank risk-taking.

The main findings in this chapter show that there is a fundamental tension between the informativeness of stock prices and bank capital. A significantly positive relationship between market discipline and the bank capital structure is being found. In another word, banks with a high level of informed trading are more likely to adjust their capital ratio

tightly. In addition, banks with better performance levels respond more promptly to stock prices as a source of information for monitoring. Indeed, a more informative stock price allows banks to reap more of the benefits of efficient investments. My findings complement the existing literature on the determinants of bank capital build up.

## 1.3 Corporate governance and bank risk taking

The financial crisis of 2008 has changed the world financial system in many different ways. Bank risk-taking is an important issue that has been reemphasised by the financial crisis and the subsequent attempts to reformulate the nature of global banking regulations. To improve risk reporting and management practices, regulators take steps to produce positive impacts on the quality of risk disclosure and risk management in the banking sector. In most corporations, corporate governance is generally responsible for designing and implementing strategic decisions. There is widespread recognition, as well as growing empirical evidence, that corporate governance arrangements can substantially affect a firm's value. Thus, regulators have emphasised the importance of effective corporate governance practices in the banking sector. Given that the solvency of financial institutions is a critical concern for regulators, a number of important reforms took place to overhaul the norms of governance, as well as in the board structure and ownership structure of corporations (see e.g., Basel Committee on Banking Supervision 2010; Board of Governors of the Federal Reserve System 2010a; b; OECD, Organisation for Economic Co-operation and Development 2010). Those requirements strongly focus on internal mechanisms and risks when describing good corporate governance.

In this chapter, I provide empirical evidence on the effects of corporate governance on bank risk-taking in the Greater China Region. My results show that banks with strong corporate governance are associated with higher risk-taking. In particular, banks with no relationship among the top ten 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 corporate governance.

This chapter has two purposes. Firstly, it analyses the effectiveness of internal corporate governance in monitoring and advising managers in the banking sector. The underlying idea is that several characteristics of internal corporate governance (board size, board composition, ownership structure, or auditing) might reflect directors' motivations and their abilities to effectively monitor and advise managers. Secondly, some previous literature has investigated the relationship between corporate governance and bank performance. Yet, it normally focuses only on the specific internal dimensions of governance rather than multiple governance mechanisms. The core of this chapter is the conviction that good corporate governance increases the monitoring of bank risk-taking.

## 1.4 Ownership structure and bank performance

The ownership structure of banks has long been studied in multiple disciplines and through various theoretical frameworks. It is recognised as an important determinant of general investment policies and, in particular, of bank performance and profitability. However, there is no consensus regarding the effect of ownership type on bank performance. To date, literature surrounding this relationship has only provided mixed results. While some studies show that government-owned banks are less efficient than private-owned banks (Berger et al., 2008; Iannotta et al., 2007 and Lin and Zhang, 2009), others find little evidence that private-owned banks are more efficient than government-owned banks (Altunbas et al., 2001), or that there are neutral associations between ownership and performance (Micco et al., 2007). In addition, previous literature has examined this relationship in international contexts (Caprio et al., 2007 and Micco et al., 2007), and some comparative work with European banks has been conducted (Altunbas et al., 2001), but very little is known about these relationships in an emerging market.

The aim of this chapter is to reconcile these conflicting results by enriching the analysis of the firm's ownership structure using the Chinese case. The Chinese banking system has several institutional characteristics that make it suitable for explaining the influence of ownership type on performance, and distinguishes it from those considered in previous research. I move a step further from the simple dummy characterisation of the main shareholder to incorporate two features: (1) the percentage at stake of different types of shareholders; and (2) the degree of concentration necessary to affect a bank. Previous studies rest on the assumption that shareholders have homogenous preferences for investment strategies. Only recently has the type of shareholder received some attention. Extending this line of research, I explore four different types of shareholders: state, state-owned enterprises, domestic private owners, and foreign owners. By introducing the type of shareholder as an explicative element, I can evaluate how differences in preferences may influence bank performance. Moreover, I consider the degree of ownership diversity, a variable that has been largely neglected in previous studies, as an additional determinant of bank operating strategies.

To investigate the relationship between types of large shareholders, ownership structure, and bank performance, I collected data from 138 Chinese banks during the period 2006–2015 to test my hypothesis. The main findings regarding the static effects of bank ownership on performance suggest that banks with more state shareholders tend to have poorer performance, consistent with much of the literature. In addition, banks with higher domestic private shareholders generally operate more profitably. Furthermore, higher foreign ownership may negatively affect bank performance. Moreover, ownership type diversity is associated with better bank performance, while banks with concentrated ownership types perform worse. The results are robust to a number of sensitivity tests, including alternative measure of bank profitability, alternative proxies of ownership concentration, bank-level regressions, and endogeneity concerns of ownership and performance. This chapter concludes by offering new contextual

directions to better understand the role of ownership in shaping bank outcomes.

## 1.5 Political connection and bank lending

Growing studies investigating the phenomenon of political implication on financial systems. There are two competing argument that explain the role of politics on economic institution. The 'development' view claim that government-owned financial institutions would achieve the public interest goal by capital injection to underpin economy in market recession. In contrast, the 'political economy' view argues that government-owned financial institutions are speculate tools for the politicians rather than public interest and tends to be associated with distortions in allocation of resources (Jackowicz et al., 2013; Sapienza; 2004). This debate is readily apparent for the public-sector involvement on economic reform in developing countries. Compare with other sectors, failure of individual bank can spread to others, as a consequence, a chain effect might impair the stability of the entire financial system at a specific economy or even globally. Previous financial crisis has been shown to cause a negative shock to start from banks failure to whole financial system globally.

This study is one of the first attempts to identify differences in lending behavior based on banks' missions in an emerging market. Specifically, I investigate whether banks with political connection, which exclusively focus lending behavior, and seek to maximize the credit supply. This issue is important because politics are an especially important element of the developing country's financial architecture. Not only do this chapter provide new proof about the role of political connections in credit allocation, we also show the effects of political connections under different economic environments.

The rest of this thesis proceeds as follows: Chapters 2, 3, 4 and 5 present my studies on the previously discussed research topic in the format of three papers. Chapter 2 investigates the influence of market discipline on bank capital strategy. Chapter 3

explores the association between internal corporate governance and bank risk-taking. Chapter 4 examines the role of ownership structure in enhancing bank performance. Chapter 5 investigates the relation between political connection and bank lending. Finally, chapter 6 provides concluding remarks.

# Chapter 2: Invisible hand discipline from informed trading: Does market discipline from trading affect bank capital structure?

## 2.1 Introduction

The capital adequacy requirement is one of the appropriate tools that enable regulators to maintain the stability of the banking system. A wealthy body of theoretical and empirical banking literature suggests that bank capital levels purely reflect regulatory minimum requirements. However, recent banking literature reveals that banks maintain or strengthen their regulatory capital ratios when they face higher illiquidity and want to strengthen their capital structure, and thus solvency standards, and improve their ability to raise external funds (Berger et al., 2008; Distinguin et al., 2013; Gropp and Heider, 2010).

The challenges in monitoring banks are closely linked to the complexity and information asymmetry problem that feature in this unique sector (De Andres and Vallelado, 2008). Informed trading, by incorporating private information into share prices, is central to the price discovery process and eventually enhances price informativeness in stock markets (Ealey and O'Hara, 2004). Governance via informed trading has recently been recognised as a potential market discipline mechanism on the management of firms that complement legal and regulatory institutions, thus improving market efficiency (Admati and Pfleiderer, 2009; Edmans 2009; Edmans and Manso, 2011; Edmans et al., 2013; Ferreira et al., 2011; Ferreira and Matos, 2008; Gallagher et al., 2013; Massa et al., 2015). The basic insight gleaned is that informed trades drive stock prices to fundamentals, and are dependent on corporate managerial actions. With stock prices more sensitive to these actions, governance through trading credibly

rewards (penalises) the stock-incentivised manager, who ex ante has greater incentive to put in effort by means of costly hidden actions (Holmstrom and Tirole 1993). Ultimately stock-incentivised managers exert more effort on behalf of shareholders (Edmans et al., 2013, 2015; Gallagher et al., 2013; Massa et al., 2015; Zhang et al., 2015).

Despite trading being widely recognised as a market discipline in corporate governance literature, its role in affecting bank capital structure has been neglected. In this chapter, I focus on informed trading and investigate how it targets banks with different performance levels, and ultimately how this affects bank capital ratio. I argue that informed trading, by actively incorporating the superior insights of a bank's real fundamental status, including its solvency condition into share prices, should act as an "invisible" hand to discipline bank managers. It especially targets "under-performing" bank managers, thus acting as a private enforcement to force managers to strengthen their solvency standards above the mandatory minimum requirement. The effectiveness of trading, as the market discipline, should become more obvious if bank managers are more stock-incentivised. This analysis can enhance the understanding of why banks maintain their capital buffer from a market discipline perspective. It has implications for policy makers on whether and under what conditions market discipline, via informed trading, can act as an effective private enforcement to strengthen the solvency standards in addition to the public mandatory minimum requirement.

This chapter focuses on banks listed on stock exchanges from Mainland China, Hong Kong and Taiwan. This is because Mainland China is the largest emerging economy where disclosure quality is relatively poor, and stock-option compensation is rare in its banking sector. Despite Hong Kong and Taiwan sharing many similar market and cultural characteristics with Mainland China, as their economic development and financial systems are being increasingly integrated, they have highly stock-incentivised managers in their banking sectors. Hong Kong, in particular, has the highest disclosure quality and most stock-incentivised bank managers among these three. Thus, these three

markets represent a good opportunity for us to mitigate different culture related impacts on capital buffer decisions made by bank managers, and to focus on the impacts of informed trading conducted in similar market structures with different degree of stock-incentivised bank managers and their capital decisions.

I employ a three-step procedure to generate the empirical evidence in this study. First, the level of informed trading is estimated using a market microstructure model (PIN) and high frequency trade and bid-ask data. Following recent literature (De Jonghe and Oztekin, 2015; Flannery and Giacomini, 2015; Lepetit et al., 2015), I measure capital level using the traditional ratio of total capital to total asset. I measure bank performance using bank efficiency estimated by the frontier approach. I then construct an empirical model to test the relationship between PIN and capital. My main finding is that there is a significantly positive relationship between market discipline and bank capital structure. In addition, over-performing banks attracts a high level of informed trading, which in turn leads to a higher level of capital buffer held by a bank. Finally, my results are robust in pooled OLS, fixed effect panel-regression. I acknowledge the potential endogeneity issue of research on market discipline and bank capital, which is general recognised as "a serious methodological problem". Thus, I employ an instrumental variable (IV) in the two-stage least square regressions (2SLS) to treat for endogeneity IV-2SLS, as well as the dynamic GMM approach panel regression estimations, while controlling for several specific financial and macro-economic characteristics.

This chapter contributes to the literature in several ways. First, the chapter makes the attempt to explore the role of informed trading in the banking sector through a microstructural perspective. To the best of my knowledge, it is the first study to link the literature concerned with PIN, in the context of market microstructure, with the numerous empirical studies on bank capital structure. Second, the chapter sheds light on the bank performing condition where market discipline influences capital structure,

which adds a new dimension to the understanding of the relationship between market discipline and bank capital decisions. Third, the chapter also gives an empirical analysis on the relationship between bank capital and efficiency, using the sample of the Great China listed banks, while the existing theory often provides contradictory predictions. Moreover, a single-market study seems appropriate for this type of analysis. However, given the cross-market discrepancy in the development level of capital markets, culturally homogeneous samples provide an excellent laboratory for understanding the role of information in the banking sector.

The reminder of the chapter is organised as follows. The next section discusses the related literature on informed trading as the market discipline force, and literature on the determinants of bank capital structure. Drawing on these theoretical insights, I develop hypotheses relating market discipline with bank capital structure, as well as the effectiveness of using bank performance to discipline bank managers and affect bank capital decisions. I then explain the operationalisation of the dependent and explanatory variables, present and discuss some descriptive statistics, and outline the estimation methodology for the main regression analysis. The empirical results are then presented and discussed, as well as several robustness tests. Finally, I conclude with some comments about the importance and applicability of my analysis and make some suggestions about future work.

## 2.2 Literature review and hypothesis development

### 2.2.1 Bank capital

Although the role of capital has varied over time, it remains an important source of funds for banks in all countries. Normally bank capital is financed by shareholder funds as non-financial firms that serve three important functions. First, bank capital can be a buffer against adverse outcomes. Second, bank capital creates incentives for

management to manage risk when inverting in risky assets. High capital implies higher losses for the bank's shareholders in case of default, and hence lower incentives for risk-taking (Hilscher and Raviv, 2014). Regulators may require some additional capital for individual banks that are perceived to pose significant risks. Third, sufficient capital can be a single to different stakeholders suggesting that the bank will not be taken advantage of.

Capital adequacy ratio has played an important role in regulation as banks have long been subject to explicit or implicit limits on their permissible leverage levels. Setting capital requirements is a major task for regulators. There is a large literature on regulation that analyses its role in determining bank capital (Allen et al., 2011; Barrios and Blanco, 2003; Chalermchatvichien et al., 2014). For example, the 1988 Basel Accord[1], and subsequent amendments, significantly influences the effectiveness of bank capital structure. A common justification for bank capital regulation is the reduction of bank moral hazard and conflicts between equity holders and debt holders. In addition, an under-capitalised bank may take excessive risks to maximise its shareholder wealth. This incentive is reduced if banks have capital at risk. The equity capital is costly for banks, compared to other types of funds, and thus bank managers attempt to economise on the use of the valuable resource.

Although the regulatory constraint is one of factors related to the determinant of capital level, it is not the most important one (Barrios and Blanco, 2003; Gropp and Heider, 2010). Gropp and Heider (2010) do not detect a first-order effect of regulation on banks' capital holdings. Based on their sample, they find that both banks and non-financial firms function as a buffer against regulatory distress, and conclude that the regulatory requirement is not the main determinant of bank equity. In addition, despite banks complying with regulatory standards for minimum capital requirements, several

[1] The Basel Agreement of 1988 is to ensure that financial institutions have enough capital to meet their obligations, which requires that banks in European countries meet the minimum capital ratios of 4 per cent tier 1 capital and 8 per cent tier 1, plus tier 2 capital to risk-weighted assets.

financial crises have undoubtedly demonstrated that existing capital regulations were inadequate to prevent a panic in the financial sector. The historical system of relying on book capital rules and supervisory (Basel Pillar 2) discretion to maintain adequate capital may need to be revised (Flannery and Giacomini, 2015). Benink and Wihlborg (2002) find that supervision alone cannot prevent banks from 'gaming and manipulation' of risk-weights.

Both theoretical (Barrios and Blanco, 2003, Diamond and Rajan, 2000; Mehran and Thakor, 2011) and empirical (Berger et al. 2008; Flannery and Rangan, 2008; Miles et al. 2013) literature suggests that banks have a target capital structure, which is different from the regulatory requirement. Barrios and Blanco (2003) develop two theoretical models: the first one for firms not affected by capital adequacy regulations, and the second one for firms which are affected. They demonstrate in both models the existence of an optimal capital ratio. In addition, Diamond and Rajan (2000) summarise that optimal capital structures for bank trades off three effects of capital, rent absorbed by the banker, against shocks and extracted from borrowers. In addition, banks might target higher capital ratios to mitigate insolvency risk. Given the historically high profitability of the banking sector, banks increase the capital ratio because earnings are easily retained. Berger et al. (2008) find that banks actively manage their capital ratio, set target capital levels above regulatory minima, and make rapid adjustments toward their targets. Alternatively, banks might target lower capital ratios to maintain lending relationships and competitive advantage.

Memmel and Raupach (2010) analyse the capital ratios using monthly regulatory data of large German banks and obtain the best fit to the optimal capital ratio of just above the regulatory minimum of 8 per cent. Miles et al. (2013) find that the amount of equity capital that is likely to be desirable for banks to use is much larger than banks have actually used, and it is also higher than targets agreed to under the Basel III requirement in United Kingdom banks for the 1992–2010 period. In the United States, Flannery and

Rangan (2008) find that banks' capital ratios increased substantially during the 1990s, with banks holding capital levels that were 75 per cent more than the regulatory minimums in the early 2000s. Berger et al. (2008) also find similar evidence in US bank holding companies from 1992 to 2006.

Gropp and Heider (2010) suggest that unobserved time-invariant bank fixed-effects are ultimately the most important determinant of a bank's capital structure. Based on a global sample of 64 countries, De Jonghe and Oztekin (2015) find that banks make faster capital structure adjustments in countries with more stringent capital requirements, better supervisory monitoring, more developed capital markets, and higher inflation. Memmel and Raupach (2010) find that large German private commercial banks (neither state-owned nor cooperative), and banks with a high level of proprietary trading are more likely to adjust their capital ratio tightly. Lepetit et al. (2015) find that the internal governance mechanisms affect the way banks adjust to the target capital structure.

### 2.2.2 Market discipline

To make progress in understanding bank capital structures, it is necessary to consider other various determinants. Market discipline might be an instrument to induce banks to hold appropriate capital under the Basel Accord, as markets have significant resources with numerous investors and analysts that have access to both public and private information about bank operations. For market discipline to be effective, factors such as changes in equity values and returns would influence the firm's manager decision-making. Bliss and Flannery (2002) show that market discipline implies two distinct notions: the private investors' ability to understand (monitor) a financial firm's true condition, and their ability to influence managerial actions. Therefore, market participants can affect bank behavior.

A large body of evidence in the banking sector suggests that markets monitor banks effectively and promptly. For example, Flannery and Rangan (2008) demonstrate that

market investors can influence bank behavior in terms of capital decision. Barrios and Blanco (2003) argue that a bank's capital ratio is primarily driven by the pressure of market forces rather than regulatory constraints, concluding that the main determinant of bank capital requirements is the pressure of market discipline. Nier and Baumann (2006) suggest that market discipline is effective in providing incentives for banks to limit their risk of default by holding capital buffers. Allen et al. (2011) also claim that market discipline is imposed on the bank's capital to provide monitoring incentives. Bennett et al. (2015) suggest that market discipline tends to begin far enough in advance to signal to both banks and supervisors that corrective actions can and should be taken. Curry et al. (2008) claim that the equity market can provide timely information and add value to bank holding companies. Hilscher and Raviv (2014) show that effecting market discipline via introducing contingent capital into bank capital structures represents a possibility to substantially reduce incentives to increase bank risk and decrease bank failure rate.

The informational efficiency of prices is a key attribute of capital markets that can have significant implications for the real economy. Thus, information from stock markets is a useful mechanism for designing corporate governance and can discipline managers on corporate investment decision-making (Dow et al., 2015; Faure-Grimaud and Gromb, 2004; Ferreira et al., 2011; Ferreira and Laux, 2007; Gorton et al., 2016). Indeed, investors can exert governance through affecting stock prices. The stock prices generate informative signals that affect how managers run their companies. Gorton et al. (2016) show that there is a fundamental tension between the informativeness of stock prices and the effectiveness of market discipline in corporate governance. Dow et al. (2015) analyse the incentives for financial market traders to produce information about a firm's investment opportunities.

More specifically, various literature argues that stock trading can be an effective mechanism of market discipline in corporate governance (Admati and Pfleiderer, 2009;

Edmans, 2009; Ferreira et al., 2011). By trading on information, market participates move the stock price toward fundamental value and closely reflect the effort exerted by managers. Faure-Grimaud and Gromb (2004) claim that public trading results in the formation of a stock price that is informative about the large shareholder's incentives to engage in value-increasing activity. Edams (2009) finds that institutional trading enhances the informational efficiency of the firm's equity, which leads myopic managers to make better financing decisions. Massa et al. (2015) suggest that short selling functions as an external governance mechanism to discipline managers.

Market discipline can be a source from information asymmetry, which arises from differential information between informed and non-informed traders. Informed traders are normally large shareholders, financial analysts and managers. Informed traders use superior knowledge, on such private information, to obtain private benefits. Managerial private benefits are commonly represented in previous studies as shirking, managerial career concerns, and perquisites. John et al. (2000) recognise that managerial compensation schemes may directly affect bank risk-taking preferences. In addition, Barakat et al. (2014) find that the increase in information asymmetry is higher for internal fraud-related events. Dell'Ariccia (2001) suggest that informational asymmetries are important determinants of the industry structure and of bank strategic behavior.

### 2.2.3 Hypothesis development

Bank supervisors require that banks maintain minimal equity capital as a protection for depositors and other stakeholders. Although supervisory pressure may contribute to the capital build-up, it also creates the environment that makes market discipline more relevant to banks. Capital build-up might be a rational response by market participants to changes in the banking environment.

First, market discipline through informed trading would help discipline management

and improve corporate governance (Admati and Pfeiderer, 2009; Edmans et al., 2013). This in turn encourages managers to invest in long-run growth instead of short-term earnings. Edmans et al. (2013) and Edmans and Manso (2009) show that governance from trading by blockholders leads to positive announcement returns and improvements in operating performance. Ferreira et al. (2011) claim that external market discipline by informed trading and internal board monitoring are substitutes. Both Berger (1995) and Mehran and Thakor (2011) find that total bank value and bank equity capital are positively correlated in the cross-section. Anginer et al. (2016) show that executive options and stock wealth that is invested in the bank are generally associated with better capitalisation.

Second, informed trading has significant impact on stock prices (Kitamura, 2016; Vega, 2006). A higher stock price would increase the value of equity. However, a sharp decrease in stock prices may lead to the risk of holding stocks. As a consequence, stock prices influence bank behavior indirectly if price changes lead supervisors to take steps designed to reduce a bank's risk exposure. The Third Pillar of Basel III specifies rules for expanded information disclosure to enhance the market disciplines on bank risk taking. The increasing complexity of large banking organisations makes it difficult for regulators to monitor and control using traditional tools, but markets can recognise and influence a bank's complex activity, and can therefore assess the true condition. Therefore, market discipline from informed trading can play an important role in bank supervision. Both Estrella (2004) and Benink and Wihlborg (2002) suggest that market discipline is a necessary supplement to capital requirement.

The requirement of capital build-up might be a rational response by supervisors to raise bank risk taking. Lepetit et al. (2015) find that banks are likely to boost their capital ratios by issuing equity without cutting lending when control and cash-flow rights are identical. Based on a sample of 341 European commercial banks during the 2002–2010 period, Allen et al. (2011) claim that the market discipline is one of the forces that

induces banks to hold positive capital because it allows higher borrower surplus. Allen et al. (2011) explain that borrowers prefer lower interest rates and higher capital as they do not bear the cost of the capital. Even there is deposit insurance, banks' incentives to monitor are reduced, but the market discipline still entails high capital level. Nier and Baumann (2006) find that stronger market discipline, resulting from uninsured liabilities and disclosure, creates larger capital buffers. In addition, Demirguc-Kunt (2013) finds that better capitalised banks experience higher stock returns.

Third, large shareholders often collect information and use it for informed trading. These shareholders have private information about managerial actions and/or about the consequences of these actions to the value of the firm. Thus, these shareholders with more information (private or public) have more knowledge about the true value of an asset, and are more likely to trade on this information (Vega, 2006). They can influence managerial decisions through an elected board of directors. Additionally, there is general agreement that the risk classification determines the bank capital requirement. Markets can recognise and influence bank default risk. Thus, bank capital ratios reliably relate to portfolio risk exposures. Flannery and Giacomini (2015) demonstrate that large European banks' reported regulatory capital measures often far exceeded their loss-absorbing capacity during 1997–2011. Bank risk exposures increase when banks are permitted to enter new, riskier lines of business. Risk aversion investors are likely to require the bank to adjust upward the capital ratio based on the risk level. Nier and Baumann (2006) find that while competition leads to greater risk-taking incentives, market discipline is more effective in curbing these incentives. Curry et al. (2008) conclude that equity markets provide an economically substantive degree of independent assessment of banking company risk, thereby establishing the conditions for market discipline to be effective. Allen et al. (2014) conclude that banks hold a positive amount of equity capital as a way to reduce bankruptcy costs.

Based on the above arguments, market disciplinary forces can be the explanation behind

capital buildup. To sum up, there are several reasons why a bank that is disciplined by the capital market should keep its capital ratio within a narrow high range. Therefore, it is proposed that:

*Hypothesis 1: Market discipline from informed trading is positively associated with the level of bank capital.*

Previous literature also provides rational explanations for low capital ratios. First, the pecking order theory (Myers and Majluf, 1984) states that information asymmetries between bank managers and outside investors induce a preference order from internal capital through debt, to equity financing. Information asymmetries about banks' financial health can be relieved by market monitoring. Strong external market discipline enables market participants to assess bank capital adequacy more efficiently. Therefore, this form of monitoring should be associated with lower external financing costs, thus increasing the leverage.

Second, bankers normally argue that an excessively high equity capital level has a negative effect on their ability to compete. An increase in bank competition erodes the present value of the banks' future rents, which lead to reducing the incentives to behave prudently.

Third, liquidity production is a central function of banks. Greater bank capital reduces the probability of financial distress, but also reduces liquidity creation (Diamond and Rajan, 2000). Distinguin et al. (2013) find that banks decrease their capital ratios when they face higher illiquidity. DeAngelo and Stulz (2015) claim that high leverage is optimal for banks to have a meaningful role in liquid claim production. Allen et al. (2014) show that equity capital is costly relative to deposit to provide liquidity.

Fourth, raising equity by issuing new shares may entail significant share price reductions and transaction costs. De Jonghe and Oztekin (2015) suggest that external

governance has an opposite effect on bank capital structure adjustments.

Based on above arguments, the contribution of market disciplinary forces can used to explain capital decrease. Therefore, it is proposed that:
*Hypothesis 2: Market discipline from informed trading is negatively associated with the level of bank capital.*

Bank performance may contribute to the effect of market discipline on capital structure. General investors have limited knowledge and skills and cannot become privately informed about every bank; thus they choose to trade banks that are most profitable. Management may respond to market assessments of company performance and change capital strategies. If markets are efficient, it leads to changing equity market valuations, reflecting market attitudes, and expectations of bank profitability. Thus, better performing banks respond to stock prices as a source of information to monitor management. Uninformed investors are likely to access an asset portfolio that has been 'cream-skimmed' by informed investors (Bolton et al., 2016).

Short selling is another avenue that contributes to market discipline when a bank is underperforming. Large shareholders are more likely to sell their stake in an under-performing bank rather than bear the cost of intervening to fix things. Such sales not only drive down the stock price, but also reduce the manager's equity compensation and, thus, punish them ex post. Anginer et al. (2016) show that executive options and stock wealth invested in the bank is generally associated with better capitalisation. Managers are more sensitive to the short selling as their wealth is closely tied to the stock price. Although market participants could be motivated purely to maximise their trading profits, by disciplining the manager such actions also have a social benefit. A bulk of the literature focuses on empirically testing the effect of short selling behavior from investors on company reaction. For example, Admati and Pfleiderer (2009) argue that when the larger shareholders observe managers underperforming, they will exit

before the information becomes public. Dasgupta and Piacentino (2015) claim that the efficacy of exit as a governance mechanism by equity blockholders can be an effective market discipline. Fang et al. (2016) find that short selling, or its prospect, helps detect fraud and improves price efficiency. Massa et al. (2015) document a significantly negative relationship between the treat of short selling and earning management. Edmans et al. (2013) also provide evidence consistent with exit theories suggesting that trading by institutions is an effective governance mechanism.

Bank performance has an important role to play in shaping the relationship between market discipline and bank capital structure. When banks are under-performing, their capital ratio is difficult to adjust upwards. The idea is simply that banks with lower earnings can be expected to face higher costs of issuing equity and have less financial slack. Under-performing banks will adjust their capital level downwards in response to exogenous changes in market discipline. In such a situation, these banks cannot obtain a better price when issuing new equity (De Jonghe and Oztekin (2015). In addition, managers are more likely to engage in risky investments when banks are underperforming. In another words, over-performing banks attract a high level of informed trading.

Therefore, it is proposed that:
*Hypothesis 3: Market discipline from informed trading can increase the capital ratio when banks perform efficiently.*

## 2.3 Methodology

### 2.3.1 Bank capital

The economist's definition of bank capital is the amount of equity that is financed by itself with. The regulatory view is similar but broader, in that regulatory capital typically

includes other sources of financing, such as preferred stock. As the variety of regulatory definitions of capital all assign a central role to equity, I will refer to bank capital simply as common equity (paid-in capital plus retained earnings) in the bank. Therefore, the ratio of equity to total assets (ETA) represents the bank capital and is calculated by the equity position as a fraction to the total assets of a bank. The ETA is commonly used to measure the level of bank capital in literature, as seen in Flannery and Giacomini (2015), De Jonghe and Oztekin (2015), and Lepetit et al. (2015). The ETA is used to capture the capital structure and risk preference across banks in terms of their equity requirements.

In addition, I include an alternative measure for the bank capital for the robustness test, which is the regulatory capital ratio (REG). Normally banks need to hold more capital than the required regulatory minimum in order to reduce the likelihood of liquidation. The regulatory capital is the amount of capital needed for a bank to be regarded as in continuous operation by depositors and other stakeholders. Basel III requires that banks with more risky assets maintain higher regulatory capital. Following Lepetit et al. (2015), Chalermchatvichien et al. (2014) and Memmel and Raupach (2010), the regulatory capital ratio is defined as the bank's core capital divided by the risk-weighted average assets.

### 2.3.2 Market discipline

To measure market discipline levels, the market microstructure model of Easley, Kiefer, and O'Hara (1996; 1997a; 1997b) is used to generate the PIN. The PIN is a measure of market disciplinary that exists based on the stock market. It reflects a firm-specific estimate of the probability that investors trade from private information; hence, it directly captures the extent of information among investors in the capital market. In addition, the model focuses on the mechanism through which the market participants observe updated trading and draw inferences about the true value of an asset. If the private information is being reflected on relevant transactions and the market participant updates their beliefs, then the trading price will be affected. In time, the full information

converges into the processes of trading, learning and pricing.

In Easley, Kiefer, and O'Hara' model (EKO), it is assumed that news events[2] occur independently with probability $\alpha$. When an event occurs, it is either bad or good news, and the probabilities are $\delta$ and 1 – $\delta$ respectively. Therefore, the bad news event occurs at the probability $\alpha\delta$, and good news event occurs at the probability $\alpha(1-\delta)$. During each trading day, orders from market participants are assumed to arrive according to the Poisson process. The informed traders arrive at rate $\mu$, regardless whether the news is good or bad[3]. The selling and buying of orders from uninformed traders would arrive at the rate of $\varepsilon_s$ and $\varepsilon_b$ respectively. According to EKO, the likelihood function induced by this simple model of the trade process for a single trade day is given as follow:

$$L(\theta \mid B,S) = (1-\alpha)\cdot e^{-\varepsilon_b}\frac{\varepsilon_b^B}{B!}\cdot e^{-\varepsilon_s}\frac{\varepsilon_s^S}{S!} + \alpha\delta\cdot e^{-\varepsilon_b}\frac{\varepsilon_b^B}{B!}\cdot e^{-(\mu+\varepsilon_s)}\frac{(\mu+\varepsilon_s)^S}{S!} + \alpha(1-\delta) \cdot e^{-(\mu+\varepsilon_b)}\frac{(\mu+\varepsilon_b)^B}{B!}e^{-\varepsilon_s}\frac{\varepsilon_s^S}{S!}$$

*(Equation 1)*

As the likelihood function is a mixture of distribution, these three elements refer to the likelihood weighted by the probability of a day with "no event day" (1 –α), a "bad news day" (αδ), and a "good news day"($\alpha(1-\delta)$). The ($B_i$, $S_i$) is the total number of buys and sells in a single date for the period $i \in (1,\ldots,I)$, and $\theta$ = ($\alpha$,$\mu$,$\varepsilon_b$,$\varepsilon_s$,$\delta$) is the parameter vector. All that is required to generate these parameters is to input the number of buyer-initiated and seller-initiated trades. However, trade and quote databases do not provide the number of seller-initiated or buyer-initiated trades in each day. The validity of my study that classifies trades as buyer-initiated and seller-initiated depends on the accuracy of the classification method. Consistent with Lai et al. (2014), the Lee and Ready (1991)[4] trade classification algorithm is being used to identify the trades. Ellis et

[2] The events could relate to private information of which the firm is aware or unaware, such as releasing new competitive products, or an adversely changing legal environment.

[3] The EKO model assumes that either informed buying or selling order occur on the same data.

[4] The Lee and Ready (1991) method is the classification of each trade by comparing the transaction price and the

al. (2000), Lee and Radhakrishna (2000) and Odders-White (2000) examine the validity of the Lee and Ready algorithms and find that this method correctly classifies 81.5 per cent, 93 per cent and 85 per cent of the trade, depending of the sample period and market studied.

Assuming sufficient independence conditions are held across a trading day, the likelihood function for the period is:

$$V = L(\theta \mid M) = \prod_{i=1}^{n} L(\theta \mid B_i, S_i)$$

*(Equation 2)*

Here $M = \{(B_i, S_i)\}_{i=1}^{I}$ refers to the data set. This maximises the likelihood of giving us the ML estimator for $\theta$, from which I can estimate the probability that the trade is information-based as follows:

$$PIN = \frac{\alpha\mu}{\alpha\mu + \varepsilon_b + \varepsilon_s}$$

*(Equation 3)*

The denominator $\alpha\mu + \varepsilon_b + \varepsilon_s$ is the arrival rate for all orders, which includes the informed and uninformed. The numerator $\alpha\mu$ is the arrival rate for information-based orders. Therefore the PIN equals the fraction of trades in a given day that arise from informed trading. This model interprets normal trading activities as uninformed trades, and the abnormal trades as informed trades. Two concerns may exist about the model:, it is simplistic and does not consider the volume factor.

There are several reasons to choose PIN as proxies of market discipline. First, it captures the characteristic of each transaction on the microstructure economic environment. Easley et al. (2002) use PIN in the asset pricing and find that higher PIN stocks earns higher expected returns. Vega (2006) finds that stocks with high PIN have

midpoint of the current bid and ask price. A trade would classify as a buy (sell) if the transaction price is closer to the prevailing ask (bid) quote. If the current transaction price is equal to the midpoint, the previous transaction price is used. A trade would classify as a buy (sell) if the transaction price is higher (lower) than the previous price. Next previous transaction price is being used if the current and previous transaction prices are the same.

smaller reactions with earnings announcements, which suggests that those stocks likely contain more speculator-held private information. Second, full information can converge through the processes of trading and learning from trading results in prices (Easley and O'Hara, 1992). Therefore, a high PIN helps the market become more efficient. Third, compared to other proxies of market forces, such as spread-based, abnormal accruals and earnings informativeness, PIN is more accurate for using the decision by all stock investors rather than individual reports or analysts. Classifying the number of buyer-initiated and seller-initiated trades for a listed company is more direct and comprehensive than reflecting the probability of informed trading in a dynamic market view.

### 2.3.3 Bank performance

The most common efficiency estimations in banking are nonparametric techniques, such as data envelopment analysis (DEA), and parametric techniques, such as the distribution-free approach (DFA) and stochastic frontier approach (SFA). The main difference between DEA and SFA is how they separate the measure of efficiency for an individual bank from random errors. DEA has the disadvantage of not allowing for random errors associated with luck and other measurement errors. Thus, I employ SFA to measure efficiency, which considers measurement errors, as well as other random factors in the estimation of efficiency. It was developed by Aigner et al. (1977) and Meeusen and Van den Broeck (1977). This method has been widely applied to the banking sector to evaluate cost and profit efficiency, both theoretically and empirically (Altunbas et al., 2007; Berger and Mester, 1997; Berger et al., 2009a; Koutsomanoli-Filippaki and Mamatzakis, 2009; Jiang et al., 2013). SFA has been criticised for predetermining functional form and for the distributional assumptions for the residual and efficiency score. However, separating the random error and efficiency score would be more appropriate in the efficiency literature in transition economies (Fries and Taci, 2005).

Suppose that total cost for each bank in each time period is given by:

$$TC_{it} = f(P_{it}, Y_{it}, Z_{it}) + v_{it} + u_{it}$$

*(Equation 4)*

where TC denotes observed total overhead for bank i at year t. P is a vector of input prices, Y is a vector of outputs, and Z stands for a set of control variables (fixed netputs). This approach disentangles the error term in two components. The first, (v), corresponds to the random fluctuations, and is assumed to follow a symmetric normal distribution around the frontier, capturing all phenomena beyond the control of management. The second, (u), accounts for bank inefficiency, relative to the frontier, and is assumed here to follow a truncated normal distribution. Cost efficiency measures the extent to which an individual's cost is above the cost of the best performance bank under the same condition. Cost efficiency is based on a more reasonable economic goal of cost minimisation and explains errors on both the output and the input sides (Sun et al. 2013).

Concerning issues regarding the choice of functional form, the translog function form has been commonly applied in bank efficiency studies (Beccalli et al., 2006; Fu et al., 2014a). The Fourier Flexible Form has gained the attention of bank related literature as it offers a better global approximation of the unknown function without misspecification (Vennet, 2002). But Altunbas and Chakravraty (2001) suggest that there is a problem with the Fourier Flexible Function when dealing with heterogeneous data sets. Berger and Mester (1997) argue that the difference between the translog form and the Fourier Flexible Form does not cause serious inconsistencies. Thus, the translog form has been chosen, and the SFA efficiency is based on the following function:

$$\ln TC = \alpha_{i0} + \sum_i a_i lnP_i + \sum_i \beta_i lnY_i + \frac{1}{2}\sum_i \sum_j \alpha_{ij} lnP_i lnP_j + \frac{1}{2}\sum_i \sum_j \beta_{ij} lnY_i lnY_j +$$

$$\frac{1}{2}\sum_i \sum_j \delta_{ij} lnP_i lnY_j + \sum_i \emptyset_i lnZ_i + \frac{1}{2}\sum_i \sum_j \emptyset_{ij} lnZ_i lnZ_j + \frac{1}{2}\sum_i \sum_j n_{ij} lnZ_i lnY_j +$$

$$\frac{1}{2}\sum_i \lambda_{ij} lnZ_i lnP_j + v_{it} + u_{it}$$

*(Equation 5)*

where TC is the logarithm of the overhead cost, Pi are input prices, Yi are output quantities, and Zi are control variables. For the definition of bank inputs and outputs, the intermediation approach proposed by Sealey and Lindley (1997) is applied. The banks collect funds through labour and physical capital, and transfer to the loans and other earning assets. So there are two inputs: labour and financial capital; and two outputs: loans and other earning assets. These two output variables are commonly used in previous researches, such as Berger et al. (2009a) and Bonin et al. (2005). Due to the unavailability of the personal expense data, I follow Jiang et al. (2009) and Fu et al. (2014), where the ratio of operating expenses to average assets is used as the price of labour. The price of financial capital is calculated by dividing the total interest expenses by the total interest bearing borrowed funds. Greater organisational complexity may be associated with lower efficiency; therefore, two bank-specific control variables are being employed to account for the size differences associated with banks. These are the amount of total earning assets and fixed assets.

To ensure that the estimated frontier is well behaved, standard homogeneity and symmetry restrictions are imposed. All variables are normalised by total assets, except for input price, which imposes linear homogeneity to ensure that the cost-minimising or profit-maximising do not change if all input prices are multiplied by the same positive scalar.

Table (1) presents the summary statistics of the used variables in stochastic frontier approach.

| Table 1: Descriptive statistics for variables in stochastic frontier approach for efficiency | | | | | |
|---|---|---|---|---|---|
| **Variable** | **N** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |
| Total overhead (TC) | 345 | 0.108 | 0.011 | 0.026 | 0.142 |
| *Output quantities* | | | | | |
| Gross loans (Y1) | 345 | 0.539 | 0.118 | 0.181 | 0.776 |
| Other earning assets (Y2) | 345 | 0.396 | 0.117 | 0.170 | 0.695 |
| *Input prices* | | | | | |
| Price of labour (P1) | 345 | 1.660 | 1.362 | 0.300 | 15.34 |
| Price of capital (P2) | 345 | 0.023 | 0.042 | 0.002 | 0.627 |
| *Control variables* | | | | | |
| Fixed assets (Z1) | 345 | 0.012 | 0.007 | 0.002 | 0.054 |
| Total earning assets (Z2) | 345 | 0.928 | 0.052 | 0.744 | 0.988 |

Note: All variables are normalised by total asset, except for input prices. Price of labor (P1) is the ratio of operating expenses to average assets. Price of capital (P2) is the ratio of total interest expenses to total interest bearing borrowed funds. All variables are winsorised at the 1 per cent and 99 per cent levels.

### 2.3.4 Main model specification and variable construction

To disentangle the relationship between capital, information risk and efficiency leads on, the system of equations estimated is as follows:

$$ETA_{it} = \alpha + \beta_1 PIN_{it} + \beta_2 CEFF_{it} + \beta_3 PIN * CEFF_{it} + \beta_4 X'_{it} + \varepsilon_{it}$$

*(Equation 6)*

where ETA represents the level of capital and is calculated by equity to average asset. The PIN is proxy for the market discipline, which is calculated by the Easley et al. (1997a, b) market microstructure model. CEFF represents bank cost inefficiency and is a proxy for bank performance. The interaction term between PIN and CEFF is being included to test Hypothesis (3). Lastly, X i,t refers to a list of control variables which includes bank specific characteristics and macro market control variables. The controls (Xi, t) include a full set of time-fixed effects and all variables listed in Table (2).

For control variables, I use a range of bank and market-specific variables that are considered important in explaining the relationship between the market discipline and capital. First, the logarithm of total asset (LNTA) is used to control the firm size. Larger banks hold more diversified asset portfolios and have a size advantage over smaller banks (Hughes et al., 2001). However, Berger et al. (1987) provide evidence that very large banks often encounter scale inefficiencies. I expect this variable to negatively impact the variation in the capital level because larger banks experience lower expected costs of raising new equity and enjoy conjectural government guarantees. In addition, banks with high earnings may choose to maintain higher equity capital ratios. This motive is likely to be amplified by the degree of risk aversion among bank management. However, high earnings indicate that banks will easily raise new capital in the future. Therefore, higher earnings would be associated with a lower capital ratio. I use earning per share (EPS) to control the impact from the fluctuation of earnings on capital. Third, the ratio of total deposits to total loans (DEPTOL) assesses the degree to which customer loans are financed by customer deposits, and is related to the bank's liquidity. DEPTOL is expected to be positive with capital, since holding more liquid assets is usually accompanied with higher risk, therefore leading to higher levels of capital. Finally, assets per employee (APE) is used as a control for the basic indicators of productive efficiency. I expect that APE negatively impacts the capital structure.

Several market specific variables are also included for controlling the macroeconomic development characteristics of Mainland China, Hong Kong and Taiwan. The impact of a macroeconomic environment may be more important for financial institutions than for non-financial firms because banks are exposed to business cycle fluctuations. These variables are commonly used in the banking literature. First, the inflation rate (INF) is also used to capture market characteristics. Customer bank fees would increase in high-inflation environments, but due loans may be accumulated and lead to higher risks. Athanasoglou et al. (2008) find that inflation can determine bank performance in the Greek market. In addition, the lending interest rate (LINT) is used to capture the

differences of regulatory regimes and monetary policies in these three markets. Third, a dummy variable (PCRISIS) of financial crisis (years 2008–2015) is used to capture the impact of the global financial crisis.

**Table 2: Definition of variables**

| Variables | Symbol | Description | Sources |
|---|---|---|---|
| Capital ratio | **ETA** | The ratio of equity to average asset | Bankscope |
| Regulatory ratio | **REG** | The bank's core capital divided by risk-weighted assets, as mandated by Basel III | Bankscope |
| Market discipline | **PIN** | The probability of informed trading calculated by equation (3) | Use original trade and quote data from stock exchange to estimate |
| Cost inefficiency | **CEFF** | The score of cost inefficiency obtained using stochastic frontier approach with translog specifications | Use original Bankscope data to estimate |
| Bank size | **LNTA** | The natural logarithm of total assets in thousands of USD | Bankscope |
| Earnings | **EPS** | The ratio of earning per share | Bankscope |
| Liquidity | **DEPTOL** | The ratio of total deposits to total loans | Bankscope |
| Asset per employee | **APE** | The natural logarithm of total assets per employees | Bankscope |
| Return volatility | **PRICEV** | The annualised standard deviation of daily stock returns | Datastream |
| Share turnover | **LNTBV** | The natural logarithm of share turnover by volume. | Datastream |
| Inflation rate | **INF** | Inflation rate | Datastream |
| Lending interest | **LINT** | Lending interest rate | Datastream |
| Financial crisis | **POSTC** | 1 for the post financial crisis period (years 2008–2015), 0 otherwise | Year dummy |

## 2.4 Data

### 2.4.1 Data sources

In this chapter, I use a region sample of banks over the 2006–2015 period. The sample covers the listed banks in three capital markets: Mainland China, Hong Kong and Taiwan. There are several reasons for concentrating on the Greater China listed banks. First, as the scope of this chapter involves understanding the potential effects of trading

behaviour on the stock market, it is important to consider markets that have a similar culture. These three stock markets can offer great opportunities to exam investor trading behaviours from a similar cultural background. Second, unlike the European and US banks, my sample is less affected by the global financial crisis. Thus, far less coverage has been given to non-western banks. I hope to fill this gap in the literature. Third, as the PIN variable needs to be calculated from the trading data from the stock market, the unlisted banks are excluded.

The financial data regarding income statements and balance sheet information on individual banks is from Bankscope (Fitch's International Bank Database). Given that my focus is listed commercial banks in the stock exchanges of the Mainland China, Hong Kong and Taiwan markets, I start by excluding central banks, investment banks, policy banks, securities houses, multilateral government banks, non-banking credit institutions, and specialised government financial institutions. For estimate efficiency, I exclude banks that have the following features: (1) missing values for profit before tax; (2) missing, negative or zero values for inputs and outputs; and (3) missing values for control variables (total assets and fixed assets). In addition, duplicate information is eliminated. If Bankscope shows both unconsolidated and consolidated financial statements, I use consolidated statement to analyse (except, of course, for banks that do not consolidate their data and do not belong to a consolidated group), as capital requirements are imposed at the consolidated group level. The scope of the risks contained in the consolidated statement is broader, as information about the banking subsidiaries operating outside Greater China is included. Furthermore, most of the banks in Mainland China follow the International Accounting Standards (IAS), while some banks, including the joint ventures and banks listed in the stock market, also prepare annual reports based on the Chinese Accounting Standards (CAS). However, the CAS was developed in 2006, following the principles of IAS. Therefore, I compare the financial statements of the same banks in Mainland China, which report under both the CAS and IAS, and do not find a major difference. The quality of data in China is often

questioned and criticised, so data from multiple sources has been checked carefully.

Another problem I have faced in this bank-level sample is that Bankscope reports financial statement data at the aggregated level. The impact of bank mergers during the period has also to be taken into account, especially in the Taiwan market. The aggregated statements are combined of a group of affiliated banks that have merged or expect to merge. These banks neither have financial links nor form a legal entity. Therefore, a given bank might be presented several times in Bankscope. Micco et al. (2007) propose two methods to deal with banks that have aggregated statements. The first is using the aggregated statement and dropping the observation for the individual banks. The second is using individual banks up to the time of merger, and then starting from the year of merger with the new bank. Following Dietrich and Wanzenried (2011), I use the first method and work with the aggregated statements. In addition, a similar problem arises for banks which, having belonged at t-1 to a consolidated group, leave the group at t. To calculate both the averages of certain variables, the figure at t-1 is obtained from the individually reported financial statements.

In order to calculate PIN, my sample is restricted to publicly listed banks because I require high-frequency transaction data from the stock market. The high-frequency data represents trades and quotes submitted during the regular trading hours of each listed bank. The high-frequency transaction data for banks in Mainland China are from the GTA Information Technology Company Limited. GTA Information Technology Company Limited is a local data provider that collects all the Chinese listed company transaction data. The transaction data for banks in Hong Kong are from Hong Kong Exchanges and Clearing Limited (HKEx). HKEx is a leading global operator of exchanges and clearing houses based in Hong Kong. The transaction data for banks in Taiwan are from Taiwan Economic Journal (TEJ). TEJ is a financial data collection and content processing companywhich focuses mainly on the Taiwan stock exchange. My transaction data includes all trades and quotes submitted to the stock exchanges of the

three markets from January 2006 through December 2015. Those three data sources provide information on trade qualifiers., Trades identified as irregular trades, and those with negative trading prices, are excluded.

In my study, three of stock exchange markets implement an automated electronic trading system during my sample period from January 2006 to December 2015. In this manner, a full business cycle of the Great China economy is included; a point of particular importance given that the aim of this paper is to analyse whether there is a relationship between the market discipline driven from the stock market and the capital held by financial institutions.

In addition to the bank-specific data and stock market information, I use two macroeconomic variables to control for a country's macroeconomic environment and overall level of economic development. These are the rate of inflation of consumer prices and the lending interest rate. This data is obtained from Datastream, which is managed by Thompson Financial Limited.

The initial sample contained 468 bank-level observations for PIN measure. I merge these observations with efficiency data, calculated by using SFA. For those observations that cannot be matched by efficiency, I manually match by firm names. Therefore, my panel is incomplete since new listed banks have started to operate during the period considered, while other banks have ceased to exist.

As shown in Table (3), some years have more observations than others due to new IPO, delisted, or acquisition during the sample period. Next, I apply the filters for firm-specific information. After filtering, the dimension of the data set is 345 observations and 36 banks for the period of 2006–2015. The number of banks and the number of bank-year observations are the highest from the Taiwan market, with 15 banks and 150 observations (making up 43.47% of the number of observations). The

Mainland China market is ranked second with 16 banks and 145 observations (making up 45.03% of the number of observations). The remaining Hong Kong market has 5 banks and 50 observations. The observations are distributed relatively evenly over the 2010–2015 period in the sample, but the years from 2006 to 2009 have fewer observations. Table (3) reports the distribution for my sample.

**Table 3: Sample distribution**

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mainland China | 7 | 14 | 14 | 14 | 16 | 16 | 16 | 16 | 16 | 16 | 145 |
| Hong Kong | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 50 |
| Taiwan | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 150 |
| **Total** | | | | | | | | | | | 345 |

Using a panel data methodology does not only control for individual heterogeneity, but also reduces concerns associated with multicollinearity and estimation bias, and specifies the time-varying relation between dependent and independent variables (Baltagi, 2008). Thus, my study employs a panel data methodology. An F-test is used to determine whether the fixed-effects model outperforms the pooled OLS. In addition, the appropriateness of the random-effects model relative to the pooled OLS model is examined with the Breusche and Pagan Lagrange multiplier (LM) test. Finally, Hausman's test is used to compare the fixed-effects model with the random-effects model.

### 2.4.2 Descriptive statistics and correlations

Table (4) presents the summary statistics of the used variables in the PIN estimation.

**Table 4: Descriptive statistics for PIN estimation**

| Variable | N | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| PIN | 345 | 0.180 | 0.105 | 0.001 | 0.800 |
| ALPHA | 345 | 0.648 | 0.263 | 0.001 | 1.000 |
| MU | 345 | 5.174 | 0.846 | 2.274 | 7.597 |
| EPSILON | 345 | 5.522 | 1.424 | 0.878 | 7.600 |

Note: PIN is probability of informed trading. ALPHA is probability of an information event. MU is arrival rate of informed traders. EPSILON is arrival rate of uninformed investors. The summary statistics of MU and EPSILON are based on the natural logarithm of MU and EPSILON. All variables are winsorised at the 1 per cent and 99 per cent levels.

Table (5) presents the descriptive statistics for the variables used in main empirical model. The key variables in my analyses are the proxies for the bank capital structure and market discipline.

For the full sample, as banks are highly leveraged, the mean (median) capital asset ratio (ETA) is 9.56 per cent (9.2 per cent), with a standard deviation of 2.9 per cent. The mean of the regulatory capital (REG) is 9.6 per cent, comfortably above the minimum Basel requirement of 8 per cent, with a standard deviation of 3.9 per cent. There is much greater variation in the ratio of equity to average assets. The pattern is similar to the study of Williams (2004), who examines the relationship between bank risk and efficiency in European banks. These two measures of bank capital level represent different capital structure dynamics, and one should be cautious in interpreting and generalising results obtained with each measure.

My estimated PIN variable has a mean of 0.17 and ranges from 0.05 to 0.65. This mean of PIN is comparable to previous studies. Easley et al. (2002) find that the mean of PIN is 0.19 in the New York Stock Exchange. More recently, Lai et al. (2014) use a larger dataset from 47 countries worldwide to examine the pricing effect of PIN. They estimate that the mean of PIN in Mainland China, Hong Kong and Taiwan are 0.10, 0.20 and 0.23 respectively. As the participants of Chinese equity markets are 99.5 per cent individual investors (Ng and Wu, 2006), the lower PIN is more plausible in these markets because individual investors have less information advantage compared to institution investors. While the PIN estimates are in the same order of magnitude, the frustrating in the PIN estimate probably reflects the increasing financial transparency of Mainland China markets and the implementation of an automated trading system.

In addition, the mean of cost inefficiency is 0.07, which is same as the cost efficiency in the study of Sun et al. (2013). The sample of Sun (2013) covers an eight-year period (2002–2010) in Mainland China. For other control variables, the asset size is highly

skewed to the right, as banks in the top quartile are several times bigger than median sized banks. Therefore, I use the natural logarithm of total assets (LNTA) to measure bank size to reduce the effect of skewness on my results. The average natural logarithm of the total assets is 18.27. The deposit to loan ratio (DEPTOL) ranges from 0.77 to 1.87, with an average of 1.23. The median DEPTOL ratio is 1.21, with a lower degree of variation across banks. The earning per share ratio (EPS) ranges from -0.52 to 1.85, with an average of 0.12. All these various checks reinforce my level of confidence in the accuracy of the estimated variables.

**Table 5: Descriptive statistics for main model variables**

| Variable | N | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| **ETA** | 345 | 0.095 | 0.029 | 0.017 | 0.264 |
| **REG** | 345 | 0.096 | 0.024 | 0.029 | 0.273 |
| **PIN** | 345 | 0.173 | 0.100 | 0.048 | 0.659 |
| **CEFF** | 345 | 0.070 | 0.064 | 0.025 | 0.527 |
| **LNTA** | 345 | 18.27 | 1.656 | 15.29 | 21.97 |
| **EPS** | 345 | 0.120 | 0.223 | -0.524 | 1.856 |
| **DEPTOL** | 345 | 1.237 | 0.165 | 0.772 | 1.874 |
| **APE** | 345 | 10.81 | 25.80 | 1.120 | 36.08 |
| **PRICEV** | 345 | 0.019 | 0.007 | 0.005 | 0.039 |
| **LNTBV** | 345 | 15.30 | 1.853 | 10.46 | 18.75 |
| **INF** | 345 | 2.111 | 1.908 | -.860 | 5.864 |
| **LINT** | 345 | 4.663 | 1.489 | 2.560 | 7.900 |
| **POSTC** | 345 | 0.724 | 0.447 | 0.000 | 1.000 |

Note: This table contains means, standard deviations, and minimum and maximum values on the variables included in the main model. ETA is the ratio of equity to average asset. REG is bank's core capital divided by risk-weighted assets, as mandated by Basel III. PIN is the probability of informed trading given by equation (3). CEFF represents the score of cost inefficiency obtained from the stochastic frontier approach with translog specifications. LNTA is total assets in natural logarithm. EPS is the ratio of earning per share. DEPTOL is the ratio of total deposits to total loans. APE is the natural logarithm of total assets per employee. PRICEV is the annualised standard deviation of daily stock returns. LNTBV is the natural logarithm of share turnover by volume. INF is the inflation rate. LINT is the lending interest rate. POSTC is the dummy variable, 1, for the post financial crisis period (years 2008–2015), and 0 otherwise.

The correlation matrix of correlations between the variables is shows on Table (6). The correlation between market discipline (PIN) and capital ratio (ETA) is 0.141, and is significant at the 5 per cent level, which suggests that banks with an intensive market disciplinary are likely to build up their capital. Additionally, the correlation between the regulatory ratio (REG) and PIN is -0.014, and is insignificant, while correlation between the REG and ETA is 0.344 and significant. The bank inefficiency (CEFF) and ETA

variables have a correlation of -0.190, and is not significant, while the CEFF and REG variables have a correlation of -0.213 and is significant at the 5 per cent level. This suggests that an inefficient bank may hold higher levels of bank capital. The correlation between CEFF and PIN is not very high, only -0.099, and in absolute value not more than 9 per cent.

**Table 6: Correlations**

| | ETA | REG | PIN | CEFF | LNTA | EPS | DEPTOL |
|---|---|---|---|---|---|---|---|
| **ETA** | 1.000 | | | | | | |
| **REG** | 0.344* | 1.000 | | | | | |
| **PIN** | 0.141* | -0.014 | 1.000 | | | | |
| **CEFF** | -0.190* | -0.213* | -0.099 | 1.000 | | | |
| **LNTA** | -0.193* | 0.001 | -0.375* | -0.002 | 1.000 | | |
| **EPS** | 0.016 | 0.285* | -0.091 | -0.006 | 0.219* | 1.000 | |
| **DEPTOL** | -0.067 | 0.296* | -0.078 | 0.062 | 0.234* | 0.075 | 1.000 |
| **APE** | -0.087 | -0.057 | -0.099 | 0.044 | 0.147* | 0.121* | 0.038 |
| **PRICEV** | 0.061 | -0.041 | 0.023 | 0.165* | -0.042 | -0.145* | 0.026 |
| **LNTBV** | -0.272* | -0.153* | -0.375* | 0.074 | 0.753* | -0.088 | 0.117* |
| **INF** | -0.098 | 0.184* | -0.140* | 0.079 | 0.179* | 0.198* | 0.123* |
| **LINT** | -0.143* | 0.138* | -0.378* | 0.164* | 0.468* | 0.257* | 0.279* |
| **POSTC** | 0.005 | 0.084 | -0.027 | -0.110* | 0.222* | 0.174* | 0.101 |

| | APE | PRICEV | LNTBV | INF | LINT | POSTC |
|---|---|---|---|---|---|---|
| **APE** | 1.000 | | | | | |
| **PRICEV** | -0.048 | 1.000 | | | | |
| **LNTBV** | 0.110* | 0.234* | 1.000 | | | |
| **INF** | 0.056 | 0.184* | 0.017 | 1.000 | | |
| **LINT** | 0.120* | 0.205* | 0.293* | 0.579* | 1.000 | |
| **POSTC** | 0.118* | -0.432* | 0.052 | -0.303* | -0.317* | 1.000 |

Note: ETA is the ratio of equity to average asset. REG is a bank's core capital divided by risk-weighted assets, as mandated by Basel III. PIN is the probability of informed trading given by equation (3). CEFF represents the score of cost inefficiency obtained from the stochastic frontier approach with translog specifications. LNTA is total assets in natural logarithm. EPS is the ratio of earning per share. DEPTOL is the ratio of total deposits to total loans. APE is the natural logarithm of total assets per employee. PRICEV is the annualised standard deviation of daily stock returns. LNTBV is the natural logarithm of share turnover by volume. INF is the inflation rate. LINT is the lending interest rate. POSTC is the dummy variable, 1, for the post financial crisis period (years 2008–2015), and 0 otherwise. * indicates statistical significance at the 5 per cent level.

Table (6) further shows that the correlation between the ETA and bank size (LNTA) is negative at -0.193 and significant, while the correlation between the REG and LNTA is positive and insignificant. This suggests that the economic impact of bank size on capital level may be opposite. In addition, the negative relation between PIN and bank size (LNTA) is consistent with previous empirical studies, such as Vega (2006), which uses PIN as an informed trading measure.

Overall, most of the value drivers considered exhibit a statistically significant correlation, so there are no strong correlations between the variables forming my models, and the risk of multicollinearity is very low.

## 2.5 Empirical results

### 2.5.1 Fixed effect estimation

Table (7) contains estimation results for the baseline model for the full sample using ETA as the dependent variable from Equation (6). It presents the results of proxy regressions for market discipline over bank capital variables, and a set of bank-level and country-level control variables.

To formally test how a firm fixed effect makes a difference to my results, I use the firm fixed effect estimation as my the baseline. I allow for residuals of the firms to be correlated over time. Bank capital structure can be explained by time invariant, firm-specific effect, i.e. a firm fixed effect (Gropp and Heider, 2010). These fixed effects can be correlated with other observed variables and influence the estimates.

**Table 7: The relationship between market discipline and capital - Fixed effect**

| | (1) | (2) | (3) |
|---|---|---|---|
| **Dependent variable** | **ETA** | **ETA** | **ETA** |
| PIN | 0.064** | 0.045* | 0.068*** |
| | (2.44) | (1.79) | (2.64) |
| CEFF | 0.099* | 0.089* | 0.107** |
| | (1.94) | (1.73) | (2.11) |
| PIN * CEFF | -0.845*** | -0.741** | -0.890*** |
| | (-2.67) | (-2.35) | (-2.85) |
| LNTA | 0.020*** | 0.024*** | 0.021*** |
| | (4.64) | (6.89) | (4.57) |
| EPS | -0.006 | 0.004 | -0.005 |
| | (-0.49) | (0.33) | (-0.43) |
| DEPTOL | -0.006 | -0.003 | -0.006 |

| | | | |
|---|---|---|---|
| | (-0.62) | (-0.34) | (-0.64) |
| APE | 0.001 | 0.001 | 0.001 |
| | (0.17) | (0.31) | (0.50) |
| INF | | -0.001** | -0.001 |
| | | (-2.18) | (-0.09) |
| LINT | | -0.004*** | -0.007*** |
| | | (-2.62) | (-2.93) |
| POSTC | | -0.023*** | -0.013 |
| | | (-6.09) | (-1.62) |
| Constant | -0.262*** | -0.312*** | -0.241*** |
| | (-3.25) | (-4.60) | (-2.83) |
| **Observation** | 345 | 345 | 345 |
| **F test** | 0.000 | 0.000 | 0.000 |
| **R** | 0.248 | 0.221 | 0.271 |
| **Year fixed effect** | Y | N | Y |

Note: ETA is the ratio of equity to average asset. REG is a bank's core capital divided by risk-weighted assets, as mandated by Basel III. PIN is the probability of informed trading given by equation (3). CEFF represents the score of cost inefficiency obtained from the stochastic frontier approach with translog specifications. LNTA is total assets in natural logarithm. EPS is the ratio of earning per share. DEPTOL is the ratio of total deposits to total loans. APE is the natural logarithm of total assets per employee. PRICEV is the annualised standard deviation of daily stock returns. LNTBV is the natural logarithm of share turnover by volume. INF is the inflation rate. LINT is the lending interest rate. POSTC is the dummy variable, 1, for the post financial crisis period (years 2008–2015), and 0 otherwise.

First, I include market discipline, bank inefficiency, the interaction term between PIN and CEFF, and bank specific control variables in column (1) of Table (7). The coefficient of PIN is positive and significant at the 5 per cent level, and the termed slope shifter is 0.064. Increased market discipline results in a context in which managers are less likely to enjoy a quiet life and it encourages more bank-specific capital strategies. This findings supports Hypothesis (1). In addition, the coefficient of CEFF is positive and significant at the 10 level level, indicating that bank efficiency has a negative effect on the level of capital. Low profit and inefficient banks have higher capital ratios. The result contrasts with the findings of De Jonghe and Oztekin (2015). Furthermore, the interaction term is negative and significant at the 5 per cent level, which suggests that market discipline may reduce bank capital for low efficient banks. Therefore, Hypothesis (3) is supported. However, the result should be handled with care as it may be driven by covariate: better performing banks tend to have a higher level of market discipline; at the same time, they tend to adjust their capital ratio frequently. The capital

market effectively subjects banks to a capital requirement, which brings their preference closer in alignment with those of the authorities, and reduces the level of social losses in event of bank failure.

I present the full model with the bank-specific and macroeconomic development variables in column (2) of Table (7). Again, the coefficient of PIN is still positive and significant at the 10 per cent level, and the termed slope shifter is 0.045. In addition, the coefficient of CEFF is also positive and significant at the 10 per cent level. Furthermore, the coefficient of the interaction term is negative and significant at the 5 per cent level. These results suggest that market discipline is a more effective method to enhance bank capital levels when banks perform efficiently.

Finally, I present the full model with the year dummy in column (3) of Table (7). Again, the coefficient of PIN is still positive and significant at the 1 per cent level, and the termed slope shifter is 0.068. In addition, the coefficient of CEFF is also positive and significant at the 10 per cent level. Furthermore, the coefficient of the interaction term is negative and significant at the 1 per cent level.

Overall, results of Table (7) show that controlling for a firm fixed effect, and other bank and market characteristics, does not change the effect qualitatively, and supports Hypothesis (1) and (3). The magnitudes of the coefficients are qualitatively unchanged, despite the significance decrease for some variables. All four coefficients of PIN are positively and statistically at the 5 per cent or 10 per cent significance level. Again, these findings still show that banks with strong market discipline are associated with higher levels of capital. The results of all the Hausmann tests shown in Table (7) suggest that the fixed effects model is the optimal one, in comparison to the random effect. The relevant value of the $\chi 2$-test is $\chi 2\ (12) = 23.60$, with a p-value=0.0008.

The results are consistent with Allen et al. (2011), who argue that an important factor in

inducing banks to choose higher capital is market discipline. In addition, Barrios and Blanco (2003) also find that market discipline lead banks to hold higher capital, compared to other factors. Furthermore, Nier and Baumann (2006) conclude that market discipline is more effective in limiting bank risk by the choice of a larger capital buffer. Curry et al. (2008) also claim that markets can provide useful information to bank supervisors and become channels for market discipline to be effective in restraining risky behaviors of institutions. A bank has a number of typical choices when raising its capital: it can raise funds from existing shareholders, issue new shares via the domestic capital market or, alternatively, it can source funds via the international capital markets.

Some criticisms for banks to operate with more capital is that banks would be forced to reduce liquidity and thus lead to impairing their competitive advantage. However, the lost liquidity is likely to be significantly lower than the cost to taxpayers of bailing out inadequately capitalised failing banks. Banks tend to decrease their Tier 1 and 2 capital ratios when they face higher illiquidity (Distinguin et al., 2013). Diamond and Rajan (2000) propose that the fragility associated with low bank capital is necessary for banks to create liquidity.

The result contrasts with the findings of both Petacchi (2015) and Agarwal and O'Hara (2007), which find that strong market discipline from higher information asymmetry have higher leverage, supporting the pecking order theory. However, there is a major difference between our study, and those of Petacchi (2015) and Agarwal and O'Hara (2007). The observation of Petacchi (2015) includes not only financial firms, but also non-financial firms, while Agarwal and O'Hara (2007) exclude financial firms.

This positive relation between market discipline from informed trading and capital level can be explained by several factors. First, since the stock price aggregates information dispersed among investors, this information can be useful for the design of corporate governance mechanisms. The trading brings new information on the true value of a

stock to discipline bank managers. Thus, market information can affect a firm's corporate governance through trading (Dow et al., 2015; Edams, 2009; Gorton et al., 2016). Ferreira et al. (2011) claim that firms with a high probability of informed trading are associated with strong governance. The effectiveness of banking firm governance could also be affected by information environment from the stock market. The information revealed by stock prices allows external monitoring mechanisms to operate more efficiently. In turn, managers learn about their own firms' fundamentals from the information in the stock prices, and incorporate this information in the corporate investment decisions (Chen et al., 2007). As suggested by Bhagat and Bolton (2008), better corporate governance has a positive impact on bank profitability and bank value. Mehran and Thakor (2011) claim a positive relation between bank value and capital. Therefore, the increase in capitalisation can be simply reflected by high bank earnings (Berger, 1995). Banks with a more conservative profile tend to hold higher capital to meet potential adverse shocks. Ferreira and Laux (2007) suggest that the openness in the market for corporate control leads to strong market discipline, which has more informative stock prices by encouraging the collection of, and trading on, private information. Banks clearly appear to have different governance structures compared with non-financial institutions, which have not only intensive regulations, but also higher leverage. In addition, a manager is less willing to pay dividends, and capital ratios have thus risen 'passively'. Indeed, higher capital is associated with higher lending, higher liquidity creation, higher bank values, and higher probabilities of surviving crises (Thakor, 2014).

Second, the effect of ownership could also play an important role from market discipline to bank capital adjustment. Holmstrom and Tirol (1993) claim that a firm's ownership structure influences the value of market monitoring through its effect on market liquidity. If the larger shareholder is government or family, rather than widely held institutions, the incentive for expropriation could be stronger. These shareholders would inject funds during hard times, with the expectation of extracting benefit in the

future, and to avoid failure. Thus, the ownership structure can play an important role in monitoring management, and banks with a strong orientation towards shareholder value are likely to keep the capital ratio at relatively higher levels. Although a decrease in the capital ratio seems desirable, as does an increase in the ROE, it may also result in costs of rating downgrades and rising debt spreads. Banks with excess control rights are presumably under greater market discipline pressure to adjust their capital ratio upward (Lepetit et al., 2015). Chalermchatvichien et al. (2014) find that an increase in ownership concentration by one standard deviation results in an improvement in capital adequacy by 7.64 per cent. Furthermore, these large shareholders have private information about their managers' actions and/or about the consequences of these actions to the value of the bank. If large shareholders are aware that a bank's management does not act in their best interest, it may be rational for the shareholders to vote 'with their feet' and sell their shares, rather than attempting to be active (Admati and Pfleiderer, 2009). Moreover, it appears that outside investors can impose discipline on the specific institution by mitigating the moral hazard incentives of equity holders.

Third, in order to measure the ability of investors to influence bank behavior, it is necessary to rule out the possibility that any corrective behavior is being driven by pressure from regulators in terms of risk management. Market discipline can influence a bank's risk management function (Barakat et al., 2014). Stronger market discipline should be applied to banks that are at greater risk of failure. Although the senior management and board of directors play an important role in bank risk management, market discipline is effective in providing incentives for banks to limit their risk of default by holding capital buffers against adverse outcomes (Nier and Baumann, 2006). The evolution of bank income towards an emphasis on non-interest revenue has also seen a structural change in banks, which may lead to higher risk-taking. Excessive risk-taking may lead to significant loss during financial crisis periods. William (2014) finds that external governance and higher capital regulations both act to reduce bank-level risk. Banks can improve risk control functions, due to the pressure of market

discipline, when they choose to undertake high-risk investments. High levels of capital would increase a bank's chances of survival and assist it to withstand major negative shocks (Berger and Bouwman, 2013). In the event of a crisis, the lower the capital ratio the higher the probability that a bank will fail to pay back its debts. Miles et al. (2013) conclude that the amount of equity funding that is likely to be desirable for banks to use is much larger than what banks have had in recent years, and it is also higher than minimum target requirements set by the regulator. As the separation of ownership and control raises the question of manager incentive to take actions in the best interest of shareholders (Jensen and Meckling, 1976), the managers have greater incentive to choose the disclosure policy, which may not fully reflect the risk taking of the banks. Regulators may not be able to monitor the 'moral hazard' problem and hence cannot fully control a bank's risk-taking incentive. Thus, the market force would discipline bank managers, who would, in turn, actively rebalance their capital structure to converge excessive risk taking.

Fourth, Nier and Baumann (2006) find that stronger market discipline from more disclosure increase capital buffers. Regulators should foster disclosure information and private-sector monitoring of banks (Barth et al., 2004). Estrella (2004) also suggests that market discipline through information disclosure can be supplemented with other tools for bank supervision. A bank with higher information asymmetry may indicate that less information is released or selectively disclosed. Brown and Hillegeist (2007) suggest that a negative relationship exists between disclosure quality and information asymmetry. Disclosure is a signal that contains information on future investment, future cash flows, and expectation of earnings. However, there is more informative signal if greatened the expenditure on disclosure and leakage of strategic information. Thus, banks may not be willing to disclose certain information. Additionally, banks hiding information could represent either poor asset quality or a high portion of nonperforming loans, in turn raising the level of bank risk. A failing bank can be seen as one that has insufficient capital and excess risk-taking. The regulation on bank asset restriction has

limited effectiveness given the high leverage ratios of banks. In addition, higher information asymmetry may indicate lower quality information disclosure by firms. It creates a potentially constructive role for government interventions to offset the market failures and enhance social costs. Thus, information asymmetry is crucial in determining the possibility of market discipline, both at the individual level and the systemic level. Especially for banking sector, information asymmetry prone is contagious and is socially costly. Based on the information provided by the bank about its level of capital, the authorities should consider whether to allow the bank to continue to operate. Thus, banks should provide more accurate and value-relevant information to the regulator and public regarding the risk management function. Therefore, regulators may focus on the capital adequacy to maintain the stability of financial systems by requiring banks to enhance their capital level.

More importantly, the combination of opaque assets composition and deposit liabilities make banks potentially vague. Thus, a bank may also 'cherry-pick' its information disclosure. For example, it might accelerate disclosing the gains on appreciated asset portfolios, while postponing recognition of unrealised losses. Berger and Bouwman (2013) suggest that banks with higher levels of capital have better chances of survival during a banking crisis. The benefit comes because a larger buffer of loss-absorbing capital limits the chances of financial crises. Setting the adequate level of capital is a major policy issue for banking regulators. Therefore, regulators can encourage banks to raise the capital when information asymmetry increases. Regulatory pressure plays an important role in banks' control of the level of capital. The Basel III framework also requires banks use more equity capital to finance their assets than was required under previous sets of requirement. Overall, Hypothesis (1) is supported.

The pecking order theory argues that the asymmetric information problem drives the capital structure (Myers, 1984; Myers and Majluf, 1984). Information asymmetries between bank managers and outsider investors induce a preference order from internal

capital, via debt to equity issuing. Agency costs arise from a conflict of interests between shareholders and managers, when shareholders cannot effectively monitor senior management. The costs include structuring, monitoring and holding a set of contracts among agents with conflicting interests (Fama and Jensen, 1983). In addition, there is some disadvantage for internal capital, which may have the risk of being misused for the private benefit of managers. Moreover, banks may have insufficient surplus cash during crises. However, the effect of these problems can be partially neutralised by adjusting capital. Memmel and Raupach (2010) suggest that banks with a higher level of proprietary trading are more likely to adjust their capital ratio upwards. High information asymmetry costs result in difficulty on external financing, which in turn lead to issuing equity capital. In addition, the optimal bank capital trades off three effects: more capital increasess the rent, increase the buffer against shocks, and changes the amount that can be extracted from borrowers (Diamond and Rajan, 2000). The cost of intermediation of saving through the banking system might offset the benefit of maintaining a larger buffer of capital. This would tend to reduce the level of investment, which has potentially long-term effects on real economy. Furthermore, the socially efficient capital level may exceed a bank's optimal capital levels, and market discipline would become germane to minimise the system risk. To sum up, there are several reasons why a bank increases capital levels when strong market discipline is in place.

Both column (3) and (4) of Table (6) include the bank inefficiency (CEFF); the interaction between PIN and CEFF that is estimated from stochastic frontier approach. However, both the bank inefficiency and the interaction term are not statistically significant. In addition, I briefly describe the set of control variables. Bank size (LNTA) is not correlated with capital in the first three columns, but is negatively correlated with this variable in column (4). This negative relationship suggests that larger banks have a relatively lower level of capital. This is consistent with the findings of Berger and DeYoung (1997), which show that larger banks are associated with lower capital levels. Lower capital is generally associated with higher bank risk. It is argued that in the

developing markets, such as Mainland China, a higher probability is attached to the likelihood of bailout for larger banks. Thus, large banks find the risk-seeking incentives from being too big to fail reinforced. Earning per share (EPS) is not correlated with bank capital in all specifications.

## 2.6 Robustness test

I perform several regressions to check for the robustness of my results obtained in Section 2.5. The causality could also go in the opposite direction, from bank capital to market discipline. The share price would go up for higher levels of capital and efficient banks, compared with counterparties. Thus, these banks may attract more attention in the capital market. Therefore, the trading volume would increase when more investors trade, and the more information would aggregate from trading. This would affect the level of market discipline. Another challenge is unobservable heterogeneity across banks, which definitively exists in these three similar markets.

The previous results, although favourable to the disciplining hypothesis, may be subject to the same issue of endogeneity. Although the FE model addresses endogeneity due to unobserved, time-invariant heterogeneities, it does not take account of the endogeneity problems due to time-varying heterogeneities, simultaneity, or reverse causality. Therefore, I use IV-2SLS and dynamic GMM to further address these econometric challenges.

### 2.6.1 IV-2SLS estimation

IV-2SLS is a standard methodology used to address the endogeneity problem in empirical corporate finance research. Under standard identification assumptions, I apply 2SLS methods to isolate the effect of PIN on capital.

A valid instrument must meet two criteria: a strong correlation with the instrumented specific-independent variables, and orthogonality with the error term. That is, the instrument should be a variable that can be excluded from the original list of control variables without affecting the results. In another words, the main challenge is to identify at least one good instrumental variable (IV), which is required to be related to the dummy predictor variable but not directly related to the dependent variable of the overall mode. Thus, I need the following instruments for PIN: a variable that is correlated with PIN (this assumption can be tested), but uncorrelated with bank capital structure, except indirectly through other independent variables.

Following the literature (Ferreira et al., 2011; Easley et al., 2002), I instrument PIN of a specific firm in each year by using the share turnover and annual stock volatility as instruments. Share turnover is also likely to be strong correlated with PIN, consistent with the assumption that stocks with greater trading activity tend to have more uninformed order flow (Easley et al., 2002). This instrument variable has never been used as the explanatory variables of bank capital in previous studies. Another instrument variable is stock-return volatility; that is, the standard deviation of the daily returns. The volatility of stock returns corresponds to information arrival to the stock market: the more information arrival, the more volatile a price. A daily return, which is the sum of each intra-day return, then depends on the daily number of information arrivals. This indicates that daily volatility is also an increasing function of the number of information arrivals, which represents more strengthening market discipline from the stock market. A high volatility reflects intensive arrival of information. This instrument variable has been found to be significantly correlated with PIN. The annualised standard deviation of daily stock returns for a given year has a mean of 0.0190, with a standard deviation of 0.007. This figure is comparable to the figure reported in Bai and Elyasiani (2013), using U.S. data.

Based on these two instruments, I perform a two-stage IV regression as follows: I

regress PIN on two instruments in the first stage and then regress my capital on predicted PIN in the second stage, together with firm-level control variables and year fixed effects.

First stage:

$$PIN_{it} = \alpha + \beta_1 Pricevol_{it} + \beta_2 Shareto_{it} + \beta_3 X'_{it} + \varepsilon_{it}$$

Second stage:

$$ETA_{it} = \alpha + \beta_1 PredictedPIN_{it} + \beta_2 X'_{it} + \varepsilon_{it}$$

*(Equation 7)*

**Table 8: The relationship between market discipline and capital - IV-2SLS**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | First stage | | Second stage | |
| **Dependent variable** | **PIN** | **PIN** | **ETA** | **ETA** |
| Predicted PIN | | | 0.500** | 0.237* |
| | | | (2.24) | (1.70) |
| CEFF | -1.475*** | -1.466*** | 0.777** | 0.375* |
| | (-18.99) | (-18.94) | (2.28) | (1.76) |
| PIN * CEFF | 10.434*** | 10.39*** | -5.575** | -2.769* |
| | (28.15) | (28.14) | (-2.33) | (-1.85) |
| LNTA | 0.009 | 0.001 | 0.014*** | 0.025*** |
| | (1.24) | (0.20) | (3.46) | (6.53) |
| EPS | -0.044 | -0.052* | 0.016 | 0.014 |
| | (-1.49) | (-1.75) | (0.73) | (0.91) |
| DEPTOL | 0.028 | 0.021 | -0.022 | -0.006 |
| | (1.31) | (0.94) | (-1.46) | (-0.56) |
| APE | 0.001 | 0.001 | -0.001 | -0.001 |
| | (0.96) | (0.76) | (-0.86) | (-0.16) |
| PRICEV | 1.232*** | 1.48*** | | |
| | (2.61) | (3.01) | | |
| LNTBV | -0.001 | -0.001 | | |
| | (-0.35) | (-0.25) | | |
| INF | | 0.001 | | -0.002*** |
| | | (0.84) | | (-2.84) |
| LINT | | 0.000 | | 0.000 |
| | | (0.67) | | (0.17) |
| POSTC | | 0.017** | | -0.020*** |
| | | (2.21) | | (-5.29) |

| | | | | |
|---|---|---|---|---|
| **Observation** | 345 | 345 | 345 | 345 |
| **F test** | 0.014 | 0.000 | 0.000 | 0.000 |
| **R** | 0.740- | 0.753 | 0.753 | 0.058 |
| **Sargan test** | | | 0.562 | 0.825 |

Note: ETA is the ratio of equity to average asset. REG is a bank's core capital divided by risk-weighted assets, as mandated by Basel III. PIN is the probability of informed trading given by equation (3). CEFF represents the score of cost inefficiency obtained from the stochastic frontier approach with translog specifications. LNTA is total assets in natural logarithm. EPS is the ratio of earning per share. DEPTOL is the ratio of total deposits to total loans. APE is the natural logarithm of total assets per employee. PRICEV is the annualised standard deviation of daily stock returns. LNTBV is the natural logarithm of share turnover by volume. INF is the inflation rate. LINT is the lending interest rate. POSTC is the dummy variable, 1, for the post financial crisis period (years 2008–2015), and 0 otherwise.

In first stage regressions, my instruments significantly correlate with PIN at the 1 per cent significance level. In the second stage regressions, the Hansen's over-identification test fails to reject the hypothesis that my instruments are exogenous. As columns (1) and (2) of Table (8) illustrate, the second-stage regressions in table (8) show a strong positive correlation between predicted PIN and ETA. The result also supports my earlier findings that market discipline enhances ban capital in listed banks. Therefore, Hypothesis (1) is supported.

### 2.6.2 Dynamic estimation - GMM

To further confirm my findings and address the correlation and possible endogeneity problems, I employ the difference Generalized Method of Moments (GMM) estimators developed for dynamic panel models by Arellano and Bond (1991). The lagged values of the explanatory variable are used as instruments for the equation in first differences. However, this 'difference estimator' has been found to exacerbate measurement error biases in variables by decreasing the signal-to-noise ratio (Griliches and Hausman, 1986). To reduce the potential biases and imprecision associated with the difference estimator, following Berger et al. (2009b), I employ the system GMM estimator, which is proposed by Arellano and Bover (1995) and Blundell and Bond (1998). The system GMM estimator uses lagged differences of the explanatory variables as instruments in differences and levels equations, as well as lagged values of other regressors which might suffer endogeneity. The system GMM estimator controls for unobserved heterogeneity and for the persistence of the dependent variable. In addition, the two-step system GMM estimator with Windmeijer's (2005) corrected standard error has also

been used in my estimation.

Compared to the IV-2SLS methods, the dynamic GMM estimator has the advantages of: (1) tackling the endogeneity problem based on internal instruments, instead of relying on external instruments which may not be readily available; and (2) explicitly modeling the dynamic nature of the capital and market discipline relationship by including past capital as one of the independent variables.

To tackle potential serial correlations, I use the first differences of the dependent variables, following Blundell and Bond (1998). The lags of each independent variable are used as instruments to account for the simultaneity of capital and bank inefficiency. These instrument variables are valid under the assumption that the correlation between the bank-specific effect and the levels of the independent variables is constant over time. To generate consistent estimations of parameters, both the validity of the assumption in error term and instrument need to be considered. Following De Jonghe and Oztekin (2015), Fiordelisi et al. (2011), and Fu et al. (2014a), I perform two tests of the GMM model. The first test is to examine the assumption of no serial correlation in the error term. The differenced error term is the test for the serially correlated second-order. The second test is the Hansen test of over-identifying restriction, which tests the overall validity of the instruments. The null hypothesis is that the instruments are uncorrelated with the residuals.

$$ETA_{it} = \alpha + \beta_1 ETA_{i,t-1} + \beta_2 PIN_{it} + \beta_3 X'_{it} + \varepsilon_{it}$$

*(Equation 8)*

Table (9) presents the system GMM result. The coefficient in PIN documents a strong, positive and statistically significant relationship between market discipline by informed trading and the amount of capital for commercial banks. In addition, the first and second order correlation tests, and the Hansen tests of instrument validity, as well as the F test of model statistical significance. Furthermore, the lagged dependent variable for ETA is statically significant across all specifications, indicating a high degree of persistence of

bank capital and justifying the use of a dynamic model.

**Table 9: The relationship between market discipline and capital - GMM**

| | (1) | (2) |
|---|---|---|
| **Dependent variable** | **ETA** | **ETA** |
| Lag. ETA | 0.967*** | 0.804*** |
| | (12.30) | (5.10) |
| PIN | 0.155** | 0.106** |
| | (2.20) | (2.10) |
| CEFF | 0.281** | 0.189 |
| | (2.48) | (1.48) |
| PIN * CEFF | -2.401** | -1.498* |
| | (-2.45) | (-2.01) |
| LNTA | -0.001 | -0.001 |
| | (-0.26) | (-1.59) |
| EPS | 0.001 | 0.007 |
| | (0.19) | (1.50) |
| DEPTOL | 0.020*** | 0.021*** |
| | (3.03) | (3.70) |
| APE | 0.001*** | 0.001** |
| | (7.56) | (2.67) |
| INF | | -0.002** |
| | | (-2.53) |
| LINT | | 0.002** |
| | | (2.16) |
| POSTC | | 0.004 |
| | | (0.85) |
| Constant | -0.029 | 0.006 |
| | (-1.46) | (0.19) |
| **Observation** | 309 | 309 |
| **F test** | 0.000 | 0.000 |
| **AR 1** | 0.001 | 0.006 |
| **AR 2** | 0.115 | 0.131 |
| **Hansen test** | 1.000 | 1.000 |

Note: ETA is the ratio of equity to average asset. REG is a bank's core capital divided by risk-weighted assets, as mandated by Basel III. PIN is the probability of informed trading given by equation (3). CEFF represents the score of cost inefficiency obtained from the stochastic frontier approach with translog specifications. LNTA is total assets in natural logarithm. EPS is the ratio of earning per share. DEPTOL is the ratio of total deposits to total loans. APE is the natural logarithm of total assets per employee. PRICEV is the annualised standard deviation of daily stock returns. LNTBV is the natural logarithm of share turnover by volume. INF is the inflation rate. LINT is the lending interest rate. POSTC is the dummy variable, 1, for the post financial crisis period (years 2008–2015), and 0 otherwise.

Overall, ETA is positively and statistically significant linking with PIN. I can confirm that the market discipline influences the level of capital. The system GMM estimates in Table (9) support my previous findings, even after controlling for unobserved heterogeneity, simultaneity and dynamic endogeneity. The diagnostics tests in Table (9) show that the model is well-fitted with statistically insignificant test statistics for both second-order autocorrelation in second differences (AR2) and Hansen J-statistics of over-identifying restrictions. The residuals in the first difference should be serially correlated (AR1) by way of construction, but the residuals in the second difference should not be serially correlated (AR2). Accordingly, results show statistically significant AR1 and statistically insignificant AR2 for all bank risk measures. Likewise, the Hansen statistics of over-identifying restrictions test the null of instrument validity, and the statistically insignificant Hansen J-statistics for all the specifications indicate that the instruments are valid in the respective estimation. Moreover, the systems-GMM estimation provides certain findings that are an improvement from the IV-2SLS results.

### 2.6.3 Alternative capital structure measure

In this section, I examine whether the above results are robust by replacing the capital ratio variables. I use an alternative definition of bank capital. Specifically, I replace the measure of capital structure with the regulatory capital requirement. Table (10) contains estimation results for the baseline model for the full sample, using regulatory capital (REG) as the dependent variable. The magnitudes of the coefficients are qualitatively unchanged, and the significance raised for some variables. The coefficients of PIN in regressions (1) to (2), which are termed slope shifters, are 0.147, and 0.135 respectively. Again, both coefficients of PIN are positively and statistically at the 1 per cent or 5 per cent significance level, which is an even stronger result than ETA as the dependent variable in Table (6).

**Table 10: The relationship between market discipline and alternative capital - GMM**

| | (1) | (2) |
|---|---|---|
| **Dependent variable** | **REG** | **REG** |
| Lag. REG | 0.605*** | 0.719*** |
| | (10.92) | (8.99) |
| PIN | 0.147** | 0.135*** |
| | (2.36) | (3.04) |
| CEFF | 0.066 | 0.177*** |
| | (0.67) | (3.61) |
| PIN * CEFF | -1.503 | -1.212** |
| | (-1.57) | (-2.39) |
| LNTA | -0.001 | 0.002 |
| | (-0.38) | (1.56) |
| EPS | 0.018*** | 0.013 |
| | (2.77) | (1.11) |
| DEPTOL | 0.017 | -0.001 |
| | (1.48) | (-0.02) |
| APE | 0.001 | -0.001** |
| | (0.07) | (-2.19) |
| INF | | 0.003** |
| | | (2.44) |
| LINT | | -0.002* |
| | | (-1.71) |
| POSTC | | 0.024*** |
| | | (4.59) |
| Constant | 0.022 | -0.048 |
| | (0.44) | (-1.66) |
| **Observation** | 309 | 309 |
| **F test** | 0.000 | 0.000 |
| **AR 1** | 0.0241 | 0.00499 |
| **AR 2** | 0.370 | 0.122 |
| **Hansen test** | 1.000 | 1.000 |

Note: ETA is the ratio of equity to average asset. REG is a bank's core capital divided by risk-weighted assets, as mandated by Basel III. PIN is the probability of informed trading given by equation (3). CEFF represents the score of cost inefficiency obtained from the stochastic frontier approach with translog specifications. LNTA is total assets in natural logarithm. EPS is the ratio of earning per share. DEPTOL is the ratio of total deposits to total loans. APE is the natural logarithm of total assets per employee. PRICEV is the annualised standard deviation of daily stock returns. LNTBV is the natural logarithm of share turnover by volume. INF is the inflation rate. LINT is the lending interest rate. POSTC is the dummy variable, 1, for the post financial crisis period (years 2008–2015), and 0 otherwise.

The estimated equation, on the other hand, passes the standard goodness-of-fit tests without any major problems. Major variables have expected signs and most of them are significant even at 1 per cent. There is significant negative first-order autocorrelation in the residuals (AR1 statistic), and nil second-order correlation (AR2), as should be the case if the error term (in levels) is white noise. The Hansen test for validity of the instruments used is also fully satisfactory. In all cases, the robustness results are consistent with those previously obtained in section 2.5 and support Hypotheses (1) and (3).

## 2.7 Conclusions

For banks going public, previous literature focuses mainly on the impact of stock prices or returns on bank performance, while the role of market discipline reflected by stock prices, and its potential effect on bank capital, is a relatively unexplored area. A large body of evidence suggests that markets monitor financial firms effectively and promptly, but specific tests of investor trading have been much more limited. Holding capital is costly due to agency and information costs. Yet, banks are required to carry minimum capital levels to maintain their default value at an acceptable level. This chapter attempts to link the literature concerned with market discipline and the numerous empirical works on bank capital which, to the best of my knowledge, have never been integrated before. Using a large sample of Chinese banks listed between 2006 and 2015, results show that banks with strong market discipline have higher levels of bank capital. In addition, I also find that market discipline is negatively associated with bank capital when a bank is underperforming. The findings imply that frictions associated with asymmetrical information problems in the stock market do impact a bank's access to external finance. The results shed new light on the understanding of the role of market discipline for the prudential banking industry.

This chapter departs from the literature on the information structure of corporate securities and bank capital in several respects. First, it fills the gap in the literature and, for the first time, provides a comprehensive assessment of the causal relationship between market discipline and bank capital structures in Chinese banking. This chapter is the first study to predict and find this relation. Second, while previous literature on high frequency data has been dominated by empirical studies in the developed capital markets of the U.S. and Europe, my data covers three major Chinese regulatory regimes, including Mainland China, Hong Kong and Taiwan – an interesting market that has never been explored in the past. Third, my proxy for market discipline is PIN, which is calculated by high frequency data and is based on the imbalance between buy and sell orders among investors. PIN is validated and strengthens previous studies focusing on accounting data, such as financial ratios and other accounting numbers. Public accounting information is incorporated in the price formation process in an efficient market, but private information may not be taken into consideration. Fourth, beside the OLS and FE estimators, I also employ the Generalized Method of Moments (GMM) method to account for endogeneity, unobserved heteorogeneity and for the persistence of dependent variables. This estimator yields consistent estimations of parameters, compared with the OLS estimation, which may lead to inconsistent estimates in this type of study.

The findings highlight several important issues for policymakers in the three markets. First, the governance role of equity trading can complement the internal governance mechanism as stock markets perform an external monitoring role, which will lead to an improvement of bank performance. As suggested by Ferreira et al. (2011), stock prices are informative; thus, stock markets are able to perform a monitoring role to discipline managers. This is especially useful for regulators when designing trading regulation to achieve fair competition in the stock market. Second, regulators should encourage financial institutions to monitor their stock price reaction of disclosure in order to enhance the risk management function. Third, with the mixed empirical findings on the

relationship between capital and bank efficiency, I argue that prudential regulation and supervision on capital requirement could affect bank performance. My findings extend the understanding of the relationship between bank efficiency and stock price in the Chinese market. My findings indicate that stock prices affect optimal organisation design.

The analysis offers a simple fundamentals-based explanation for why banks need to maintain high levels of capital. From a methodological viewpoint, both the higher frequency data and the compensatory effects between bank-specific information and macroeconomic data prove the usefulness of measuring market discipline and bank capital, particularly when banks are investigated.

The findings indicate a rich set of future research aspects. First, I have focused on market factors associated with financial firms. However, many non-financial firms in emerging economies also face a high degree of information asymmetry. Therefore, future research should verify whether my findings can be replicated in the non-financial industry. Second, PIN can act as one of the external corporate governance instruments to influence bank capital structure. However, some internal corporate governance, such as board composition and the ownership structure, also can affect the level of capital. For example, is better internal governance associated with capital structure? Third, there is little known about the inter-relationship between the external and internal corporate governance. Future research should address these important questions.

# Chapter 3: How the corporate governance mechanisms affect bank risk taking

## 3.1 Introduction

The reason behind the 2008 financial crisis is, to a large extent, attributable to excessive risk-taking by financial institutions (DeYoung et al., 2013; Minton et al., 2014). In turn, international supervisory authorities proposed an array of requirements to monitor and control bank risk. In addition, the forces of technological change have contributed to the progressive process of financial integration and have 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 banks taking greater risks, or possibly even excessive risk-taking.

Given that corporate governance is essentially a mechanism for controlling risk within banks, it is not surprising that the recent academic studies have emphasised the importance of effective corporate governance practices in the banking industry (Elyasiani and Zhang, 2015; Srivastav and Hagendorff, 2015). Some researchers argue that banks with better governance take lower risks (De Andres and Vallelado, 2008; Ellul and Yerramilli, 2013). However, 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 a different effect on bank risk-taking depending on the bank's ownership structure (Adams and Mehran, 2012; Laeven and Levine, 2009) 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 in the Greater China banking industry during the 2006–2015 period. My results show that banks with strong corporate governance are associated with higher risk-taking. More specifically, banks that have no relationship with the top ten shareholders, have a meaningful stake-holding by managers, and that are audited by the Big Four audit firm, are likely to be taking more risks. 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).

This 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 also be a significant factor in explaining risk difference for the banking sector (Barry, et al., 2011). My research aims to fill this gap by incorporating three characteristics to construct a governance score, and which represent the level of corporate governance. In addition, measurement of bank risk can encompass a variety of dimensions; this chapter focuses on loan quality and default risk (Z score).

Second, my research 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, which 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 internal governance is still an effective mechanism to monitor bank risk-taking in the Chinese market, which is consistent with the findings on European and US markets.

The remainder of the chapter is organised 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 relationship between governance and bank risk-taking. Section 6 presents results from additional robustness checks. Section 7 provides concluding remarks.

## 3.2 Literature review and hypotheses development

Banking research has devoted tremendous effort to studying the roles of corporate governance in recent years. Some studies emphasise that flaws in corporate governance play a key role in bank risk-taking (Minton et al., 2014; Srivastav and Hagendorff, 2015; Williams, 2014). Srivastav and Hagendorff (2015) highlight the need for effective bank governance to mitigate the behaviours 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, this 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. Following Srivastav and Hagendorff (2015), I define bank risk-taking as policies that increase risk through governance channels.

Academics have argued that the board is the shareholder's 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 since the financial crisis. Additionally, establishing and implementing risk-control systems are also part of the responsibility of boards. Thus, the board becomes one of the key mechanisms to monitor management 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 a board's composition on bank risk-taking has remained far from convincing. Specifically, extant literatures on boards of directors that concentrate on the determinants of size, board meetings, 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 in turn requires greater levels of advising and monitoring, and is 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 banks. According to Jensen (1993), increased group becomes less effective because of coordination and process problems. Anginer et al. (2016) find that boards of an intermediate size are associated with lower bank risk-taking in terms of bank capitalisation. Equally, De Andres and Vallelado (2008) also suggest 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 a bank's board is mainly to mitigate the agency cost of equity. A higher number of independent directors on a board are expected

to better represent the interest of shareholders and effectively monitor the bank's managers. However, the impact of a more or less independent board on a bank's 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 thus 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 that a higher fraction of independent directors pursue less risky policies. Minton et al. (2014) find that independent directors with financial expertise supported increased risk-taking prior to the financial crisis in US banks.

CEO power is also an important factor that affects a board's monitoring ability. CEO duality means that the chief executive officer and the chairman of the board are the same person. CEO duality restricts the information flow to other members of the board, which may give rise to riskier bank strategies, and hence negatively affect the independence of the board. DeYoung et al. (2013) show that contractual risk-taking incentives for CEOs increase when industry deregulation expands 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 the standard factors on board governance discussed above, Elyasiani and Zhang (2015) examine the association between the '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, or by a higher proportion of female executives, while an increase of executives holding PhD degrees reduces portfolio risk.

In addition to the board function, standard agency theories suggest that ownership

structure has an 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 relationships between bank risk and capital regulations, deposit insurance policies, and restrictions on bank activities, depend 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 the Chinese market. They find that banks with foreign ownership are more profitable and have better asset quality than state-owned banks. The management of state-owned banks is not adequately monitored; thus there are no private owners 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 a lower default risk, but a higher operating risk, than private banks, indicating that the presence of governmental protection induces higher risk-taking. In addition, institutional ownership of banks has increased substantially over the past two decades, which also implies changes in corporate governance and banks' behaviors 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, after empirically examining the determinants of risk-taking at Japanese commercial banks, Konishi and Yasuda (2004) show that the relationship between the stable shareholders' ownership and bank risk is nonlinear.

**Hypothesis development**

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

My main hypothesis is motivated by Ellul and Yerramilli (2013), who suggest that banks with strong internal control on governance should have a lower tail risk, all else equal. In contrast, banks with poor governance likely engage in excessive risk-taking, causing them to make larger losses. 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 risks, 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 securitisations. Because only safe debt commands a liquidity premium, banks use risk management to maximise their capacity to include such debt into their operations. 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 banks to control their portfolio risk and maintain higher levels of safe debt, such as diversification, hedging, and using derivatives. Ellul and Yerramilli (2013) suggest that banks with better governance (lower G-Index), more independent boards, and less entrenched CEOs have strong a risk-management function in large US bank holding companies. Moreover, Aebi et al. (2012) document that banks with a chief risk officer (CRO) directly reporting to the board of directors exhibited significantly higher stock returns and return on equity during the 2008 financial crisis. Additionally, from an asset quality management perspective, better quality credit and the reduction of excessive shares of illiquid loans in asset portfolios will diminish bank risk-taking (Ghosh, 2015).

Risk-taking is affected not just by risk-management, but also by the taking of private benefits of larger shareholders. Larger shareholders may opt to risk adverse investments in order to protect their private benefits. 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 directly influence the decision-making by managers. 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 would lead to reduced risk-taking.

The third argument is that managerial incentives matter. Higher executive compensation leads to excessive risk-taking by banks (Bai and Elyasiani, 2013; Bolton et al., 2015; Cunat and Guadalupe, 2009; DeYound et al., 2013), which may improve performances in the short run, but can cause significant impairments to the banks when such risks materialise. Specifically, equity-based compensation (EBC) has increased recently in embedded bank executive compensation packages. The advantage of EBC for executives is to share the benefits from risky investments with shareholders, and to reduce agency costs. As a senior manager's 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 a wide range of investment opportunity sets. However, adopting EBC schemes aligns the interest of management and shareholders, and also encourages managers to pass up risky investments. A number of studies on financial firms provide evidence consistent with this phenomenon. Specifically, Hagendorff and Vallascas (2011) find the evidence which supports 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 the risk exposures of financial institutions.

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

My second hypothesis is that banks with strong corporate governance attributes may take more risks. Value-maximising shareholders are likely to choose aggressive strategies, especially for banks, and such risky strategies may lead to significant losses. Thus, firms with better investor protection governance are likely to undertake riskier, but more value enhancing, investments (John et al., 2008). Anginer et al. (2016) find that shareholder-friendly corporate governance associates with lower bank capitalisation, and that such a relationship is especially strong for banks located in developed countries. In addition, Fahlenbrach and Stulz (2011) find that CEOs whose incentives are better

aligned with the interests of shareholders perform worse, and there is no evidence that they perform better. Pathan (2009) finds that strong bank boards positively affect bank risk-taking. Sullivan and Spong (2007) also find that stock ownership by hired managers can increase total the risk of a bank.

In addition, deposit insurance schemes are widely applied in many countries as part of a financial system safety net to promote banking stability. However, the schemes may contribute to bank shareholders' moral hazard problems by stimulating higher bank risk-taking, as they enjoy a 'subsidy' which increases the 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 the deposit insurance. The scheme also discourages most bank creditors from limiting managers' risk-taking. Anginer et al., (2014) find that deposit insurance schemes increased bank risk and systemic fragility in the years leading up to the global financial crisis. Since shareholders have incentives to take higher risks, strong corporate governance can be expected to be positively associated with bank risk-taking.

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

My third hypothesis is that corporate governance does not have any impact on bank risk-taking. Several arguments support this hypothesis. First, risk managers of banks are without any real power; they merely satisfy the regulatory requirements of banks. Beltratti and Stulz (2012) find no relationship between better governance and bank risk-taking because of 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 are more likely to fail later on.

My second argument relates to regulation. The 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 include capital requirements, restrictions on bank activities, and official supervisory power. The failure of the banking sector would thus increase systemic risk, and cause the possible consequent meltdown of the whole financial system. Fratzscher et al. (2016) suggest that bank supervision/regulation and institutions tend to be substitutes rather than complements. An obvious example is that many governments bailed out financial institutions in the financial crisis of 2008 and 2009 in order to stabilise them. However, Hakenes and Schnabel (2010) find that government's bailouts lead to higher risk-taking among protected banks' competitors. Acharya et al. (2014) document that bailouts triggered the rise of sovereign credit risk in 2008. Banks' shareholders benefited from 'too big to fail' that was supported by regulators, and gained most from shifting risk to other stakeholders (Hagendorff and Vallascas, 2011). Williams (2014) finds evidence of risk-seeking due to 'too big to fail' effects in the Asian region.

Third, market discipline is another mechanism which influences bank risk-taking (Barry et al., 2011; Bennett et al., 2015; Hilscher and Raviv, 2014), because the market participants have the incentives to monitor the banks and the ability to accurately process 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 remains mixed in the banking sector. After investigating the effects of issuing contingent capital, Hilscher and Raviv (2014) conclude that market discipline is an effective tool for stabilising financial institutions. Hou et al. (2016) investigate 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 risk-taking in banking industry. One plausible interpretation is that the

boards provide their executives with the incentives necessary to exploit the growth opportunities in new products (such as insurance underwriting, securities brokerage, and investment banking), but the investment opportunities are limited by regulatory restrictions in the banking industry. Therefore, EBC are expected to be lower under strict regulations, leading to weaker incentives to take risks.

*H4: Corporate governance positively / negatively impacts bank risk-taking while bank performance increases.*

Banking theory suggests that corporate governance affects risk-taking in different economic environments. Better governed banks can identify risks that are more beneficial to shareholders and encourage managers to take higher risks in normal time. Bank with strong risk management functions can curtail risk exposures (Ellul and Yerramilli, 2013). Minton et al. (2014) claim that financial expertise among the boards was 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 may be a major cause of financial crisis, as banks with more shareholder-friendly boards performed worse during the crisis (Beltratti and Stulz, 2012). Thus, it is an empirical question as to whether corporate governance is associated with more or less risk-taking while bank performance increasing.

## 3.3 Methodology

### 3.3.1 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: board governance, ownership structure, and the quality of external auditor.

First, bank boards should be able to effectively monitor and control bank risks (Berger et al., 2014; Minton et al., 2014). Therefore, banks with boards that are more effective in monitoring and advising management terms are better governed. A vast number of literatures discuss the composition of the board of directors. I argue that three crucial aspects regarding the boards of directors need to be emphasised relating to bank risk-taking: the fraction of the 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-making and risk-management control. As a bank grows and diversifies, it faces an increasing demand for specialised outside board members who can perform tasks such as identifying and monitoring risk. Liang et al. (2013) find that the proportion of independent directors positively impacts on a bank's asset quality in Chinese banks. In addition, an advantage of large boards is the ability to assign more people to supervise and advise managers' decisions. Both Pathan (2009) and Wang and Hsu (2013) find that small boards lead to additional bank risks, as reflected in market measures of risk. In contrast, large boards may encounter problems of coordination, control, and decision-making, as well as the concern of the free rider. Small boards, however, may not have enough ability to monitor such complexities within the banking business. De Andres and Vallelado (2008) confirm a hypothesised inverted U-shaped relation between board size and bank performance. Furthermore, Anginer et al. (2016) show that separation of the CEO and chairman roles is associated with higher bank risk, in terms of bank capitalisation, due to board independence from management. In contrast, Pathan (2009) finds that a CEO's power (a CEO's ability to control board decisions) negatively affects bank risk-taking.

Apart from board governance, the incentives of managers or directors to take risks should also be considered within the banking sector. The managers or directors may

have incentives to take fewer risks when they hold a small share of the bank's ownership. As managers' human capital investment and reputation are non-diversifiable, they have incentive to lead a bank better performance. Fahlenbrach and Stulz (2011) find that the banks managers whose incentives are better aligned with shareholders are more likely to affect performance levels. However, Saunders et al. (1990) show that stockholder-controlled banks exhibit significantly higher risk-taking behavior than managerially controlled banks during deregulation periods. In addition, given the growing significance of financing across countries, foreign ownership is one of the factors that draws considerable attention from corporate governance. Foreign investors are in the position of informational disadvantage, as compared to domestic investors (Choe et al., 2005). Additionally, foreign investors avoid investing in poorly governed corporations because they suffer from asymmetrical information problems (Ferreira and Matos, 2008; Leuz et al., 2010). Therefore, they are normally more adverse to risks.

Large controlling shareholders are suggested by concentrating their stakes to monitor managers and directly intervene in investment decisions (Porta et al., 1999), which may help to mitigate 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 that benefits them. Second, the relational shareholders provide facilities for expropriating benefits from dispensed small shareholders. Thus, the presence of the relation between larger shareholders is likely to affect firms' corporate governance.

A regulatory environment can constrain excessive bank risk-taking. More specifically, a high quality audit is expected to affect firm 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 the 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 banks' boards (2BS); CEO power (whether or not the CEO also chairs the board) (3DUAL); whether there are any relationships between 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 the identification of the external auditors (7AUDIT). Thereafter, in light of the findings in previous studies (e.g. Adams and Mehran, 2012; Anginer et al., 2016; Bouvatier et al., 2014; DeYoung et al., 2013), I apply specific criteria for each characteristic. According to Hass et al. (2014), a dummy variable is constructed for each characteristic that meets certain criteria. Seven criteria specify as follows: whether the board consists of 50% of independent board members; whether the board size is greater than 6 but less than 13; whether there is separation between the role of CEO and board chairman; whether there are any relationships among the top ten largest shareholders; whether there are any holdings of executives that are greater than 1% but less than 30%; whether there is any foreign ownership; and whether the bank is audited by the joint ventures of the Big Four[5] internal audit firms and domestic audit firms. Finally, I add the seven criteria into a total score that represents the overall governance quality, denoted as CG. Higher scores indicate strong corporate governance for individual banks in a particular year.

### 3.3.2 Measures of bank risk-taking

A traditional measure of bank risk is the standard deviation of either return on equity or return on assets. However, this type of measure has been criticised as being imprecise, as it is based on small samples. Two proxies of bank risk are selected to show whether strong corporate governance has any impact on bank risk-taking. I primarily measure bank risk using the Z-score, which is widely used in the bank literature as a bank

[5] The Big Four audit firms are Deloitte, Ernst & Young, KPMG and PwC.

risk-taking indicator (see, for instance, Beltratti and Stulz, 2012; Fu et al., 2014; Minton et al., 2014; Laeven and Levine, 2009; Williams, 2014). Z-score is calculated as follows:

$$Z_{it} = \frac{ROA_{it} + E_{it}/TA_{it}}{\sigma ROA_{it}}$$

*(Equation 9)*

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 the natural logarithm of the Z-score, which is normally distributed.

The Z-score measures the distance from insolvency because a bank becomes insolvent when its assets value is 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 a larger Z-score indicates that the bank is more stable, as it is further away from bankruptcy. Elyasiani and Zhang (2015) use Z-score as an insolvency risk, and find that banks with a greater number of busy directors exhibit lower insolvency risks. Beltratti and Stulz (2012) find that Z-score is positively associated with shareholder-friendly boards. Minton et al. (2014) suggest that boards consisting of higher numbers of financial experts are positively associated with bank risk, which is measured by Z-score. Fu et al., (2014) investigate the influence of bank competition, concentration, and regulation, and of national institutions on individual bank fragility, as measured by the bank's Z-score.

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

### 3.3.3 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 to 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 benefit from diversification and economies of scales, and would be more stable than smaller banks. Pathan (2009) shows that bank size lowers insolvency risks. Haq and Heaney (2012) also find that large banks reflect lower credit risks. Additionally, smaller banks are more easily liquidated, or are the target of unfavorable takeovers when they are in financial distress. However, banks are becoming larger and arguably more complex, which may increase difficulties in monitoring their risk levels effectively. In a recent study of Asian banks, Fu et al., (2014) find that smaller banks tend to take fewer risks. In addition, the concept of 'too big to fail' is important to the national banking system, as governments are likely to seek means to prevent bank failures (Williams, 2014). Given the skewed numbers of size distribution, the logarithm of total assets (LNTA) is employed as proxy for a bank's size, which is consistent with Fu et al. (2014), Pathan (2009) and Laeven and Levine (2009).

Diversification provides a credible sign of a bank's ability to minimise risk. In contrast, increased non-interest income also generates agency conflict and increased complexity. Broad activities may lead to the bank becoming extremely large and complex, and thus extraordinarily difficult to monitor and 'too big to discipline' (Laeven and Levine, 2007). In addition, diversification might intensify moral hazard problems and present more opportunities for banks to take higher risks. As diversification relates to both bank risk-taking and corporate governance, I also control for the banks' diversification activities. Following Fu et al. (2014), I employ the return on average assets (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 depositors in the banking sector. Bank capital is the main buffer against unexpected default; but the effect of bank capital on risk-taking is ambiguous. Greater equity capital encourages prudent behaviour and improves the survival probability of banks (Beltratti and Stulz, 2012; Fratzscher et al., 2016). Both Fratzscher et al. (2016) and Haq and Heaney (2012) find that higher capital buffers lower bank risk, which is consistent with the argument that it facilitates the stability of the banking system. In addition, Lee and Hsieh (2013) also find a negative relationship between capital and bank risk. Konishi and Yasuda (2004) find that the implementation of the capital adequacy requirement reduces risk-taking at commercial banks. Yet, the moral hazard hypothesis suggests that bank managers have incentive to increase risk-taking. Highly capitalised banks may take more risks as the deposit is guaranteed. Ghosh (2015) finds a positive relationship between the level of capital and bank risk. Moreover, Williams (2014) finds a U-shaped relationship between bank risk and capital. I use the ratio of total equity to total asset to measure capitalisation, much 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 be taken into account (Ghosh, 2015). Banks may fail to internalise 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 RGDP reduces non-performing loans. The GDP growth is expected to have a negative effect on bank risk because the demand for revenue increases during cyclical upswings. Alternatively, a positive relationship is expected if the level of bank risk is lower in business upturns, given a countercyclical materialisation. 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 rates also play an ambiguous role in determining bank risk-taking. Inflation variability causes lenders to estimate incorrectly the value of loan collateral and borrowers' loan repayments. Thus, stable and constant inflation rates would reduce the real value of debt and, in turn, lower bank risks. However, excessive inflation rates may deplete borrowers' real income and boom bank risk, especially when income does not increase with inflation. Ghosh (2015) finds a positive relationship between inflation rates and bank risk-taking.

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

### 3.3.4 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. Thus the following regression equation is formulated to empirically test the Hypotheses 1 to 3:

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

*(Equation 10)*

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:

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

*(Equation 11)*

The definition of the above bank risk proxies and explanatory variables are summarised in Table (11).

### 3.3.5 Endogeneity and generalised method of moments (GMM)

Based on the discussions of the dependent and explanatory variables, I employ the generalised 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 applied by several recent banking literatures, such as Hou et al. (2016) Ghosh (2015), and Bouvatier et al. (2014). As in 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 the following particular econometric problems: (i) the autoregressive process in the data-relating dependent variables; (ii) the presence of unobserved firm-specific effects; and (iii) the likely endogeneity of the independent variables.

| Table 11: Definition of variables | | | |
|---|---|---|---|
| **Variables** | **Symbol** | **Description** | **Sources** |
| ***Corporate governance*** | | | |
| Independent members | **1NDIV** | Whether board is controlled by more than 50% independent directors | Manual collection |
| Board size | **2BS** | Whether board size is greater than 6 but fewer than 13 | Manual collection |
| CEO chairman duality | **3DUAL** | The chairman and CEO are not the same person | Manual collection |
| Relationship | **4TOP10** | There are no relationships among the top ten shareholders | Manual collection |
| Managerial holding | **5MH** | Management ownership (directors, supervisors, and executives) is greater than 1% but less than 30% | Manual collection |
| Foreign ownership | **6FORE** | Foreign investor ownership is greater than zero | Manual collection |
| Bi4 4 Audit firm | **7AUDIT** | Audited by one of the Big 4 audit firm or their joint ventures | Manual collection |
| Internal corporate governance | **CG** | Internal corporate governance score | Aggregate above seven attributes |
| ***Bank risk-taking*** | | | |
| Z-score | **ZS** | [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets) | Use original Bankscope data to calculate |
| Loan loss provision | **LLP** | The natural logarithm of the amount of loan loss reserve | Bankscope |
| ***Bank specific characteristics*** | | | |
| Bank size | **LNTA** | The natural logarithm of total assets in thousands of USD | Bankscope |
| Capitalisation | **ETA** | The ratio of equity to assets | Bankscope |
| PE ratio | **PE** | The ratio of market price to earnings per share | Bankscope |
| Return on assets | **ROAA** | The ratio of profit to average assets | Bankscope |
| Depositor | **LNDEP** | The natural logarithm of the amount of deposit in thousands of USD | Bankscope |
| ***Macroeconomics*** | | | |
| GDP growth rate | **GDP** | Yearly real GDP growth (%) | International Monetary Fund |
| Inflation rate | **INF** | Inflation rate | International Monetary Fund |
| Lending interest | **INT** | Lending interest rate | International Monetary Fund |

I employ the AR (1) and AR (2), and the 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. The AR (1) test should reject the null hypothesis of no first order serial correlation, while the AR (2) test should not reject the null hypothesis of no second order serial correlation of the residuals. The Hansen test checks the validity of the entire set of instruments as a group.

## 3.4 Data

### 3.4.1 Data sources

The sample examined in this chapter includes the largest commercial listed banks in the Mainland China, Hong Kong and Taiwan markets, covering a span of ten years, from 2006 to 2015. The requirement of my observation is that the bank must be publicly traded, making it possible to collect data on board governance as well as other internal governance characteristics of the firms from published statements. My sample period (2006–2015) is carefully chosen to avoid the impact of the 2005 reform in Mainland China.[6] In addition, most of the banks in Mainland China are listed in the Shanghai Stock Exchange and the Shenzhen Stock Exchange from 2006. These banks pillar contain large nationwide banks and regional banks. Moreover, aggregate data for cross-marketing are considered preferable as the risk of non-representativeness of the sample is reduced. Meanwhile, studies based on a bank-by-bank basis 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 markets.

The data used in this chapter comes from three sources. My first source is the Bankscope, which is a leading information source for global financial institutions. All variables sourced from Bankscope are in US dollars, using the year ending date exchange rate. As information on bank governance is particularly difficult to construct, my second approach is to 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

[6] The authorities in China initiated a reform to make non-tradable shares become tradable in 2005. The non-tradable shares, originally held by the State or by politically connected investors, were issued at the early stages of the financial market development.

corresponding fiscal year.[7] My third source is the International Monetary Fund's International Financial Statistics, where I obtained macroeconomic data, with the exception of Taiwan.[8]

As discussed in Section 3, I obtain the score of corporate governance by taking the principle component of the following seven governance variables: independent directors; board size; CEO duality; relationship between the top ten shareholders; managerial shareholding; foreign ownership; and external audit firms. The analysis of these components 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 judgments regarding the relative importance of these characteristics (Tetlock, 2007).

The dataset comprises of markets with different levels of development, as well as different legal, political, and institutional environments. However, my data set is comparable with Sun and Chang's (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 perspectives on corporate governance, and thus provides potentially more complete tests of the importance of governance structures. Second, the managers of these banks have similar cultural background in these markets; thus it offers a unique regional set of data for each year over the 2006–2015 period. Third, using panel data allows me to capture the market-specific effects and the unobservable differences between markets. While it is true that I examine corporate governance only for the very largest banks in these markets, these banks hold the vast majority of industry assets. Consequently, these

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

[8] 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).

banks command great interest among investors, regulators and other stakeholders.

| Table 12: Descriptive statistics for corporate governance components | | | | | |
|---|---|---|---|---|---|
| **Variable** | **N** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |
| Panel A: Corporate governance attributes | | | | | |
| **1NDIV** | 345 | 0.074 | 0.263 | 0 | 1 |
| **2BS** | 345 | 0.483 | 0.500 | 0 | 1 |
| **3DUAL** | 345 | 0.925 | 0.263 | 0 | 1 |
| **4TOP10** | 345 | 0.302 | 0.459 | 0 | 1 |
| **5MH** | 345 | 0.147 | 0.354 | 0 | 1 |
| **6FORE** | 345 | 0.622 | 0.485 | 0 | 1 |
| **7AUDIT** | 345 | 0.868 | 0.338 | 0 | 1 |
| **CG** | 345 | 3.429 | 0.939 | 1.000 | 6.000 |

Note: This table contains means, standard deviations, minimum and maximum values on the variables included in the main model. ZS is the Z-score, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the board is controlled by more than 50% of 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 externally 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.

I present summary statistics for the risk measures, governance scores, bank financial characteristics and macroeconomic variables in Table (13). The mean Z-score of 3.13 is close to the 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 governance in the financial sector is stronger than other industries. Regarding the bank characteristics variables, bank capital ranges from 1.7% to 26.4%, with an average of 9.5%. Bank size and the logarithm of total assets ranges from 15.29 to 21.97, with an average of 18.27.

| Table 13: Descriptive statistics for main model variables | | | | | |
|---|---|---|---|---|---|
| **Variable** | **N** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |

| | | | | | |
|---|---|---|---|---|---|
| **ZS** | 345 | 3.138 | 0.771 | -1.442 | 5.308 |
| **LLP** | 345 | 13.11 | 1.948 | 9.603 | 18.46 |
| **ETA** | 345 | 0.095 | 0.029 | 0.017 | 0.264 |
| **LNTA** | 345 | 18.27 | 1.656 | 15.29 | 21.97 |
| **PE** | 345 | 5.227 | 0.739 | 2.838 | 6.602 |
| **ROAA** | 345 | 0.761 | 0.665 | -2.020 | 2.630 |
| **LNDEP** | 345 | 17.88 | 1.630 | 14.62 | 21.78 |
| **GDP** | 345 | 5.918 | 4.195 | -2.459 | 14.16 |
| **INF** | 345 | 2.111 | 1.908 | -0.860 | 5.864 |
| **INT** | 345 | 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, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the board is 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 externally 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 14: The matrix of Pearson correlation coefficients**

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

| | GDP | INF | INT |
|---|---|---|---|
| **GDP** | 1.0000 | | |
| **INF** | 0.3198* | 1.0000 | |
| **INT** | 0.6077* | 0.5529* | 1.0000 |

Note: This table contains means, standard deviations, minimum and maximum values on the variables included in the main model. ZS is the Z-score, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the board is 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 externally 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 (14). The correlation coefficients are usually small (less than 0.4), suggesting that the correlation between variables is weak. Pointedly, governance scores exhibit 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.

## 3.5 Empirical results

### 3.5.1 Governance and risk-taking – OLS estimation

The empirical evidence of the relationship between bank performance and governance

is presented in this section. Table (15) reports the estimation results of Equation (10) 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 (15), macroeconomic control variables are excluded from the estimations because they are statistically insignificant in most specifications. The regression results reported in columns (3) and (4) of Table (15) are consistent with those in columns (1) and (2) of Table (15).

**Table 15: The relationship between bank corporate governance and risk-taking (Z-score) - OLS**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | **ZS** | **ZS** | **ZS** | **ZS** |
| CG | -1.244** | -1.355** | -1.337** | -1.360** |
| | (-2.53) | (-2.42) | (-2.55) | (-2.43) |
| ETA | 2.006*** | 1.926*** | 1.976*** | 1.936*** |
| | (15.76) | (13.21) | (14.45) | (13.30) |
| LNTA | -8.188*** | -9.708*** | -8.053*** | -9.541*** |
| | (-2.77) | (-2.94) | (-2.58) | (-2.92) |
| PE | -0.564 | 0.223 | -0.291 | 0.455 |
| | (-1.10) | (0.36) | (-0.51) | (0.72) |
| ROAA | 1.091*** | 1.010** | 1.180*** | 0.979** |
| | (2.90) | (2.20) | (2.84) | (2.12) |
| LNDEP | 9.716*** | 10.86*** | 10.02*** | 11.09*** |
| | (3.28) | (3.31) | (3.21) | (3.4) |
| GDP | | | 0.027 | 0.104 |
| | | | (0.42) | (0.73) |
| INF | | | 0.167 | 0.575* |
| | | | (1.29) | (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 | 345 | 345 | 345 | 345 |
| F test | 0.000 | 0.000 | 0.000 | 0.000 |
| R | 0.547 | 0.588 | 0.550 | 0.590 |

Note: This table contains means, standard deviations, minimum and maximum values on the variables included in the main model. ZS is the Z-score, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the board is 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 externally 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 a dependent variable, I find relatively strong evidence that the coefficient estimates on corporate governance are negative and significant on all specifications in Table (15). This finding confirms Hypothesis (2). This illustrates that, after controlling for other bank characteristics and macro-economic factors, a bank with strong governance is associated with higher risk-taking. More specification, a 1-standarad deviation increase in CG is associated with around 1.22 to 1.36 increase in bank risk-taking. This result is consistent with the evidence by Pathan (2009) and Elyasiani and Zhang (2015).

The board of directors is widely recognised as the cornerstone of an effective governance framework. The board can evaluate whether the current and future risk-exposure is consistent with risk appetite by monitoring and advising bank operations. Most banks can be viewed as complex and opaque, based on revenue diversification and debt intensity. Thus, banks are likely to require more advice from their boards. My results confirm that an intermediate board with a greater number of independent directors is more effective in monitoring and advising a bank's management team (Liang et al., 2013). This in turn leads bank to undertake riskier, but value-enhancing, investments. In a contrary manner, my results also support the claim of both Pathan (2009) and Wang and Hsu (2013), who find that a small board is associated with higher risks in banks. Also, larger boards are also less effective and more susceptible to influence from CEOs. In addition, as independent directors pay more attention to regulatory and statutory issues, managers will act more conservatively to avoid lawsuits (Pathan, 2009). Bank directors are more likely to be exposed to high penalties imposed by regulators for violating fiduciary duties. Additionally, recent discussions suggest that independent boards may become less effective as directors serve on 'too many' boards. However, Elyasiani and Zhang (2015) suggest that many directors serve on too many boards to fulfill their duties adequately, and the relationship between bank risk and board busyness is negative. 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 results are consistent with the findings of Elyasiani and Zhang (2015) and Wang and Hsu (2013), which state that boards with more outside members lead to higher risk-taking. Moreover, separating the role of CEO and chair could be one explanation for strong governance and lower bank risk-taking. As an individual with CEO and chair duality has a more complex job, and thus merits a higher equilibrium wage, I might expect increases in the level of job complexity and monitoring quality to fall. Thus, these CEOs may slack with regard to monitoring duties and advising on bank risk-taking.

Another possible explanation might be that banks with managerial shareholding and foreign ownership can serve as a catalyst to control bank risk-taking. Agency problems and risk-preference behavior differ depending on the nature and incentive of the shareholder (Barry et al., 2011; Saunders et al., 1990). If a bank is managed to maximise investor returns, it will choose a level of risk that is consistent with that objective. This is because managers seeking to improve 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. In addition, shareholders may not be able to commit to monitoring 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 banks 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 maximise their wealth.

In contrast, managers may act risk-averse, rather than chasing risk, due to non-diversifiable human capital. Therefore, banks with part managerial shareholding exhibit higher risk-taking behaviours than stockholder-controlled banks (Saunders et al., 1990). My results are consistent with the findings 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 a consequence, banks with foreign shareholders would be more efficient due to the strength of governance, while operating at higher risk levels.

A third point is DeAngelo and Stulz's (2015) claim that risk management is central to banks' operating policies, as banks with risky assets use risk management to maximise their capacities. 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 banks can be characterised as consequences of a weak internal control environment (Chernobai et al., 2012). Thus, risk-management systems can ensure that the bank has the appropriate risk level; for example, ceiling increases risk or eliminating uncover risk. Indeed, risk-management systems would strike the balance between helping banks to take risks efficiently and ensuring they do not take excessive risks that can destroy their value. For instance, banks with a greater percentage of financial experts among their management teams can engage in higher risk-taking activities because they have a better understanding of more complex investments (Minton et al., 2014). Additionally, 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, is associated with better bank performance (Aebi et al., 2012). Therefore, consistent with my findings, banks with strong corporate governance are normally associated with better risk-management systems, in turn raising risk-taking (Ellul and Yerramilli, 2013).

Fourth, depositors' discipline could also be one of the reasons that explains the positive relationship between corporate governance and bank risk-taking. Deposit insurance protects the interests of unsophisticated depositors and helps prevent bank failures. The banking sector is dominated by large, state-owned banks in emerging economies,

especially in China. Those commercial banks are under strict government regulations and guaranteed by government safety nets. However, Demirguç-Kunt and Detragiache (2002) find 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 stabilisation effect of deposit insurance dominates in turbulent times. Thus, banks with strong governance may focus on mainly maximising shareholders' wealth, and may neglect the interest of the depositor, which would take on excessive risks in normal time.

Summing up, as my sample represents all major banks in the three markets, my results are consistent with conjecture on corporate firms, which in turn allow these banks to monitor and control their risk-taking at an appropriate level. My results are 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 terms of managerial compensation. My results are also consistent with the findings of John et al. (2008), who conclude that corporate risk-taking is positively related to the quality of investor protection. The results support Hypothesis (2), that better corporate governance increases bank risk-taking. This finding is in line with other published papers using data from other markets (e.g. Pathan, 2009; Elyasiani and Zhang, 2015).

Concerning the control variables, not surprisingly, size is an important determinant of bank risk-taking. From table (16), I find that the coefficients of bank size are positively and statistically significant. This indicates that larger banks have lower risk levels than smaller banks, which is 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 risks (Bai and Elyasiani, 2013; Elyasiani and Zhang, 2015; Haq and Heaney, 2012). A possible explanation for this is that the larger banks are more likely to have strong risk-management functions (Ellul and Yerramilli, 2013).

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

Somewhat surprisingly, greater prices to earning ratios negatively influence Z-score, suggesting that a higher share price increases bank risk-taking. This implies that banks in favoured stock markets engage in less prudent lending, and do not carefully originate their loans, in turn increasing risk. A possible explanation is that excess bank risk-taking is induced by management compensation based 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 raises concern that the result could be biased. For instance, high-risk banks might be from better governance structures if dispersed shareholders have difficulty in monitoring risky investments. In the estimation equation $R = b * C + u$, R represents the

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 to address this concern by using a variety of strategies in the following sections.

**Table 16: The relationship between bank corporate governance and risk-taking (Z-score) - FE**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | **ZS** | **ZS** | **ZS** | **ZS** |
| 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 | 345 | 345 | 345 | 345 |
| 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, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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.

### 3.5.2 Governance and risk-taking – Fixed-effect within estimation

The OLS estimation may be not consistent due to not considering the unobservable and constant heterogeneity of the bank. Therefore, in the presence of unobserved bank

fixed-effects, a 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 this estimation in research, either on corporate governance or on risk (Adams and Mehran, 2012; De Andres and Vallelado, 2008; Laeven and Levine, 2009; Pathan, 2009). Finally, the Hausman test is used to identify the optimal model compared with random effects. The results shown in Tables (16) suggest that the fixed effects model is the optimal one.

Table (16) reports the estimation results of Equation (11) to test the relationship between CG and Z-score using the FE estimation. As before, the coefficients on the CG are 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 (16). This illustrates that, after controlling for unobserved bank fixed effects, a bank with strong governance is associated with higher risk-taking. Thus, the Hypothesis (2) is also supported. A 1-standarad deviation increase in CG is associated with around 0.97 to 1.16 increase in bank risk-taking, which is smaller than the OLS estimation. Corporate governance plays a proactive role through directors' meetings, in discussions and the exchange of ideas on how to monitor and advise managers, which could subsequently influence bank risk-taking.

### 3.5.3 Governance and risk-taking – GMM estimation

The OLS and fixed effect estimators are neither econometrically consistent nor related to the theoretical postulates of corporate governance literature. Additionally, 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 techniques that are able to take into account 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 (17) presents the two-step system GMM results of bank risk measures as Z-score. I present estimated coefficients, and show whether they are statistically different from zero (p-value). In addition, the diagnostics tests in Table (17) 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. Also, the residuals in the first difference (AR 1) are statistically significant, and are serially correlated by way of construction.

With regard to the determinant of Z-score as the 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 Hypothesis (2): that bank governance plays a role that is more proactive than reactive. In addition, the results in Table (17) provide at least some assurance that the negative association between bank governance and risk-taking is not being induced by obvious model misspecification.

**Table 17: The relationship between bank corporate governance and risk-taking (Z-score) - GMM**

| | (1) DIFF | (2) SYS | (3) DIFF | (4) SYS |
|---|---|---|---|---|
| **Dependent variable** | **ZS** | **ZS** | **ZS** | **ZS** |
| Lag.ZS | 0.045*** | 0.737*** | 0.143*** | 0.966*** |
| | (4.22) | (21.76) | (6.16) | (42.46) |
| CG | -0.400** | -0.652 | -1.002** | -0.159* |
| | (-2.04) | (-1.46) | (-2.18) | (-1.82) |
| ETA | 2.323*** | 0.177*** | 1.476*** | -0.118* |
| | (11.10) | (3.37) | (12.25) | (-2.00) |
| LNTA | -5.010*** | 0.31 | -4.330** | -0.479 |
| | (-3.63) | (0.29) | (-2.68) | (-1.58) |
| PE | -0.526*** | -5.251*** | 0.905 | -0.941** |
| | (-5.62) | (-6.12) | (0.98) | (-2.68) |
| ROAA | 2.258*** | 0.471 | 1.144*** | 0.092 |
| | (16.13) | (0.68) | (9.18) | (0.23) |
| LNDEP | 6.402*** | 2.896** | 4.274*** | 1.516*** |
| | (4.56) | (2.40) | (3.42) | (4.26) |
| GDP | | | -0.275*** | -0.416*** |
| | | | (-4.98) | (-13.15) |
| INF | | | 0.507*** | 1.199*** |
| | | | (5.60) | (9.49) |
| INT | | | -1.180*** | -0.643*** |
| | | | (-4.93) | (-3.84) |
| Constant | | -21.73*** | | -7.331*** |
| | | (-5.20) | | (-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 |
| Hansan | 0.998 | 0.828 | 1.000 | 0.682 |

Note: ZS is the Z-score, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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.

### 3.5.4 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 (18), I replace the aggregate governance scores 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 the seven attributes of corporate

governance, board size (2BS) has a negative coefficient across different specifications, which supports the notion that intermediate board bank boards (greater than 6 but fewer than 13) are involved with more risk-taking. This result is consistent with the evidence by Pathan (2009) and De Andres and Vallelado (2008) in the banking sector.

The governance literature argues that the optimal board size should balance advisory needs with the costs of decision-making. More directors on boards are able to assign more people to supervise and monitor management decisions. Independent directors, in particular, should be endowed with the knowledge, incentives and abilities to discipline and advise managers, thus enabling the reduction of conflicts of interest between insiders and shareholders. Large banks have many subsidiary boards, making 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 the addition of directors with subsidiary directorships, who may add value as complexity increases. Small boards may not able to monitor the complexity levels in the organisation. Nevertheless, larger boards are not more valuable over time. Complexity can explain the positive relationship between board size and risk-taking, due to banks engaging in diversifying activities while increasing risk exposure over time. In addition, negative a relationship between bank performance and board size is a common 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 risks. Therefore, since shareholders have incentives to take more risks, strong bank boards (measured by board size) can be expected to be associated with bank risk-taking positively.

| Table 18: The relationship between the composition of corporate governance and risk-taking (Z-score) – OLS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **Dependent variable** | **ZS** | **ZS** | **ZS** | **ZS** | **ZS** | **ZS** | **ZS** | **ZS** |
| 1INDIV | -0.017 | | | | | | | 0.628 |
| | (-0.01) | | | | | | | (0.45) |
| 2BS | | -1.996*** | | | | | | -1.390** |
| | | (-2.77) | | | | | | (-1.99) |
| 3DUAL | | | 6.619*** | | | | | 6.821*** |
| | | | (3.61) | | | | | (3.73) |
| 4TOP10 | | | | 18.61*** | | | | 19.50*** |
| | | | | (2.95) | | | | (2.74) |
| 5 MH | | | | | -5.644 | | | 1.996 |
| | | | | | (-0.73) | | | (0.24) |
| 6FORE | | | | | | 0.086 | | 0.659 |
| | | | | | | (0.07) | | (0.53) |
| 7AUDIT | | | | | | | -2.474 | -3.378** |
| | | | | | | | (-1.58) | (-2.22) |
| ETA | 1.881*** | 1.844*** | 1.825*** | 1.889*** | 1.881*** | 1.884*** | 1.896*** | 1.832*** |
| | (13.09) | (13.04) | (13.07) | (13.28) | (13.22) | (13.19) | (13.35) | (13.44) |
| LNTA | -9.277*** | -8.572*** | -9.662*** | -10.41*** | -9.544*** | -9.292*** | -9.138*** | -9.864*** |
| | (-2.90) | (-2.71) | (-3.11) | (-3.25) | (-2.98) | (-2.91) | (-2.88) | (-3.23) |
| PE | 0.190 | 0.209 | 0.227 | 0.155 | 0.176 | 0.190 | 0.168 | 0.215 |
| | (0.30) | (0.34) | (0.38) | (0.25) | (0.28) | (0.31) | (0.27) | (0.37) |
| ROAA | 0.961** | 1.004** | 0.933** | 0.915** | 0.956** | 0.959** | 0.931** | 0.889** |
| | (2.11) | (2.26) | (2.13) | (2.03) | (2.13) | (2.13) | (2.07) | (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 | 345 | 345 | 345 | 345 | 345 | 345 | 345 | 345 |
| 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 |

Note: ZS is the Z-score, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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.

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 interventions. However, raising equity capital is costly during a 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, is substantial. Non-equity stakeholders, such as debtholders and regulators, who often prefer conservative investments, may influence investment policy for their own benefit. The conflicts between bank managers and shareholders would lead to risk-taking varying within different corporate governance structures (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 has more independent board members, strategic decisions should improve due to the counselling skills of the members that complement those of the CEO. Adams and Mehran (2012) also find that board independence is not related to bank performance. My results are in contrast to the work of Minton et al. (2014), who find that the fraction of independent financial experts is positively related to several measures of risk for US commercial banks. Liang et al. (2013) also suggest that the proportion of independent direct has significantly positive impacts on the quality of bank assets. However, I focus exclusively on the markets where data about insolvency risk is widely available.

In addition, the Big 4 Audit firms (7AUDIT) also have a negative coefficient across different specifications, which support the premise that banks audited by a Big 4 audit firm are involved 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 and, as a result, perform worse

(Core et al., 1999). If a bank is audited by an industry specialist for the controlling accounting quality, this 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 compared with banks audited by non-Big 4 audit firms. My result is thus in line with Bouvatier et al. (2014), who find that the Big 4 firms do not contribute to improving the quality of banks' financial statements. Thus, high quality auditing could enhance bank governance and therefore act as one of mechanisms associated with higher bank risk-taking.

Furthermore, the relationship between the top ten shareholders (4TOP10) has a positive coefficient across different specifications. These findings suggest that banks with no relationship with the top ten shareholders are associated with lower risk-taking. The results are 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. Moreover, other stakeholders have less incentive in monitoring bank risk-taking for their own self-interest (Bolton et al., 2015). Better corporate governance mitigates the risk of the 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, a bank with strong corporate governance, and with no relationship with the top ten shareholders, is associated with lower risk-taking.

### 3.5.5 Governance components and risk-taking – GMM estimation

Following De Andres and Vallelado (2008) and Liang et al. (2013), the generalised method of moments (GMMs) is used to control for the potential endogeneity

problems for each governance component and risk-taking. Table (19) reports the result from the two-step system estimator with an adjusted standard error for potential heteroskedasticity, as proposed by Blundell and Bond (1998).

It is worth recognising that the GMM estimation can take account of 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 my sample size is not large, I use the adjustment for a small sample, as in Windmeijer (2005).

Column (2) of Table (19) shows that board size (2BS) has a significantly negative relationship with Z-score at the 1% level across different specifications, which is consistent with the above OLS finding and a number of empirical studies (e.g. Anginer et al., 2016; De Andres and Vallelado, 2008; Pathan, 2009). The strong negative relationships suggest that intermediate boards represent efficient governance and align with the shareholder's preference on bank risk-taking.

| Table 19: 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*** | 0.943*** | 0.955*** | 0.949*** | 0.952*** | 0.952*** | 0.949*** | 0.895*** |
| | (200.32) | (81.87) | (237.00) | (196.44) | (158.54) | (167.11) | (163.89) | (24.30) |
| **1INDIV** | -0.139 | | | | | | | -0.394 |
| | (-0.28) | | | | | | | (-0.23) |
| **2BS** | | -0.463* | | | | | | -2.243* |
| | | (-1.76) | | | | | | (-1.89) |
| **3DUAL** | | | -2.003*** | | | | | -2.221 |
| | | | (-4.38) | | | | | (-0.75) |
| **4TOP10** | | | | 0.166 | | | | 2.683 |
| | | | | (0.77) | | | | (1.65) |
| **5MH** | | | | | -0.461 | | | -2.244 |
| | | | | | (-1.17) | | | (-1.51) |
| **6FORE** | | | | | | 0.295 | | 4.302* |
| | | | | | | (1.00) | | (1.71) |
| **7AUDIT** | | | | | | | 0.167 | 1.705 |
| | | | | | | | (0.66) | (1.21) |
| **ETA** | -0.099*** | -0.129*** | -0.104*** | -0.096*** | -0.100*** | -0.113** | -0.076*** | 0.131*** |
| | (-4.76) | (-3.47) | (-2.90) | (-3.82) | (-4.95) | (-2.67) | (-3.37) | (5.48) |
| **LNTA** | 0.635*** | 0.144 | 0.702*** | 0.537* | 0.544* | 0.813** | 0.655** | -1.548 |
| | (2.78) | (0.66) | (2.88) | (1.99) | (2.00) | (2.69) | (2.50) | (-1.56) |
| **PE** | -4.045*** | -3.009*** | -4.128*** | -3.954*** | -4.101*** | -3.974*** | -3.825*** | -2.042*** |
| | (-15.50) | (-4.79) | (-23.03) | (-13.99) | (-16.44) | (-16.91) | (-13.97) | (-3.19) |
| **ROAA** | 1.946*** | 1.833*** | 1.783*** | 1.923*** | 1.869*** | 1.816*** | 1.592*** | 1.139*** |
| | (8.26) | (5.16) | (10.00) | (7.84) | (8.46) | (6.87) | (6.29) | (3.97) |

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

Note: ZS is the Z-score, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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.

Column (3) of Table (19) illustrates the effects of CEO chairman duality (3DUAL) on bank risk-taking. The results show that CEO chairman duality has a significantly negative effect on bank risk-taking, meaning that banks operating in non CEO chairman duality take more risks than those operating in CEO chairman duality structures. The result is consistent with the evidence of Pathan (2009), who finds that CEO power negatively affects bank risk-taking. The presence of CEO chairman duality may result in greater managerial discretion to implement conservative investment strategies. This can give rise to a negative relationship between governance and risk-taking. In addition, Anginer et al. (2016) also find that banks with shareholder-friendly corporate governance, in terms of the separation of 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 investments 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.

### 3.5.6 Interactive effects: corporate governance and bank performance

So far, I have investigated the effect of corporate governance on bank risk-taking, and controlling for other control variables. I follow up with additional investigation of 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 variable, CG*ROAA, which is constructed by the interaction between the score of governance and the return on average assets. Table (20) reports the estimation results of Equation (3) to test the relationship between the interaction term (CG*ROAA) and bank risk-taking by OLS estimation.

**Table 20: The relationship between the interaction term and risk-taking (Z-score) – OLS**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | **ZS** | **ZS** | **ZS** | **ZS** |
| CG | -0.257 | -0.415 | -0.392 | -0.473 |
| | (-0.42) | (-0.59) | (-0.60) | (-0.67) |
| ETA | 2.010*** | 1.921*** | 1.978*** | 1.933*** |
| | (15.98) | (13.30) | (14.63) | (13.41) |
| LNTA | -8.617*** | -10.21*** | -8.479*** | -10.02*** |
| | (-2.94) | (-3.11) | (-2.74) | (-3.08) |
| PE | -0.392 | 0.344 | -0.164 | 0.53 |
| | (-0.77) | (0.56) | (-0.29) | (0.85) |
| ROAA | 4.734*** | 4.467*** | 4.666*** | 4.187** |
| | (3.31) | (2.66) | (3.02) | (2.51) |
| LNDEP | 10.08*** | 11.03*** | 10.32*** | 11.23*** |
| | (3.43) | (3.39) | (3.34) | (3.47) |
| CG*ROAA | -0.962*** | -0.921** | -0.923** | -0.857** |
| | (-2.64) | (-2.14) | (-2.34) | (-2.00) |
| GDP | | | 0.025 | 0.108 |
| | | | (0.38) | (0.76) |
| INF | | | 0.179 | 0.508* |
| | | | (1.40) | (1.74) |
| INT | | | 0.238 | -0.15 |
| | | | (0.85) | (-0.29) |
| Constant | -4.400 | 5.235 | -13.42 | -2.88 |
| | (-0.45) | (0.34) | (-1.22) | (-0.17) |
| Year effect | No | Yes | No | Yes |
| Observation | 345 | 345 | 345 | 345 |
| 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, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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 the CG*ROAA variable in Table (20) regressions were negative, and significant at least at the 5% level. These results indicate that the increase in bank governance levels, while having a better performance, enhance bank risk-taking significantly, and the results remain significant even after controlling for size and other bank characteristics. This finding confirms Hypothesis (4). Results are consistent in the risk estimates, i.e. in Tables (15), (16) and (17) regressions, with the expected sign and significant statistical significance.

In Table (21), 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 variable explanations as sources of endogeneity. As the result, there is still evidence of a negative relationship between the interaction term (CG*ROAA) and bank risk-taking.

**Table 21: The relationship between the interaction term and risk-taking (Z-score) – FE**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | **ZS** | **ZS** | **ZS** | **ZS** |
| CG | -0.172 | 0.114 | -0.201 | -0.002 |
| | (-0.28) | (0.19) | (-0.33) | (-0.00) |
| ETA | 2.030*** | 1.963*** | 2.017*** | 1.956*** |
| | (16.20) | (16.16) | (15.94) | (15.89) |
| LNTA | -8.454*** | -10.53*** | -8.280*** | -10.35*** |
| | (-2.87) | (-3.68) | (-2.80) | (-3.61) |
| PE | -0.447 | 0.0709 | -0.342 | 0.132 |
| | (-0.88) | (0.14) | (-0.66) | (0.25) |
| ROAA | 4.725*** | 4.735*** | 4.734*** | 4.617*** |
| | (3.34) | (3.44) | (3.32) | (3.33) |
| LNDEP | 9.754*** | 9.471*** | 9.699*** | 9.605*** |
| | (3.30) | (3.33) | (3.28) | (3.36) |
| CG*ROAA | -0.961*** | -1.046*** | -0.949*** | -0.998*** |
| | (-2.66) | (-2.96) | (-2.61) | (-2.80) |
| GDP | | | 0.0154 | -0.073 |
| | | | (0.25) | (-0.60) |
| INF | | | 0.177 | 0.194 |
| | | | (1.50) | (0.78) |
| INT | | | 0.088 | -0.495 |
| | | | (0.34) | (-1.14) |
| Constant | -4.67 | 34.36** | -8.071 | 32.22** |
| | (-0.54) | (2.44) | (-0.81) | -2.02 |
| Year effect | No | Yes | No | Yes |
| Observation | 345 | 345 | 345 | 345 |
| 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, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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 22: The relationship between the interaction term and risk-taking (Z-score) – GMM**

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

Note: ZS is the Z-score, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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 (22), I present the GMM estimates (with difference and system GMM). Again, there is evidence of a negative relationship 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 strengthens 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.

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

## 3.6 Robustness test

I conduct several additional tests to check the robustness of my results. First, I re-estimate equation (10) using pooled-OLS with clustered standard errors on an alternative risk-taking measure and loan loss provision (LLP), while controlling for the effect on 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 (23) shows that governance still has a significant effect on bank risk-taking.

**Table 23: The relationship between bank corporate governance and risk-taking (Loan loss provision) – OLS**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | **LLP** | **LLP** | **LLP** | **LLP** |
| CG | -0.106*** | -0.041 | -0.102*** | -0.046* |
| | (-3.08) | (-1.42) | (-2.87) | (-1.69) |
| ETA | 0.015* | 0.018*** | 0.017** | 0.017*** |
| | (1.83) | (2.84) | (2.06) | (2.62) |
| LNTA | 0.656*** | 0.347*** | 0.388*** | 0.358*** |
| | (3.62) | (2.95) | (2.59) | (3.03) |
| PE | -0.029 | -0.015 | -0.007 | -0.025 |
| | (-0.75) | (-0.42) | (-0.17) | (-0.68) |
| ROAA | -0.087*** | -0.064** | -0.111*** | -0.054* |
| | (-3.02) | (-2.26) | (-3.25) | (-1.89) |
| LNDEP | 0.376** | 0.637*** | 0.707*** | 0.614*** |
| | (2.08) | (5.22) | (4.72) | (4.99) |
| GDP | | | -0.001 | -0.018** |
| | | | (-0.23) | (-2.03) |
| INF | | | -0.007 | -0.027 |
| | | | (-0.68) | (-1.47) |
| INT | | | 0.029 | -0.026 |
| | | | (1.41) | (-0.79) |
| Constant | -5.070*** | -4.424*** | -6.365*** | -3.927*** |
| | (-8.75) | (-7.89) | (-11.61) | (-6.54) |
| Year effect | No | Yes | No | Yes |
| Observation | 345 | 345 | 345 | 345 |
| 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, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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 (10) using the fixed effect estimation on the loan loss provision in Table (24), 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 measures 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 24: 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** | -0.065* | -0.083** | -0.066* |
| | (-2.13) | (-1.85) | (-2.32) | (-1.90) |
| ETA | 0.012 | 0.011 | 0.010 | 0.008 |
| | (1.34) | (1.26) | (1.10) | (0.87) |
| LNTA | 1.065*** | 0.944*** | 1.051*** | 0.925*** |
| | (4.75) | (4.33) | (4.75) | (4.29) |
| PE | -0.041 | -0.009 | -0.027 | -0.023 |
| | (-1.08) | (-0.24) | (-0.72) | (-0.59) |
| ROAA | -0.070** | -0.060** | -0.052* | -0.050* |
| | (-2.51) | (-2.13) | (-1.83) | (-1.77) |
| LNDEP | -0.112 | -0.060 | -0.116 | -0.122 |
| | (-0.50) | (-0.28) | (-0.52) | (-0.57) |
| GDP | | | -0.015*** | -0.025*** |
| | | | (-3.31) | (-2.80) |
| INF | | | -0.001 | -0.040** |
| | | | (-0.12) | (-2.19) |
| INT | | | 0.032 | -0.003 |
| | | | (1.65) | (-0.11) |
| Constant | -3.800*** | -2.699** | -3.578*** | -0.92 |
| | (-5.82) | (-2.52) | (-4.80) | (-0.77) |
| Year effect | No | Yes | No | Yes |
| Observation | 345 | 345 | 345 | 345 |
| 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, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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, and to remove the strict exogeneity assumption for independent variables and eliminate the unobserved bank-specific effects, I employ the GMM estimator for hypothesis testing. Table (25) 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 (25) suggests that strong corporate governance is still associated

with higher bank risk-taking.

**Table 25: The relationship between the interaction term and risk-taking (Loan loss provision) – GMM**

| | (1) DIFF | (2) SYS | (3) DIFF | (4) SYS |
|---|---|---|---|---|
| **Dependent variable** | **LLP** | **LLP** | **LLP** | **LLP** |
| Lag.LLP | 0.270*** | 0.622*** | 0.354*** | 0.862*** |
| | (4.34) | (13.23) | (4.95) | (11.13) |
| CG | -0.138*** | -0.016* | -0.060** | -0.096** |
| | (-7.70) | (-1.81) | (-2.21) | (-2.39) |
| ETA | -0.032** | 0.009*** | -0.021 | -0.009** |
| | (-2.16) | (2.96) | (-1.31) | (-2.32) |
| LNTA | 2.201*** | 0.042 | 1.796*** | -0.059 |
| | (7.10) | (0.86) | (3.53) | (-1.58) |
| PE | -0.128*** | -0.094 | 0.0845** | 0.026 |
| | (-2.80) | (-1.54) | (2.58) | (0.56) |
| ROAA | -0.062** | -0.082** | -0.026 | 0.001 |
| | (-2.57) | (-2.51) | (-0.54) | (0.02) |
| LNDEP | -1.375*** | 0.394*** | -1.309** | 0.147 |
| | (-5.40) | (10.14) | (-2.69) | (1.47) |
| GDP | | | -0.013*** | 0.010** |
| | | | (-3.33) | (2.04) |
| INF | | | -0.013* | -0.018* |
| | | | (-1.94) | (-1.71) |
| INT | | | 0.022 | 0.010 |
| | | | (0.84) | (0.59) |
| Constant | | -2.249*** | | 0.673 |
| | | (-9.64) | | (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, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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 (26), while controlling for the effect of bank characteristics and other macroeconomic factors. Consistent with above, I find that my results continue to be qualitatively similar to those reported in previous studies. Thus, my conclusion on the relationship between risk-taking and governance is not sensitive to an alternative measure of risk.

| Table 26: The relationship between the composition of corporate governance and risk-taking (Loan loss provision) – OLS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **Dependent variable** | **LLP** | **LLP** | **LLP** | **LLP** | **LLP** | **LLP** | **LLP** | **LLP** |
| 1INDIV | -0.247*** | | | | | | | -0.260*** |
| | (-2.82) | | | | | | | (-2.94) |
| 2BS | | 0.005 | | | | | | -0.006 |
| | | (0.13) | | | | | | (-0.15) |
| 3DUAL | | | -0.217** | | | | | -0.238** |
| | | | (-1.99) | | | | | (-2.16) |
| 4TOP10 | | | | -0.123 | | | | -0.107 |
| | | | | (-1.22) | | | | (-0.96) |
| 5 MH | | | | | 0.078 | | | 0.092 |
| | | | | | (0.66) | | | (0.71) |
| 6FORE | | | | | | 0.033 | | -0.033 |
| | | | | | | (0.53) | | (-0.49) |
| 7AUDIT | | | | | | | -0.077 | -0.039 |
| | | | | | | | (-0.94) | (-0.46) |
| ETA | 0.0192*** | 0.0180*** | 0.0188*** | 0.0171*** | 0.0183*** | 0.0178*** | 0.0172*** | 0.0198*** |
| | (2.99) | (2.76) | (2.87) | (2.63) | (2.78) | (2.73) | (2.62) | (2.98) |
| LNTA | 0.363*** | 0.362*** | 0.369*** | 0.397*** | 0.385*** | 0.377*** | 0.368*** | 0.414*** |
| | (3.13) | (3.08) | (3.13) | (3.29) | (3.17) | (3.14) | (3.11) | (3.36) |
| PE | -0.028 | -0.021 | -0.027 | -0.018 | -0.019 | -0.021 | -0.023 | -0.032 |
| | (-0.77) | (-0.57) | (-0.72) | (-0.49) | (-0.52) | (-0.56) | (-0.62) | (-0.85) |
| ROAA | -0.062** | -0.054* | -0.053* | -0.051* | -0.054* | -0.054* | -0.055* | -0.058** |
| | (-2.16) | (-1.89) | (-1.86) | (-1.77) | (-1.89) | (-1.90) | (-1.92) | (-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 | 345 | 345 | 345 | 345 | 345 | 345 | 345 | 345 |
| 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 |

Note: ZS is the Z-score, calculated as [Average (Returns) + Average (Equity/Total assets)] / Standard deviation (Equity/Total assets). LLP is loan loss provision in natural logarithem. LNTA is total assets in natural logarithem. 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 the 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.

## 3.7 Conclusion

Banking crises are crucial, not just because of the destruction on a particular sector, but also because typically the shock waves strike the entire economy. Thus, the substantial portions of banks' wealth should be operated and managed 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. The main objective of this chapter is to study empirically the impact of various governance mechanisms on bank risk-taking. Although it is well recognised that corporate governance can affect firm value, in this chapter, I combine the external and internal characteristics of corporate governances and study them by linking bank risk-taking to managerial behaviour on the stock markets.

This chapter examines the relationship between bank corporate governance and risk-taking, using a wide ranging and most recent panel data, which covers 345 bank observations over the period from 2006 to 2015. The empirical results indicate that the effect of strong corporate governance on bank risk is significantly negative, which suggests that corporate governance that favours the interests of its shareholders is associated with higher levels of bank risk-taking. Despite with OLS and fixed effects estimations, this chapter also applies the recent two-step system GMM dynamic panel data techniques as the robustness test. The dynamic model specification allows for dependent variable persistence and controls for possible endogeneity issues.

While my sample is unique in terms of the prudential regulations, and similar cultural backgrounds, the financial incentives analysis 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 incentives for top managers, and ownership structure. All of these issues need to be taken into

consideration when establishing the appropriate governance structures of other banks and businesses. In addition, given the differences in institution and business environments, it is certainly possible that 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 the resilience of the banking industry. Thus, an 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 evaluating and approving bank-engaged activities at the national level. If banking regulators are committed to safeguarding banks' asset qualities, elimination of explicit protection might be a sufficient condition. Second, to promote the stability of the economy, regulators should encourage banks to build a high standard of risk management systems. Third, regulators should consider using recent innovations in the financial markets to reduce risk-taking by bank executives (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 problems (Keys et al., 2009).

# Chapter 4: Ownership structure and bank performance: An emerging market perspective

## 4.1 Introduction

Explaining performance differences among banks is a prevailing theoretical and empirical issue in the field of finance literature. Ownership structure is widely accepted in the finance and economics study as an instrumental determinant of bank performance. Indeed, considerable literature has developed on the relationship between ownership and performance. More specifically, examining state ownership versus private ownership has received much attention in the banking sector.

This chapter falls within a broad research programme, focusing on ownership in general. There are commonly three types of shareholder in governance literature: state, private investors and foreign investors. There have been a number of empirical studies showing how differences between owner types influence bank performance (for government-owned banks, see Iannotta et al., 2013 and Berger et al., 2015; for ownership by privately owners, see Cornett et al., 2010; for ownership by foreign owners, see Lensink et al., 2008; for managerial owners, see DeYoung et al., 2013). The results of these studies are mixed, but overall they suggest that types of owners differ in their contributions to performance variation over time. The aim of this chapter is to reconcile these conflicting results by enriching the analysis of the bank's ownership structure using the Chinese case.

I limit this chapter to the significance of owner type in countries making the transition to some form of capitalism, and focus specifically on China. China’s bank reform is still

ongoing, so it is hard to reach conclusions on how it may affect the whole financial system. In particular, China's banking sector is the most important component of the financial system (with 69% of total financial assets in 2016), and yet it has long remained undercapitalised and presented with non-performing loans. In addition, bank capitalisation, solvency and profitability are still below the average of international counterparts. As China's importance in the world economy grows, improved understanding about the banking sector in China has enormous practical implications for regulators and other stakeholders. Moreover, studies on ownership differences have to be grounded in an environment where banks of different ownership types coexist and compete; China's transition economy presents such an ideal context.

While ownership itself is an objective structure, I contend different ownership types that lead to different managerial cognitions. The main findings regarding the static effects of bank ownership on performance suggest that, consistent with much of the literature, banks with more state shareholders tend to have poorer performance levels. In addition, banks with higher domestic private shareholders generally operate more profitably. Furthermore, higher foreign ownership may negatively affect bank performance. Moreover, ownership type diversity is positively associated with bank performance, while banks with concentrated ownership are worse performing. The results are robustness under the different measures of bank performance. My findings have implications for the design of appropriate corporate governance systems for Chinese commercial banks. Moreover, my results provide information that can inform policy debates within the China regulators.

This chapter makes a number of contributions to the existing literature. First, it analyses the effects of ownership reforms, enriching the literature from the perspective of transitional, as well as developing, countries. The type of privatisation and the form of state ownership are some of the major concerns in these countries. Second, this chapter exploits how banks function in an economy that combines rapid economic growth and state-owned banks serving political goals. In other words, it examines the role of

corporate governance in the banking sector of emerging markets using a unique sample of Chinese banks. Third, it expands beyond the narrow confines of ownership concentration and performance by incorporating issues related to bank reform. Thus, it adds to the literature that aims to examine the determinants of bank profitability. Additionally, this is the first study that considers both concentration and diversity of ownership structure (i.e. ownership distribution and the nature of the owners) in the banking sector. As there have been recent calls to consider the multiple dimensions of diversity simultaneously, this chapter extends the literature to explore the effects of shareholder diversity on bank performance.

The chapter is organised as follows. Section 2 provides a brief outline of the current Chinese banking system, followed by a literature review in Section 3. Section 4 discusses the methodology and the data used. Section 5 presents the results of the tests, followed by the robustness test in Section 6. Finally, Section 7 summarises and presents the implications of the results for China's banking sector in its new regulatory environment.

## 4.2 Chinese banking background

From 1949 to 1978, China was a central planned economy and the People's Bank of China (PBC) was the only bank in the country that acted as both a central bank and a commercial. The majority of companies were owned by the government or state-related organisations. Under the traditional communist system, the Chinese government gathered revenues from these organisations and provided financial support to the society, as per government planning.

In 1978, the fundamental economic reforms transferred the state-owned, low efficiency and policy-driven organisations to a multi-ownership and market-oriented corporation. In the banking system, the Bank of China, the China Construction Bank, and the

Agricultural Bank of China were all established in 1979. In 1984, the Industrial and Commercial Bank of China was separated from the PBC and became the fourth national specialty bank. Thus, the 'big four' state-owned banks make up the fundamental foundation of the commercial banking system in China. The PBC began to function as the central bank and the main regulatory agency of China's banking system.

Chinese banking systems were further reformed by introducing a number of joint-stock or joint equity banks (Liang et al., 2013) during 1980s. The first nationwide joint-stock commercial bank was set up and named the Bank of Communications in 1986. Other nationwide joint-stock commercial banks, and urban and rural credit cooperatives were established during this period, such as Shenzhen Development Bank Co Ltd and China Merchants Bank Co Ltd. Shenzhen Development Bank Co Ltd, now renamed as Ping An Bank, was the first publically listed bank in 1988. China Merchants Bank Co Ltd is the first nationwide enterprise-owned bank. These nationwide and joint stock commercial banks were established in an attempt to decrease the monopoly power of the 'big four' state-owned banks in the market. These banks are the second most important group in the Chinese banking market.

In 1994, the reform of the commercial banking system in China progressed further with the establishment of three policy banks: the China Development Bank (CDB), the Agricultural Development Bank of China (ADBC), and the Export-Import Bank of China (China Eximbank). These policy banks took over most of the policy loan activity from the 'big four' state-owned banks. Whilst financial liberalisation helped to integrate Chinese markets with global markets, it constituted a major challenge for domestic banks and their systems of governance. However, the weak state of law and regulation in China are major limitations on the efficiency of financial institutions. In 1995, the Central Bank Law and the Commercial Bank Law, both of which construct a legal commercial banking system, came into effect. These regulations require that commercial banks must operate individually, take their own risks, and assume their own losses.

Alongside the introduction of the concept of the new banking regulations in the Chinese economy, the urban credit cooperatives accumulated a large proportion of non-performing loans. Thus, PBC allowed those urban credit cooperatives and local financial institutions to merge and consolidate into the joint-stock banks, i.e. city commercial banks. These city commercial banks emerged as the third most important group, and compete with the 'big four' state-owned banks and joint-stock commercial banks in the Chinese banking market. These banks are normally shareholding ownership structures and are restricted geographically within their own localities; they are required to conduct business within their own administrative provinces.

The 'big four' state-owned banks have been criticised for their larger amount of impairment loans due to their political lending practices. Specifically, inefficient state-owned corporations are normally the largest borrowers for Chinese banks. Therefore, the Chinese government has established the assets management companies that liquidate majority bank assets at high discounts. In 1999, four assets management companies (AMC) were established to transfer the non-performing assets from the banks.

In 2003, a large number of commercial banks were still owned or controlled by the state, either directly through central or local government institutions, or indirectly through marketised SOEs. Thus, the government has been implementing a series of reforms to improve the efficiency and profitability of the state banks, particularly given the impending opening of the domestic financial sector to foreign investors under the World Trade Organization (WTO). The China Banking Regulatory Commission (CBRC) was established and assumed most supervisory functions from the PBC. The main role of the CBRC is to regulate and supervise banking-related financial institutions through formulating and implementing supervisory rules and policies to maintain a safe and sound banking system. The role of the PBC focuses on monitoring and regulating the macro economy and currency policies. In addition, new accounting principles that

follow the International Accounting Standards were implemented in 2005, which aims to provide comparable financial information integrated with the normal financial market.

Conventional state-owned, joint-stock and city commercial banks have started to transform into modern corporate systems to improve their efficiency and competitiveness by attracting strategic investors and going public. First, attracting domestic and foreign strategic investors is an important strategy for enhancing governance and performance. In 2005, three of the 'big four' state banks were changed from fully state-owned banks to corporations owned by public and private shareholders. However, the state still remains the largest shareholder. Foreign investors have been allowed to take a few ownership shareholdings in the state banks. Second, going public is another important strategy for maintaining competitiveness. Some larger banks went public in Hong Kong's capital market, such as the China Construction Bank listed, in Hong Kong in 2005, and the Bank of China and the Industrial and Commercial Bank of China, cross listed in Hong Kong and Shanghai in 2006. All the 'big four' state-owned banks successfully issued IPOs in the Hong Kong and Shanghai stock exchanges during the 2005 to 2010 period.

Beyond the 'big four' state-owned banks, reforms have also spread to joint-stock banks and city commercial banks. For example, the Bank of Beijing was listed on the Shanghai stock exchange in 2007. Since 2007, some large city commercial banks have gradually expanded by setting up branches outside their own provinces, and this was allowed by the CBRC. The joint-stock and city commercial banks have also taken further steps by attracting public funds as capital to improve their governance.

At present, after more than three decades of reform, the Chinese banking sector has been the primary source of financing for the economy's growth, with the banking and other financial institutions accounting for over 80% of the whole country's financial assets. The banking system consists mainly of three groups of domestic banks. The 'big

four' state-owned banks still held over 50% of the banking sector's assets, as of June 2016. The banking sector's assets of joint-stock banks and city commercial banks are nearly 16% and 6%, respectively, while other relevant financial institutions, such as policy banks, urban and rural credit cooperatives, and other finance companies account for the remaining per cent.

Over the last few decades, China has become the world's most rapidly developing economy. The Chinese banking system has largely withstood the financial crisis without an emergence of systemic risk, despite the fact that the majority of Chinese commercial banks are controlled by government entities with minority individual shareholders. In spite of these efforts, many inherent drawbacks still remain in the Chinese banking system. For instance, the ownership of foreign investors is relatively minor, and their involvement in efficient corporate governance remains limited. Also, Chinese banks are forced to meet multiple and contradictory goals to support local economic growth, employment and political lending.

## 4.3 Literature review and hypothesis development

### 4.3.1 Ownership and performance

Academic interest in bank performance has shifted from developed economies to developing and transitional markets. Bank governance structure is a critical and well-explored topic of relevant studies. For example, the study on bank governance is dominated by research focused on how insiders versus outsiders can affect a bank's performance. However, in addition to insider versus outsider equity holders, another important dimension of ownership structure is state or public ownership versus private ownership structure. In particular, the study examines the impact of equity ownership by different shareholder groups on manager behavior, which in turn would affect bank performance. Thus, it seems reasonable to suggest that ownership is a key determinant underlying different corporate governance regime.

A bank's ownership structure influences its performance for several reasons. First, differences in ownership type identity, concentration, diversity, and resource endowments among shareholders determine incentives and the ability to monitor bank managers. Shareholdings by state, state-owned enterprises (SOE), and domestic private and foreign investors are typical examples of this phenomenon. Second, as shareholders have divergent interests, consequently they have different impacts on bank behaviour.

The relationship between the shareholder and management is complicated due to their interests not aligned. The effect that ownership structure has on bank performance may be considered through the principal-agent framework (Altunbas et al., 2001).

The effectiveness of governance is determined by ownership mechanisms and, as a consequence, these affects firm performance. Several studies have analysed whether ownership and governance actually impact bank performance.

### 4.3.2 Chinese banking literature

Although many sudies on banking in transition countries exist, they focus mainly on countries in Central and Eastern Europe, and primarily investigate the relationship between bank ownership and performance.

Despite the growing interest of researchers worldwide in the banking sector, there are few studies on Chinese bank corporate governance. Lin and Zhang (2009) analyse the impact of bank ownership reform on performance (where performance is measured by simple accounting ratios) over the period from 1997 to 2004. Liang et al. (2013) analyse the impact of board characteristics on bank performance and bank asset quality in China from 2003 to 2010. Berger et al. (2009) analyse the profit and cost efficiency of banks operating in China between 1994 and 2003.

### 4.3.3 State ownership

State ownership refers to equity investments by central or local governmental institutions. The state has become increasingly important as an owner of domestic firms as well as foreign firms (Carney and Child, 2013). Generally, government-owned banks have multiple (often conflicting) goals other than commercial considerations. They are forced to meet the contradictory objectives of supporting employment and changing into modern commercial banks. Therefore, state-owned banks may not be independent organisations governed by shareholders with return maximisation. Barth et al. (2013) present cross-country statistics on the degree of state ownership of the banking sector, without providing detailed information on the ownership structure of banks.

Banks with majority government ownership are normally beneficiaries of either implicit or explicit regulatory support from the authorities (Faccio et al., 2006). For instance, these banks are likely to benefit from a lower cost of funding when issuing debt or equity securities in capital markets. Cornett et al. (2010) find that the deterioration in the cash flow returns, core capital, and credit quality of state-owned banks was significantly greater than that of private banks, especially for the countries that were hardest hit by the Asian crisis. Chen et al. (2016) find that government banks have higher loan growth rates than privately owned banks. Zhu and Yang (2016) find that state-owned banks have relatively lower risk-taking after foreign acquisitions. Zhang et al. (2013) suggest that banks taking a lower level of risks perform better. Tan (2016) finds that compared to the state-owned commercial banks, the joint-stock commercial banks and city commercial banks in China have lower profitability. Beuselinck et al. (2017) suggest that in countries with good investor protection and low corruption the benefits of government ownership increase relative to the costs of government ownership.

On the other hand, the bulk of the evidence on government ownership of banks suggests that it is associated with poor bank performance due to weak managerial incentives, political lending and misallocation of resource (Berger et al., 2005; Lin and Zhang, 2009; Micco et al., 2007). First, state shareholding is argued to be intrinsically

inefficient because of agency problems (Williams and Nguyen, 2005). The agent-principal problem becomes more significant under government ownership. Managers are likely to pursue their own benefit rather than acting in the best interest of owners, which may lead to negative effects on bank performance. Ashrf (2017) suggests that government ownership in banks is likely generating moral hazard problems due to the expectation of government bailouts during negative economic conditions. Therefore, governance of banks is more relevant for performance in bad times rather than in good (Martin-Oliver et al., 2017).

Second, the state invests in a particular bank because of its political and strategic value (Iannotta et al., 2013). As such, governments tend to own equity in firms and industries that usually are not the most competitive ones. Iannotta et al. (2013) find that government-owned banks have higher operating risks than private banks, indicating that the presence of governmental protection induces higher risk-taking. For instance, state-owned banks are likely to grant loans to socially valuable investment projects with low financial returns. State ownership of banks has led to ownership bias in lending (Lin et al., 2015). As a consequence, these lending behaviours will inevitably deteriorate their assets quality and increase their risk profile. Dong et al. (2014) also find that government-controlled banks tend to take more risks than those controlled by state-owned enterprises or private investors. Allen et al. (2017) find that government-owned banks relatively increased their credit supply during the global crisis. Iannotta et al. (2007) find that government-owned banks exhibit a lower profitability than privately owned banks. Indeed, stated-owned banks with lower profitability may be related to the situation that those banks finance projects with high social benefit.

Furthermore, within state-owned banks there is a lack of market discipline , as well as inadequate punishment for managerial misbehaviour (Zhang et al., 2016). Bailey et al. (2011) find that poor financial performance and high managerial expenses increase the likelihood of obtaining a bank loan in China. Additionally, the government's nominees on the board are typically bureaucrats with minimal skill or expertise in the banking

sector. Micco et al. (2007) find that state-owned banks located in developing countries tend to have lower profitability and higher costs than their private counterparts. Shaban and James (2017) find that state-owned banks tend to be less profitable and more exposed to risk than private and foreign banks.

*H1: Banks with high state-ownership are negatively related to performance.*

### 4.3.4 State-owned enterprise (SOE) ownership

Although an SOE's ultimate controlling shareholder is the local or central government, as the shareholder of a bank, SOEs are different from government shareholders in many respects. First, despite SOEs' need to serve some politicians' interests, they are more empowered and have large autonomy. Second, SOEs have some financial policy constraints and may not obtain sufficient support from the government. Furthermore, banks in China give preferential treatment to SOEs and discriminate against non-SOEs, when making lending decisions (Lu et al., 2013). Therefore, SOEs are willing to hold higher ownership and maintain good relationships with banks. Chen et al. (2009) find that SOE-controlled Chinese listed firms perform better than privately controlled firms. SOEs may change their organisational goals following partial privatisation; in turn, this affects firm performance as higher levels of profit orientation are instituted by the private investors.

In theory, SOEs are owned by all citizens in a country. However, in practice they are controlled and managed by government bureaucrats and politicians. SOEs are able to obtain additional finances from government if they make losses, and get rescued with public money when threatened with bankruptcy. In this way, the managerial view of SOEs posits that these banks are inefficient because their managers are not adequately monitored (leading to poor incentive structures). The predominant view is that SOEs may not have enough resources and financial expertise to monitor and discipline bank managers, and thereby reduce agency problems. Therefore, managers of these banks have little incentive to minimise costs or maximise profit. Banks owned by SOEs are

not run by their owners; therefore the owners cannot tell how much of the performances are due to managerial failures or external factors. Furthermore, organisational slack can readily inform the understanding of organisations' behavior is possible due to SOEs prioritise goals such as social welfare different than other privately owned firms (Stan et al., 2014). Saghi-Zedek (2016) finds that banks with no controlling shareholders yield diseconomies on activity diversification.

Given that they are less sensitive to market pressures, economic performance and operation efficiency are not necessarily the priority concerns of SOE managers. In particular, direct monitoring from shareholders is either unavailable or is an ineffective tool for mitigating agency costs in SOEs. Thus, in the absence of appropriate monitoring, bank managers may prefer to take riskier activities in order to maintain or increase their remuneration.

*H2: Banks with high SOE ownership are negatively related to performance.*

### 4.3.5 Domestic private investors

The third type of shareholder is the domestic private shareholder. In many emerging countries, domestic private investors are among the largest group of blockholders (Claessens et al., 2000). Lu et al. (2009) show that Chinese domestic investors have a greater propensity to hold significant ownership in commercial banks due to less suffering from bank discrimination for political reasons. These shareholders usually have a long investment horizon. Shaban and James (2017) find that domestic investors tend to select the best performers for acquisition.

Domestic private ownership is anticipated to reduce agency problems and enhance operating performance through various mechanisms, such as managerial ownership and attractive remuneration packages. These investors tend to have maximum equity returns as their primary investment objective. Thus, they are typically tied to the firm only with their equity stakes and mostly operate at arm's length from managers. In response to the

greater competitive and liberalised environment, these investors closely monitor and pressurise managers to improve operations, as inadequate managers can be changed. Their monitoring incentives, as well as their abilities, are substantially greater than other domestic institutions. Jiang et al. (2013) show that the privatisation of banks has improved performance with respect to revenue inflow and efficiency gains, in the short- or long-run in China. Saghi-Zedek (2016) also finds that banks with more domestic shareholders display higher profitability, as these shareholders bring additional skills to manage activity diversification and yield economies.

*H3: Banks with high domestic private ownership are positively related to performance.*

### 4.3.6 Foreign shareholders

Financial globalisation has further opened banking sectors that were previously off-limits to international investment. Increased openness to foreign equity investors generally enhances the information environment, such as increasing analyst coverage and decreasing earnings management.

Foreign shareholding is expected to have a positive impact on performance. First, foreign shareholders are less prone to political pressure and more likely to participate in company negotiations and monitoring from arm's-length (Huang and Zhu, 2015). Second, foreign shareholders are likely to bring in new technology, modern techniques and effective managerial skills. As foreign investors often invest in similar corporations in different jurisdictions, they tend to have the relevant experience and know-how to set appropriate benchmarks for performance. Gillan and Starks (2003) observe that foreign owners play a more active role than local investors in advocating better firm-level governance, which may influence corporate performance. Empirical studies (i.e. Berger et al., 2009; Lin and Zhang, 2009) suggest that there are improvements in domestic bank performance after involvement with foreign strategic investors. Additionally, foreign investors may choose to invest in better performing banks, or, alternatively, the government sells the equity of better performing banks first in an effort to attract foreign

investors. These foreign investors could help local banks employ advanced banking strategies to enhance operating efficiency. Furthermore, foreign shareholders may insist on having board members that represent their interests. Having foreign directors on the boards would bring diversity of expertise that may result in enhancing bank performance, and may be more effective than having members from similar local business environments.

However, there are some inherent limitations for foreign shareholders improving bank performance. Firstly, it may be more difficult to closely monitor foreign investors from a long distance, and they may have limited access to local information. Indeed, these shareholders are generally disadvantaged with regard to understanding the local country's economy, language, laws and politics. Second, foreigners and nationals may receive different treatment from local governments, consumers and suppliers. Lensink et al. (2008) find that foreign ownership negatively affects bank efficiency. Additionally, Berger et al. (2009b) claim that foreign ownership is not helpful for bank stability in 23 developed nations. Lee and Hsieh (2014) show that domestic banks are better than foreign banks.

*H4: Banks with higher foreign ownership are positively related to performance.*

### 4.3.7 Ownership diversity

Ownership diversity is the distribution of equity type with regard to votes and capital, which includes the state, SOE, domestic private, and foreign owners. Ownership diversity can influence firm performance in several ways. First, these diversities have an impact on corporate governance structures because they determine the incentives of managers and the economic efficiency of the corporations. Second, enhancing performance is a common avenue for state, private, and foreign investors to alleviate conflicts of interest between each shareholder. More diversity equity ownership may increase corporate performance because it means better alignment of monetary incentives between the manager and other equity owners. Theories from economics,

organisational behaviour, and social psychology can provide some understanding of the nature of the link between ownership diversity and financial performance. Diversity incentives of shareholders hold the potential conflict to improve the information provided by the board to managers. Thus, differences in the backgrounds of shareholders are very likely to produce unique information sets that are available to management for better decision-making. However, decision-making may be slower and more conflicted with diverse shareholders. Garcia-Meca et al. (2015) shows that directors' diversity increases bank performance.

Therefore, relying on above arguments, it is reasonable to believe that a bank with different types of owners (state, SOE, domestic private, and foreign) is more capable of securing the complementary set of key resources for improving operations.

*H5: Ownership type diversity is positively related to bank performance.*

### 4.3.8 Ownership concentration

Ownership concentration is a generally used structure through which investors aim to ensure reasonable returns on their investments (Shleifer and Vishny, 1997). After examining the separation of ownership and control in public corporations in East Asian countries, Claessens et al. (2000) find that more than two-thirds of the firms are controlled by a single shareholder. In particular, Caprio et al. (2007) find that banks are not widely held and tend to be controlled by a family or the State. It is a commonly held belief that concentrated ownership offers the best protection to shareholders.

Evidence from previous studies on the effect of ownership concentration on bank performances are mixed and complex. The different national systems of corporate governance reflect differences in ownership structure of firms in distinct economies and, particularly, in ownership concentration too (Shleifer and Vishney. 1997; Caprio et al., 2007). Beltratti and Stulz (2012) find that more concentrated banking systems are not associated with better performance.

It is not necessarily the case that greater ownership concentration means better alignment of interests of management with shareholders and thus enhances performance. DeYoung et al. (2001) indicate that banks with large ownership concentrations face classic monitoring problems. Garcia-Herrero et al. (2008) find that a more concentrated banking system is associated with a lower profit. Indeed, controlling shareholders could use control of a bank to benefit their related entities and easily extract private benefits. Also, controlling shareholders may abuse their power, which could be detrimental to the value maximisation goals of the firm. Large bank shareholders can fire managers, and such shareholders can use their power to ensure that managers engage in related lending (Caprio et al., 2007). Battaglia and Gallo (2017) find that greater shareholder influence results in more systemic risk during crises. Indeed, although a few larger shareholders might have the power to induce management to run the firm to their interests, these interests may not converge with those of minority shareholders.

In contrast, some empirical evidence shows that a bank with higher ownership by few shareholders performs better because a large ownership concentration has more incentive to enhance firm performance and to discipline managers. Heugens et al. (2009) find a significant positive association between concentrated ownership and firm financial performance in Asia. Iannotta et al. (2007) find that ownership concentration has no effect on banks' performance, but is associated with better loan quality. Caprio et al. (2007) find that concentrated ownership reduces incentives for insiders to expropriate bank resources, which can boost valuations. In contrast, Jensen and Meckling (1976) argue that with more dispersed shareholding, the firm value increases.

More concentrated ownership can exploit strong bargaining powers with mangers and in turn reduce managerial initiatives. Thus, my sixth hypothesis is as follows:
*H6: Ownership concentration is negatively related to bank performance.*

## 4.4 Methodology and data

### 4.4.1 Data and sample selection

My sample is an unbalanced panel of 132 Chinese banks over the 2005–2015 period. These banks are the top banks, based on their total assets according to the annual China Banking Regulatory Commission (CBRC) ranking.

To investigate the impact of ownership structure on banks' performance, I collect my dataset from two sources. I hand-collect the information about the sample banks' ownership structures from annual reports, such as the percentage of ownership held by the top ten owners. In addition, the bank-specific accounting data is retrieved from the BankScope database and the banks' annual reports. Whenever Bankscope and the annual report do not have sufficient information, or have a questionable amount, I retrieve or double-check the data from other official sources, such as annual issues of the Almanac of China's Finance and Banking.

Table (27) shows the top ten largest shareholders' ownership structures of the banks in my sample over the period 2005 to 2015.

**Table 27: The ownership structure of Chinese banks**

| | N | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| **Largest shareholder** | 830 | 21.82 | 15.64 | 4.23 | 92.01 |
| **Second shareholder** | 830 | 12.25 | 6.49 | 1.83 | 50.00 |
| **Third shareholder** | 830 | 7.87 | 3.53 | 0.90 | 20.00 |
| **Fourth shareholder** | 830 | 6.07 | 3.02 | 0.07 | 20.00 |
| **Fifth shareholder** | 830 | 4.92 | 2.36 | 0.06 | 11.67 |
| **Sixth shareholder** | 830 | 4.17 | 2.22 | 0.06 | 10.08 |
| **Seventh shareholder** | 830 | 3.61 | 1.94 | 0.04 | 10.00 |
| **Eighth shareholder** | 830 | 3.06 | 1.69 | 0.04 | 9.90 |
| **Ninth shareholder** | 830 | 2.66 | 1.51 | 0.03 | 8.00 |
| **Tenth shareholder** | 830 | 2.33 | 1.35 | 0.01 | 8.00 |
| **Ownership of top ten shareholders** | 830 | 67.18 | 18.23 | 38.54 | 100 |

Note: This table presents the percentage of a bank's equity share capital owned by the top ten largest shareholders individually and their total shareholding.

I delete the observations in the top 0.5% and in the bottom 0.5% of bank performance and ownership structure, as did Chen et al. (2014).

### 4.4.2 Model

Several studies analyse whether ownership and governance do matter for bank performance. For example, Lin and Zhang (2009) assess the effect of bank ownership on performance using a panel of Chinese banks over the 1997–2004 period. Berger et al. (2009) analyse the efficiency using 266 annual observations, over the 1994–2003 period, on 38 commercial banks in China with different majority ownerships. Iannotta et al. (2007) investigate whether any significant difference exists in the performance of European banks with different ownership structures.

Following previous studies (Iannotta et al., 2007; De Andres and Vallelado, 2008; Jiang et al., 2013; Lin and Zhang, 2009), I focus on two traditional performance measures. First, I use the measures of bank profitability, return on assets (ROA). ROA is calculated as the income before extraordinary items, interest expense and taxes, divided by the average of the two most recent years of total assets. Following Elyasiani and Zhang (2015) and Berger et al. (2005), the second performance variable is return on equity (ROE), defined as profits (net income after taxes) relative to equity, which is used as the robustness test.

In line with prior studies that examine the relationship between ownership and bank performance (e.g. Berger et al., 2009; Iannotta et al., 2009; Lin and Zhang, 2009), I use the following regression specification:

$$PERF_{it} = \alpha + \beta_1 STATE_{it} + \beta_2 SOE_{it} + \beta_3 DPO_{it} + \beta_4 FOR_{it} + \gamma_1 DIV_{it} + \gamma_2 CONC_{it} + \Sigma_k \delta_k CONTROL_{it}^k + \varepsilon_{it}$$

*(Equation 12)*

where the dependent variable PERF is one of the two bank performance measures: the return on assets (ROA) and return on equity (ROE).

STATE, SOE, DPO and FOR indicate the percentage of equity shares held by the shareholders for government, state-owned enterprises, domestic private owners and foreign investors, respectively. State ownership refers to equity investments by central or local governmental institutions. In China, for historical reasons, a large number of commercial banks are owned or controlled by the state, either directly through central or local government institutions or indirectly through marketised SOEs. Governments have conflicting objectives other than profit maximisation. The model captures the contribution of state ownership, SOE ownership, domestic private ownership, foreign ownership, ownership diversity, and ownership concentration on the performance measured by return on asset and return on equity of conglomerate banks.

DIV and CONC represent the ownership type diversity and concentration. First, following Chen et al. (2014), I use the Herfindahl measure, a commonly used approach of computing the level of diversification for ownership type diversity.

$$Ownership\ type\ diversity = {}^{1}\Big/{\sum i}\left[\left(\frac{cumulative\ ownership\ of\ type\ i\ blockholder}{total\ ownershipby\ all\ blockholder}\right)^{2}\right]$$

*(Equation 13)*

where i can be one of the state, SOE, domestic private, or foreign investors.

In addition, ownership concentration equals the sum of the squared ownership shares of the ten largest shareholders of the bank (Dong et al., 2014). It is the proportion of shares owned by a certain number of shareholders. I argue that the higher the number of equity owned by the block holders, the more manger actions will be monitored to act in the interest of the shareholders.

A greater value of ownership diversity indicates a more diverse presence of ownership

types among those larger shareholders, while a higher value of ownership concentration indicates more concentrated control by larger shareholders.

### 4.4.3 Control variables

Bank size: Bank size is measured by the natural logarithm of the bank's total assets. This variable includes the total assets to take account for differences in bank size. Large banks normally have diversified geographies, setting up branches around the world in countries, and with many different sources of income. As large and complex organisations have multiple and overlapping layers of hierarchy, they may suffer from complex agency problems. However, DeYoung et al. (2013) find that the larger banks were able to take advantage of these opportunities when industry deregulation expanded these banks' growth opportunities. Bertay et al. (2013) show that bank returns increase with absolute size because large banks are subject to greater market discipline, yet decline with systemic size.

Loans: Over the past decades, deposits and loans have been regarded as the most important businesses for Chinese banks. Banks obtain low cost funds by giving lower interest rates for deposits. A large portion of these funds is loaned to enterprises and individual borrowers to generate interest income. Jiang et al. (2013) find that Chinese banks are more efficient in generating interest revenue than non-interest income. Moreover, loans might be more profitable than other types of assets, such as securities and other types of investment; therefore, a positive coefficient sign is expected for this variable in the regression.

Capital adequacy: Better capitalised banks may reflect higher management quality, thereby generating a higher profit. As pointed out by Berger and Bouwman (2013), well capitalised banks face lower expected bankruptcy costs, which in turn increase their shareholders' return. Moreover, regulators require banks to hold a minimum level of capital as a percentage of risk-weighted assets. Higher levels of capital may therefore indicate banks with riskier assets.

Non-performing loans: This variable is used to proxy for asset quality. Lower loan quality typically indicates more resources on credit underwriting and loan monitoring, thus reducing profitability.

Block shareholder numbers: This variable is the number of shareholders whose single holding exceeds 5% of total shares outstanding of the bank. Block shareholders may have incentive to extract private benefits from banks, and have a negative effect on a bank's profitability.

Board size: Corporate governance plays a special role due to the uniqueness of the banking sector. The consensus is that complex firms, which need a greater level of advising and monitoring, have larger boards. Small boards may have difficulty in monitoring managers due to the idiosyncratic nature of the banking business. However, more board members would increase the free rider problem. De Andres and Vallelado (2008) find an inverted U-shaped relation between bank performance and board size. Jiang et al. (2013) find that board size has a significantly negative impact on bank performance.

Independent directors: It is not enough merely to appoint more executive directors to safeguard the efficacy of supervision and advising for a bank. Independent directors should be appointed to monitor and discipline mangers. De Andres and Vallelado (2008) suggest that that larger and not excessively independent boards might prove more efficient in monitoring and advising functions, and thus create more value. Jiang et al. (2013) find the proportion of independent directors has a significantly positive impact on both bank performance and asset quality.

| Table 28: Definition of variables | | | |
|---|---|---|---|
| **Variables** | **Symbol** | **Description** | **Sources** |
| ***Performance variables*** | | | |
| Return on assets | **ROA** | The ratio of profit to total assets | Bankscope |
| Return on equity | **ROE** | The ratio of profit to equity | Bankscope |
| ***Ownership variables*** | | | |
| Government ownership | **STATE** | The percentage of shares held by government | Manual collection |
| SOE ownership | **SOE** | The percentage of shares held by state-owned enterprises (SOE) | Manual collection |
| Domestic private ownership | **DPO** | The percentage of shares held by domestic private owners | Manual collection |
| Foreign ownership | **FOR** | The percentage of shares held by foreign investors | Manual collection |
| Ownership type diversity | **DIV** | The diversification for ownership type diversity and calculated from Equation 2 | Use original ownership data to calculate |
| Ownership concentration | **CONC** | The sum of the squared ownership shares of the top ten largest shareholders of the bank | Use original ownership data to calculate |
| Top 3 ownership | **TOP3** | The sum of the percentage of equity shares owned by the top three shareholders | Use original ownership data to calculate |
| ***Control variables*** | | | |
| Bank size | **LNTA** | The natural logarithm of total assets in thousands of Chinese Yuan | Bankscope |
| Loans | **LTD** | Ratio of total loans to total deposit | Bankscope |
| Capital adequacy | **CAR** | Risk-weighted capital adequacy ratio | Bankscope |
| Non-performing loan | **NPL** | Ratio of non-performing loans to total loans | Bankscope |
| Block shareholder numbers | **BLO** | The number of block shareholders, whose holding exceeds 5% of total shares outstanding of the bank | Annual reports |
| Board size | **BS** | The number of board members | Annual reports |
| Independent board members | **IND** | The number of non-executive directors in the board | Annual reports |

It is reasonable to believe that the role played by the different types of owners in banks' performance behaviours is conditional on their incentives, as reflected by the ownership type diversity and concentration, i.e. the relationship between performance and the ownership type diversity and the degree of ownership concentration. To explore this issue, I use the following regression model:

$$PERF_{it} = \alpha + \beta_1 STATE_{it} + \beta_2 SOE_{it} + \beta_3 DPO_{it} + \beta_4 FOR_{it} + \gamma_1 DIV_{it} + \gamma_2 CONC_{it} + \varepsilon_1 STATE_{it} \times DIV_{it} + \varepsilon_2 SOE_{it} \times DIV_{it} + \varepsilon_3 DPO_{it} \times DIV_{it} + \varepsilon_4 FOR_{it} \times DIV_{it} + \varepsilon_5 STATE_{it} \times CONC_{it} + \varepsilon_6 SOE_{it} \times CONC_{it} + \varepsilon_7 DPO_{it} \times CONC_{it} + \varepsilon_8 FOR_{it} \times CONC_{it} + \Sigma_k \delta_k CONTROL_{it}^k + \varepsilon_{it}$$

*(Equation 14)*

where the interaction terms are included in the model as the output of the ownership type diversity (DIV) and concentration (CONC), with the percentage of each ownership type, respectively. Other control variables are defined as above. If the coefficients of the interaction terms are statistically significant, it implies that the impacts of ownership type diversity and concentration on performance varies across those ownership types.

### 4.4.3 Descriptive statistics

Table (29) presents statistics for all variables. The mean (median) of ROA is 1.13% (1.12%) with standard deviation of 0.42%, and minimum and maximum values of 0.05% and 2.39%, respectively. This is similar to the value given by Lin and Zhang (2009). The mean (median) ROE is 17.71% (17.64%).

Regarding ownership structure, the state ownership has a mean of 7.21% with standard deviation of 10.18%, and minimum and maximum of 0% and 39%. In addition, the SOE owners hold an average stake of 25.18% in commercial banks. The domestic private investors and foreign investors hold an average stake of 14.37% and 3.89%. Furthermore, the mean (median) of the ownership type diversity is 1.80 (1.80). The mean (median) of the ownership concentration is 0.21 (0.15), with a small degree of variation across the sample.

With regard to the control variables, the range of capital adequacy ratio is from 5.77% to 30.14%, with an average of 13.19%. This figure is comparable to the figure reported in Dong et al. (2014). The mean (median) NPL is 1.31% (1.03%).

| Table 29: Descriptive statistics for main model variables | | | | | |
|---|---|---|---|---|---|
| **Variable** | **N** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |
| ***Performance variables*** | | | | | |
| **ROA** | 830 | 1.14 | 0.43 | 0.05 | 2.39 |
| **ROE** | 830 | 17.87 | 6.86 | 0.63 | 39.72 |
| ***Ownership variables*** | | | | | |
| **STATE** | 830 | 7.22 | 10.18 | 0.00 | 39.21 |
| **SOE** | 830 | 25.16 | 22.66 | 0.00 | 90.15 |
| **DPO** | 830 | 14.36 | 17.02 | 0.00 | 67.33 |
| **FOR** | 830 | 3.88 | 7.14 | 0.00 | 20.00 |
| **DIV** | 830 | 1.81 | 0.6 | 1.00 | 2.99 |
| **CONC** | 830 | 0.21 | 0.14 | 0.00 | 0.74 |
| **TOP3** | 830 | 0.42 | 0.18 | 0.16 | 0.92 |
| ***Control variables*** | | | | | |
| **LNTA** | 830 | 16.32 | 1.79 | 13.19 | 21.19 |
| **LTD** | 830 | 60.76 | 10.64 | 28.34 | 78.45 |
| **CAR** | 830 | 12.96 | 3.18 | 5.77 | 30.14 |
| **NPL** | 830 | 1.31 | 1.18 | 0.00 | 8.21 |
| **BLO** | 830 | 4.22 | 2.15 | 0.00 | 10.00 |
| **BS** | 830 | 12.88 | 2.94 | 6.00 | 19.00 |
| **IND** | 830 | 3.09 | 1.85 | 0.00 | 7.00 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

The correlation between variables is used to identify whether there is a significant relationship between the ownership type and the performance. Table (30) shows the correlation matrix, which shows the relationship between all pairs of variables in the regression model. The correlation matrix indicates that state ownership (STATE) is not significantly related to the two performance measures: the return on assets (ROA), and the return on equity (ROE).

**Table 30: The matrix of Pearson correlation coefficients**

| | ROA | ROE | STATE | SOE | DPO | FOR | DIV | CONC |
|---|---|---|---|---|---|---|---|---|
| **ROA** | 1.000 | | | | | | | |
| **ROE** | 0.6835* | 1.000 | | | | | | |
| **STATE** | 0.0256 | 0.0367 | 1.000 | | | | | |
| **SOE** | -0.2905* | -0.1922* | -0.1908* | 1.000 | | | | |
| **DPO** | 0.2195* | 0.0971* | -0.0272 | -0.3855* | 1.000 | | | |
| **FOR** | -0.1966* | -0.0261 | -0.1087* | 0.1146* | -0.2816* | 1.000 | | |
| **DIV** | 0.1244* | 0.0911* | 0.4770* | -0.2431* | 0.1090* | 0.2375* | 1.000 | |
| **CONC** | -0.1660* | -0.0835* | 0.0338 | 0.6410* | -0.3978* | 0.0998* | -0.3075* | 1.000 |
| **TOP3** | -0.2134* | -0.1232* | 0.1884* | 0.7436* | -0.2477* | 0.2305* | -0.0646 | 0.7885* |
| **LNTA** | -0.1346* | 0.0655 | -0.0483 | 0.2801* | -0.4228* | 0.3179* | -0.1244* | 0.4500* |
| **LTD** | -0.0336 | -0.0329 | -0.1146* | -0.0133 | -0.0852* | 0.1245* | -0.03 | 0.0147 |
| **CAR** | 0.2160* | -0.1602* | -0.0157 | -0.0022 | 0.1425* | -0.0774* | 0.0736* | -0.0696* |
| **NPL** | -0.3412* | -0.2524* | 0.0850* | 0.0032 | -0.1801* | 0.0313 | -0.0247 | 0.0851* |
| **BLO** | 0.0441 | -0.0186 | 0.0721* | -0.0366 | 0.6979* | -0.0928* | 0.2743* | -0.4306* |
| **BS** | -0.1284* | -0.0382 | -0.1001* | -0.0073 | -0.1839* | 0.2494* | -0.0116 | -0.0137 |
| **IND** | -0.1176* | -0.0385 | -0.0841* | 0.0765* | -0.3162* | 0.2771* | -0.0547 | 0.1768* |

| | TOP3 | LNTA | LTD | CAR | NPL | BLO | BS | IND |
|---|---|---|---|---|---|---|---|---|
| **TOP3** | 1.000 | | | | | | | |
| **LNTA** | 0.3000* | 1.000 | | | | | | |
| **LTD** | -0.0695* | 0.2277* | 1.000 | | | | | |
| **CAR** | -0.0054 | -0.2204* | -0.1305* | 1.000 | | | | |
| **NPL** | 0.0484 | 0.0093 | 0.0849* | -0.2916* | 1.000 | | | |
| **BLO** | -0.2031* | -0.3931* | -0.0780* | 0.1273* | -0.1546* | 1.000 | | |
| **BS** | -0.1124* | 0.5084* | 0.2436* | -0.0911* | -0.0013 | -0.0730* | 1.000 | |
| **IND** | 0.0394 | 0.6735* | 0.2591* | -0.0949* | -0.0629 | -0.2699* | 0.6725* | 1.000 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

SOE ownership (SOE) is significantly negatively related to ROA and ROE. Foreign ownership (FOR) is also significantly negatively related to ROA, but not significantly related to ROE. In addition, private domestic ownership (PDO) is significantly positively related to both ROA and ROE. Furthermore, ownership type diversity (DIV) is significantly positively related to ROA and ROE, and ownership concentration (CONC) is significantly negatively related to both ROA and ROE. Although I observe significant correlation among the measures of performance variables, they are not used in same model. In general, there is no evidence of severe multicollinearity.

# 4.5 Empirical results

## 4.5.1 OLS estimation results

These regressions for the estimations of the relationship between the ownership structure and performance are presented in Table (31).

**Table 31: The relationship between ownership and bank performance (full model) – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROA** | **ROA** | **ROA** | **ROA** | **ROA** |
| STATE | 0.002 | | | | -0.005*** |
| | (0.98) | | | | (-3.00) |
| SOE | | -0.007*** | | | -0.007*** |
| | | (-8.23) | | | (-6.33) |
| DPO | | | 0.007*** | | 0.001 |
| | | | (6.18) | | (-0.28) |
| FOR | | | | -0.011*** | -0.011*** |
| | | | | (-5.53) | (-5.25) |
| DIV | 0.058** | 0.047** | 0.092*** | 0.112*** | 0.131*** |
| | (2.11) | (2.06) | (3.91) | (4.57) | (4.59) |
| CONC | -0.434*** | -0.384** | -0.339*** | -0.406*** | -0.509*** |
| | (-3.26) | (-2.41) | (-2.61) | (-3.13) | (-2.76) |
| LNTA | -0.003 | 0.004 | 0.003 | 0.009 | 0.016 |
| | (-0.27) | -0.3 | -0.28 | -0.73 | -1.32 |
| LTD | 0.002* | 0.002 | 0.002 | 0.002* | 0.002 |
| | (1.70) | (1.54) | (1.48) | (1.85) | (1.39) |
| CAR | 0.014*** | 0.016*** | 0.014*** | 0.014*** | 0.015*** |
| | (3.09) | (3.50) | (3.04) | (3.09) | (3.42) |
| NPL | -0.131*** | -0.133*** | -0.120*** | -0.126*** | -0.125*** |
| | (-9.86) | (-10.42) | (-9.19) | (-9.67) | (-9.79) |
| BLO | -0.021*** | 0.003 | -0.056*** | -0.024*** | 0.004 |
| | (-2.69) | -0.37 | (-5.87) | (-3.07) | -0.3 |
| BS | -0.012* | -0.012** | -0.01 | -0.01 | -0.011* |
| | (-1.89) | (-1.99) | (-1.51) | (-1.60) | (-1.82) |
| IND | -0.015 | -0.017 | -0.013 | -0.014 | -0.016 |
| | (-1.29) | (-1.50) | (-1.15) | (-1.21) | (-1.48) |
| Constant | 1.303*** | 1.121*** | 1.144*** | 1.022*** | 0.834*** |
| | (6.00) | (5.34) | (5.35) | (4.66) | (3.92) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 18.225 | 26.377 | 22.77 | 21.843 | 23.426 |
| R | 0.182 | 0.244 | 0.218 | 0.211 | 0.272 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

There is a significant relationship between performance and the different types of ownership. I present the full model by adding all control variables as Equation (12), while the table also presents the results for individual type shareholders from column (1) to (4). Again, the signs of the coefficients on STATE, SOE, DPO and FOR are relatively consistent with regression results in previous specifications. The coefficient for STATE is negative and significant at the 1% level in column (5), instead of column (1) of Table (31). In addition, the coefficients for SOE are negative and significant at the 1% level in both column (2) and column (5) of Table (31). Moreover, the coefficient for DPO is positive and significant at the 1% level in column (3) of Table (31). However, for column (5) of Table (31), this result breaks down. It is still positive, yet no longer significant. Furthermore, the coefficients for FOR are negative and significant at the 1% level in both column (4) and column (5) of Table (31).

First, this result indicates that state shareholders may not create enough of an incentive-based environment for managers that is conducive to knowledge transfer for enhancing performance. These results are in line with Altunbas et al. (2001) and Micco et al. (2007), who find no evidence that state-owned banks are less profitable than private banks. In addition, this result further extends the findings of Fu and Heffernan (2009), who investigate the relationship between market structure and performance in China's banking system from 1985 to 2002, and find no evidence to support the quiet-life hypothesis in state-owned banks. The influence of government ownership on bank performance is especially complex, as governments impose non-profit-maximising social and political objectives, yet also provide implicit guarantees against default. Moreover, this evidence also can be explained by the fact that state-owned banks do not enjoy monopoly profits, probably because of strict interest rate controls.

Second, the result is not surprising as in many cases SOE shareholders tend to satisfy their personal interests instead of aligning their interests with that of the bank. Thus, agency problems could be a source of negative performance, and this explains why external pressures, which influence the efforts of management, may fail to coerce

maximum effort from managers. In highly competitive markets, external pressures are expected to strengthen management's incentive to operate efficiently. In addition, increased SOE shareholding may encourage a lack of discipline and greater risk-taking behaviour. The notion of economically efficient SOE-owned banks is contentious and revolves around alternative views of government benevolence. Hypothesis (2) is fully confirmed by these results: banks with high SOE ownership are associated with worse performance.

Third, the result indicates that banks with more private domestic shareholders perform better. The finding is consistent with the literature; for example, following the studies of Williams and Nguyen (2005). Domestic private owners might require that management implement certain operational strategies in order to achieve their returns. This, in turn, results in better performance. In addition, this result can be explained by the findings of Jiang et al. (2013), who claim that bank performance is improved after privatisation, with respect to revenue inflow and efficiency. Domestic shareholders in the bank's control chain are an advantageous source of skills and expertise that can help banks with activity diversification (Saghi-Zedek, 2016). Moreover, Altunbas et al. (2001) also conclude that privately owned banks are more efficient than their counterparts. Indeed, private domestic ownership is expected to reduce agency problems, thereby promoting profitability because these shareholders exercise due diligence and monitor managers efficiently. Shaban and James (2017) find that domestic investors tend to select the best performing banks. Hence, the results confirm Hypothesis (3).

Fourth, this result is in line with the findings of Lensink et al. (2008), who also find that foreign ownership negatively affects bank performance. In addition, this result can be interpreted in that foreign owners may find it more difficult than domestic owners to deal with a host country's regulations or related banking supervision requirements. Indeed, foreign shareholders may face strong domestic networks and may also encourage managers to increase shareholder returns through greater risk-taking (Garcia-Meca et al., 2015). Consistent with the findings of Lee and Hsieh (2014), they

find that the home field advantage hypothesis is in existence. The results confirm Hypothesis (4).

However, these results are contrast with the findings of Berger et al., (2005) who state that foreign ownership helps mitigate loss of profit or increase in costs from diversification. Jiang et al., (2013) also find that a high level of cost efficiency is associated with more shares of foreign ownership. Micco et al. (2007) also offer evidence that foreign ownership improves a bank's performance through profit increases and cost downs.

More generally, firms with few large, undiversified shareholders, such as founding owners, may forgo maximum profits because they are unable to separate their financial preferences from those of outside or minority shareholders. Founding owners often limit executive management positions to the members who may have relation. These suggest restricted human resourcees from which to obtain qualified and capable talent, potentially leading to competitive disadvantages in relation to other firms.

The results can be explained by the views regarding the expropriation of minority shareholders in banks, which is contrast with the findings of Caprio et al. (2007). Although the dispersed owners lack both the means and the motive to address managerial agency problems, the incentives of the controlling shareholders are more likely to expropriate resources from the corporation. This situation is generally known as 'tunneling', and is commonly defined as 'the transfer of assets and revenues out of firms for the benefit of their controlling shareholders'.

A stream of corporate governance research indicates the attempts of large shareholders to expropriate smaller shareholders. Fama and Jensen (1983) claim that combining ownership and control allows concentrated shareholders to exchange profit for private rent. Shleifer and Vishny (1997) suggest that large premiums associated with superior voting shares or control rights provide incentives, and that larger shareholders seek to

extract private benefits from the firm. Indeed, higher ownership concentration may increase the power for shareholders to monitor management, but it may also increase the risk for the abuse of power by large controlling shareholders.

The political view claims that government control of financial institutions politicises resource allocation for the sake of advancing certain political agendas and, by pursuing such objectives, economic efficiency is impaired (Shleifer and Vishny, 1997). In other words, state ownership of commercial banks is used to assist national economic development policies. In fact, political views should not be seen as corner solutions without any intermediate possibility; it is possible that state-owned banks are mandated to engage with some political lending. In addition, the state shareholders may act as both owner and regulator of state-owned banks. As a consequence, some banks might be either too-big-to-fail or too-important-to-fail, which would allow worse performing banks to survive. This view can be support by the findings of Faccio et al. (2006), who find that politically connected firms are significantly more likely to be bailed out than similar non-connected firms. Furthermore, the free-rider problem becomes obvious in government-owned banks. State ownership means that every citizen is a shareholder, which suggests that shareholders may have no power or incentive to monitor the managers. Indeed, the inferior performance of state-owned banks may due to the perverse incentives of political bureaucrats who influence the operation of state-owned banks. My findings provide further support for the political view of public banks and corroborate previous findings by Micco et al. (2007), who find that state-owned banks tend to have lower profitability and higher costs than their private counterparts in developing countries.

Regarding the control variables in the efficiency equation, it appears that most variables are in line with expectations. The coefficients on the majority control variables are significant, except for that of LNTA and IND. The coefficients of loan to deposit ratio (LTD) have a statistically significant and positive effect on performance in column (1) and (4) of Table (34), which suggests that banks with more loans are likely to associate

with higher returns for the shareholders. The result is in line with the findings of Jiang et al. (2013). In addition, the coefficients of the non-performing loan ratio (NPL) have a statistically significant and negative effect on performance in column (1) and (4) of Table (34), which suggests that banks with lower non-performing loans perform better and are more profitable. Furthermore, consistent with the findings of Liang et al. (2013), board size has a significantly negative impact on bank performance.

The coefficients of bank sizes (LNTA) have no statistical significance. This result is consistent with the findings of Micco et al. (2007), who state that there is no correlation between absolute bank size and ROA for banks located in developing countries.

Adding these control variables greatly increases the explanatory power of the model, but leaves the significance levels and relative magnitudes of the various ownership coefficients unchanged. Although the control variables together explain the different types of owners' share of the total variation in performance across banks, marginal changes in diversity and concentration are still statistically significant. The R2 values increase significantly after control variables are added in the estimations (e.g. R2 increases from 18.2% in Column 1 to 27.2% in Column 5), meaning that these control variables are reasonable explanatory factors determining bank performance.

### 4.5.2 Fixed effect estimation

In Table (32), the results still clearly suggest that bank ownership matters. In both column (1) and (5), the coefficient on STATE is negative and significant at 10% and 5%. The results confirm the previous findings that banks with more percentage shareholding by government are associated with lower profitability. In addition, the coefficient on DPO is positive and significant at 5% and 10% on column (3) and (5), respectively. The results confirm the previous findings that banks with more shares holding by domestic provide investors are associated with better performing. Moreover, the coefficient on DIV is positive and significant at 1% on all five columns.

**Table 32: The relationship between ownership and bank performance (without control variables) – Fixed effect**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROA** | **ROA** | **ROA** | **ROA** | **ROA** |
| STATE | -0.006* | | | | -0.007** |
| | (-1.75) | | | | (-2.00) |
| SOE | | -0.001 | | | -0.002 |
| | | (-0.97) | | | (-1.25) |
| DPO | | | 0.004** | | 0.003* |
| | | | (2.18) | | (1.71) |
| FOR | | | | 0.000 | 0.000 |
| | | | | (0.12) | (0.04) |
| DIV | 0.209*** | 0.204*** | 0.193*** | 0.198*** | 0.213*** |
| | (4.91) | (4.78) | (4.57) | (4.56) | (4.77) |
| CONC | 0.021 | -0.08 | -0.076 | -0.151 | 0.236 |
| | (0.08) | (-0.30) | (-0.29) | (-0.58) | (0.78) |
| Constant | 0.793*** | 0.818*** | 0.747*** | 0.805*** | 0.759*** |
| | (8.00) | (8.19) | (7.30) | (8.11) | (7.28) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 8.84 | 8.101 | 9.411 | 7.784 | 5.433 |
| R | 0.036 | 0.033 | 0.039 | 0.032 | 0.045 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

The results of Table (33) indicate that controlling for these other bank-specific characteristics does not change previous findings. In particular, NPL enters negatively and significantly, as expected.

**Table 33: The relationship between ownership and bank performance (full model) – Fixed effect**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROA** | **ROA** | **ROA** | **ROA** | **ROA** |
| STATE | 0.003 | | | | -0.001 |
| | (0.90) | | | | (-0.15) |
| SOE | | -0.004*** | | | -0.004** |
| | | (-2.86) | | | (-2.12) |
| DPO | | | 0.003* | | 0.00 |
| | | | (1.71) | | (0.01) |
| FOR | | | | -0.001 | -0.002 |
| | | | | (-0.30) | (-0.43) |
| DIV | 0.172*** | 0.183*** | 0.184*** | 0.181*** | 0.188*** |
| | (4.25) | (4.61) | (4.61) | (4.42) | (4.49) |
| CONC | -0.129 | 0.243 | -0.083 | -0.061 | 0.251 |
| | (-0.48) | (0.90) | (-0.33) | (-0.24) | (0.75) |
| LNTA | 0.024 | 0.021 | 0.019 | 0.018 | 0.02 |
| | (1.25) | (1.16) | (1.06) | (0.99) | (1.01) |
| LTD | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 |
| | (-0.85) | (-0.71) | (-0.78) | (-0.82) | (-0.69) |
| CAR | 0.005 | 0.006 | 0.005 | 0.005 | 0.006 |
| | (1.38) | (1.45) | (1.33) | (1.30) | (1.43) |
| NPL | -0.114*** | -0.115*** | -0.112*** | -0.113*** | -0.115*** |
| | (-10.02) | (-10.19) | (-9.92) | (-9.96) | (-10.10) |
| BLO | 0.016 | 0.025** | -0.001 | 0.015 | 0.024 |
| | (1.51) | (2.21) | (-0.08) | (1.41) | (1.31) |
| BS | -0.002 | -0.001 | -0.001 | -0.002 | -0.001 |
| | (-0.20) | (-0.11) | (-0.13) | (-0.29) | (-0.11) |
| IND | -0.001 | 0.000 | 0.001 | -0.001 | 0.000 |
| | (-0.10) | (0.02) | (0.06) | (-0.07) | (-0.02) |
| Constant | 0.54 | 0.552 | 0.615* | 0.650* | 0.581 |
| | (1.41) | (1.51) | (1.68) | (1.77) | (1.51) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 16.917 | 17.836 | 17.182 | 16.828 | 13.68 |
| R | 0.197 | 0.205 | 0.199 | 0.196 | 0.206 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

### *4.5.3 Interacting different types of owners with ownership type diversity and concentration*

Table (34) reports the results of Equation (14) that examines how the different types of owners in banks' performance behaviours are conditional on ownership type diversity and concentration. In other words, the marginal effect of percentage of shareholding by different owners may depend on the ownership type diversity and the level of ownership concentration.

In column (1) of Table (34), the coefficient on the interaction between STATE and DIV is not significantly affected. However, CONC is negative and significant at 5%, while the interaction term STATE and CONC enters negatively and significantly at 1%. The result can be explained by the fact that the negative impact of STATE shareholders on bank performance is pronounced among banks with concentrated ownership.

In column (2) of Table (34), the coefficient on the interaction between SOE and DIV is positive and significant at 5%, while the interaction term SOE and CONC enters also positively and significantly. The results suggest that the negative impact of SOE shareholders on bank performance is reduced on banks with ownership type diversity and concentrated ownership.

In column (4) of Table (34), the coefficient on the interaction between FOR and CONC is positive and significant at 1%, while the coefficient of interaction between FOR and DIV is not significantly affected. The result indicates that that FOR and CONC reduce bank performance, but the marginal effect of each diminishes as the other increases. In other words, the results suggest that the negative impact of FOR shareholders on bank performance is reduced in banks with concentrated ownership.

**Table 34: The relationship between ownership and bank performance (interaction without control variables)**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROA** | **ROA** | **ROA** | **ROA** | **ROA** |
| DIV | 0.034 | -0.000 | 0.027 | 0.108*** | 0.048 |
| | (0.89) | (-0.00) | (0.77) | (3.82) | (0.70) |
| CONC | -0.265** | -0.757*** | -0.154 | -0.482*** | 0.544 |
| | (-2.20) | (-2.73) | (-1.27) | (-3.98) | (1.24) |
| STATE | 0.007 | | | | -0.003 |
| | (1.10) | | | | (-0.45) |
| STATE * DIV | 0.001 | | | | 0.001 |
| | (0.44) | | | | (0.54) |
| STATE * CONC | -0.035*** | | | | -0.025** |
| | (-3.59) | | | | (-2.28) |
| SOE | | -0.015*** | | | -0.013*** |
| | | (-4.57) | | | (-3.59) |
| SOE * DIV | | 0.004** | | | 0.004** |
| | | (2.10) | | | (2.26) |
| SOE * CONC | | 0.018*** | | | 0.002 |
| | | (3.93) | | | (0.39) |
| DPO | | | 0.001 | | 0.000 |
| | | | -0.21 | | (-0.11) |
| DPO * DIV | | | 0.002 | | 0.002 |
| | | | (1.39) | | (1.01) |
| SOE * CONC | | | 0.004 | | -0.008 |
| | | | (0.20) | | (-0.41) |
| FOR | | | | -0.025*** | -0.007 |
| | | | | (-2.84) | (-0.75) |
| FOR * DIV | | | | -0.001 | -0.005 |
| | | | | (-0.41) | (-1.54) |
| FOR * CONC | | | | 0.069*** | 0.024 |
| | | | | (3.53) | (1.14) |
| Constant | 1.111*** | 1.387*** | 1.030*** | 1.087*** | 1.127*** |
| | (14.71) | (16.25) | (13.45) | (17.11) | (7.70) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 8.135 | 18.742 | 12.354 | 16.58 | 11.637 |
| R | 0.047 | 0.102 | 0.069 | 0.091 | 0.166 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

The results in column (5) of Table (34) indicate that the inclusion of all variables does not change previous findings. For example, the coefficient on interaction term STATE and CONC is still negative and significant at 1%. The coefficients on interaction term SOE and DIV is positive and significant.

Perhaps as a result of so many inconsistencies, previous researchers have typically pointed out that the fragile relationship between ownership and performance may be explained in terms of certain 'conditional factors'. To determine which variable affects the relationship between ownership and performance, and whether these factors enhance or weaken this relationship, I further adopt Equation (14) to investigate the interaction effects of the variables for different types of ownership, ownership diversity, and concentration on bank performance on Table (35).

In particular, ownership type diversity continues to have a consistently positive effect on bank performance (Column 4 of Table 38), and ownership concentration has a consistently negative effect on bank performance (columns 1, 3 and 4 of Table 35).

Table (35) results indicate that controlling for these other bank-specific characteristics does not change the findings. In addition, these control variables enter significantly, as expected, but this does not affect the chapter's core results on the impact of ownership structure on bank performance.

The other control variable, for example, the effects of capital adequacy ratio, non-performing loan, and board size on bank performance, are all significantly negative, meaning bank profitability will drop. More specifically, the coefficients on CAR are still positive and significant at 1% in all specifications, while the coefficients on NPL are still negative and significant at 1%.

**Table 35: The relationship between ownership and bank performance (interaction with control variables)**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROA** | **ROA** | **ROA** | **ROA** | **ROA** |
| DIV | 0.025 | -0.004 | 0.054 | 0.122*** | 0.025 |
| | (0.70) | (-0.11) | (1.61) | (4.57) | (0.39) |
| CONC | -0.418*** | 0.034 | -0.374*** | -0.639*** | 0.561 |
| | (-3.06) | (0.11) | (-2.78) | (-4.68) | (1.30) |
| STATE | 0.001 | | | | -0.009 |
| | (0.11) | | | | (-1.54) |
| STATE * DIV | 0.003 | | | | 0.003 |
| | (1.13) | | | | (1.20) |
| STATE * CONC | -0.020** | | | | -0.009 |
| | (-2.01) | | | | (-0.81) |
| SOE | | -0.013*** | | | -0.014*** |
| | | (-4.26) | | | (-3.87) |
| SOE * DIV | | 0.003** | | | 0.004** |
| | | (2.06) | | | -2.36 |
| SOE * CONC | | 0.008* | | | 0.000 |
| | | (1.67) | | | (0.00) |
| DPO | | | 0.005 | | -0.003 |
| | | | (1.40) | | (-0.62) |
| DPO * DIV | | | 0.003* | | 0.003 |
| | | | (1.89) | | (1.43) |
| SOE * CONC | | | -0.021 | | -0.012 |
| | | | (-1.13) | | (-0.57) |
| FOR | | | | -0.024*** | -0.003 |
| | | | | (-2.89) | (-0.35) |
| FOR * DIV | | | | -0.003 | -0.008** |
| | | | | (-0.97) | (-2.46) |
| FOR * CONC | | | | 0.088*** | 0.039** |
| | | | | (4.73) | (1.97) |
| LNTA | 0.003 | 0.004 | 0.005 | 0.001 | 0.013 |
| | (0.21) | (0.33) | (0.42) | (0.09) | (1.04) |
| LTD | 0.002* | 0.002 | 0.002 | 0.002 | 0.001 |
| | (1.65) | (1.39) | (1.35) | (1.43) | (0.57) |
| CAR | 0.015*** | 0.014*** | 0.014*** | 0.012*** | 0.013*** |
| | (3.26) | (3.17) | (2.99) | (2.73) | (2.94) |
| NPL | -0.126*** | -0.134*** | -0.117*** | -0.133*** | -0.131*** |
| | (-9.27) | (-10.34) | (-8.91) | (-10.30) | (-10.01) |
| BLO | -0.023*** | -0.001 | -0.063*** | -0.028*** | -0.004 |
| | (-2.94) | (-0.08) | (-6.18) | (-3.57) | (-0.29) |
| BS | -0.013** | -0.011* | -0.012* | -0.012* | -0.014** |
| | (-1.97) | (-1.79) | (-1.89) | (-1.96) | (-2.22) |
| IND | -0.019 | -0.017 | -0.011 | -0.011 | -0.014 |
| | (-1.57) | (-1.47) | (-0.91) | (-0.94) | (-1.21) |
| Constant | 1.261*** | 1.281*** | 1.231*** | 1.276*** | 1.191*** |
| | -5.66 | -5.75 | -5.63 | -5.72 | -4.74 |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 15.685 | 22.481 | 19.424 | 20.937 | 16.288 |
| R | 0.187 | 0.248 | 0.222 | 0.235 | 0.297 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three

shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

Some prior research has concluded that there are nonlinear relationships between ownership concentration and bank performance. To test this on our data, I add squared terms for each of the ownership variables (e.g. STATE, SOE, DPO and FOR). However, the model specifications are rather weak when the squared terms are included, and so the results are not tabulated in this chapter. The evidence for a non-linear effect is weak.

## 4.6 Robustness test

Next, I replicated my main regressions using alternative bank performance measures to examine whether my previous results would be affected by measurement errors. These regression estimates of the relationship between ownership structures and performance are shown in the Tables. In the majority of the estimations of this section, I still found that there was a significant relationship between bank performance and the different types of owners.

### 4.6.1 Alternative bank performance

Table (36) presents the regression results when return on equity (ROE) is used as the dependent variable. The results imply that the significantly positive relationship between ownership type diversity and performance remains obvious.

**Table 36: The relationship between ownership and alternative bank performance (only individual type ownership) – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROE** | **ROE** | **ROE** | **ROE** | **ROE** |
| STATE | 0.025 | | | | 0.001 |
| | (1.07) | | | | (0.05) |
| SOE | | -0.058*** | | | -0.055*** |
| | | (-5.68) | | | (-4.79) |
| DPO | | | 0.039*** | | 0.01 |
| | | | (2.83) | | (0.65) |
| FOR | | | | -0.025 | 0.002 |
| | | | | (-0.76) | (0.06) |
| Constant | 17.693*** | 19.351*** | 17.304*** | 17.971*** | 19.108*** |
| | (60.94) | (55.56) | (55.98) | (66.77) | (32.06) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 1.137 | 32.314 | 8.02 | 0.573 | 8.166 |
| R | 0.001 | 0.037 | 0.009 | 0.001 | 0.037 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

Using alternative bank performance ROE in Table (37), I re-estimate the baseline model without including control variables, and find that the results are similar to the benchmark regression in Table (31). The results suggest that the significantly positive relationship between ownership type diversity and performance remains in most specifications.

**Table 37: The relationship between ownership and alternative bank performance (without control variables) – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROE** | **ROE** | **ROE** | **ROE** | **ROE** |
| STATE | 0.011 | | | | -0.03 |
| | (0.42) | | | | (-1.02) |
| SOE | | -0.066*** | | | -0.065*** |
| | | (-4.98) | | | (-4.61) |
| DPO | | | 0.040*** | | 0.022 |
| | | | (2.64) | | (1.36) |
| FOR | | | | -0.033 | -0.017 |
| | | | | (-0.98) | (-0.45) |
| DIV | 0.757 | 0.728* | 0.888** | 0.972** | 1.072** |
| | (1.60) | (1.81) | (2.19) | (2.29) | (2.09) |
| CONC | -2.559 | -4.070* | -0.264 | -2.106 | -5.791** |
| | (-1.42) | (-1.87) | (-0.14) | (-1.18) | (-2.44) |
| Constant | 16.868*** | 17.275*** | 15.638*** | 16.597*** | 16.245*** |
| | (16.85) | (18.30) | (15.10) | (17.25) | (15.06) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 3.005 | 11.288 | 5.299 | 3.267 | 6.299 |
| R | 0.011 | 0.039 | 0.019 | 0.012 | 0.044 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

After including control variables in Table (38), I still find similar impacts of state, SOE, domestic private and foreign ownership on bank performance, as well as the measure of ownership type diversity and concentration. Specifically, ownership type diversity has a significantly positive effect on bank performance, while ownership concentration has a consistently negative effect on bank performance. The coefficient estimate for CAR is negative and significant in all columns of Table (38). This result suggests that well capitalised banks are relatively more profit efficient than poorly capitalised banks. This is in line with the conventional view of capital playing a role of implicit deposit insurance, which improves depositor confidence and attracts more deposits, thus improving bank profits. Our results are broadly consistent with the findings of Garcia-Herrero et al. (2009) and Barth et al. (2013b), who all find that well capitalised banks have higher levels of efficiency.

**Table 38: The relationship between ownership and alternative bank performance (full model) – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROE** | **ROE** | **ROE** | **ROE** | **ROE** |
| STATE | 0.024 | | | | -0.026 |
| | (0.93) | | | | (-0.89) |
| SOE | | -0.075*** | | | -0.071*** |
| | | (-5.65) | | | (-3.79) |
| DPO | | | 0.079*** | | 0.014 |
| | | | (4.28) | | (0.55) |
| FOR | | | | -0.057* | -0.039 |
| | | | | (-1.67) | (-1.06) |
| DIV | 0.913** | 0.846** | 1.351*** | 1.322*** | 1.267*** |
| | (2.04) | (2.22) | (3.51) | (3.28) | (2.64) |
| CONC | -6.089*** | 3.304 | -4.922** | -5.745*** | 3.342 |
| | (-2.82) | (1.25) | (-2.31) | (-2.69) | (1.08) |
| LNTA | 0.672*** | 0.751*** | 0.750*** | 0.733*** | 0.802*** |
| | (3.30) | (3.75) | (3.71) | (3.55) | (3.93) |
| LTD | -0.011 | -0.016 | -0.016 | -0.012 | -0.017 |
| | (-0.53) | (-0.73) | (-0.75) | (-0.57) | (-0.81) |
| CAR | -0.532*** | -0.519*** | -0.539*** | -0.536*** | -0.524*** |
| | (-7.05) | (-7.00) | (-7.23) | (-7.11) | (-7.06) |
| NPL | -1.967*** | -1.977*** | -1.832*** | -1.926*** | -1.919*** |
| | (-9.11) | (-9.37) | (-8.55) | (-8.96) | (-8.93) |
| BLO | -0.199 | 0.078 | -0.598*** | -0.213* | -0.017 |
| | (-1.54) | (0.57) | (-3.79) | (-1.65) | (-0.08) |
| BS | -0.109 | -0.111 | -0.08 | -0.102 | -0.103 |
| | (-1.03) | (-1.08) | (-0.76) | (-0.96) | (-0.99) |
| IND | -0.500*** | -0.522*** | -0.479** | -0.496*** | -0.515*** |
| | (-2.62) | (-2.78) | (-2.53) | (-2.60) | (-2.74) |
| Constant | 20.217*** | 18.136*** | 18.395*** | 18.796*** | 16.950*** |
| | (5.74) | (5.21) | (5.24) | (5.20) | (4.73) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 15.216 | 18.897 | 17.287 | 15.444 | 14.727 |
| R | 0.157 | 0.187 | 0.174 | 0.159 | 0.190 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

Total asset (LNTA) is positively correlated with return on equity at 1% significance level in all specifications in Table (38). It suggests that banks with larger assets are likely to be more profit-efficient than their counterparts. This might be the case if the banks were to take advantage of economies of scale (Dietrich and Wanzenried, 2011).

As our sample represents all the top banks in each market, these banks are likely to be viewed as too-big-to-fail and therefore enjoy better credibility than other small competitors. Additionally, large sized banks are likely to be more diversified. Indeed, more diversification would allow for the maintenance or enhancement of performance, while lowering risk. Other banking literatures, such as Peni and Vahamaa (2012), Fu et al. (2014) and Goddard et al. (2004), also find that very large banks tend to be more profitable in industrial countries.

### 4.6.2 Alternative bank concentration

In Table (39), the ownership concentration is replaced by the cumulative top three (TOP3) shareholding as one of the robustness tests.

**Table 39: The relationship between alternative ownership concentration and bank performance (without control variables) – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROA** | **ROA** | **ROA** | **ROA** | **ROA** |
| STATE | 0.001 | | | | -0.009*** |
| | (0.81) | | | | (-4.24) |
| SOE | | -0.005*** | | | -0.008*** |
| | | (-5.20) | | | (-6.03) |
| DPO | | | 0.005*** | | 0.000 |
| | | | (5.42) | | (0.29) |
| FOR | | | | -0.012*** | -0.016*** |
| | | | | (-5.66) | (-6.41) |
| DIV | 0.069** | 0.043* | 0.068*** | 0.115*** | 0.148*** |
| | (2.50) | (1.75) | (2.89) | (4.76) | (4.91) |
| TOP3 | -0.478*** | 0.005 | -0.348*** | -0.344*** | -0.531*** |
| | (-5.73) | (0.04) | (-4.24) | (-4.20) | (-3.38) |
| Constant | 1.199*** | 1.183*** | 1.088*** | 1.116*** | 0.969*** |
| | (19.36) | (20.65) | (18.2) | (19.15) | (15.08) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 15.623 | 24.893 | 25.741 | 26.655 | 23.052 |
| R | 0.054 | 0.083 | 0.085 | 0.088 | 0.143 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

In Table (40), after including control variables, I find similar impacts of state, SOE, domestic private and foreign ownership on bank performance, as well as ownership type diversity and concentration variables.

**Table 40: The relationship between alternative ownership concentration and bank performance (full model) – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROA** | **ROA** | **ROA** | **ROA** | **ROA** |
| STATE | -0.003* | | | | -0.009*** |
| | (-1.84) | | | | (-3.26) |
| SOE | | -0.005*** | | | -0.010*** |
| | | (-5.57) | | | (-4.51) |
| DPO | | | 0.006*** | | -0.004 |
| | | | (5.80) | | (-1.51) |
| FOR | | | | -0.009*** | -0.016*** |
| | | | | (-4.40) | (-5.25) |
| DIV | 0.065** | 0.044* | 0.105*** | 0.121*** | 0.126*** |
| | (2.49) | (1.84) | (4.66) | (5.12) | (4.44) |
| TOP3 | -0.563*** | -0.036 | -0.471*** | -0.453*** | -0.656** |
| | (-6.56) | (-0.30) | (-5.67) | (-5.34) | (-2.55) |
| LNTA | 0.007 | 0.013 | 0.013 | 0.013 | 0.025** |
| | (0.60) | (1.06) | (1.10) | (1.11) | (2.08) |
| LTD | 0.002 | 0.002 | 0.001 | 0.002 | 0.002* |
| | (1.34) | (1.45) | (1.08) | (1.44) | (1.67) |
| CAR | 0.016*** | 0.016*** | 0.015*** | 0.015*** | 0.015*** |
| | (3.52) | (3.67) | (3.41) | (3.36) | (3.48) |
| NPL | -0.132*** | -0.130*** | -0.120*** | -0.126*** | -0.123*** |
| | (-10.06) | (-10.14) | (-9.27) | (-9.79) | (-9.65) |
| BLO | -0.017** | -0.007 | -0.051*** | -0.019*** | 0.017 |
| | (-2.26) | (-0.90) | (-5.48) | (-2.60) | -0.99 |
| BS | -0.017*** | -0.015** | -0.014** | -0.014** | -0.011* |
| | (-2.63) | (-2.45) | (-2.25) | (-2.21) | (-1.77) |
| IND | -0.018 | -0.019 | -0.016 | -0.016 | -0.017 |
| | (-1.56) | (-1.63) | (-1.42) | (-1.42) | (-1.54) |
| Constant | 1.308*** | 1.118*** | 1.153*** | 1.086*** | 0.629*** |
| | (6.13) | (5.26) | (5.46) | (5.00) | (2.75) |
| Observation | 830 | 830 | 830 | 830 | 830 |
| F test | 22.003 | 25.489 | 25.824 | 24.026 | 23.173 |
| R | 0.212 | 0.238 | 0.24 | 0.227 | 0.27 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

### 4.6.3 System GMM estimation

**Table 41: The relationship between ownership and bank performance (full model) – GMM**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | **ROA** | **ROA** | **ROA** | **ROA** | **ROA** |
| Lag.ROA | 0.392*** | 0.371*** | 0.355*** | 0.368*** | 0.379*** |
| | (12.34) | (12.28) | (10.68) | (11.00) | (11.94) |
| STATE | 0.002** | | | | 0.001 |
| | (2.54) | | | | (0.81) |
| SOE | | -0.004*** | | | -0.003*** |
| | | (-6.39) | | | (-3.12) |
| DPO | | | 0.005*** | | 0.002 |
| | | | (5.93) | | (1.58) |
| FOR | | | | -0.005*** | -0.003* |
| | | | | (-4.55) | (-1.93) |
| DIV | 0.042** | 0.058*** | 0.096*** | 0.097*** | 0.064*** |
| | (2.17) | (3.18) | (4.71) | (5.18) | (3.02) |
| CONC | -0.132* | -0.427*** | -0.08 | -0.128 | -0.238* |
| | (-1.67) | (-3.89) | (-1.02) | (-1.65) | (-1.79) |
| LNTA | -0.004 | -0.004 | 0.000 | 0.005 | 0.000 |
| | (-0.62) | (-0.51) | (0.06) | (0.79) | (0.010) |
| LTD | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 |
| | (-0.30) | (-1.11) | (-1.16) | (-0.07) | (-0.89) |
| CAR | 0.034*** | 0.035*** | 0.033*** | 0.034*** | 0.034*** |
| | (9.36) | (9.28) | (8.55) | (9.47) | (8.89) |
| NPL | -0.102*** | -0.101*** | -0.103*** | -0.103*** | -0.100*** |
| | (-11.20) | (-12.33) | (-9.45) | (-11.43) | (-8.89) |
| BLO | -0.028*** | -0.013* | -0.056*** | -0.033*** | -0.029*** |
| | (-4.34) | (-1.91) | (-8.53) | (-5.31) | (-2.72) |
| BS | 0.015*** | 0.018*** | 0.018*** | 0.016*** | 0.018*** |
| | (3.72) | (3.42) | (4.45) | (3.90) | (4.27) |
| IND | -0.033*** | -0.033*** | -0.034*** | -0.036*** | -0.034*** |
| | (-4.10) | (-4.36) | (-4.79) | (-4.76) | (-4.82) |
| Constant | 0.419** | 0.337** | 0.387** | 0.242 | 0.308* |
| | (2.47) | (2.21) | (2.21) | (1.37) | (1.87) |
| Observation | 691 | 691 | 691 | 691 | 691 |
| F test | 138.797 | 129.139 | 555.814 | 125.463 | 230.406 |
| AR1 | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 |
| AR2 | 0.852 | 0.944 | 0.872 | 0.833 | 0.872 |
| Hansen | 0.150 | 0.206 | 0.187 | 0.158 | 0.195 |

Note: ROA is ratio of profit to the book value of total assets. ROE is ratio of profit to the book value of total equity. STATE is the percentage of equity shares held by government owners. SOE is the percentage of equity shares held by state-owned enterprises (SOE) owners. DPO is the percentage of equity shares held by domestic private owners. FOR is the percentage of equity shares held by foreign owners. DIV is the diversification for ownership type diversity and calculated from Equation 2. CONC is the sum of the squared ownership shares held by top ten largest shareholders. TOP3 is the total percentage of equity shares owned by the largest three shareholders. LNTA is the natural logarithm for the amount of total assets in thousands of Chinese Yuan. LTD is the ratio of total loans to total deposit. CAR is risk-weighted capital adequacy ratio. NPL is the ratio of the amount of non-performing loans over the amount of total loans. BLO is the number of block shareholders. BS is the number of board members. IND is the total number of independent members on the board.

System GMM estimator is employed as another robustness test. This methodology

controls for potential endogeneity, unobserved heterogeneity, and the persistence of the dependent variable measuring bank performance. This methodology also yields consistent results. For instance, a higher shareholding from domestic private owners is found to be significant in increasing bank performance in the column (3) specification. Additionally, more diversity of ownership structure is positive with bank performance in all specifications.

Using different model specifications and alternative performance indicators, the robustness checks suggest that the above relationships are consistent. In summary, the empirical results of the robustness tests indicate that bank ownership structure is not influenced by bank performance, and reverse causality does not appear to be a problem for my study. Thus, my results provide new perspectives on the impact of governance mechanisms on bank performance.

## 4.7 Conclusion

Ownership structure is widely recognised in financial studies as an instrumental determinant of firm performance. This chapter has provided empirical evidence in support of the typical hypothesis that bank ownership governance is an important determinant of performance. Specifically, this chapter examines how ownership type and distribution in a country's banking system affect bank performance.

This chapter compares all foreign-owned banks, private domestic, and government-owned banks to assess the impact of ownership on performance in an emerging market. The main findings regarding the static effects of bank ownership on performance suggest that banks with more state shareholders tend to have poorer long-term performance, consistent with much of the literature. The result can be explained by greater government involvement and political corruption in the banking system. In addition, banks with higher private shareholders generally operate more profitably. Furthermore, higher foreign ownership may negatively affect bank

performance. Moreover, ownership type diversity is associated with better bank performance, while banks with concentrated ownership are worse performing. I check the robustness of the results by using different model specifications and ownership indicators.

I believe that my findings contribute to a better understanding of how ownership structure influences the efficient operation of Chinese banks. However, many questions pertaining to the impact of well-developed governance on the performance of banks have yet to be answered. A drawback of the analysis presented in this chapter is that it only examines the extent to which ownership structure influences bank performance, or, in other words, to what extent governance explains the gap from the accounting ratio. However, it may also be possible that ownership structure affects bank efficiency, i.e. may lead to shifts in accounting measures. This would be the case if ownership structure has an impact on the efficiencies that are most suited for individual banks. In my opinion, future research on this issue is highly relevant.

I acknowledge that the findings also could be consistent with other explanations. For instance, state shareholders may be more exposed to a different set of bank regulations, such as small banks have more intensive monitoring. It is also possible that subsidies to poor borrowers may have been funneled through government banks to improve social welfare. My findings are of interest to a variety of academics, and policymakers, and contribute to dealing with problems ranging from improving banking supervision and regulations to market discipline, such as the recent large bank initial public offerings (IPOs) from China. The positive impact of ownership diversity presence on a bank's performance enhances its economic prospects, opening new pathways for the flourishing of the banking sector.

# Chapter 5: Political connection and bank lending: Evidence from China's banking sector

## 5.1 Introduction

An increasing body of economic studies focuses on the implications of politics in the business world. The traditional view indicates that government ownership of financial institutions should benefit from economic development. However, the link between politics and economic development remains strongly debated in transitional countries. Financial institutions may use political connections to enhance firm competition advantage or expropriation, perhaps by affecting relevant regulations. Unlike most firms, banks have a significant role in the allocation of credit, which affects the entire economy. The extent to which banks are politically connected, and whether this is associated with the allocation of credit, remains unexplored. In other words, research on the effect of financial intermediaries' political connections on lending behavior has been very limited. This chapter fills this void by employing bank-level information to examine the relation between political connections and lending decision in an emerging market.

China's financial system is particularly interesting for this area because most major financial institutions are state-owned or state-connected enterprises. The largest banks are likely politically orientated and are dominated by the government through direct or indirect channels. Hence, these politically connected banks are likely to allocate and price lending according to government preferences. Such behaviours of banks would affect the entire financial system. In addition, the Chinese government has been moving

forward with further reforms in financial institutions with the goal of building global competitive banks. Nevertheless, state ownership and political pressure likely affect the performance of these banks. Furthermore, the degree of political influence on bank activity is important from both a policy and regulatory perspective, particularly in an economy where government ownership monopolises the financial system. It is therefore timely to investigate the extent of political issues in the Chinese banking sector and consider how it might relate to decisions concerning resource allocation.

This chapter analyses the banks' overall loan portfolios, as well as corporate and consumer loans. The results show that politics plays a role in the lending decisions of commercial banks. More specifically, banks with political connections supply more credit in terms of gross loans. In addition, the relation is prominent when considering economic conditions, and this indicates that lending behavior is pro-cyclical in an emerging market. My evidence is robust to different model specifications and estimation techniques.

This chapter contributes to the existing literature in several ways. First, my chapter provides manifest from China, a country whose transition to a market economy has been more gradual than those in Western countries. Greater government involvement, gradual ownership reform, political corruption, and less developed legal systems capture the influence of the prevailing government-related shareholders, and the Chinese market thus offers a potentially interesting contrast to most other economies. Therefore, we fill the gap where there has been insufficient prior evidence concerning a direct link between banks' political connections and banks' lending behaviours in China. Second, my evidence enriches the extant literature on the implications of political influences, particular political connections. The chapter not only provides new manifest about the role of political connections in credit growth, but also shows the different effects of political connections between corporate loans and consumer loans. Thus, this chapter extends previous studies by shedding further insights into the role played by governance structure on bank lending behaviour. Third, the relationship between banks

and firms through credit supply has recently been explored, but resulting in mixed evidence. This chapter expands the literature connecting the effect of corporate governance of banks on credit supply. Existing studies focus more on bank ownership type; little is known about how political institutions affect bank-lending behaviour. This chapter proposes that banks' political connections are more important in justifying credit supplies than ownership type preferences. In addition, unlike prior evidence, which uses a pooled sample of all listed banks (with a dummy measure to control for the effect of ownership type), this chapter disentangles the effects of political connections between state-owned and non state-owned banks by considering them independently.

In this chapter, the used approach is similar to that of Jackowicz et al. (2013); however, unlike their study, I control for possible endogeneity problems of political connections to lending by using the system GMM estimation. In addition, I consider the largest emerging market sample of banks for the period from 2005 to 2015, including the recent ownership reform period. Furthermore, unlike previous studies, I consider the dynamics of the main categories of bank credit to better understand the political preferences that influence bank lending over long periods. Moreover, the study attempts to combine empirical designs employed by de Haas and van Lelyveld (2014) and Dinc (2005) to analyse the lending behaviour of politically connected banks in an emerging market.

The remainder of the chapter is organised as follows: Section 2 reviews the evolution of banks' political connections and the bank credit exercised; Section 3 develops the hypotheses; Section 4 describes the employed data and methodology; Section 5 presents the empirical evidence; Section 6 addresses robustness issues; and Section 7 presents the chapter's conclusions and discusses the policy implications of the evidence.

## 5.2 Literature review

Corporate political connections are relatively widespread in the banking sector. The relationship between the banking sector and politics is not only close, but also intimate. La Porta et al. (2002) find a great degree of government-owned banks, particularly in less-developed countries. Gonzalez-Garcia and Grigoli (2013) show that governments control around 21 per cent of assets in the banking sector globally. Braun and Raddatz (2010) show that, based on the 150 countries dataset, former cabinet members, central bank governors, and financial regulators are more likely to become board members or senior officers of banks. This evidence shows that the political nature of the impact of the banking sector is obvious in different economies. Therefore, political influence is one facet of the relationship between banks and economic development.

Political connections are a double-edged sword for business. Some of the empirical literature documents several benefits that political connections and governments can play in improving economic efficiency. First, politically connected enterprises appear to get preferential access to credit. Indeed, easy access to bank finance is an important benefit for enterprises through which political connections operate (Boubakri et al., 2012; Claessens et al., 2008; Cull and Xu, 2005; Duchin and Sosyura, 2012).

Second, the connection between politicians and firms would generate better outcomes by the sharing of knowledge, ability and experience. Faccio (2006) shows that the announcement of a new political connection results in a significant increase in firm value. In the banking sector, Braun and Raddatz (2010) find that politically connected banks are more profitable than non-politically connected banks. Nys et al. (2015) find that politically connected banks are able to attract more deposits than their non-connected counterparts. In contrast, after examining the hazard rate, the results of Liu and Ngo (2014) show that financial institution failure is about 45 per cent less likely prior to an election year.

Third, political institutions affect investor perceptions of risk, and the cost of equity financing should be lower for firms with strong political connections. Borisova et al.,

(2015) and Boubakri et al. (2012; 2014) provide strong evidence that investors require a lower cost of capital for politically connected firms. Infante and Piazza (2014) also conclude that politically connected firms gain lower interest rates when the political link is at a local government level. In addition, Sapienza (2004) finds that state-owned banks charge lower interest rates than do privately owned-banks to similar or identical firms. Additionally, politically connected firms have higher credibility in promising future recapitalisation in the case of recessions.

On the other hand, corporate governance problems in politically connected firms are also obvious, and some empirical studies claim several drawbacks of political connections. Indeed, political influence will inevitably change the objective function of firms to that preferred by the government, which leads to operating inefficiencies and worse performance. First, politically connected firms likely appoint managers and directors with lower qualifications and capabiilties, resulting in a misallocation of valuable economic resources. As a consequence, risk of expropriation by government agencies is prevalent in political connections at the firm level. Boubakri et al. (2012) suggest that managers of politically connected firms are not concerned with improving the quality of earning and accounting information. Chen et al. (2011) find that firms with concentrated control structures on top management facilitate rent-seeking and allow the controlling shareholders to retain the benefits arising from connections with politicians. Faleye and Krishnan (2017) claim that banks with more effective boards are less likely to lend to riskier borrowers. In addition, governments may appoint officials to state-owned firms as a means to enhance control.

Second, Khwaja and Mian (2005) find that borrowing and default may be higher for firms with political connections. Both Cornett et al. (2010) and Micco et al. (2007) find that state-owned banks located in developing countries tend to have lower profitability and higher costs than their private counterparts. Kostovetsky (2015) finds that politically connected financial firms have higher leverage and are more likely to increase their leverage. Indeed, higher leverage is associated with worse performance

during financial crises. Duchin and Sosyura (2012) find that investments in politically connected firms underperform compared with those in non-politically connected firms. Both Beuselinck et al. (2017) and Chen et al. (2017) find a negative relation between political connection and firm value. Chen et al. (2011) also finds a negative relationship between government intervention and investment efficiency.

Third, politicians likely extract rents from connected firms, especially when there is less prudential regulation and supervision. Thus, the moral hazard problem is the rational consideration or expectation by market participants for politically connected firms (Jia, 2009; Kostovetsky, 2015; Zhang et al., 2016). The CEO or chairman are normally appointed by the relevant authorities of banks where governments are the controlling shareholder. These managing boards do not bear the consequences of any inefficient decisions they make or lack of proper incentives. Therefore, government officials might exert political pressure to engage in rent-seeking activities (Chen et al., 2017), while the existence of agency problem. In addition, stronger politically connected firms increase their risk taking and exacerbate moral hazard problems due to their expectation of government bailouts during worst economic conditions (Ashraf, 2017; Faccio et al., 2006). Akins et al. (2017) argue that government banks have a higher probability of being bailed out of trouble due to poor loans.

Political connections play a significant role in economic activities, especially in developing countries with intensive government regulation and weaker investor protection (Claessens et al., 2008; La Porta et al., 2002). From 1979, China started moving from a centrally-planned economy to a market-oriented economy. During this transition, one of the main challenges of the Chinese government was to create a healthy financial system as a prerequisite for stable economic growth. Thus, China's banking system has been gradually transformed from a wholly government-owned and government-controlled provider of loans into an increasingly competitive market. There is a two-tier ownership structure consisting of state-owned banks and privately-owned banks in China. The shareholders of privately-owned banks are normally domestic and

foreign investors, which is same as other emerging markets. The senior management of government-owned banks are normally members of the Chinese Communist Party and they also generally serve the government authorities (Martin, 2012). Sapienza (2004) finda that lending of Italian public banks is driven by political incentives.

Political connection studies in the literature have largely focused on non-financial firms, while the impact of political connections on banks is relatively limited. Banks are likely to use political influence to improve their competitive advantage, perhaps by affecting relevant regulations. This consequence would easily appear where governments are relatively more powerful. Thus, the issue of political connection in the banking sector is of particular interest. A growth number of studies have analysed the lending activities of state-owned and private banks during election years (Claessens et al., 2008; Cull and Xu, 2005; Dinc, 2005; Onder and Ozyildirim, 2013; Sapienza, 2004). For example, Dinc (2005) provides cross-country, bank-level empirical evidence about political influences on bank-lending behaviors. Cull and Martinez Peria (2013) examine the impact of bank ownership on credit growth in Latin American and Eastern European, and find mixed results. Cull and Martinez Peria (2013) also find that the link between loan growth and bank ownership is not homogenous across developing countries. Liu and Ngo (2014) show that US bank failure is lower in the 12 months leading up to an election than in normal periods. Jackowicz et al. (2013) analyse the impact of political factors on the banking sector in Central European countries. Ferri et a. (2014) analyse the differences in lending policies across banks characterised by different types of ownership and suggest that ownership type has an impact on bank lending. Allen et al. (2017) examine the interactions of bank lending dynamics and ownership structures in the banking systems for Central and Eastern European (CEE) countries. Carvalho (2014) investigates lending by government banks, as well as firms' employment decisions. Dong et al. (2014) examines government ownership structures and risk management-related corporate governance for Chinese banks.

## 5.3 Hypothesis development

*H1: Bank lending is higher for politically connected banks than for those which are non-politically connected.*

Governments might require politically connected banks to ensure more lending so as to avert unemployment and social instability. For example, politically connected banks are able to maintain higher rates of loan growth to maintain or stimulate the economy during recessions. The government's role in financial markets is obviously significant in the market when there are credit supply shortages. In other words, politically connected banks may wish to achieve multiple goals, and have both political and economic objectives (Cull and Xu, 2005). State-owned or politically connected banks are likely to facilitate the financing of projects that private banks are unable or unwilling to finance, particularly issuing loans that could favorite society benefit. Indeed, politically connected banks would absorb negative shocks to lending growth in abnormal periods. Bertay et al. (2015) find that state-owned banks can play a useful role in stabilising credit over the business cycle, as well as during periods of financial instability, indicating that state banks expand their credit relatively more during crisis periods. Cull and Martinez Peria (2013) also find similar results. Additionally, government banks form a stabilising objective by increase their lending, and do not amplify financial shocks (Brei and Schclarek, 2013; Merilainen, 2016; Micco and Panizza, 2006; Onder and Ozyildirim, 2013). Such lending may be used as a complement to general monetary and fiscal policies. In particular, governments may use politically connected banks to smooth gross credit when private banks began to reduce their leverage (De Haas et al., 2014).

In addition, government bank credit growth is politically motivated, especially in an election year (Carvalho, 3014; Onder and Ozyildirim, 2013; Sapienza, 2004). The reasons for increased lending include enhancing re-election chances or avoiding political unrest. Dinc (2005) finds that heightened lending by government banks in election years appears to support political goals. Claessens et al. (2008) find that, after

each election, contributing companies substantially increased their bank financing relative to a politically connected group. In fact, election outcomes are relevant to politically connected banks' activities as they have impacts on relevant regulation and monetary policies, and, in more extreme circumstance, the possible expropriation or nationalisation of banks.

Alternatively, stakeholders might worry that higher-risk banks could fail, but they also appear to believe that banks with political connections can be relatively safe in event of crisis because of the higher possibility of government bailouts or the injection of additional capital. Dong et al. (2014) find that Chinese government-owned banks tend to take more risks than their counterparts because of the severe political interventions and weak incentives to follow prudent bank management practices. Indeed, politically connected banks are likely to accept riskier lending in an economic downturn because their objective is not only to maximise return for shareholders, but also to maintain credit growth by the supply of lending. Also, these banks may suffer relatively less deposit withdrawals in financial crises. Hence, the supply of funds is higher for politically connected banks compared with non-politically connected banks (Nys et al., 2015). Ivashina and Scharfstein (2010) show that banks cut their lending less if they have better access to deposit financing.

Political connections can affect bank-lending channels by credit market competition. The economic environment affects the availability of alternative sources of finance for borrowing firms. Governments might encourage more financial institutions to enter the credit market, especially politically connected banks. In particular, banks in developing countries would be encouraged to undertake more lending activities and help increase competition in the banking sector. Thus, the competition in the bank credit market would become intensive, while more options for borrowers and the importance of risk management might have less focus, and lending decisions become less prudent. Jia (2009) show that lending by state-owned banks has been less prudent than lending by joint-equity banks. Kostovetsky (2015) find that politically connected financial

institutions have higher leverage and their stocks have higher volatility and beta. Indeed, government-controlled banks tend to take more risks than those controlled by state-owned enterprises or private investors (Akin et al., 2017; Dong et al., 2014; Zhu and Yang, 2016). Khwaja and Mian (2005) show that state-owned banks lend more to firms with politically connected directors.

*H2: Bank lending is lower for politically connected banks than for those which are non-politically connected.*

As per the findings of Cornett et al. (2010), banks with political connections are likely to be less profitable compared with privately-owned banks. The financial position of connected banks has come under stress; in particular their balance sheets have significant write-downs on assets, which leads to reductions in capital. As a consequence, these banks are more difficult to issue new shares to raise capital and meet regulatory requirements. Thus, a reduction in the supply of funding is a result of the bank's high risk-taking (Ivashina and Scharfstein, 2010). In other words, forgoing lending opportunities would be the optimal choice in order to reduce the risk of capital inadequacy.

In addition, financial crises and other debt crises may cause negative financial shocks to lending growth. Procyclical lending behaviour could exacerbate the shocks in the financial system, making it more difficult for borrowers to continue relying on bank finance. The economic cycle is more pronounced for firms' lending decisions that are considered sensitive to political influence. The impact of financial shocks is aggregated due to bank tendancies to reduce loan supplies after those shocks materialise (Merilainen, 2016). However, politically motivated lending is not only associated with stimulating economies in recession, but it is also linked to lower credit supplies in non-crisis periods. Therefore, governmentowned bank may tend to be linked with lower levels of lending. La Porta et al. (2002) find that government ownership of banks is related to lower subsequent economic growth. They argue that politicians use state-owned banks to further fulfill their political goals, rather create economic value.

Thus, the projects financed by government are likely to be inefficient and have negative effects on productivity and growth. Barth et al. (2014) suggest that government-ownership of banks does not retain independence, and is negatively correlated with favorable banking outcomes. The findings of Brei and Schclarek (2015) indicate that politically connected banks play a counter-cyclical role, while private banks play a more pro-cyclical role in banking systems.

Third, Jackowicz et al. (2013) find that government-owned banks report significantly smaller amounts of lending during election years. The profitability of state-owned banks is reduced, in comparison with the profitability of privately-owned banks in emerging countries during election years. Lending corruption, as a widespread appearance, may reduce the banking system's efficiency in allocating scarce resources. Julio and Yook (2012) suggest that political uncertainty affects real economic outcomes, and firms may reduce investment expenditures until the electoral uncertainty is resolved.

*H3: Bank lending is not relative with politically connected banks.*

Moreover, change in the economic environment may impact the role played by political connections with regard to credit allocation. The bank credit literature has long held that the influence of external shocks is exacerbated because banks tend to adjust their loan supply as those shocks materialise. Better economic conditions would increase credit demand by households and firms. Micco and Panizza (2006) suggest that government-owned banks' credit is less sensitive to business cycle fluctuations than private banks'.

Governments are normally unlikely to allow an enterprise in which they hold a larger portion of ownership or are closely connected with to fail. An optimal bank lending decision leads to investment efficiency for borrowing firms, and the effect of political connection is determined by bank ownership structure. In addition, capital injections would play a role in maintain bank lending.

Clarke et al. (2012) find that banks with government ownership were not related to financial constraints for firms in Eastern Europe and Central Asia. Additionally, Detragiache and Gupta (2006) illustrate that political connections do not explain the discrepancy in the profitability of Malaysian banks.

## 5.4 Data and methodology

I construct an unbalanced panel dataset to test the hypothesis by using both bank-level and macroeconomic data. The source for the bank-level variables is from Bankscope, a common-use database in the banking sector, provided by Bureau van Dijk. Bankscope consists of bank-level financial statements, including income statements, balance sheets and cash flow data. Annual panel data are used in the study, and the study period is from 2005 to 2015. This chapter composes commercial, savings, mortgage, and long-term credit banks, and excludes centre banks, investment banks, securities houses, and nonbank institutions. I start my sample from 2005, because the first Chinese larger state-owned bank was listed in 2005, and collect a total of 849 firm-year observations.

To track the politically connected information regarding ownership, my primary source is the information available in Bankscope. I complement this information with information from other sources, including banks' annual reports, holding company websites and annual reports, and regulatory agency websites. Following Allen et al. (2017), I removed the outliers with respect to loan dynamics growth from the dataset. For example, banks with real loan growth rates of more than 300 per cent are excluded. I collect bank-specific information about total loan volumes and loan amounts by type of loan (corporate, consumer, and residential mortgages). I also gather information on bank size, capitalisation, liquidity and profitability. To avoid the impact of outliers, every continuous variable is being winsorized at the 2.5 top and bottom percentiles of their distributions.

Corporate political connections are well explored in the finance study. There are many channels to create a political connection. I develop the politics measure for this chapter by referring to previous literatures on the discipline and examining the institutional setting in emerging countries (Duchin and Sosyura, 2012; Faccio, 2006; Infante and Piazza, 2014; Nys et al., 2014). I manually collect directors' employment histories in annual reports and identify the chairman and directors who have a connection with politics. Following a study in China from Chen et al. (2011), board members who fulfill any one of the following three criteria are defined as politically connected directors: (1) previous work in the government agency; (2) member of the People's Congress; and (3) member of the People's Political Consultative Conference. These criteria have some restrictions as connections may also be built through family members, business partners, shell entities or figureheads; but these would lead to a lower level of the degree of political connection as China is a relationship-based economy. Hence, political connections may be multidimensional. Following Infante and Piazza's (2014) method, I reduce this bias by focusing only on directors becoming politicians.

To identify which bank with political connections is important for this study, I introduce four measures for corporate political connections. The first political variable is whether the chairman or CEO has served as a current or former officer of the central or local government. This measure has been used in some previous studies, such as Chen et al. (2017) and Nys et al. (2014). The second political variable is the number of current or former government bureaucrats and politicians on the board. The third political variable is the percentage of the number of current or former government bureaucrats and politicians on the board. Lastly, the fourth political variable is the cumulative government shareholding from the top ten shareholders. Those four variables are supposed to capture the impact of political connection.

Bank credit is measured by the amount that a bank is able to supply in terms of gross loans. Bank gross loans generally consist of retail lending, corporate, and consumer loans.

Our baseline empirical model to examine the impact of banks' political connections on credit growth follows the equation:

$$LOAN_{it} = \alpha + \beta_1 PC_{it} + \Sigma_k \delta_k CONTROL_{it}^k + \varepsilon_{it}$$

*(Equation 15)*

where LOAN i,t is the natural logarithm of total gross loans (or corporate, or consumer loans) for bank i at time t. Loans are expressed in thousands of CNY. PC is the indicator variable for whether a bank is politically connected. CONTROL i,t, is a matrix of bank characteristics that can also impact loan growth, such as size, capital, liquidity, profitability, and funding structure.

To examine the cyclicality of lending by politically connected banks, I specify a model where the dependent variable is the gross loan variable, and where the set of independent variables comprise the political connection, GDP growth rate, and an interaction of these two variables.

$$LOAN_{it} = \alpha + \beta_1 PC_{it} + \beta_2 GDP_t + \beta_3 PC\ x\ GDP_t + \Sigma_k \delta_k CONTROL_{it}^k + \varepsilon_{it}$$

*(Equation 16)*

where GDP t is the GDP growth in year t, and its interaction with the political connection variables (PL × GDP growth rate) to test sthe relationship between bank credit and political connection in economic condition by the interaction variables, while the same set of control variables includes as Equation (15).

Previous studies indicate (at least using US data) that specific characteristics of size, undercapitalisation, profitability and relatively illiquidity would affect economic outcome through the lending mechanism. Allen et al. (2017) find that bank-specific characteristics, such as deposit growth and profitability ratios, are significant determinants of lending growth during both normal economic times and crisis periods. Therefore, a number of time-invariant bank and country features might be correlated with the explanatory variables.

The size of banks has been accounted as an important determinant for bank lending. Large banks have more diversification revenue and richer resources, and thus can minimise the level of bad loans. Indeed, larger banks have relative advantages in providing wide range of products and services. Yet, small banks are also likely to distribute more credit to enhance or maintain their competitive advantage and build good relationship with borrowers. Thus, the expected coefficient of bank size is ambiguous. The logarithm of total assets is included to control for bank size, as per Cull and Martinez Peria (2013).

Equity is the ratio of equity to total assets, to capture for bank soundness. Kim and Sohn (2017) suggest that bank capital exerts a significantly positive effect on lending when banks retain sufficient liquid assets. Indeed, limited capital would be a key element restricting banks' ability to issue loans. Following previous studies, such as Ferri et al. (2014) and Cull and Martinez Peria (2013), bank capital is controlled to ensure that the outcomes are not driven by differences in the level of bank capital in the firm-level regression. Thus, the level of capital may play an ambiguous role with respect to bank lending.

Deposit/loan ratio represents the liquidity risk. Banks with more deposits (and less on bond and money markets) tend to disburse more loans, as the liquidity risk is lower. In other words, banks that have relatively more liquid assets on their financial statements are able to shield their lending activities.

Profitability is measured as the ratio of net profit after taxes to total assets. Banks with high profitability are likely to have more credit distribution, because profitability is connected to the quality and quantity of interest income.

**Table 42: Definition of variables**

| Variables | Symbol | Description | Sources |
|---|---|---|---|
| *Bank credit* | | | |
| Gross loan | **LOAN** | The natural logarithm of total gross loan in thousands of CYN | Bankscope |
| Corporate loan | **CORP** | The natural logarithm of total corporate loans in thousands of CYN | Manual collection |
| Consumer loan | **CONS** | The natural logarithm of total consumer loans in thousands of CYN | Manual collection |
| Interest income | **INTI** | The natural logarithm of total interest income in thousands of CYN | Bankscope |
| *Political connection* | | | |
| Political dummy | **PCD** | 1 if the chairman or CEO is politically connected and 0 otherwise | Manual collection |
| Politics board member | **PCB** | The number of board members has political connection | Manual collection |
| Politics percentage on board | **PCP** | The percentage of board members has political connection | Manual collection |
| Government ownership | **PCGO** | The percentage of government shareholding. | Manual collection |
| *Control variables* | | | |
| Capital ratio | **ETA** | The ratio of total equity to total asset | Bankscope |
| Bank size | **LNTA** | The natural logarithm of total assets in thousands of USD | Bankscope |
| Liquidity | **DEP** | The ratio of total deposits to total loans | Bankscope |
| Non-performing loan | **NPL** | Ratio of non-performing loans to total loans | Bankscope |
| Return on assets | **ROA** | Ratio of return on average assets | Bankscope |
| GDP growth | **GDP** | Gross domestic product (GDP) change (in percentage points) | World bank |
| Inflation rate | **INF** | Inflation rate | World bank |
| Lending interest | **LINT** | One-year loan interest rate | World bank |

Given the literature on political influences, several macroeconomic variables from the World Development Indicators database are used in this chapter. These variables represent the attractiveness of the spreading of bank credit. These are lending interest rate, and inflation rate measured as the percentage change in the GDP deflator. Economic conditions would affect banks' lending activities through the quality of credit (Albertazzi and Gambacorta, 2009). Banks are likely to hold less reserves and make more credit during an economic boom. In addition, Tan and Floros (2013) report that

inflation and GDP growth rates have impacts on bank productivity in China. Furthermore, a one-year bank loan rate is included to control the effect of interest fluctuation on lending and changes in monetary policy. Banks can make more profit through lending when the interest rate spread is large. However, the coefficient is also negative as corporates and consumers are unwilling to borrow when there is a high interest rate. Lastly, following Dong et al. (2014) and Bertay et al. (2015), the crisis variable is a dummy variable indicating the financial crisis. Table (42) contains definitions of all the variables used in this chapter.

Table (43) presents the descriptive statistics of the variables that are used in this chapter. For the sample, 76 per cent of banks have a connection with politics. On average, the number of political board members is five.

**Table 43: Descriptive statistics for main model variables**

| Variable | N | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| **LOAN** | 814 | 15.54 | 1.80 | 12.60 | 20.57 |
| **CORP** | 659 | 15.64 | 1.79 | 12.70 | 20.24 |
| **CONS** | 659 | 13.88 | 2.31 | 8.76 | 19.42 |
| **INTI** | 814 | 13.29 | 1.79 | 10.02 | 17.93 |
| **PCD** | 814 | 0.76 | 0.42 | 0 | 1 |
| **PCB** | 814 | 5.13 | 2.33 | 1 | 11 |
| **PCP** | 814 | 0.39 | 0.15 | 0.07 | 0.73 |
| **PCGO** | 814 | 0.08 | 0.17 | 0 | 1 |
| **ETA** | 814 | 12.96 | 3.18 | 5.77 | 30.14 |
| **LNTA** | 814 | 16.32 | 1.79 | 13.19 | 21.19 |
| **DEP** | 814 | 60.76 | 10.64 | 28.34 | 78.45 |
| **NPL** | 814 | 1.31 | 1.18 | 0.00 | 8.21 |
| **ROA** | 814 | 1.14 | 0.43 | 0.05 | 2.39 |
| **GDP** | 814 | 8.76 | 1.86 | 6.9 | 14.16 |
| **INF** | 814 | 2.41 | 2.02 | -0.70 | 5.86 |
| **LINT** | 814 | 5.73 | 0.74 | 4.35 | 7.47 |

Note: This table contains means, standard deviations, and minimum and maximum values on the variables included in the main model. LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

The indicator of capital risk is the ratio of bank equity to total assets, and averages close to 13 per cent. Bank liquidity is captured by the ratio of deposit to total liability, and averages at 60 per cent. The average of profitability is 1.14 per cent. The average (median) NPL ratio is 1.31 per cent, with a large degree of variation across banks. This is comparable with the figure given by Dong et al. (2014).

I employ three estimation methods for the panel regressions: general pool OLS, random effects, and a dynamic Generalized Method of Moments (GMM) panel estimator. A concern that influential banks may use their influence to obtain preferential lending and, meanwhile, attract former government officials or politicians as board members, increased (Khwaja and Mian, 2005). Likewise, Claessens et al. (2008) documented that causality may go from higher firm value to larger campaign contributions (their measure of political connection), rather than the other way around. In addition, referring to some update studies (Allen et al., 2017; Bertay et al., 2015), two main tests are used to identify the appropriateness of the dynamic GMM estimations. First, the Hansen test of the over identifying restrictions is used to evaluate the over identifying for the set of instruments, and ensure the instruments used are valid; while the null hypothesis is that the instruments are appropriate. In addition, the Arellano Bond test is used for autocorrelation of the errors, whether there is no perceptible second-order serial correlation and is not subject to serial correlation of order, with a null hypothesis of no autocorrelation in differenced residuals. By first differencing the regressors, the fixed effects are removed because they are time-invariant.

**Table 44: Correlations**

| | LOAN | CORP | CONS | INTI | PCD | PCB | PCP |
|---|---|---|---|---|---|---|---|
| **LOAN** | 1.000 | | | | | | |
| **CORP** | 0.9945* | 1.000 | | | | | |
| **CONS** | 0.9328* | 0.9045* | 1.000 | | | | |
| **INTI** | 0.9807* | 0.9727* | 0.9245* | 1.000 | | | |
| **PCD** | 0.0817* | 0.1233* | 0.1217* | 0.0893* | 1.000 | | |
| **PCB** | 0.4680* | 0.4539* | 0.4440* | 0.4553* | 0.3059* | 1.000 | |
| **PCP** | 0.1961* | 0.2035* | 0.1992* | 0.1955* | 0.3328* | 0.8437* | 1.000 |
| **PCGO** | -0.0554 | -0.035 | 0.0152 | -0.0679 | -0.0238 | -0.0831* | -0.0382 |
| **ETA** | -0.2480* | -0.2944* | -0.2966* | -0.2208* | 0.0098 | -0.0671 | -0.0347 |
| **LNTA** | 0.9862* | 0.9830* | 0.9213* | 0.9863* | 0.0710* | 0.4521* | 0.1947* |
| **DEP** | 0.3381* | 0.4058* | 0.3754* | 0.2583* | -0.0019 | 0.1329* | -0.0075 |
| **NPL** | 0.0303 | 0.1762* | 0.1795* | -0.0115 | 0.0102 | -0.0396 | -0.0358 |
| **ROA** | -0.1238* | -0.1191* | -0.0642 | -0.0849* | -0.0095 | -0.0331 | 0.0169 |
| **GDP** | -0.0417 | 0.0707 | 0.0203 | -0.1368* | 0.0593 | 0.1116* | 0.0772* |
| **INF** | -0.0658 | -0.0245 | -0.0423 | -0.0631 | 0.0606 | 0.0898* | 0.0736* |
| **LINT** | -0.0702* | -0.0351 | -0.055 | -0.0808* | 0.0476 | 0.0996* | 0.0802* |
| | **PCGO** | **ETA** | **LNTA** | **DEP** | **NPL** | **ROA** | **GDP** |
| **PCGO** | 1.000 | | | | | | |
| **ETA** | 0.0031 | 1.000 | | | | | |
| **LNTA** | -0.0599 | -0.2204* | 1.000 | | | | |
| **DEP** | -0.0422 | -0.1305* | 0.2277* | 1.000 | | | |
| **NPL** | 0.0894* | -0.2916* | 0.0093 | 0.0849* | 1.000 | | |
| **ROA** | 0.0594 | 0.2160* | -0.1346* | -0.0336 | 0.3412* | 1.000 | |
| **GDP** | 0.0377 | -0.1083* | -0.0898* | 0.1019* | 0.3517* | -0.1715* | 1.000 |
| **INF** | 0.0492 | 0.0552 | -0.0791* | 0.0121 | 0.0211 | 0.1283* | 0.4732* |
| **LINT** | 0.042 | 0.0045 | -0.0871* | 0.0058 | -0.0021 | 0.0926* | 0.6079* |
| | **INF** | **LINT** | | | | | |
| **INF** | 1.000 | | | | | | |
| **LINT** | 0.6520* | 1.000 | | | | | |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate. * indicate statistical significance at the 5% level.

Table (44) reports the correlations between the main variables used in this study. The correlations between the measures of gross loan, corporate loan and consumer loan are quite high.

## 5.5 Empirical result

Table (48) presents the regression of the analyses of the association between political connections and bank-lending behaviour. In the four columns of Table (45), I show the results of the baseline specification, as in Equation (15), without control variables. The coefficients for various political connections are significantly different from 0. The results consistently indicate that political connections generally ensure ceteris paribus – higher loans for connected banks.

**Table 45: The relationship between bank credit and political connection – OLS**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN |
| PCD | 0.345*** | | | |
| | (2.69) | | | |
| PCB | | 0.360*** | | |
| | | (15.34) | | |
| PCP | | | 2.294*** | |
| | | | (5.61) | |
| PCGO | | | | -0.572 |
| | | | | (-1.65) |
| Constant | 15.302*** | 13.727*** | 14.637*** | 15.559*** |
| | (145.98) | (119.98) | (96.46) | (240.49) |
| **Observation** | 814 | 814 | 814 | 814 |
| **F test** | 7.212 | 235.273 | 31.441 | 2.711 |
| **R** | 0.007 | 0.219 | 0.038 | 0.003 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

**Table 46: The relationship between bank credit and political connection – OLS with control variables**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN |
| PCD | 0.035** | | | |
| | (2.35) | | | |
| PCB | | 0.006** | | |
| | | (1.98) | | |
| PCP | | | 0.115*** | |
| | | | (3.14) | |
| PCGO | | | | 0.050* |
| | | | | (1.69) |
| ETA | -0.009*** | -0.009*** | -0.009*** | -0.010*** |
| | (-3.49) | (-3.50) | (-3.48) | (-3.57) |
| LNTA | 0.960*** | 0.957*** | 0.958*** | 0.961*** |
| | (144.41) | (150.45) | (144.93) | (147.72) |
| DEP | 0.020*** | 0.020*** | 0.020*** | 0.020*** |
| | (22.90) | (22.47) | (22.76) | (22.37) |
| NPL | 0.047*** | 0.047*** | 0.047*** | 0.044*** |
| | (5.35) | (5.41) | (5.39) | (5.09) |
| ROA | 0.086*** | 0.088*** | 0.086*** | 0.078*** |
| | (4.10) | (4.04) | (3.98) | (3.66) |
| INF | -0.004 | -0.004 | -0.004 | -0.003 |
| | (-0.87) | (-0.82) | (-0.83) | (-0.68) |
| LINT | 0.034*** | 0.032*** | 0.033*** | 0.033*** |
| | (3.04) | (2.84) | (2.95) | (3.00) |
| Constant | -1.605*** | -1.550*** | -1.597*** | -1.582*** |
| | (-12.54) | (-12.11) | (-12.22) | (-12.20) |
| **Observation** | 814 | 814 | 814 | 814 |
| **F test** | 6658.865 | 6459.638 | 6256.295 | 6604.588 |
| **R** | 0.987 | 0.987 | 0.987 | 0.987 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

In Table (46), when more independent variables are included in the regressions of gross loan variables, there is a significant rise in the coefficients of the bank's political

connection variable. This indicates that, to some extent, the other independent variables complement the effect of political influence on bank lending and the change in lending pattern of the banks. Hence, the findings provide further evidence for the political view of public banks and corroborate previous studies by Dinc¸ (2005), Sapienza (2004), and Khwaja and Mian (2005). Sapienza (2004) finds that politically connected firms had better access to state-owned bank lending. As a consequence, in contrast to Cull and Martinez Peria (2013), I find some evidence for the claim that politically connected banks engage with relatively more lending. Additionally, De Haas et al. (2014) reports some weak evidence that politically connected banks reduce less credit supply than their counterparts in CEE emerging countries.

There are several explanations for these results. First, the credit might be used to finance socially beneficial infrastructure, as these banks could be a policy choice to comply with certain economic or political goals. It is reasonably claimed that politically connected banks support the investment of projects that other banks are unwilling to finance, especially projects that could facilitate local economic development. In other words, lending by politically connected banks is associated with government-induced investment distortions.

In addition, governments are likely to implement expansionary fiscal policies on upcoming elections to enhance re-election prospects. Sapienza (2004) suggests that government-owned banks are affected by the electoral results of the related party. In addition, higher loan growth applied to connected banks could be lent to their cronies and political use from state-owned bank loans. Khwaja and Mian (2005) find that Pakistan state-owned banks tend to lend more to companies with politically connected directors.

Moreover, Brei and Schclarek (2013) suggest that governments can play an active counter-cyclical role in their banking systems directly through government-owned banks. The state-owned banks would increase their lending in the credit market in crisis

periods (Onder and Ozyildirim, 2013). The evidence shows that government intervention is another type of friction that drives bank credit decisions in an emerging market. Additionally, politically connected banks could suffer less deposit withdrawals than non-connected banks, because the public might expect those banks to be safer given that they are government related.

The results with respect to the control variables are similar to the other studies in previous literature. For example, capital ratio has a negative coefficient and is statistically significant in the regressions for most specifications. This indicates that better-capitalised banks decrease their lending; this contrasts with the findings of Dinc (2005). In other words, sufficient of bank capital would be a factor limiting banks' ability to issue credit. The bank size variable Total Assets has a positive but statistically significant coefficient in the regressions for the whole sample. Larger banks dedicate a significantly greater proportion of lending to enterprises compared with smaller banks. Indeed, larger banks have comprehensive branches and subsidiaries around the world, and the amount and variety of business they engage with are relatively greater than smaller banks. Therefore, larger banks have the ability and advantage to distribute more lending from economies of scale and scope. The results are consistent with the findings of Ferri et al. (2014) and Cull and Martinez Peria (2013). Furthermore, profitability appears to be an important variable in explaining bank credit allocation, while banks with greater profitability are likely to distribute more lending.

The national macroeconomic factors do not have very marked influences on credit patterns. Better economic conditions increase financial lending demands by households and firms. Allen et al. (2017) find that inflation is negative with bank lending. However, inflation rate is not significant in any of four regressions. Lending interest rate also seems to be a very good explanatory regressor, being significant in most of the specifications at the one per cent level. This suggests that a higher one-year loan interest rate can induce banks to lend more. The result is consistent with the findings of Jia (2009) and Ferri et al. (2014).

Overall, the results stand by Hypothesis (1) that the supply of credit is higher for politically connected banks. Governance considerations appear to have direct consequences through their influence on the financial institution to allocate credit.

**Table 47: The relationship between bank corporate loan and political connection – OLS**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | CORP | CORP | CORP | CORP |
| PCD | 0.513*** | | | |
| | (3.21) | | | |
| PCB | | 0.341*** | | |
| | | (13.17) | | |
| PCP | | | 2.346*** | |
| | | | (5.33) | |
| PCGO | | | | -0.365 |
| | | | | (-0.90) |
| Constant | 15.260*** | 13.816*** | 14.678*** | 15.624*** |
| | (109.89) | (90.73) | (78.54) | (208.94) |
| **Observation** | 659 | 659 | 659 | 659 |
| **F test** | 10.334 | 173.353 | 28.38 | 0.813 |
| **R** | 0.015 | 0.206 | 0.041 | 0.001 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

In what follows, I discuss results from regressions, replacing the total gross loans with the corporate and consumer loans. Tables (47) and (48) report results of regressions for the corporate loans as dependent variables. Again, a positive and significant coefficient on political connected bank is obtained for most models, regardless of being economically negligible.

| Table 48: The relationship between bank consumers loan and political connection – OLS | | | | |
|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** |
| **Dependent variable** | CONS | CONS | CONS | CONS |
| PCD | 0.650*** | | | |
| | (3.17) | | | |
| PCB | | 0.429*** | | |
| | | (12.81) | | |
| PCP | | | 2.956*** | |
| | | | (5.21) | |
| PCGO | | | | 0.204 |
| | | | | (0.39) |
| Constant | 13.413*** | 11.601*** | 12.685*** | 13.818*** |
| | (75.11) | (58.91) | (52.67) | (142.93) |
| **Observation** | 659 | 659 | 659 | 659 |
| **F test** | 10.058 | 164.014 | 27.134 | 0.152 |
| **R** | 0.015 | 0.197 | 0.040 | 0.001 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

After including the control variables in Tables (49) and (50), the results of the regression analysis are in line with the univariate evidence in Tables (47) and (48). Based on the result of regressions with corporate and consumer loans as the dependent variable, I can conclude that previous evidence of gross loan growth was not driven by aggregation bias across different loan categories. There is little prior evidence about how particular characteristics of bank financial statements would affect loan growth across different types of loans (corporate and consumer loans). I expect that the empirical models will reveal patterns for the financial statement variables, making it easier to interpret why some banks are likely to change lending behaviours for certain types of loans. From the result of the analysis, banks with high capital ratios and ceteris paribus were able to lend less to consumers. In addition, I find that banks with higher profitability ratios lend more to corporates and consumers.

**Table 49: The relationship between bank corporate loan and political connection – OLS with control variables**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | CORP | CORP | CORP | CORP |
| PCD | -0.013 | | | |
| | (-0.56) | | | |
| PCB | | 0.007* | | |
| | | (1.68) | | |
| PCP | | | 0.071 | |
| | | | (1.09) | |
| PCGO | | | | -0.088 |
| | | | | (-1.54) |
| ETA | -0.006* | -0.007** | -0.007** | -0.007** |
| | (-1.95) | (-2.02) | (-2.04) | (-2.19) |
| LNTA | 0.947*** | 0.942*** | 0.945*** | 0.946*** |
| | (157.33) | (143.58) | (152.79) | (157.34) |
| DEP | 0.020*** | 0.019*** | 0.020*** | 0.019*** |
| | (20.68) | (20.59) | (20.65) | (20.29) |
| NPL | 0.064*** | 0.064*** | 0.063*** | 0.061*** |
| | (4.86) | (4.90) | (4.81) | (4.66) |
| ROA | 0.073*** | 0.076*** | 0.075*** | 0.071*** |
| | (2.89) | (2.99) | (2.93) | (2.76) |
| INF | -0.001 | -0.002 | -0.002 | -0.001 |
| | (-0.19) | (-0.27) | (-0.26) | (-0.15) |
| LINT | 0.060*** | 0.058*** | 0.061*** | 0.062*** |
| | (3.30) | (3.16) | (3.33) | (3.38) |
| Constant | -1.783*** | -1.736*** | -1.795*** | -1.752*** |
| | (-11.12) | (-10.59) | (-11.13) | (-10.87) |
| **Observation** | 659 | 659 | 659 | 659 |
| **F test** | 4079.191 | 4075.774 | 3974.007 | 4023.029 |
| **R** | 0.981 | 0.981 | 0.98 | 0.98 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

**Table 50: The relationship between bank consumers loan and political connection – OLS with control variables**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | CONS | CONS | CONS | CONS |
| PCD | 0.032 | | | |
| | (0.42) | | | |
| PCB | | 0.039** | | |
| | | (2.52) | | |
| PCP | | | 0.25 | |
| | | | (1.13) | |
| PCGO | | | | 0.427** |
| | | | | (2.19) |
| ETA | -0.032*** | -0.033*** | -0.032*** | -0.027** |
| | (-2.86) | (-2.99) | (-2.85) | (-2.44) |
| LNTA | 1.140*** | 1.118*** | 1.135*** | 1.144*** |
| | (55.87) | (50.40) | (54.02) | (55.93) |
| DEP | 0.021*** | 0.020*** | 0.021*** | 0.022*** |
| | (6.49) | (6.39) | (6.50) | (6.66) |
| NPL | 0.165*** | 0.166*** | 0.164*** | 0.174*** |
| | (3.73) | (3.75) | (3.70) | (3.89) |
| ROA | 0.416*** | 0.429*** | 0.415*** | 0.433*** |
| | (4.84) | (4.99) | (4.79) | (4.97) |
| INF | -0.015 | -0.017 | -0.015 | -0.017 |
| | (-0.67) | (-0.77) | (-0.69) | (-0.78) |
| LINT | 0.033 | 0.019 | 0.029 | 0.027 |
| | (0.53) | (0.31) | (0.46) | (0.43) |
| Constant | -6.843*** | -6.553*** | -6.821*** | -7.025*** |
| | (-12.59) | (-11.84) | (-12.46) | (-12.81) |
| **Observation** | 659 | 659 | 659 | 659 |
| **F test** | 521.277 | 525.124 | 504.772 | 514.059 |
| **R** | 0.865 | 0.866 | 0.862 | 0.864 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

I also examine the cyclicality of lending by politically connected banks relative to nonpolitically connected banks. To do this, I specify a regression where the dependent variable is the gross loan variable, and where the set of independent variables include

the growth rate of GDP, the political connection variable, and the interaction of these two variables. The coefficient on the growth rate of GDP implies the cyclicality of lending by politically connected banks, while the sum of this coefficient and the coefficient on the interaction of GDP growth and the political connection variable measures the cyclicality of lending by those banks. The result indicate that higher GDP rate leads to bank distributing more lending. In the last two specifications of Table (49), the GDP growth rate enters with positive coefficients that are significant at the one per cent level, suggesting that lending by banks is pro-cyclical. The estimated coefficients vary from 0.029 to 0.032, indicating that a one per cent increase in GDP growth is associated with 2.9–3.2 per cent increase in lending. A reasonable explanation is that lending increases because it is correlated with the nominal value of the project or investment under management (Albertazzi and Gambacorta, 2009). To a certain extent, this relationship might be more descriptive than causal because firms in high growth economic environments would like to borrow more to improve their operations.

The coefficient on the interaction term is positive and significant in most specifications, suggesting that banks with political connections are likely to distribute more credit in better economic conditions. This result indicates that political considerations systematically affect the channels of financial markets' allocation of scarce resources. Indeed, governance considerations seem to have direct impact through their influence on the allocation of credit. Lending, by these banks, might be politically motivated, as they provide financing on non-commercial terms to economically underdeveloped provinces to improve economic development. The results contrast with the findings of Bertay et al. (2015), who find that credit growth is less pro-cyclical for state banks in countries with good governance.

| Table 51: The relationship between bank credit and political connection dummy– OLS | | | | | |
|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN | LOAN |
| PCD x GDP | 0.028* | 0.006*** | 0.026*** | 0.004* | (-0.001) |
| | (1.86) | (3.56) | (4.76) | (1.92) | (-0.04) |
| PCD | | | 0.190*** | | 0.035 |
| | | | (3.80) | | (0.44) |
| GDP | | | | 0.029*** | 0.032*** |
| | | | | (5.25) | (3.62) |
| ETA | | -0.009*** | -0.009*** | -0.009*** | -0.009*** |
| | | (-3.98) | (-4.01) | (-3.91) | (-3.89) |
| LNTA | | 0.960*** | 0.961*** | 0.963*** | 0.963*** |
| | | (228.84) | (230.06) | (231.19) | (231.05) |
| DEP | | 0.020*** | 0.019*** | 0.019*** | 0.019*** |
| | | (29.35) | (28.96) | (29.04) | (29.02) |
| NPL | | 0.045*** | 0.038*** | 0.033*** | 0.033*** |
| | | (6.28) | (5.31) | (4.44) | (4.42) |
| ROA | | 0.090*** | 0.101*** | 0.107*** | 0.107*** |
| | | (5.06) | (5.65) | (6.00) | (5.98) |
| INF | | -0.005 | -0.007 | -0.008* | -0.008* |
| | | (-1.10) | (-1.52) | (-1.83) | (-1.83) |
| LINT | | 0.027** | 0.008 | -0.008 | -0.008 |
| | | (2.12) | (0.57) | (-0.58) | (-0.59) |
| Constant | 15.375*** | -1.575*** | -1.458*** | -1.633*** | -1.661*** |
| | (128.56) | (-13.62) | (-12.27) | (-14.28) | (-12.72) |
| **Observation** | 814 | 814 | 814 | 814 | 814 |
| **F test** | 3.471 | 7989.197 | 7220.684 | 7337.165 | 6596.873 |
| **R** | 0.004 | 0.987 | 0.988 | 0.988 | 0.988 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

Tables (52), (53) and (54) all report the results of the GDP interaction variable and three alternative variables of political connections in the OLS estimation. Consistent with previous results, all alternative political connections are found to increase bank loan significantly in most specifications. In addition, the coefficients of GDP growth are

generally positive, and magnitudes and statistical significance are greater for most specifications. In line with the expectation that agency problems may amplify the effect of political connections, connected banks receive a relatively higher degree of autonomy from the government and are characterised by low accountability to stakeholders. Moreover, they might fill the credit gap during distress periods. The results suggest that the financing decisions made by banks are influenced by regulatory constraints, and that these banks may be trying to maximise broader social objectives.

**Table 52: The relationship between bank credit and political connection board – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN | LOAN |
| PCB x GDP | 0.028*** | 0.001*** | 0.004*** | 0.000 | 0.000 |
| | (12.09) | (3.59) | (5.11) | (1.04) | (0.14) |
| PCB | | | 0.033*** | | 0.002 |
| | | | (3.97) | | (0.11) |
| GDP | | | | 0.030*** | 0.031*** |
| | | | | (4.97) | (2.96) |
| ETA | | -0.010*** | -0.010*** | -0.009*** | -0.009*** |
| | | (-4.04) | (-4.20) | (-3.89) | (-3.85) |
| LNTA | | 0.954*** | 0.959*** | 0.961*** | 0.961*** |
| | | (209.40) | (206.16) | (204.58) | (204.45) |
| DEP | | 0.020*** | 0.020*** | 0.019*** | 0.019*** |
| | | (29.05) | (29.14) | (28.86) | (28.77) |
| NPL | | 0.045*** | 0.037*** | 0.033*** | 0.033*** |
| | | (6.24) | (5.00) | (4.49) | (4.49) |
| ROA | | 0.092*** | 0.101*** | 0.108*** | 0.108*** |
| | | (5.09) | (5.61) | (5.97) | (5.97) |
| INF | | -0.005 | -0.006 | -0.008* | -0.008* |
| | | (-1.08) | (-1.34) | (-1.73) | (-1.74) |
| LINT | | 0.021 | 0.003 | -0.009 | -0.009 |
| | | (1.64) | (0.19) | (-0.65) | (-0.66) |
| Constant | 14.284*** | -1.459*** | -1.377*** | -1.600*** | -1.607*** |
| | (118.02) | (-11.98) | (-11.25) | (-12.98) | (-11.11) |
| **Observation** | 814 | 814 | 814 | 814 | 814 |
| **F test** | 146.232 | 7928.144 | 7177.826 | 7256.725 | 6523.06 |
| **R** | 0.15 | 0.987 | 0.988 | 0.988 | 0.988 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in

thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

**Table 53: The relationship between bank credit and political connection board percentage – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN | LOAN |
| PCP x GDP | 0.158*** | 0.020*** | 0.060*** | 0.010** | 0.002 |
| | (4.17) | (4.29) | (5.18) | (1.98) | (0.10) |
| PCP | | | 0.436*** | | 0.073 |
| | | | (3.75) | | (0.33) |
| GDP | | | | 0.027*** | 0.030*** |
| | | | | (4.64) | (2.71) |
| ETA | | -0.009*** | -0.010*** | -0.009*** | -0.009*** |
| | | (-3.95) | (-4.10) | (-3.91) | (-3.86) |
| LNTA | | 0.958*** | 0.960*** | 0.961*** | 0.961*** |
| | | (223.53) | (223.39) | (223.27) | (223.11) |
| DEP | | 0.020*** | 0.020*** | 0.019*** | 0.019*** |
| | | (29.38) | (29.03) | (28.90) | (28.88) |
| NPL | | 0.044*** | 0.036*** | 0.033*** | 0.033*** |
| | | (6.09) | (4.85) | (4.48) | (4.49) |
| ROA | | 0.091*** | 0.101*** | 0.106*** | 0.107*** |
| | | (5.03) | (5.58) | (5.88) | (5.89) |
| INF | | -0.005 | -0.007 | -0.008* | -0.008* |
| | | (-1.12) | (-1.46) | (-1.74) | (-1.76) |
| LINT | | 0.021 | 0.002 | -0.008 | -0.008 |
| | | (1.65) | (0.15) | (-0.57) | (-0.58) |
| Constant | 14.987*** | -1.538*** | -1.410*** | -1.609*** | -1.639*** |
| | (103.55) | (-13.16) | (-11.67) | (-13.82) | (-11.16) |
| **Observation** | 814 | 814 | 814 | 814 | 814 |
| **F test** | 17.407 | 7783.025 | 7032.354 | 7096.735 | 6379.995 |
| **R** | 0.021 | 0.987 | 0.987 | 0.988 | 0.988 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

**Table 54: The relationship between bank credit and political connection government ownership – OLS**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN | LOAN |
| PCGO x GDP | 0.073** | 0.006* | 0.007 | 0.004 | 0.026* |
| | (2.03) | (1.83) | (0.50) | (1.30) | (1.87) |
| PCGO | | | -0.009 | | 0.280** |
| | | | (-0.07) | | (2.08) |
| GDP | | | | 0.032*** | 0.034*** |
| | | | | (6.62) | (6.78) |
| ETA | | -0.010*** | -0.010*** | -0.009*** | -0.010*** |
| | | (-3.56) | (-3.55) | (-3.75) | (-3.80) |
| LNTA | | 0.961*** | 0.961*** | 0.964*** | 0.964*** |
| | | (147.75) | (147.37) | (147.04) | (146.83) |
| DEP | | 0.020*** | 0.020*** | 0.019*** | 0.019*** |
| | | (22.38) | (22.30) | (21.83) | (21.88) |
| NPL | | 0.044*** | 0.044*** | 0.030*** | 0.030*** |
| | | (5.06) | (5.09) | (3.85) | (3.92) |
| ROA | | 0.079*** | 0.079*** | 0.100*** | 0.098*** |
| | | (3.69) | (3.65) | (4.70) | (4.62) |
| INF | | -0.003 | -0.003 | -0.007 | -0.007 |
| | | (-0.69) | (-0.69) | (-1.57) | (-1.59) |
| LINT | | 0.032*** | 0.032*** | -0.009 | -0.008 |
| | | (2.92) | (2.86) | (-0.70) | (-0.64) |
| Constant | 15.565*** | -1.579*** | -1.579*** | -1.626*** | -1.647*** |
| | (243.14) | (-12.18) | (-12.18) | (-12.49) | (-12.59) |
| **Observation** | 814 | 814 | 814 | 814 | 814 |
| **F test** | 4.127 | 6608.099 | 5867.103 | 6105.507 | 5521.216 |
| **R** | 0.004 | 0.987 | 0.987 | 0.988 | 0.988 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

Note that the specifications include bank fixed effects, which control for all the time-independent differences between politically connected banks and non-politically connected banks; thus the differences related to lending channels with regards to operating efficiencies are unlikely to be due to the general differences between private

firms and government-connected firms. Compared with OLS and the fixed effect estimator, the random effects estimator has an advantage as the tool for inference of static panel models. Table (55) presents the results for the determinants of bank lending using the random effect estimator. The results of regression still are consistent with previous findings, which point to a positive and significant effect of political connections on bank credit.

**Table 55: The relationship between bank credit and political connection – Random effect**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN |
| PCD | 0.023 | | | |
| | (1.18) | | | |
| PCB | | 0.008* | | |
| | | (1.94) | | |
| PCP | | | 0.115* | |
| | | | (1.94) | |
| PCGO | | | | 0.077 |
| | | | | (1.64) |
| ETA | -0.006*** | -0.006*** | -0.006*** | -0.006** |
| | (-2.65) | (-2.66) | (-2.62) | (-2.51) |
| LNTA | 0.921*** | 0.918*** | 0.921*** | 0.924*** |
| | (142.05) | (134.43) | (140.49) | (142.48) |
| DEP | 0.016*** | 0.016*** | 0.016*** | 0.016*** |
| | (21.46) | (21.41) | (21.42) | (21.37) |
| NPL | 0.020*** | 0.019*** | 0.019*** | 0.018*** |
| | (2.88) | (2.77) | (2.81) | (2.66) |
| ROA | 0.03 | 0.031 | 0.03 | 0.027 |
| | (1.51) | (1.53) | (1.49) | (1.34) |
| INF | -0.005 | -0.005 | -0.005 | -0.004 |
| | (-1.30) | (-1.35) | (-1.30) | (-1.18) |
| LINT | 0.019* | 0.017* | 0.018* | 0.019* |
| | (1.93) | (1.68) | (1.80) | (1.85) |
| Constant | -0.637*** | -0.588*** | -0.654*** | -0.666*** |
| | (-4.38) | (-3.99) | (-4.48) | (-4.57) |
| **Observation** | 814 | 814 | 814 | 814 |
| **Wald test** | 0.000 | 0.000 | 0.000 | 0.000 |
| **R-within** | 0.935 | 0.935 | 0.935 | 0.936 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in

thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

## 5.6 Robustness

**Table 56: The relationship between alternative bank credit and political connection - OLS**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN |
| PCD | 0.374** | | | |
| | (2.54) | | | |
| PCB | | 0.344*** | | |
| | | (14.48) | | |
| PCP | | | 2.262*** | |
| | | | (5.60) | |
| PCGO | | | | -0.701* |
| | | | | (-1.92) |
| Constant | 13.011*** | 11.529*** | 12.380*** | 13.310*** |
| | (101.48) | (85.59) | (73.00) | (194.26) |
| **Observation** | 792 | 792 | 792 | 792 |
| **F test** | 6.474 | 209.696 | 31.405 | 3.674 |
| **R** | 0.008 | 0.207 | 0.038 | 0.005 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

This section presents the robustness checks to validate the finding of increased lending in politically connected banks. First, I use the amount of interest income in the natural logarithm to replace the gross loan growth. Again, I specify a regression where the dependent variable is the interest income variable, and where the set of independent variables includes political connections, bank characteristics and macroeconomic

variables. On the whole, I obtain similar results with regard to the impact of the variables of interest on the allocation of resources (political connection variables). The results still provide strong evidence about political influences on credit in the emerging market. For example, the coefficient on political connection is positive and significant in all specifications.

**Table 57: The relationship between bank credit and political connection – sub sample**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN |
| PCD | 0.029** | | | |
| | (1.97) | | | |
| PCB | | 0.005 | | |
| | | (1.55) | | |
| PCP | | | 0.098** | |
| | | | (2.50) | |
| PCGO | | | | 0.017 |
| | | | | (0.72) |
| ETA | -0.013*** | -0.013*** | -0.013*** | -0.014*** |
| | (-4.19) | (-4.15) | (-4.05) | (-4.24) |
| LNTA | 0.900*** | 0.897*** | 0.899*** | 0.901*** |
| | (66.53) | (67.69) | (65.73) | (67.04) |
| DEP | 0.019*** | 0.019*** | 0.019*** | 0.019*** |
| | (23.14) | (22.62) | (22.99) | (22.59) |
| NPL | 0.025** | 0.026*** | 0.027*** | 0.024** |
| | (2.54) | (2.62) | (2.66) | (2.42) |
| ROA | 0.062*** | 0.063*** | 0.063*** | 0.053** |
| | (2.67) | (2.65) | (2.65) | (2.27) |
| INF | -0.007 | -0.007 | -0.007 | -0.005 |
| | (-1.20) | (-1.15) | (-1.16) | (-0.94) |
| LINT | 0.017 | 0.015 | 0.016 | 0.015 |
| | (1.35) | (1.17) | (1.20) | (1.18) |
| Constant | -0.438* | -0.377 | -0.431 | -0.408 |
| | (-1.69) | (-1.44) | (-1.61) | (-1.56) |
| **Observation** | 662 | 662 | 662 | 662 |
| **F test** | 1496.851 | 1470.03 | 1461.434 | 1573.301 |
| **R** | 0.962 | 0.962 | 0.962 | 0.962 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of

government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

Second, results for split samples are reported in Table (57). The coefficient for politically connected banks is still positive for the unlisted banks, corroborating that borrowers have been more sensitive to political connections since the bank started listing on the stock exchange. The positive coefficient found on politically connected bank credit still supports the development view explanation of government ownership of banks in developing countries.

Third, although the global financial crisis triggered in 2008 did not affect East Asia as rapidly as in other areas, following Nys et al. (2015) and Onder and Ozyildirim (2013), I run the estimations by deleting the observations of the year 2008 to ensure that the results are not driven, to some extent, by loss of investor confidence in the financial system. The results remain unchanged and show that there is a positive and significant relationship between gross lending growth and political connection. In addition, most of the coefficients for the bank-level characteristics are significant at the five per cent level. The findings presented in this section provide clear support for the argument that preferential influence is related to the political connection in itself, and not to other economic elements involved with the connection (such as an enhancement in the bank's profitability).

**Table 58: The relationship between bank credit and political connection – without year 2008**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN |
| PCD | 0.031** | | | |
| | (2.03) | | | |
| PCB | | 0.005* | | |
| | | (1.78) | | |
| PCP | | | 0.108*** | |
| | | | (2.83) | |
| PCGO | | | | 0.057* |
| | | | | (1.81) |
| ETA | -0.010*** | -0.010*** | -0.010*** | -0.011*** |
| | (-3.44) | (-3.43) | (-3.38) | (-3.53) |
| LNTA | 0.959*** | 0.957*** | 0.958*** | 0.961*** |
| | (130.66) | (136.42) | (131.2) | (133.49) |
| DEP | 0.020*** | 0.020*** | 0.020*** | 0.020*** |
| | (22.05) | (21.66) | (21.93) | (21.66) |
| NPL | 0.046*** | 0.046*** | 0.046*** | 0.043*** |
| | (5.00) | (5.08) | (5.07) | (4.72) |
| ROA | 0.100*** | 0.101*** | 0.099*** | 0.091*** |
| | (4.59) | (4.61) | (4.54) | (4.14) |
| INF | -0.018** | -0.017** | -0.018** | -0.017** |
| | (-2.22) | (-2.18) | (-2.21) | (-2.10) |
| LINT | 0.063*** | 0.061*** | 0.063*** | 0.063*** |
| | (3.81) | (3.72) | (3.82) | (3.78) |
| Constant | -1.758*** | -1.708*** | -1.755*** | -1.737*** |
| | (-11.06) | (-10.88) | (-10.89) | (-10.81) |
| **Observation** | 761 | 761 | 761 | 761 |
| **F test** | 6779.718 | 6658.212 | 6448.126 | 6734.645 |
| **R** | 0.987 | 0.987 | 0.987 | 0.987 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

**Table 59: The relationship between bank credit and political connection – GMM**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable** | LOAN | LOAN | LOAN | LOAN |
| Lag. LOAN | 0.571*** | 0.573*** | 0.570*** | 0.583*** |
| | (27.04) | (29.14) | (28.04) | (28.30) |
| PCD | 0.024*** | | | |
| | (3.80) | | | |
| PCB | | 0.005** | | |
| | | (2.52) | | |
| PCP | | | 0.080*** | |
| | | | (3.28) | |
| PCGO | | | | 0.026 |
| | | | | (0.85) |
| ETA | -0.002 | -0.002 | -0.002 | 0.001 |
| | (-0.84) | (-0.98) | (-0.86) | (0.70) |
| LNTA | 0.403*** | 0.398*** | 0.403*** | 0.392*** |
| | (19.82) | (20.79) | (20.48) | (19.89) |
| DEP | 0.008*** | 0.008*** | 0.008*** | 0.008*** |
| | (11.38) | (11.94) | (12.01) | (11.25) |
| NPL | 0.004 | 0.004 | 0.005* | -0.001 |
| | (1.26) | (1.22) | (1.71) | (-0.30) |
| ROA | -0.007 | -0.016 | -0.014 | -0.036*** |
| | (-0.52) | (-1.16) | (-1.05) | (-2.77) |
| INF | -0.005*** | -0.005*** | -0.005*** | -0.005*** |
| | (-8.90) | (-8.17) | (-8.23) | (-7.13) |
| LINT | 0.025*** | 0.023*** | 0.024*** | 0.025*** |
| | (13.45) | (12.4) | (14.12) | (11.60) |
| Constant | -0.405*** | -0.338*** | -0.401*** | -0.395*** |
| | (-5.74) | (-4.90) | (-5.69) | (-5.93) |
| **Observation** | 761 | 761 | 761 | 761 |
| **F test** | 42107.18 | 43018.38 | 38129.36 | 37535.25 |
| **AR 1** | 0.024 | 0.024 | 0.023 | 0.018 |
| **AR 2** | 0.185 | 0.185 | 0.183 | 0.178 |
| **Hansen test** | 0.183 | 0.194 | 0.156 | 0.181 |

Note: LOAN is the natural logarithm of total gross loan in thousands of CYN. CORP is the natural logarithm of total corporate loans in thousands of CYN. CONS is the natural logarithm of total consumer loans in thousands of CYN. INTI is the natural logarithm of total interest income in thousands of CYN. PCD is 1 if the chairman or CEO is politically connected and 0 otherwise. PCB is the number of board members with political connections. PCP is the percentage of board members with political connections. PCGO is the percentage of government shareholdings. ETA is the ratio of total equity to total asset. LNTA is the natural logarithm of total assets in thousands of USD. DEP is the ratio of total deposits to total loans. NPL is the ratio of non-performing loans to total loans. ROA is the ratio of return on average assets. GDP is the gross domestic product (GDP) change (in percentage points). INF is the Inflation rate. LINT is the one-year loan interest rate.

Fourth, the GMM system estimation is used as one of the robustness checks. Past shocks to bank lending may directly influence the contemporaneous political connection and there is a risk that the results may be inconsistent. Additionally, the results may also be due to reverse causality problems. For example, banks with more lending may attract politicians as board members and also use the influence of these members to distribute more credit. Given these issues, a more convincing estimation method would be included to control for all time-invariant attributes.

Again, positive and significant coefficients are observed in the relationship between of gross loans and the politics-connected variable. In addition, the regressions pass the AR (2) and Hansen OIR specification tests, suggesting the validity of the instrumentation. The GMM estimation results are reported in Table (59) with two diagnostics: the Hansen test does not reject the over identification conditions for instrument variables, and the Arellano-Bond tests for serial correlation find no second order serial correlation.

## 5.7 Conclusion

Banks generally supply a considerable portion of firm financing and play a vital role in economic development. A stable and efficient banking sector can be a huge source of benefit to governments, and bank failures can get politicians, as well as the entire economy, into ‘hot water’. Politically connected banks are likely to utilise the relationship to attract government subsidies, such as sources of finance, government guarantees and bad debts resolutions. Loan portfolio managers of main Chinese banks may select to follow the ‘herd’ of bankers in the region and invest heavily in high-profit but high-risk property industry.

Identifying the heart of bank lending behaviour with regard to political influence is valuable. Governments do not only impose maximum social and political objectives, but also offer implicit guarantees against failure. Given these conflicting views of influence

and the predominant role of bank credit behavior, this chapter empirically investigates the lending responses of political impacts on the bank sector. The findings of this chapter should be decoded with caution, as are other finance-growth literatures that analyse the connection between lending growth and financial services provided by governments.

The findings indicate that politically connected banks distribute more credit than non-politically connected banks. This evidence tests for robustness by controlling for country macroeconomic elements, as well as bank-specific factors. Results shows a significant interaction between the effect of banks' political connections and GDP growth on credit supply. This effect suggests that political connection and lending exhibit a complicated relationship rather than a linear relationship, which has been the focus in the literature.

This chapter is related to studies that explore the reasons why various bank ownership types (state, domestic private, and foreign banks) may differ in terms of credit behaviour. This chapter, nonetheless, contributes some new, tentative, empirical evidence on a range of current policy issues and theoretical debates. The methodology applied is relatively straightforward and can be replicated in other avenues to examine the role of politics in banking. In addition, the results indicate that the omission of the politic element as an independent variable may explain why previous studies from China have been, to a certain extent, inconclusive.

This chapter indicates some interesting directions for further research. First, my dataset consists of Chinese banks, which allows me to consider the impact of the institutional environment in which these banks operate. China's financial sector has experienced fundamental and extensive changes since the early 2000s. However, the Chinese market is a relatively weak institution, where investors are not well protected. This poses the research question of what the value of political connection is in markets with very strong institutions, and requires more research to better understand whether political

connections are driving the differences. Second, collecting deposits is an important and essential activity for banks. The role banks' political connections play, not only in lending channels but also in attracting deposits, reflects how politics affect depositor behaviour. Last, there would be various possible reasons for the differences in politically connected bank behaviour in developing markets and developed markets. Therefore, the relationship between bank lending and political influence could be analysed together with bank financial statement items (i.e. profitability, liquidity, and capitalisation) in a simultaneous equation structure (such as a panel VAR) in order to better capture the differences among markets. Therefore, analysing the combination of these mechanisms is a promising scope for future studies.

My chapter is subject to some limitations. First, the literature on government-owned banks and private banks in times of recession suggests that government-owned banks are less risk averse during crisis periods (Bertay et al., 2015; Brei and Schclarek, 2015). However, China's banking industry has been comparatively immune from financial crises due to strict government controls and political orientation, which relatively isolate the domestic financial sector from the developments in the global financial system. I am silent on this case. Such concerns are not taken into concern in this chapter and so are not addressed here. Second, industry distribution of loans (e.g. financial or manufacturing sectors) is not included in this study because the full data on these loans are limited and unreliable. Banks should be encouraged to report the allocation of loans in more detail in their annual reports. Moreover, the chapter would provide more convincing evidence if the information of political connection can be broken down into centre and local government and their differing political goals. It is important to understand why bank credit distribution differs across politicians throughout the country. However, analysing such a research questions go beyond the scope of this chapter because of data limitation at the regional level. Furthermore, investigating the impact of political influence on bank credit distribution is a challenging task due to the potential endogeneity between politics and firm investment, as the lending downturn itself has arguably generated a great deal of political uncertainty (Julio and Yook, 2012).

These results may provide several important policy implications that go beyond economic development and financial stability. First, the empirical results may be useful for the Chinese government and banking regulatory authority to make relevant policies on ownership reform. The supervisory authorities should be aware that the combinations of different types of ownership, in conjunction with the circumstances and economic situation, would result in differentiated lending outcomes. Privatisation may be more beneficial to society, as opposed to the direct subsidies of state-owned institutions in the purely commercial parts of the financial markets. However, we should be aware that the findings do not suggest that full privatisation of banks will eliminate political rent seeking. Second, the findings have important implications for the causes and consequences of banking regulations. The results in this chapter seem to support the argument that regulatory banking authorities should be independent from political influence for the effectiveness of the financial system.

Concurrently, the role that political influence plays in the financial system and in the emerging markets has come to attract more attention. The focus of this chapter is whether or not politically connected banks carry a higher supply of credit. The results imply that financial integration is more of a double-edged sword than previously thought.

# Chapter 6: Conclusion

The defining principle of general corporate governance is a typical term of the contract between shareholders and the firm, with the duty of managers and directors to maximise firm value for shareholders. The separation of shareholder ownership and management control is the major problem of modern corporate governance. As a result, agency problems occur when shareholders' lack the necessary power or information to monitor and control managers. Research on corporate governance has devoted tremendous effort to focusing on some internal mechanisms, such as board structure, managerial compensation, ownership structure, institutional investors, and foreign investors, specifically. However, external mechanisms of corporate governance also can influence firm value. Additionally, internal and external corporate governance mechanisms can interact as either complements or substitutes (Ferreira et al., 2011), which would affect firm value simultaneously. Thus, it is desirable to look at a universe of governance mechanisms in its entirety. Therefore, this study extends the relevant literature in three major areas: corporate governance, financial market microstructure, and bank stability.

The main objective of this thesis is to study empirically the impact of various governance mechanisms on bank stability, in terms of capital strategy, risk taking and performance. Although it is well recognised that corporate governance can affect bank value, in this thesis, I combine the external and internal corporate governances by considering the board composition, ownership structure and trading behaviours on stock market. The understanding of different governance mechanisms drivers facilitates the identification of key vulnerabilities of the banking sector.

In Chapter 2, I apply the model to the annual panel data for publicly traded bank holding companies in three stock markets over a sample period from 2006 to 2015. Using fixed effect, I find a significantly positive relationship between market discipline from informed trading and bank capital structure. In addition, I use the Stochastic

Frontier Approach (SFA) to measure bank performance in terms of profit inefficiency. I examine the relation between bank performance and market discipline mechanisms by regressing bank inefficiency on measures of governance and control variables. The results suggest that market discipline is a more effective avenue to enhance bank capital when banks perform efficiently. Robust tests based on instrumental variables and dynamic GMM show evidence of a causal link between market discipline and bank capital structure. The results have certain policy implications for understanding the role of stock markets in affecting bank operations, which in turn, could improve bank prudency and assist the design of an enhanced regulation framework. An important premise of corporate finance theory is that markets discipline managers to maximise all stockholders' wealth.

In Chapter 3, following Hass et al. (2014), my internal governance measure includes seven attributes, which are: the number of independent board members board size, executive ownership, Big 4 audit firm, foreign ownership, CEO duality, and relationships among the top ten shareholders. After analysing a majority regional banks over the period from 2006 to 2015, I find that banks with strong corporate governance are associated with higher risk-taking. More specifically, banks with intermediate sized boards, separation between CEO and the chairman of board, and that are audited by one of the Big Four audit firms, are likely to take high risks. The findings in Chapter 3 offer encouraging directions for further research and notable insights for policy makers. From an academic point of view, researchers aiming to embed a banking sector in a macroeconomic model with financial frictions should adequately control for bank risk-taking. I show in a regional context that macroeconomic conditions affect bank risk dynamics. In addition, bank stress tests, of a general nature, in the banking system in China (macro-tests) typically undertake a scenario analysis where the impact of specific determinants on a bank's financial conditions are assessed. Finally, the Generalised Method of Moments (GMM) estimator is used to control correlation and possible endogeneity problems for the regression. Our results hold after addressing endogeneity and using these tests.

In Chapter 4, I examine how different types of ownership structure in a country's banking system affect bank performance. Specifically, I use both return on assets and return on equity accounting-based measures to examine performance differences between the privately-owned and state-owned shareholding banks in an emerging market from 2006 through 2015. I find that banks with high government and SOE ownership are generally operated less profitably, and suggest that state-owned banks finance the government to a greater degree. This result can be explained by Shleifer and Vishny's (1997) corporate governance theory on state ownership of firms and contestable market perspectives of banking policy mistakes. In addition, foreign ownership is negatively associated with bank performance. Foreign shareholders might stand in a minority position, making it more conflicting, and ultimately reducing bank performance. Furthermore, more ownership type diversity is associated with better performance.

In Chapter 5, I examine corporate political connections that are widespread across the world among financial firms, particularly in countries with inefficient legal frameworks. Governments set up agencies to regulate and govern bank activities via chartering restrictions, authorisation and licensing. In addition, governments may set up practices to monitor bank operation and risk-taking. Moreover, governments may provide insurance to bank depositors and lenders with last or even only resort. Obviously, the governments play a significant and active role in the banking sector.

Differences in bank credit preference are not only a result of differences in financial statements, but also of differences in the models of business, which are closely related to corporate governance. It is reasonable that banks relying on a relationship-based approach to lending may be willing to increase loans to borrowers with whom they tend to have stable relationships. I examine the impact of banks' political connections to the supply of funds by estimating the supply functions of loans, and by using simultaneous estimations panel data techniques.

The prior literature examining controls on bank lending behaviour has considered information of corporate governance in general, while largely ignoring political connection specifically. The present chapter demonstrates that the role of political connections should be considered in analysing the effects of bank behaviour on lending. Given the growing literature on the importance of bank scarce resource allocation and ownership reform, we examine whether banks (in important developing countries) with political connections are associated with their lending decisions. The findings enhance the understanding of bank political connections in general, and in emerging markets in particular.

This thesis provides important contributions to the knowledge of corporate governance and provides a strong foundation on which future researchers can build. Future avenues of research can benefit by examining performance in the banking industry across different governance mechanisms. Firstly, from a policy perspective, my results of Chapter 2, based on the simple capital ratio, might be helpful in analysing and fine-tuning the Basel III agreement. In general, Basel II and Basel III follow a one-size-fits-all-countries approach. However, I show that stock trading characteristics affect bank capital structure adjustments and hence a conditional policy may be more desirable. Effective public monitoring and supervision positively affect the level of bank capital. Secondly, as found in Chapter 3, governance improvements have a role to play in bank risk variation; thus, this role must be considered against the backdrop of the existing systematic factors in the banking system. The distinct differences found in the risk attributes of capital, profitability and size across developed and developing financial markets should be considered when implementing a regulatory system. The key challenge for future research is to understand if, and under what conditions, the potential benefits of the development governance regulation can effectively monitor the managers and directors to maximize shareholders’ values and protect shareholders' rights.

## Reference:

Acharya, V., Drechsler, I., Schnabl, P., 2014. A pyrrhic victory? Bank bailouts and sovereign credit risk. *Journal of Finance* 69, 2689-2739.

Adams, R. B., Mehran, H., 2012. Bank board structure and performance: Evidence for large bank holding companies. *Journal of Financial Intermediation* 21, 243-267.

Admati, A. R., Pfleiderer, P., 2009. The "Wall Street Walk" and shareholder activism: Exit as a form of voice. *Review of Financial Studies* 22, 2645-2685.

Aebi, V., Sabato, G., Schmid, M., 2012. Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking and Finance* 36, 3213-3226.

Agarwal, P., O'Hara, M., 2007. Information risk and capital structure. *Working paper*.

Aigner, D., Lovel, C. A. K., Schmidt P., 1977. Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics* 6, 21-37.

Akins, B., Dou, Y., Ng, J., 2017. Corruption in bank lending: The role of timely loan loss recognition. *Journal of Accounting and Economics* 63, 454-478.

Albertazzi, U., Gambacorta, L., 2009. Bank profitability and the business cycle. *Journal of Financial Stability* 5, 393-409.

Allen, F., Carletti, E., Marquez, R., 2011. Credit market competition and capital regulation. *Review of Financial Studies* 24, 983-1018.

Allen, F., Carletti, E., Marquez, R., 2015. Deposits and bank capital structure. *Journal of Financial Economics* 118, 601-619.

Allen, F., Jackowicz, K., Kowalewski, O., Kozlowski, L., 2017. Bank lending, crises, and changing ownership structure in Central and Eastern European countries. Journal of Corporate Finance 42, 494-515.

Altunbas, Y., Carbo, S., Gardener, E. P., Molyneux, P., 2007. Examining the relationships between capital, risk and efficiency in European banking. *European Financial Management* 13, 49-70.

Altunbas, Y., Evans, L., Molyneux, P., 2001. Bank ownership and efficiency. *Journal of Money, Credit and Banking* 33, 926-954.

Anginer, D., Demirguc-Kunt, A., Huizinga, H., Ma, K., 2016. How does corporate governance affect bank capitalization strategies? *Journal of Financial Intermediation* 26, 1-27.

Anginer, D., Demirguc-Kunt, A., Zhu, M., 2014. How does deposit insurance affect bank risk? Evidence from the recent crisis. *Journal of Banking and Finance* 48, 312-321.

Arellano, M., Bond, S., 1991. Some tests of specification for panel data: Monte-Carlo evidence and an application to employment equation. *Review of Economic Studies* 58, 277–287.

Arellano, M., Bover, O., 1995. Another look at the instrumental-variable estimation of error components models. *Journal of Econometrics* 68, 29–52.

Ashraf, B. N., 2017. Political institutions and bank risk-taking behavior. *Journal of Financial Stability* 29, 13–35.

Athanasoglou, P. P., Brissimis, S. N., Delis, M. D., 2008. Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of international financial Markets, Institutions and Money* 18, 121-136.

Bai, G., Elyasiani, E., 2013. Bank stability and managerial compensation. *Journal of Banking and Finance* 37, 799-813.

Bailey, W., Huang, W., Yang, Z., 2012. Bank loans with Chinese characteristics: some evidence on inside debt in a state-controlled banking system. *Journal of Financial and Quantitative Analysis* 46, 1795-1830.

Baltagi, B., 2008. Econometric analysis of panel data. *John Wiley and Sons*.

Barakat, A., Chernobai, A., Wahrenburg, M., 2014. Information asymmetry around operational risk announcements. *Journal of Banking and Finance* 48, 152-179.

Barrios, V E., Blanco, J. M., 2003. The effectiveness of bank capital adequacy regulation: A theoretical and empirical approach. *Journal of Banking and Finance* 27, 1935-1958.

Barry, T. A., Lepetit, L., Tarazi, A., 2011. Ownership structure and risk in publicly held and privately owned banks. *Journal of Banking and Finance* 35, 1327-1340.

Barth, J. R., Caprio Jr, G., Levine, R., 2004. Bank regulation and supervision: what

works best? *Journal of Financial Intermediation* 13, 205-248.

Barth, J. R., Caprio Jr, G., Levine, R., 2013. Bank Regulation and Supervision in 180 Countries from 1999 to 2011. *Journal of Financial Economic Policy* 5, 111-219.

Basel Committee on Banking Supervision, 2010. Principles for Enhancing Corporate. *Bank for International Settlements, Basel.*

Battaglia, F., Gallo, A., 2017. *Strong boards, ownership concentration and EU banks' systemic risk-taking: Evidence from the financial crisis.* Journal of International Financial Markets, Institutions and Money 46, 128–146.

Beltratti, A., Stulz, R. M., 2012. The credit crisis around the globe: Why did some banks perform better? *Journal of Financial Economics* 105, 1-17.

Benink, H., Wihlborg, C., 2002. The new Basel capital accord: making it effective with stronger market discipline. *European Financial Management* 8, 103-115.

Bennett, R. L., Hwa, V., Kwast, M. L., 2015. Market discipline by bank creditors during the 2008--2010 crisis. *Journal of Financial Stability* 20, 51-69.

Berger, A. N., 1995. The relationship between capital and earnings in banking. *Journal of Money, Credit and Banking* 432-456.

Berger, A. N., Bouwman, C. H., 2013. How does capital affect bank performance during financial crises? *Journal of Financial Economics* 109, 146-176.

Berger, A. N., Clarke, G. R., Cull, R., Klapper, L., Udell, G. F., 2005. Corporate governance and bank performance: A joint analysis of the static, selection, and dynamic effects of domestic, foreign, and state ownership. *Journal of Banking and Finance* 29, 2179-2221.

Berger, A. N., DeYoung, R., Flannery, M. J., Lee, D., Öztekin, Ö., 2008. How do large banking organizations manage their capital ratios? *Journal of Financial Services Research* 34, 2-3, 123-149.

Berger, A. N., Hanweck, G. A., Humphrey, D. B., 1987. Competitive viability in banking: Scale, scope, and product mix economies. *Journal of monetary economics* 20, 501-520.

Berger, A. N., Hasan, I., Zhou, M., 2009a. Bank ownership and efficiency in China: What will happen in the world's largest nation? *Journal of Banking and Finance* 33,

113-130.

Berger, A. N., Kick, T., Schaeck, K., 2014. Executive board composition and bank risk taking. *Journal of Corporate Finance* 28, 48-65.

Berger, A. N., Klapper, L. F., Turk-Ariss, R., 2009b. Bank competition and financial stability. *Journal of Financial Services Research* 35, 99-118.

Berger, A. N., Mester, L., 1997. Inside the black box: What explains differences in the efficiencies of financial institutions. *Journal of Banking and Finance* 21, 895–947.

Bertay, A. C., Demirgüç-Kunt, A., Huizinga, H., 2013. Do we need big banks? Evidence on performance, strategy and market discipline. *Journal of Financial Intermediation* 22, 532-558.

Bertay, A. C., Demirgüç-Kunt, A., Huizinga, H., 2015. Bank ownership and credit over the business cycle: Is lending by state banks less procyclical? *Journal of Banking and Finance* 50, 326–339.

Beuselinck, C., Cao, L., Deloof, M., Xia, X., 2017. The value of government ownership during the global financial crisis. *Journal of Corporate Finance* 42, 481–493.

Bhagat, S., Bolton, B., Corporate governance and firm performance. *Journal of Corporate Finance* 14, 257-273.

Bliss, R. R., Flannery, M. J., 2002. Market discipline in the governance of US bank holding companies: Monitoring vs. influencing. *European Finance Review* 6, 361-396.

Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87, 115-143.

Board of Governors of the Federal Reserve System (2010a) Bank Holding Company Supervision Manual, Supplement 38. *Board of Governors of the Federal Reserve System*, Washington, D.C.

Board of Governors of the Federal Reserve System (2010b) Testimony by General Counsel Scott G. Alvarez before the Committee on Financial Services, U.S. House of Representatives. *Board of Governors of the Federal Reserve System,* Washington, D.C.

Bolton, P., Mehran, H., Shapiro, J., 2015. Executive compensation and risk taking.

*Review of Finance*, rfu049.

Bolton, P., Santos, T., Scheinkman, J. A., 2016. Cream-Skimming in Financial Markets. *Journal of Finance* 71, 709–736.

Borisova, G., Fotak, V., Holland, K., Megginson, W. L., 2015. Government ownership and the cost of debt: Evidence from government investments in publicly traded firms. *Journal of Financial Economics* 118, 168–191.

Boubakri, N., El Ghoul, S., Saffar, W., 2014. Political rights and equity pricing. *Journal of Corporate Finance* 27, 326–344.

Bouvatier, V., Lepetit, L., Strobel, F., 2014. Bank income smoothing, ownership concentration and the regulatory environment. *Journal of Banking and Finance* 41, 253-270.

Braun, M., Raddatz, C., 2010. Banking on politics: when former high-ranking politicians become bank directors. *World Bank Economic Review* 24, 2, 234–279.

Brei, M., Schclarek, A., 2013. Public bank lending in times of crisis. *Journal of Financial Stability* 9, 820–830.

Brei, M., Schclarek, A., 2015. A theoretical model of bank lending: Does ownership matter in times of crisis? *Journal of Banking and Finance* 50, 298–307.

Burkart, M., Panunzi, F., Shleifer, A., 2003. Family firms. *Journal of Finance* 58, 2167-2202.

Caprio, G., Laeven, L., Levine, R., 2007. Governance and bank valuation. *Journal of Financial Intermediation* 16, 584-617.

Carney, R. W., Child, T. B., 2013. Changes to the ownership and control of East Asian corporations between 1996 and 2008: The primacy of politics. *Journal of Financial Economics* 107, 494-513.

Carvalho, D., 2014. The real effects of government-owned banks: Evidence from an emerging market. *Journal of Finance* 69, 577–609.

Chalermchatvichien, P., Jumreornvong, S., Jiraporn, P., Singh, M., 2014. The effect of bank ownership concentration on capital adequacy, liquidity, and capital stability. *Journal of Financial Services Research* 45, 219-240.

Chen, C. J. P., Li, Z., Su, X., Sun, Z., 2011. Rent-seeking incentives, corporate political

connections, and the control structure of private firms: Chinese evidence. *Journal of Corporate Finance* 17, 229–243.

Chen, C. R., Li, Y., Luo, D., Zhang, T., 2017. Helping hands or grabbing hands? An analysis of political connections and firm value. *Journal of Banking and Finance* 80, 71–89.

Chen, D., Guan, Y., Zhang, T., Zhao, G., 2017. Political connection of financial intermediaries: Evidence from China's IPO market. *Journal of Banking and Finance* 76, 15–31.

Chen, Q., Goldstein, I., Jiang, W., 2007. Price informativeness and investment sensitivity to stock price. *Review of Financial Studies* 20, 619-650.

Chen, S., Sun, Z., Tang, S., Wu, D., 2011. Government intervention and investment efficiency: Evidence from China. *Journal of Corporate Finance* 17, 259–271.

Chen, V. Z., Li, J., Shapiro, D. M., Zhang, X., 2014. Ownership structure and innovation: An emerging market perspective. *Asia Pacific Journal of Management* 31, 1-24.

Chen, Y., 2016. Bank capital and credit market competition: Will competitive pressure lead to higher capital levels? *Journal of International Money and Finance* 69, 247-263.

Chen, Y.-S., Chen, Y., Lin, C.-Y., Sharma, Z., 2016. Is there a bright side to government banks? Evidence from the global financial crisis. *Journal of Financial Stability* 26, 128–143.

Chernobai, A., Jorion, P., Yu, F., 2012. The determinants of operational risk in US financial institutions. *Journal of Financial and Quantitative Analysis* 46, 1683-1725.

Choe, H., Kho, B. C., Stulz, R. M., 2005. Do domestic investors have an edge? The trading experience of foreign investors in Korea. *Review of Financial Studies* 18, 795-829.

Claessens, S., Djankov, S., Lang, L. H., 2000. The separation of ownership and control in East Asian corporations. *Journal of Financial Economics* 58, 81-112.

Claessens, S., Feijen, E., Laeven, L., 2008. Political connections and preferential access to finance: The role of campaign contributions. *Journal of Financial Economics* 88,

554–580.

Clarke, G. R. G., Cull, R., Kisunko, G., 2012. External finance and firm survival in the aftermath of the crisis: Evidence from Eastern Europe and Central Asia. *Journal of Comparative Economics* 40, 372–392.

Core, J. E., Holthausen, R. W., Larcker, D. F., 1999. Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics* 51, 371-406.

Cornett, M. M., Guo, L., Khaksari, S., Tehranian, H., 2010. The impact of state ownership on performance differences in privately-owned versus state-owned banks: An international comparison. *Journal of Financial Intermediation* 19, 74-94.

Corporate Governance Code, U. K. (2010). UK corporate governance code. *Financial Services Authority*. London UK.

Cull, R., & Martínez Pería, M. S., 2013. Bank ownership and lending patterns during the 2008-2009 financial crisis: Evidence from latin America and Eastern Europe. *Journal of Banking and Finance* 37, 4861–4878.

Cull, R., Xu, L. C., 2005. Institutions, ownership, and finance: The determinants of profit reinvestment among Chinese firms. *Journal of Financial Economics* 77, 117–146.

Cuñat, V., Guadalupe, M., 2009. Executive compensation and competition in the banking and financial sectors. *Journal of Banking and Finance* 33, 495-504.

Curry, T. J., Fissel, G. S., Hanweck, G. A., 2008. Equity market information, bank holding company risk, and market discipline. *Journal of Banking and Finance* 32, 807-819.

Dasgupta, A., Piacentino, G., 2015. The wall street walk when blockholders compete for flows. *Journal of Finance* 70, 2853-2896.

De Andres, P., Vallelado, E., 2008. Corporate governance in banking: The role of the board of directors. *Journal of banking and finance* 32, 2570-2580.

De Haas, R., Van Lelyveld, I., 2014. Multinational banks and the global financial crisis: Weathering the perfect storm? *Journal of Money, Credit and Banking* 46, 333–364.

De Jonghe. O., Oztekin, o., 2015. Bank capital management: International evidence.

*Journal of Financial Intermediation* 24, 154-177.

DeAngelo, H., Stulz, R. M., 2015. Liquid-claim production, risk management, and bank capital structure: Why high leverage is optimal for banks. *Journal of Financial Economics* 116, 219-236.

Dell'Ariccia, G., 2001. Asymmetric information and the structure of the banking industry. *European Economic Review* 45, 1957–1980.

Demirguç-Kunt, A., Detragiache, E., 2002. Does deposit insurance increase banking system stability? An empirical investigation. *Journal of Monetary Economics* 49, 1373-1406.

Detragiache, E., Gupta, P., 2006. Foreign banks in emerging market crises: Evidence from Malaysia. *Journal of Financial Stability* 2, 217–242.

DeYoung, R., Peng, E. Y., Yan, M., 2013. Executive compensation and business policy choices at US commercial banks. *Journal of Financial and Quantitative Analysis* 48, 165-196.

DeYoung, R., Spong, K., Sullivan, R. J., 2001. Who's minding the store? Motivating and monitoring hired managers at small, closely held commercial banks. *Journal of Banking and Finance* 25, 1209-1243.

Diamond, D. W., Rajan, R. G., 2000. A theory of bank capital. *Journal of Finance* 55, 2431-2465.

Dinç, I. S., 2005. Politicians and banks: Political influences on government-owned banks in emerging markets. *Journal of Financial Economics* 77, 453–479.

Distinguin, I., Roulet, C., Tarazi, A., 2013. Bank regulatory capital and liquidity: Evidence from US and European publicly traded banks. *Journal of Banking and Finance* 37, 3295-3317.

Dong, Y., Meng, C., Firth, M., Hou, W., 2014. Ownership structure and risk-taking: Comparative evidence from private and state-controlled banks in China. *International Review of Financial Analysis* 36, 120-130.

Dow, J., Goldstein, I., Guembel, A., 2015. Incentives for information production in markets where prices affect real investment. *Working paper*, London Business School.

Duchin, R., & Sosyura, D., 2012. The politics of government investment. *Journal of Financial Economics* 106, 24–48.

Easley, D., Hvidkjaer, S., O'hara, M., 2002. Is information risk a determinant of asset returns? *Journal of Finance* 57, 2185-2221.

Easley, D., Kiefer, N. M., O'hara, M., 1997a. The Information content of the trading process, *Journal of Empirical Finance* 4, 159-186.

Easley, D., Kiefer, N. M., O'hara, M., 1997b. One day in the life of a very common stock, *Review of Financial Studies* 10, 805-835.

Easley, D., Kiefer, N. M., O'hara, M., Paperman, J. B., 1996. Liquidity, information, and infrequently traded stocks. *Journal of Finance*, 51, 1405-1436.

Easley, D., O'hara, M., 1992. Time and the process of security price adjustment. *Journal of Finance* 47, 577-605.

Easley, D., O'hara, M., 2004. Information and the cost of capital. *Journal of Finance* 59, 1553-1583.

Edmans, A., 2009. Blockholder trading, market efficiency, and managerial myopia. *Journal of Finance* 64, 2481-2513.

Edmans, A., Fang, V. W., Zur, E., 2013. The effect of liquidity on governance. *Review of Financial Studies* hht012.

Edmans, A., Manso, G., 2011. Governance through trading and intervention: A theory of multiple blockholders. *Review of Financial Studies* 24, 2395-2428.

Ellis, K., Michaely, R., O'Hara, M., 2000. The accuracy of trade classification rules: Evidence from Nasdaq. *Journal of Financial and Quantitative Analysis* 35, 529-551.

Ellul, A., Yerramilli, V., 2013. Stronger risk controls, lower risk: Evidence from US bank holding companies. *Journal of Finance* 68, 1757-1803.

Elyasiani, E., Zhang, L., 2015. Bank holding company performance, risk, and busy board of directors. *Journal of Banking and Finance* 60, 239 – 251.

Erkens, D. H., Hung, M., Matos, P., 2012. Corporate governance in the 2007--2008 financial crisis: Evidence from financial institutions worldwide. *Journal of Corporate Finance* 18, 389-411.

Estrella, A., 2004. Bank capital and risk: is voluntary disclosure enough? *Journal of Financial Services Research* 26, 145-160.

Faccio, M., 2006. Politically Connected Firms. *American Economic Review* 96, 369–386.

Faccio, M., Lang, L. H., Young, L., 2001. Dividends and expropriation. *American Economic Review* 91, 54-7.

Faccio, M., Masulis, R. W., McConnell, J. J., 2006. Political Connections and Corporate Bailouts. *Journal of Finance* 61, 2597-2635.

Fahlenbrach, Rü., Stulz, R. M., 2011. Bank CEO incentives and the credit crisis. *Journal of Financial Economics* 99, 11-26.

Faleye, O., Krishnan, K., 2017. Risky Lending: Does Bank Corporate Governance Matter? *Journal of Banking and Finance* 50.

Fama, E. F., Jensen, M. C., 1983. Separation of ownership and control. *Journal of Law and Economics* 301-325.

Fan, J. P. H., Wong, T. J., Zhang, T., 2007. Politically connected CEOs, corporate governance, and Post-IPO performance of China's newly partially privatized firms. *Journal of Financial Economics* 84, 330–357.

Fang, V. W., Huang, A. H., Karpoff, J. M., 2016. Short selling and earnings management: A controlled experiment. *Journal of Finance*, 1251-1294.

Faure-Grimaud, A., Gromb, D., 2004. Public trading and private incentives. *Review of financial Studies* 17, 985-1014.

Ferreira, D., Ferreira, M. A., Raposo, C. C., 2011. Board structure and price informativeness. *Journal of Financial Economics* 99, 523-545.

Ferreira, M. A., Laux, P. A., 2007. Corporate governance, idiosyncratic risk, and information flow. *Journal of Finance* 62, 951-989.

Ferreira, M. A., Matos, P., 2008. The colors of investors money: The role of institutional investors around the world. *Journal of Financial Economics* 88, 499-533.

Ferri, G., Kalmi, P., Kerola, E., 2014. Does bank ownership affect lending behavior? Evidence from the Euro area. *Journal of Banking and Finance* 48, 194–209.

Flannery, M. J., Giacomini, E., 2015. Maintaining adequate bank capital: An empirical

analysis of the supervision of European banks. *Journal of Banking and Finance* 59, 236-249.

Flannery, M. J., Rangan, K. P., 2008. What caused the bank capital build-up of the 1990s? *Review of Finance* 12, 391-429.

Fratzscher, M., König, P. J., Lambert, C., 2016. Credit provision and banking stability after the Great Financial Crisis: The role of bank regulation and the quality of governance. *Journal of International Money and Finance* 66, 113-135.

Fries, S., Taci, A., 2005. Cost efficiency of banks in transition: Evidence from 289 banks in 15 post-communist countries. *Journal of Banking and Finance* 29, 55-81.

Fu, X. M., Heffernan, S., 2009. The effects of reform on China's bank structure and performance. *Journal of Banking and Finance* 33, 39-52.

Fu, X. M., Lin, Y. R., Molyneux, P., 2014. Bank competition and financial stability in Asia Pacific. *Journal of Banking and Finance* 38, 64-77.

Fu, X. M., Lin, Y. R., Molyneux, P., 2014. Bank efficiency and shareholder value in Asia Pacific. *Journal of International Financial Markets, Institutions and Money* 33, 200-222.

Gallagher, D. R., Gardner, P. A., Swan, P. L., 2013. Governance through trading: Institutional swing trades and subsequent firm performance. *Journal of Financial and Quantitative Analysis* 48, 427-458.

Garcia-Herrero, A., Gavilá, S., Santabárbara, D., 2009. What explains the low profitability of Chinese banks? *Journal of Banking and Finance* 33, 2080-2092.

Ghosh, A., 2015. Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. *Journal of Financial Stability* 20, 93-104.

Gillan, S., Starks, L. T., 2003. Corporate governance, corporate ownership, and the role of institutional investors: A global perspective. *Journal of Applied Finance* 13, 4-22.

Gonzalez-Garcia, J., Grigoli, F., 2013. State-Owned Banks and Fiscal Discipline. *International Monetary Fund*.

Gorton, G. B., Huang, L., Kang, Q., 2016. The limitations of stock market efficiency:

price informativeness and CEO turnover. *Review of Finance*.

Gropp, R., Heider, F. 2010. The Determinants of Bank Capital Structure. *Review of Finance* rfp030.

Hagendorff, J., Vallascas, F., 2011. CEO pay incentives and risk-taking: Evidence from bank acquisitions. *Journal of Corporate Finance* 17, 1078-1095.

Hakenes, H., Schnabel, I., 2010. Banks without parachutes: Competitive effects of government bail-out policies. *Journal of Financial Stability* 6, 156-168.

Haq, M., Heaney, R., 2012. Factors determining European bank risk. *Journal of International Financial Markets, Institutions and Money* 22, 696-718.

Hass, L. H., Vergauwe, S., Zhang, Q., 2014. Corporate governance and the information environment: Evidence from Chinese stock markets. *International Review of Financial Analysis* 36, 106-119.

Hernandez, D., Vadlamannati, K. C., 2016. Politics of religiously motivated lending: An empirical analysis of aid allocation by the Islamic Development Bank. *Journal of Comparative Economics* 0, 1–20.

Heugens, P. P., Van Essen, M., van Oosterhout, J. H., 2009. Meta-analyzing ownership concentration and firm performance in Asia: Towards a more fine-grained understanding. *Asia Pacific Journal of Management* 26, 481-51.

Hilscher, J., Raviv, A., 2014. Bank stability and market discipline: The effect of contingent capital on risk taking and default probability. *Journal of Corporate Finance* 29, 542-560.

Holmstrom, B., Tirole, J., 1993. Market liquidity and performance monitoring. *Journal of Political Economy*, 678-709

Hou, X., Gao, Z., Wang, Q., 2016. Internet finance development and banking market discipline: Evidence from China. *Journal of Financial Stability* 22, 88-100.

Huang, W., Zhu, T., 2015. Foreign institutional investors and corporate governance in emerging markets: evidence of a split-share structure reform in China. *Journal of Corporate Finance* 32, 312-326.

Hughes, J. P., Mester, L., Moon, C., 2001. Are scale economies in banking elusive or illusive. Evidence obtained by incorporating capital structure and risk-taking into

models of bank production. *Journal of Banking and Finance* 25, 2169–2208.

Iannotta, G., Nocera, G., Sironi, A., 2007. Ownership structure, risk and performance in the European banking industry. *Journal of Banking & Finance* 31, 2127-2149.

Iannotta, G., Nocera, G., Sironi, A., 2013. The impact of government ownership on bank risk. *Journal of Financial Intermediation* 22, 152-176.

Infante, L., Piazza, M., 2014. Political connections and preferential lending at local level: Some evidence from the Italian credit market. *Journal of Corporate Finance* 29, 246–262.

Ivashina, V., Scharfstein, D., 2010. Bank lending during the financial crisis of 2008. *Journal of Financial Economics* 97, 319–338.

Jackowicz, K., Kowalewski, O., Kozłowski, Ł., 2013. The influence of political factors on commercial banks in Central European countries. *Journal of Financial Stability* 9, 759–777.

Jensen, M. C., 1993. The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance* 48, 831-880.

Jensen, M. C., Meckling, W. H., 1976. Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics* 3, 305-360.

Jia, C., 2009. The effect of ownership on the prudential behavior of banks - The case of China. *Journal of Banking and Finance* 33, 77–87.

Jiang, C., Yao, S., Feng, G., 2013. Bank ownership, privatization, and performance: Evidence from a transition country. *Journal of Banking and Finance* 37, 3364-3372.

John, K., Litov, L., Yeung, B., 2008. Corporate governance and risk-taking. *Journal of Finance* 63, 1679-1728.

Julio, B., Yook, Y., 2012. Political uncertainty and corporate investment cycles. *Journal of Finance* 67, 45–84.

Keys, B. J., Mukherjee, T., Seru, A., Vig, V., 2009. Financial regulation and securitization: Evidence from subprime loans. *Journal of Monetary Economics* 56, 700-720.

Khwaja, A. I., Mian, A., 2005. Do Lenders Favor Politically Connected Firms? Rent Provision in an Emerging Financial Market. *Quarterly Journal of Economics* 120, 1371–1411.

Kim, D., Sohn, W., 2017. The effect of bank capital on lending: Does liquidity matter? *Journal of Banking and Finance* 77, 95–107.

Konishi, M., Yasuda, Y., 2004. Factors affecting bank risk taking: Evidence from Japan. J*ournal of Banking and Finance* 28, 215-232.

Kostovetsky, L., 2015. Political capital and moral hazard. *Journal of Financial Economics* 116, 144–159.

Koutsomanoli-Filippaki, A., Mamatzakis, E., 2009. Performance and Merton-type default risk of listed banks in the EU: A panel VAR approach. *Journal of Banking and Finance* 33, 2050-2061.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., 2002. Government Ownership of Banks. *Journal of Finance*, 57 265–301.

Laeven, L., Levine, R., 2007. Is there a diversification discount in financial conglomerates? *Journal of Financial Economics* 85, 331-367.

Laeven, L., Levine, R., 2009. Bank governance, regulation and risk taking. *Journal of Financial Economics* 93, 259-275.

Lai, S., Ng, L. K., Zhang, B., 2014. Does PIN Affect Equity Prices Around the World? *Journal of Financial Economics* 114, 178-195.

Lee, C. C., Hsieh, M. F., 2013. The impact of bank capital on profitability and risk in Asian banking. *Journal of International Money and Finance* 32, 251-281.

Lee, C. M., Radhakrishna, B., 2000. Inferring investor behavior: Evidence from TORQ data. *Journal of Financial Markets* 3, 83-111.

Lee, C., Ready, M. J., 1991. Inferring trade direction from intraday data, *Journal of Finance* 46, 733-746.

Lee, C.-C., Hsieh, M.-F., 2014. Bank reforms, foreign ownership, and financial stability. *Journal of International Money and Finance* 40, 204-224.

Lensink, R., Meesters, A., Naaborg, I., 2008. Bank efficiency and foreign ownership: Do good institutions matter? *Journal of Banking and Finance* 32, 834-844.

Lepetit, L., Saghi-Zedek, N., Tarazi, A., 2015. Excess control rights, bank capital structure adjustments, and lending. *Journal of Financial Economics* 115, 574-591.

Leuz, C., Lins, K. V., Warnock, F. E., 2010. Do foreigners invest less in poorly governed firms? *Review of Financial Studies* 23, 3245-3285.

Levine, R., 2004. The corporate governance of banks: a concise discussion of concepts and evidence. *World Bank Policy Research.* Working Paper No. 3404.

Liang, Q., Xu, P., Jiraporn, P., 2013. Board characteristics and Chinese bank performance. *Journal of Banking and Finance* 37, 2953-2968.

Lin, J. Y., Sun, X., Wu, H. X., 2015. Banking structure and industrial growth: Evidence from China. *Journal of Banking and Finance* 58, 131–143.

Lin, X., Zhang, Y., 2009. Bank ownership reform and bank performance in China. *Journal of Banking and Finance* 33, 20-29.

Liu, W. M., Ngo, P. T. H., 2014. Elections, political competition and bank failure. *Journal of Financial Economics* 112, 251–268.

Lu, Z., Zhu, J., Zhang, W., 2012. Bank discrimination, holding bank ownership, and economic consequences: Evidence from China. *Journal of Banking and Finance* 36, 341-354.

Martin, M. F., 2012. China's banking system: Issues for congress. *Report for Congress*. Report no R42380.

Massa, M., Zhang, B., Zhang, H., 2015. The Invisible Hand of Short Selling: Does Short Selling Discipline Earnings Management? *Review of Financial Studies* 28, 1701-1736.

Meeusen, W., Broeck, J. v. D., 1977. Efficiency Estimation from Cobb-Douglas Production Functions with Composed Error. *International Economic Review* 18, 435-444.

Mehran, H., Thakor, A., 2011. Bank Capital and Value in the Cross-Section. *Review of Financial Studies* 24, 1019-1067

Memmel, C., Raupach, P., 2010. How do banks adjust their capital ratios? *Journal of Financial Intermediation* 19, 509-528.

Merilainen, J. M., 2016. Lending growth during the financial crisis and the sovereign

debt crisis: The role of bank ownership type. *Journal of International Financial Markets, Institutions and Money* 41, 168–182.

Micco, A., Panizza, U., 2006. Bank ownership and lending behavior. *Economics Letters* 93, 248–254.

Micco, A., Panizza, U., Yanez, M., 2007. Bank ownership and performance. Does politics matter? *Journal of Banking and Finance* 31, 219-24.

Miles, D., Yang, J., Marcheggiano, G., 2013. Optimal Bank Capital. *Economic Journal* 123, 1-37.

Minton, B. A., Taillard, Jé. P., Williamson, R., 2014. Financial expertise of the board, risk taking, and performance: Evidence from bank holding companies. *Journal of Financial and Quantitative Analysis* 49, 351-380.

Morck, R., Yeung, B., Yu, W., 2000. The information content of stock markets: why do emerging markets have synchronous stock price movements? *Journal of Financial Economics* 58, 215-260.

Myers, S. C., 1984. The capital structure puzzle. *Journal of Finance* 39, 574-592.

Myers, S. C., Majluf, N. S., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187-221.

Ng, L., Wu, F., 2006. Revealed stock preferences of individual investors: Evidence from Chinese equity markets. *Pacific-Basin Finance Journal* 14, 175-192.

Nier, E., Baumann, U., 2006. Market discipline, disclosure and moral hazard in banking. *Journal of Financial Intermediation* 15, 332-361

Nys, E., Tarazi, A., Trinugroho, I., 2014. Political connections, bank deposits, and formal deposit insurance. *Journal of Financial Stability* 19, 83–104.

Odders-White, E. R., 2000. On the occurrence and consequences of inaccurate trade classification. *Journal of Financial Markets* 3, 259-286.

OECD, Organisation for Economic Co-operation and Development (2010) Corporate governance and the financial crisis: conclusions and emerging good practices to enhance implementation of the principles. *OECD*, Paris.

Onder, Z., Ozyildirim, S., 2013. Role of bank credit on local growth: Do politics and

crisis matter? *Journal of Financial Stability* 9, 13–25.

Pathan, S., 2009. Strong boards, CEO power and bank risk-taking. *Journal of Banking and Finance* 33, 1340-135.

Peng, W. Q., Wei, K. J., Yang, Z., 2011. Tunneling or propping: Evidence from connected transactions in China. *Journal of Corporate Finance* 17, 306-325.

Petacchi, R., 2015. Information asymmetry and capital structure: Evidence from regulation FD. *Journal of Accounting and Economics* 59, 143-162.

Porta, R., Lopez-de-Silanes, F., Shleifer, A., 1999. Corporate ownership around the world. *Journal of Finance* 54, 471-517.

Saghi-Zedek, N., 2016. Product diversification and bank performance: Does ownership structure matter? *Journal of Banking and Finance* 71, 154–167.

Sapienza, P., 2004. The effects of government ownership on bank lending. *Journal of Financial Economics* 72, 357–384.

Saunders, A., Strock, E., Travlos, N. G., 1990. Ownership structure, deregulation, and bank risk taking. *Journal of Finance* 45, 643-654.

Sealey, C. W., Lindley, J. T., 1977. Inputs, outputs and a theory of production and cost at depository financial institutions. *Journal of Finance* 32, 1251−1266.

Shleifer, A., Vishny, R. W., 1997. A survey of corporate governance. *Journal of Finance* 52, 737-783.

Srivastav, A., Hagendorff, J., 2015. Corporate Governance and Bank Risk-taking. *Corporate Governance: An International Review* 3, 334-345.

Stan, C. V., Peng, M. W., Bruton, G. D., 2014. Slack and the performance of state-owned enterprises. *Asia Pacific Journal of Management* 31, 473-495.

Sullivan, R. J., Spong, K. R., 2007. Manager wealth concentration, ownership structure, and risk in commercial banks. *Journal of Financial Intermediation* 16, 229-248.

Sun, J., Harimaya, K., Yamori, N., 2013. Regional economic development, strategic investors, and efficiency of Chinese city commercial banks. *Journal of Banking and Finance* 37, 1602-1611.

Sun, L., Chang, T. P., 2011. A comprehensive analysis of the effects of risk measures on bank efficiency: Evidence from emerging Asian countries. *Journal of Banking and*

*Finance* 35, 1727-1735.

Tan, Y., Floros, C., 2013. Risk, capital and efficiency in Chinese banking. *Journal of International Financial Markets, Institutions and Money* 26, 378–393.

Tetlock, P. C., 2007. Giving content to investor sentiment: The role of media in the stock market. *Journal of Finance* 62, 1139-1168.

Thakor, A. V., 2014. Bank Capital and Financial Stability: An Economic Trade-Off or a Faustian Bargain? *Annual Review of Financial Economics* 6, 185-223.

Vazquez, F., Federico, P., 2015. Bank funding structures and risk: Evidence from the global financial crisis. *Journal of Banking and Finance* 61, 1-14.

Vega, C., 2006. Stock price reaction to public and private information. *Journal of Financial Economics* 82, 103-133.

Wang, T., Hsu, C., 2013. Board composition and operational risk events of financial institutions. *Journal of Banking and Finance* 37, 2042-2051.

Williams, B., 2014. Bank risk and national governance in Asia. *Journal of Banking and Finance* 49, 10-26.

Williams, J., 2004. Determining management behaviour in European banking. *Journal of Banking and Finance* 28, 2427-2460.

Williams, J., Nguyen, N., 2005. Financial liberalisation, crisis, and restructuring: A comparative study of bank performance and bank governance in South East Asia. *Journal of Banking and Finance* 29, 2119-2154.

Windmeijer, F., 2005. A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics* 126, 25-51.

Wooldridge, J.M., 2002. Econometric Analysis of Cross Section and Panel Data. *MIT*.

Zhang, D., Cai, J., Dickinson, D. G., Kutan, A. M., 2016. Non-performing loans, moral hazard and regulation of the Chinese commercial banking system. *Journal of Banking and Finance* 63, 48–60.

Zhang, J., Jiang, C., Qu, B., Wang, P., 2013. Market concentration, risk-taking, and bank performance: Evidence from emerging economies. *International Review of Financial Analysis* 30, 149–157.

Zhang, X., Piesse, J., Filatotchev, I., 2015. Family control, multiple institutional

block-holders, and informed trading. *European Journal of Finance* 21, 826-847.

Zhu, W., Yang, J., 2016. State ownership, cross-border acquisition, and risk-taking: Evidence from China's banking industry. *Journal of Banking and Finance* 71, 133–153.