# CHARLES UNIVERSITY IN PRAGUE

## FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

## UNIVERSITY COLLEGE LONDON

SCHOOL OF SLAVONIC & EAST EUROPEAN STUDIES (SSEES)

# Master thesis

Capital Regulation, Bank Ownership and Bank Risks: Evidence from Central and Eastern Europe, and Asia

**2016**                                                 **Tian Jie Gwee**

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**Tian Jie, Gwee**
*Student Number: (14108387)*

# Capital Regulation, Bank Ownership and Bank Risks: Evidence from Central and Eastern Europe, and Asia

Master thesis

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**Author:** Bc. Tian Jie, Gwee

**Supervisor**:  PhDr. Martin Gregor, Ph.D.

**UCL Advisor:** Dr Randolph L Bruno, Ph.D.

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## Bibliographic note

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# Abstract

The aim of this thesis is to investigate the association of ownership structure and bank risk-taking as well as the effects of capital regulation. This study employs simultaneous equations, panel data and instrumental variables (IV) models on a sample of 192 banks from Eastern Central Europe and Asia Regions from 2005-2014. An assessment was made on how banks adjust their capital level as well as portfolio risks when there is a minimum capital regulatory ratio. The results indicate that firstly, banks react to the capital regulatory pressure by increasing capital and changes in capital and bank risk changes are positively related. Secondly, it is found that Foreign-owned banks have higher default risks than Domestic-owned banks; however, Government-owned banks are more stable in terms of asset risks measure during the year when there is election. When taking the market forces into account, in listed banks, insider owners and institutional owners have positive impacts on asset risks while positive asset risks on listed Government-owned banks only during the election. Finally, the findings also show that when capital regulation is taken as a moderating variable, it has influenced the impacts of ownership structure and bank risk, however, the increasing effects can only be proven for insider owners and government shareholders.

# Keywords

# Abstrakt

Tato práce zkoumá tři hypotézy ohledně vztahu mezi vlastnickou strukturou bank a podstupovaným rizikem, kdy regulace kapitálu slouží jako proměnná zprostředkující vliv vlastnické struktury. Empirická analýza využívá rovnic, panelových dat a modely instrumentálních proměnných (IV) na vzorku 192 bank ze střední a východní Evropy a regionů Asie během let 2005-2014. Práce začíná posouzením otázky, jak banky v obou regionech nastavují svou úroveň kapitálu a portfolio rizika v situaci minimální regulace kapitálu. Výsledky ukazují, že banky reagují na zvýšení regulace zvýšením množství kapitálu, což znamená i zvýšení bankovních rizik. Za druhé, pokud jde o dopady bankovní vlastnické struktury na podstoupené riziko, bylo zjištěno, že banky mající zahraniční vlastníky vykazují vyšší rizika než banky mající domácí vlastníky; nicméně, státem vlastněné banky jsou během předvolebních období mnohem stabilnější z hlediska rizikovosti aktiv. Vezmeme-li v úvahu tržní sílu uvedených bank, vlastnictví ze strany managementu či institucionálních investorů zvyšuje rizikovost aktiv, zatímco u státem vlastněných bank je tento vliv patrný pouze v průběhu volebního období. Zjištění také ukazují, že regulace kapitálu funguje ovlivňuje dopady vlastnické struktury a bankovních rizik, avšak rostoucí efekty lze prokázat pouze u státem vlastněných bank a u bank vlastněných managementem.

# Klíčová slova

Bankovní riziko, vlastnická struktura, regulace kapitálu, střední a východní Evropa, asijské banky, panelová data, simultánní rovnice, model fixních efektů

## Declaration of Authorship

1. The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

2. The author hereby declares that all the sources and literature used have been properly cited.

3. The author hereby declares that the thesis has not been used to obtain a different or the same degree.

4. The author hereby declares that the main text of thesis (excluding bibliography and appendices) is within the range of 25,000 words (25,000).

Prague, May 20, 2016

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Tian Jie, Gwee

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**Proposed Topic:** Capital Regulation, Bank Ownership and Bank Risks: Evidence from Central and Eastern Europe, and Asia

**Topic Characteristics:**

With the validity of Basel III, capital regulation has become stringent but some of the countries in CEE or CIS region like Bulgaria and Croatia had begun tightening the requirement even before 2009. The new banking regulation evolving the Basel III that is aspired to make global banking system safer to ensure soundness of the banks. On the other hand, banking industry in Central and Eastern Europe has undergone significant transformations ever since the fall of communisms. Both remains as the central of discussion in this paper. Therefore, the aim of this thesis is to contribute on how the banks in Eastern and Central Europe and Asia react towards the capital regulation set in Basel regulator and to see if different ownership structure has any interction with the capital regulation to impact bank risks. This paper employs a panel-data set for 14 countries of the CEE Region and three countries from Asia Pacific for a 10-year period from 2005 to 2014. The empirical study of exploring the relationship between capital regulation and ownership structure will provide important policy implications if bank regulations should be harmonised across the globe or should be geared towards the different ownership structure trends.

**Hypotheses:**

1. There will be an increase in portfolio risk (an increase in RWA/TA) when there is an adjustment in the capital requirement (increase), representing positive relationship of the two variables.

2. Foreign ownership has significant impact on bank risks while the effects of other type of ownership on bank risks might differs depends on external factors such as elections and market disciplines.

3. Risks exposure of the banks and the shareholdings of different ownership could be moderated (either increase or decrease) by the bank capital regulation.

**Methodology:**

This study employs several methods including simultaneous equations model, panel data analysis and instrumental variables (IV) models on a sample of 192 banks from

Eastern Central Europe and Asia Regions from 2005-2014. The primary source of the data is from Bankscope, other data is available from sources like: Claessens and Van Horen (2015), Kaufman, Kraay & Mastruzzi (2010), World Bank, Bloomberg and other useful journals and articles as quoted accordingly.

**Outline:**

1. Introduction
2. Banking Regulation and Bank Governance: Theory and Practice
3. Literature Review, Research Questions and Hypotheses
4. Empirical Evidence
   a. Criteria of Data Selection
   b. Capital Regulation and Bank Risk Taking
   c. Ownership Structure and Risk-Taking Behaviour
   d. Interaction between Ownership Structure and Regulation on Bank Risk
5. Conclusion

**Core Bibliography:**

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# Acronyms

| | |
|---|---|
| **2SLS** | Two-Stage Least Squares |
| **3SLS** | Three-Stage Least Squares |
| **BAL** | Baltic States |
| **BCBS** | Basel Committee on Banking Supervision |
| **CAR** | Capital Adequacy Ratio |
| **CEE** | Central and Eastern Europe |
| **CIS** | Community of Independent States |
| **FE** | Fixed Effecrs |
| **GDP** | Gross Domestic Product |
| **GOV** | Government Shareholdings |
| **GOVDUM** | Government Dummy |
| **IAS** | International Accounting Standards |
| **IFRS** | International Financial Reporting Standards |
| **INSDMAN** | Insider Management Shareholdings |
| **INST** | Institutional Shareholdings |
| **IV** | Instrumental Variables |
| **MENA** | Middle East and North Africa |
| **NPL** | Non Performing Loan Ratio (represented by impaired loans to total assets) |
| **RE** | Random Effects |
| **RWATA** | Risk Weighted Assets to Total Assets |
| **SEE** | Southern Eastern Europe |
| **STDEVROAA** | Standard Deviation of the Recent Three Years of ROA |
| **STDEVROAE** | Standard Deviation of the Recent Three Years of ROE |
| **YOE** | Year of Establishment |

# Chapter 1: Introduction

Banks play a pivotal role in any country's economic development. However, in order for the banking sector to live up to its economic role, proper regulation and strong governance have to be put into place, *see* Bokpin (2011). We noted the importance of banking regulation evolving the Basel III that is aspired to make the global banking system safer to overcome flaws which were visible in the recent financial crisis. Ever since the announcement of Basel III, capital regulation has become widely emphasized. Furthermore, banking systems in the past twenty years have undergone a major transformation within the deregulation, market integration, privatization and entry of foreign investors, Hammami & Boubaker (2015). These transformation have led to changes with shareholdings in the banks. Therefore, the aim of this thesis is to contribute on how the behaviour of the Central & Eastern Europe and Asia banks act towards the capital regulatory pressure set in Basel regulator and to see if different ownership structure has any interaction with the capital regulation and further influence bank risks.

The banking industry in Central and Eastern Europe (CEE)[1] has undergone significant transformations ever since the fall of communism. There are four stages of banking development in the CEE countries. The first stage is the early establishment of the banks in the 1990s. Later, the emergence of bank failures and crisis hit in the mid-1990s affected almost all transition economies. The third stage refers to restructuring and privatisation lead to high influx of foreign banks and eventually to the accession into EU for some of the transition economies like Czech Republic, Hungary, Slovakia and Poland, there were substantial improvement in the regulatory framework in the banking sector, Haselmann & Wachtel (2007). Ever since the 1990s, international banking remains active in the Central and Eastern Europe region (CEE). Therefore, phenomenon of foreign bank ownership is prevalent in the Central Eastern Countries. Banking sectors in the transition economies, including Czech Republic, Poland and Hungary had gone through different stages before the privatization that involved the transfer of government ownership to the private entities. The privatization started in Czech Republic and Poland in 1992 while Hungary later followed up

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[1]       As define by Xprimm.com, supported by OECD (2016), CEE countries include Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Slovakia and

in year 1994. During the mid-1990s, we observed the revolutionary changes in the ownership structure in most of the CEE countries, the graph of the foreign-owned shares and state-owned market shares in the CEE regions can be observed below (*Figure 1 and 2*). Taking the five highest GDP countries in the CEE region as displayed below, we can see that foreign participation in the banking sector is taking important role after the privatization process from 1999 years onwards. The Czech Republic has the lowest state-owned bank assets among the five countries from 38.5% in 1999 and declined 94% till 2.3% in 2014. Romania has a big dropped in state-owned banks as well, stated with 50.3% in 1999 and later faced a huge drop in 2004 to only 6.9% while a tremendous increase in foreign-owned bank assets since 2006 and consistent 90% thereafter. Poland has a fairly moderate state-owned bank assets after the privatization with the highest at 24.9% in 1999 and lowest at 18% in 2004. Among these five countries, Hungary has the second lowest state-owned shares after Czech Republic with a huge increase in state owned shares from 5.8% in 2013 to 12.4% in 2014 while the foreign-owned shares remained at a quite even and high percentage from 2003 onwards.

While most of the CEE countries have more than 20% of foreign bank assets, Russia is a very state-owned banks. Therefore, at this point, a preliminary understanding is that there is a co-existence of ownership structure of private-owned and government-owned banks within the European banking system.

**Figure 1  Market share of state-owned banks of five highest GDP Countries in CEE**
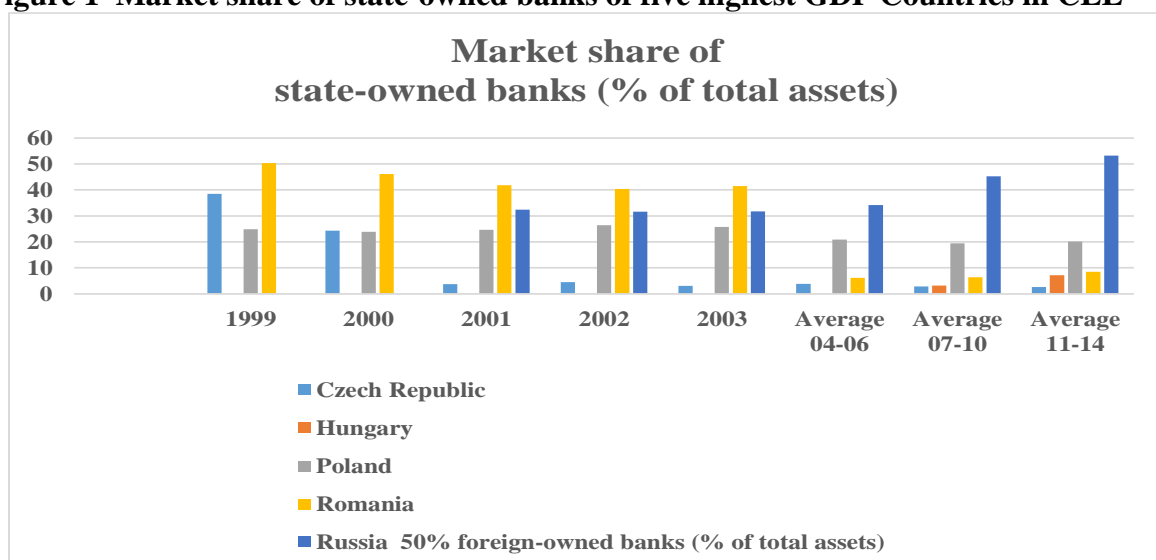


*Source: Author's graph, inspiration from (World Bank; Raiffeisen RESEARCH, 2007, 2011 and 2015)*

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Slovenia. However, we also include Russia and Belarus as CEE countries since Bankscope include both of these countries as Eastern Europe. http://www.xprimm.com/CEE-Countries-2,10.htm

**Figure 2 Market share of foreign-owned banks of five highest GDP Countries in CEE**



**Market share of foreign-owned banks (% of total assets)**

Legend:
- Czech Republic
- Hungary
- Poland
- Romania
- Russia  50% foreign-owned banks (% of total assets)

X-axis categories: 1999, 2000, 2001, 2002, 2003, Average 04-06, Average 07-10, Average 11-14
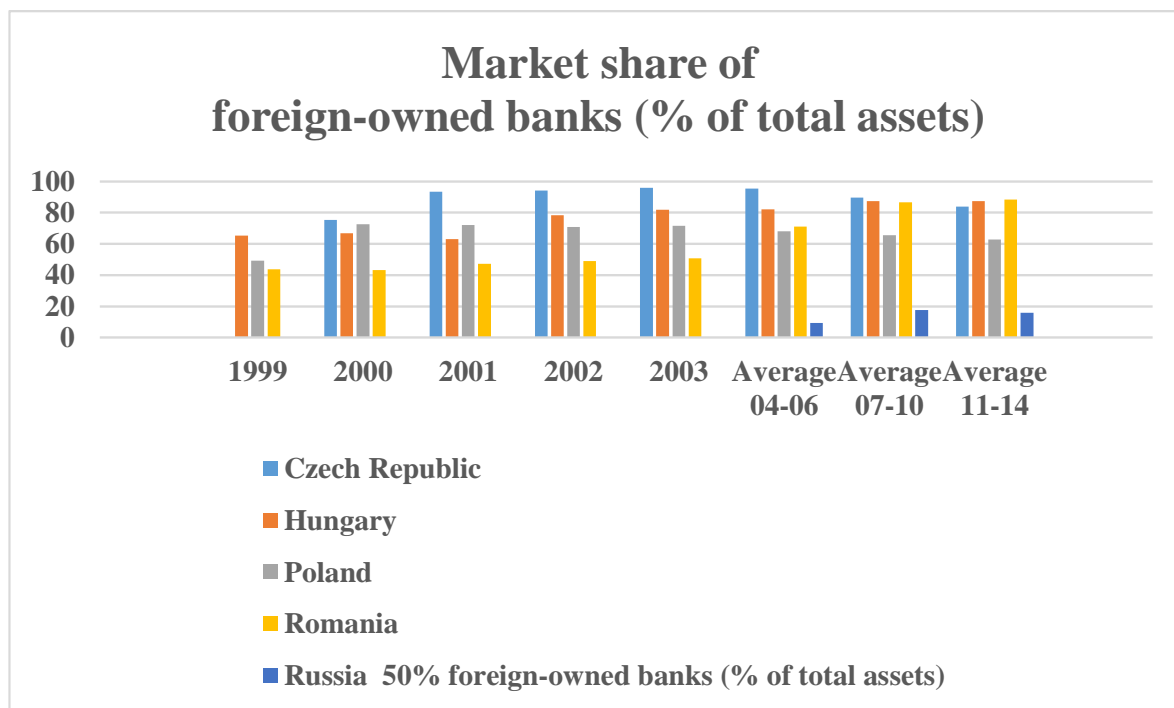
While foreign banks owned more than 50% of the total equity in the CEE region, recent research by Raiffeisen in the CEE Banking Sector Report 2015 shows the variation in the market share by the foreign banks. Countries like Hungary were on a decreasing trend from 69.2% foreign-owned banks market share in 2009 losing 8.2% of its share in Hungary to only 60.8% of market share in 2014. In addition to that, other CEE countries like Poland, Czech Republic, Croatia, Bulgaria and Russia were also showing the similar decreasing trend. Regardless of that, foreign-banks market share of those countries remain at above 50% in which it will be interesting to find out if the ownership structure has an impact in the bank risk-taking by taking into account the bank regulation on capital requirement element since there are increase regulation on bank capital.[2] Furthermore, in terms of the banks' assets of GDP, (see *Figure 3* below) the Czech Republic is considered the most developed banking sector among the other Central Eastern Europe countries, marked at 126% as per 2014, far outweigh other strong transition economies like Poland (89%) and Slovakia (81%). This

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[2] Higher capital requirements were only part of the regulatory reforms that was put in place since the financial crisis. Other elements included in the regulatory reforms were the liquidity requirement and standardized OTC derivatives. It is important to note that there requirements might also have impact on bank risk-taking, but they are not being considered here. The reason of focusing on capital requirement is due to the nature of sources a bank usually constituted, which are usually with low capital than other firm organizations since most of the resources came from the customer's deposits. Also, it has been a Basel Committee's centre of discussion.

offers the country a huge potential in banking sector since there are high reliance of bank intermediation in the Czech Republic.

**Figure 3 International Comparison of Financial Intermediation**
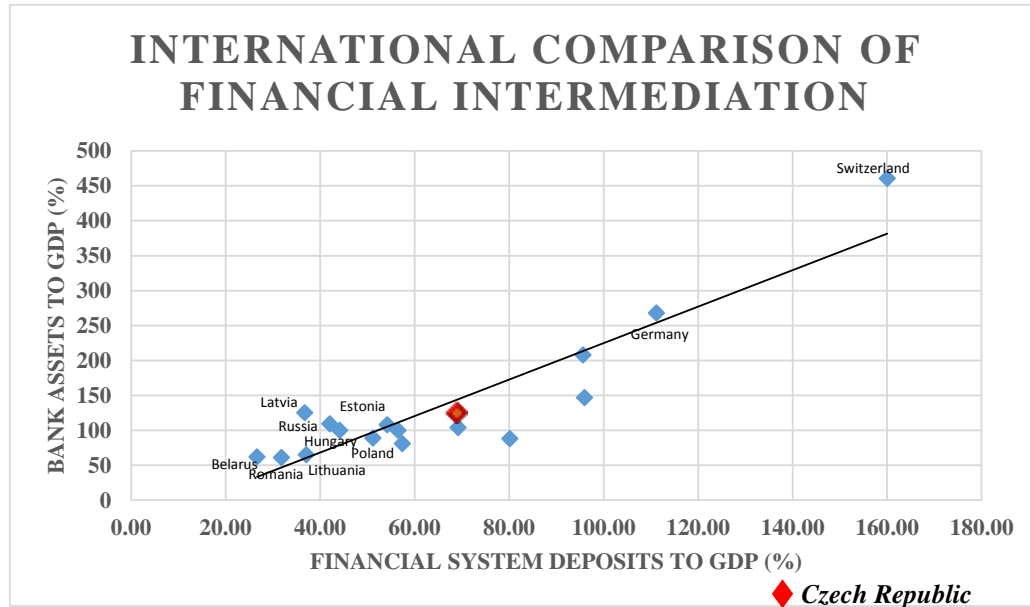


*Source: Author's graph, inspired from: World Bank; IMF*

On the other side of the globe, Asia remains an important region for international banking players. For example, Hong Kong is one of the most concentrated banks in Asia with 70% of the top 100 world banks having operations in Hong Kong, while Singapore tops the Asia attracted the most financial services FDI in Asian markets in 2015 Pavoni (2016). Therefore, Asia is included in this analysis to look into the current trends of the banks and to see if there is intersection between bank regulation and ownership structure in the risk-taking behaviour of the banks.

The thesis is structured as follows: Chapter 2 provides a theoretical overview of bank governance and banking regulation in theory and practice. Since the core focus on bank regulation is capital requirement discussion on Basel Accords (I, II, III as well as possibility of Basel IV), this will be explained. We also provide a complex overview of criticizing and supporting capital requirements and their effects. Chapter 3 explores on the literature reviews in relation to the thesis and a summary of the research questions and hypotheses based on the literature. Chapter 4 is an empirical analysis consisting of three subsections each representing a different topic (impact of capital requirements on risk-taking, association of bank ownership structure and risk-taking and influence of capital requirements on the association).

We will first examine if the stringent in capital regulation (measured by capital regulatory pressure) will have any effects on capital and risk adjustment. Then, we will also look into how different ownership structure impact risk-taking and thirdly, looking into how the capital regulation reacts with the ownership structure in influencing bank risks. Each subsections will begin with the methodology including the models, includes empirical results and finishes with the discussion of those results. Chapter 5 summarizes our findings and concludes the whole thesis and provides some policy implications alongside with the areas of improvement in the following research. Appendices and References will be attached at the end of this paper after the concluding remarks.

# Chapter 2: Banking Regulation and Bank Governance: Theory and Practice

This chapter will provide detailed theoretical background of the banking regulation specifically the capital-related theories and the coporate governance in banking sector. First, we will outline the regulation theory and Basel Regulation will also be included in the discussion as a standardised regulatory framework used in many countries before explain the governance theory.

## 2.1 The Needs of Bank Regulation

Banking regulation is generally defined as the theoretical framework that determines the creation, operation and liquidation of banking system around the globe (Alam, 2013). This definition is appears many times in different papers. In fact, the presence of international institutions to coordinate domestic and international bank only available from the mid1970s due to the growing international financial activities among the different banks. When the financial market malfunctioned, the real economy was being affected. For example, when the financial crisis caused by the U.S. subprime mortgage market, it then led to the shrinking of economies in many countries like Albania GDP growth rate in 2013 was only 1.33% as compared to 7.53% in 2008 before the crisis hit (WorldBank, 2015).

Another reason why banking regulation is important is that huge costs would incurred when a financial market fails. In the banking sector, the failure of banks is interconnected and it could triggers the fear of the customers and further increase the likelihood of the failure of other banks. Dewatripont & Tirole (1994) defines that the purpose of banking regulation is to protect the non-investors that are very likely to incur additional costs in case of any financial shocks or even to cover the loss from the insider trading strategies. Due to the complexity of banking sector as mentioned above, the banking sector is then subject to the numerous regulations with the aim to protect the related parties like the depositors and ensure efficient in bank operations.

### 2.1.1 Capital Adequacy

Before the 1988, it was difficult to measure the financial position of banks that present in different jurisdictions as the Central Banks used different definitions of Capital Ratio. Therefore, the first Basel Capital Accord pioneered the standardised concept of capital. An adequate capital base in the banks is known to serve as the safety net that could absorb any possible future losses and also to give assurance to the depositor to place their money in the banks, subsequently determine banks' assets level.

Another important perspective is that in order to grant loans to the borrowers, the bank needs to be able to attract deposits. In the competitive business environment, maintaining a certain capital in a bank is a competitive advantage that could build public confidence. Imagining if a bank's shareholders are facing capital shortage, it is hard to establish any kind of protection to convince the depositors to deposits their money into the bank. Since banks usually have a low capital-to-assets ratio due to the uniqueness of the balance sheet's structure, the regulatory authorities began to impose certain capital requirements. For example, during the late 80s, the Basel Committee on Banking Supervision was the pioneer to develop risk-based capital adequacy standard to promote stability of the international banking system.

### 2.1.1.1 Market Capital Requirement vs. Capital Regulatory Requirement

a) Market Capital Requirement

Modigliani & Miller theorem (1958) pioneered the research on the capital structure, where it generally suggests that the value of a firm is not affected by its capital structure provided the firm is operating in a perfect capital market with the absence of taxes, information asymmetry and transaction costs. There are however papers that have concluded that financial institutions can increase their market values by optimising the leverage, in which some banks would maintain optimal capital ratio even in the absence of capital regulation, which is referred to the market-generated capital requirement, as proposed in Berger, Herring & Szegö (1995).Therefore, capital requirement is classified into two regimes: the market regime and the regulatory regime (Berger et al., 1995).

In the market regime, market capital is defined as the capital ratio that maximises banks' value without the presence of regulatory capital requirement mechanism to protect the

soundness of the banks. Tax considerations and costs of financial distress are the first determinants explained in the paper that can affect the market capital requirement. Tax tends to reduce optimal capital ratio since deductibility of interest payments caused firms favour debt option over the equity to gain higher returns by reducing tax payment. The costs of financial distress including costs of bankruptcy can be partially borne by the creditors and shareholders. However, to the extent where the creditors could foresee the costs during the debt issuance, they could raise interest rates in order to past the costs to the shareholders. For the shareholders, they might choose to indeed increase the capital ratio in order to reduce these costs, whereby Berger (1995) have proven empirically for during the 1980s, a period when there was raise in expected costs of financial distress, for the U.S. banks that do not respond to the scenario by increasing the capital requirements suffered lower earnings than the counterparts.

Furthermore, in the banking sector, the safety net for all banks includes deposit insurance and other bank safety regulation excludes capital regulation is likely to reduce market capital requirement by insulating banks from potential market discipline. When the market is expecting the uninsured debt would be de facto insured that the safety net would act as a subsidy to bank, market forces can cause bank to lower its capital ratio since the safer portfolios will need less capital to protect financial distress.

b) Regulatory Capital Requirement

Regulators require minimum capital requirement in most countries for the similar reason − to enhance financial stability of financial system by acting as a cushion against any unexpected loss to avoid bank failures. Significant decline in the capital adequacy can be observed throughout the 1970s until the 1981 whereby a reverse scenario started in the United States of such the regulators impose a certain capital adequacy ratio of a fixed percentage from the bank total assets Matejašák & Teplý (2007). This further raises the question that if the increasing capital adequacy actually reduces the portfolio riskiness of a country and the increases in capital requirement will somehow induce regulatory pressure for the banks, can it actually induces less default risk or increase in volatility risk?

Since the capital requirement is related to the Basel Accords once started in 1988, the following explores on the evolution of Basel Accords and the evolution of the capital requirement as time pasts. Also, the benefits and the weakness of such proposal and implementation across the transition countries will also be explored after.

## 2.2 Timeline of Basel Accords

Basel Committee started in 1974 from the establishment of the central bank governors of G10 countries in the aftermath of the Hersatt Collapse[3] as a way to promote international financial system. Ingves (2013). Basel Committee for Banking Supervision (which was previously known as "Basel Committee on Banking Regulations and Supervisory Practices") is still dealing with the basic problems faced by the financial market even since the establishment, such as poorly run institutions, interconnectedness of the financial institutions and financial instability across the globe. In general, this Basel Accord serves three main important purposes BCBS (2009):

1. To ensure the amount of capital held by the banks are sufficient to cover the risks.
2. To serve as a coordination platform in standardising common standards to encourage cross-border banking (such as the standardised capital standards).
3. This further lead to the possibility of capital comparability of the banks with the standardised standards given.

**Figure 4 Evolution of Basel**



*Source: Author, inspired by (Ingves, 2013)*

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[3] Herstatt Bank was a private-owned bank in Germany that went into liquidation on 26 June 1974 from the German regulators, which marked as the well-known settlement risks in the financial markets. The aftermath of this bank led to the creation of Basel Committee on Banking Supervision in seeking for remedies to avoid such future risks.

## 2.2.1 Basel I

During the 1980s, the desire of common banking capitalization standard came in the top agendas of Basel Committee Members in order to promote capital adequacy standards within the member states only. The minimum capital requirement of 8% was proposed for the international active banks only. The formula can be defined as below:

*CAR = [(Tier 1 Capital + Tier 2 Capital)/ RWA]* $\geq$ *8%; whereby Tier 2 Capital to RWA must be at least 4%.*

By the end of 1999, almost all countries had implemented the Basel I Accord. However, there were some shortcomings noted in Basel I, of such the common criticism was that Basel I was too narrow in scope that only covers credit risk and only aiming the G-10 countries. Basel I standards covers too broad risk weighting categories that somehow encouraged the banks to apply "cherry picking" by selling off the least risky assets and keep the more risky assets. This behaviour actually caused the decline of the capital in the banking system. Therefore, Basel II was introduced later in 2004, five years after its proposal to overcome the banking crisis happened in the 1990s.

## 2.2.2 Basel II

In Basel II, the scope has been greatly expanded where each pillar covers the new approaches to the credit risks, market, operational and interest rate risk as well as incorporating new market surveillance and regulation.

In the first pillar, the minimum capital requirement allows the banks to broaden the scope of regulation by including assets of holding company in order to avoid banks to transfer assets to their subsidiaries like what was the case in during Basel I implementation. The calculation of CAD remains at least 8% of tier 1 and tier 2 capital but further taking into account the credit risk, market risk and operational risk.

One additional feature in Basel II Accord is the reliance on external rating agencies in assigning risk weights. There was also the internal ratings based approach where usually applied by the largest banks to assume the probability of loss of each type of assets at the time of its defaults. Furthermore, operational risk is another extended scope in Basel II where reserves will be calculated as to avoid the failure in the internal processes and decision making of the banks. Last risk in pillar I involves market risk, whereby Basel II provides a

distinctive separation between fixed income and other products such as equity and commodities products that would contribute to two types of risks be that interest risk and volatility risk.

There are some reasons why Basel II fails and even being pointed out as one of the reasons why financial crisis 2008/2009 stroke. One of them is due to the complexity of the Internal Rating Based (IRB) approach that only few of them were qualified. Two approaches like Advance Internal Rating Based (AIRB) and Advanced Measurement Approach (AMA) for credit and operational risk respectively are very complex so these are implemented by only large banks in U. S., Mohanty (2008). Furthermore, Basel II creates a big challenge for the banks to assess risks as banks would need high quality data for IRB approach but the banks have not the time series data for that purpose, Parreñas (2002).

## 2.2.3 Basel III

This is why Basel III is considered a comprehensive measures with the aim to improve the banking sector's ability in absorbing the financial loss, improve the risk management practice as well as the governance structure further on strengthen on the transparency in a bank BCBS (2011).

In Basel III, several new measures were added, specifically on the capital quality, capital quantity, restriction of leverage and liquidity requirements. In September 2010, the banking regulators came into decision to triple the size of capital reserves that the banks must complied to in order to act as cushion against the financial crisis that hit the whole world from the mortgage market crisis began in the US. New common equity ratio of 4.5% as compared to the 2% in the Basel II plus a new buffer of additional 2.5% will be implemented. In addition to that, global banks are required to increase the Tier 1 capital ratios from 4% to 6% while maintaining the minimum total capital at 8% of RWA. Liquidity standards was also being introduced for the first time with two indicators, of Liquidity Coverage Ratio (LCR) ensure the banks hold sufficient liquid assets while Net Stable Funding Ratio (NSFR) ensures the bank has stable funding. In terms of the leverage ratio, it is set to have more than 3% of leverage ratio. The ratio can be calculated using division of Tier 1 Capital by average of bank's total assets.

## 2.2.4 Comments about Basel Implementation

To sum it up, when Basel III was announced in 2010, the capital adequacy requirement increased to 10.5% of the risk-weighted assets from the previous 8%. It seems that capital requirements have gone through significant changes over the years since Basel I drafted in 1988, moving towards a simpler capital ratios.

Arguments on the incomplete implementation of the Basel regulation have been carry on while the European banks are encouraged to move away from risk-based capital to follow suit the American's way towards a leverage-based ratio. One important flaw in the revision in Basel II to update the previous framework however have limited capitalization requirements on the balance sheets assets, resulting many banks had very high sovereign debts during the financial crisis. In order to ensure resilience in the banking system, capital requirements had tightened up in Basel III and the Basel Committee is still working on capital requirements governing the operational risk and credit risk therefore raised the question of such what are behaviour of the banks in terms of their risk-taking incentives when facing the capital regulatory pressure and if the interaction between ownership structure and capital requirement adjustments significant. Before we explore the impact empirically, the following section will shed light on how banks in CEE and Asia reacted to the capital regulation.

**Table 1 Summary of Basel I, II and III**

|  | **Basel I** | **Basel II** | **Basel III** |
|---|---|---|---|
| Capital Adequacy(CAR) | >=8% | >= 8% | >=10.5% |
| Considerations | Credit risk | Credit, Market and operational risks | Credit, Market, Operational and Liquidity risks |
| Year of Valid | Year 1988 | Year 2007 | Year 2010 |

*Source: Author's compilation with inspiration from Mejstrik, Pečená, &Teplý (2014),*

*Banking in Theory and Practice*

## 2.3 Capital Regulation and Bank Adjustment in Risk-taking: Case of CEE and Asia

As mentioned in the Basel Accords above, three Basels I, II and III hold the same principle of banks are required to maintain an increasing capital in relation to the increasing asset risks. The increasing reliance on the capital regulation in banks raised the question if all banks behaved the same way towards capital regulation and whether the penalties in falling below the threshold level set by the regulators would encourage banks to increase their capital ratio. Many previous papers have attempted to find the relationship between the capital regulation and banks' behaviour.

Most of the studies concentrate on US banks since it is the region with most banks in the world (currently about 9,600 all types of banks, based on Bankscope) and some of the recent studies started to explore the European banks, such as Rime (2001) on Switzerland banks and Heid, Porath & Stolz (2003) on German Savings Banks. To our knowledge, there is no existing research that puts light the banks in Central Eastern Europe (CEE), specifically on the capital regulation. Therefore, a modified version of the previous Shrieves & Dahl (1992) model will be estimated to investigate on the CEE countries to test hypothesis 1 (*refer to **Chapter 4**)*. The following explores the behaviour of CEE/CIS banks in tightening the capital requirements.

## 2.3.1 Banking Sustainability Regulation and Bank Adjustment in Risk-Taking: Case of CEE and Asia

2.3.1(a) Rationale on capital requirement in CEE countries

While capital requirement became stringent since the financial crisis in order to control the credit risk that started to materialize in 2009, several countries in the CEE or CIS region had begun tightening the requirements even before the crisis, some even placed requirements exceed the threshold set under Capital Requirement Directive (CRD). Bulgaria is one of the countries that set higher requirement than needed with 12% capital adequacy ratio and higher risk weights. Besides that, Bulgaria started to restrict the dividends distribution in 2008. Croatia also followed suits with higher minimum CAR of 10% until the crisis hit and increased the minimum CAR to 12%, Klingen et al. (2013). Capital regulation concerning the minimum CAR in CEE/CIS region is highlighted in *Table 2* below.

**Table 2 Minimum Capital Adequacy Ratios (CAR) in CEE/CIS Jurisdiction**

| Minimum CAR (as per Sept 2012) | CEE/CIS Jurisdictions |
|---|---|
| 8% | Belarus, Czech Republic, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia and Turkey |
| 10% | Estonia, Montenegro, Romania, Russia and Ukraine |
| 12% | Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Moldova and Serbia |

*Source: European Investment Bank (EIB), 2013 from ("Statistics - Oesterreichische Nationalbank (OeNB)", 2016)*

Following the crisis, other regulatory measures were widely adopted in several countries in the CEE region to ensure sustainability of the future credit growth. In the beginning of 2012, Financial Market Supervision Unit of Národná Banka Slovenska (NBS) recommended a sustainability measures in Slovakia by limiting the banks to strengthen their capitalization only through increasing in equity capital and not reducing the lending activities in the market. Banks in Slovakia were also required to maintain at least 9% of Core Tier 1 capital ratio to ensure the capacity of banks to bear with the bank risks. In Hungary, liquidity regulations were implemented in 2012 to tackle the mismatch of FX-positions in financial institutions. With the implementation, Hungary banks are required to hold liquidity reserves for the short-term and long-term liquidity. In the Czech Republic, there were also limitation for Intra-Group exposures from 75% haircut to only 50% allowed on the net related-party exposures. This control was tightened in July 2012 to avoid outflow of capital from the well-doing subsidiaries in Czech Republic to their foreign parent banks elsewhere.

Therefore, on personal note, the regulatory pressure in the Central Eastern Europe region is much stronger than the United States banks, as for banks that remained undercapitalized until certain period would usually be taken-over by stronger bank or will be forced to close down based on the guidelines, while United States undercapitalized banks would only face the restriction in lending activities with high deposit insurance premiums Rime (2001).

2.3.1(b) Rationale on Capital Requirement in Asia

In general, after the financial crisis, we can see that banks in Asia generally maintaining higher capital ratio than in the Europe and other Western Countries. Hong Kong, an important international player in the Asia Pacific, is considered to hold one of the highest capital adequacy ratio (*see figure 5*). However, it is important to note that there was a declining CAR from 2013 onwards. This is due to the revised capital adequacy framework (Basel III) was incorporated in the local banking sector in Hong Kong. Besides that, the CAR (%) is not consistent throughout different countries in Asia, since certain countries like Taiwan banks only require to maintain a minimum CAR (12.3%), China (13.2&) and India (12.8%) which are significantly lower than other countries like Hong Kong (16.8%), Philippines (16.7%) and Indonesia (19.6%) (*refer to The Asian Banker).*

Despite these variations, most of the markets reported an excess of the Basel III requirements (10.5% and an additional 2.5% buffer with total of 13%). Generally the large and middle-tier banks in Asia Pacific are well capitalised since the Asia Crisis in 1997. Ritesh Maheshwari, an analyst from Singapore Standard & Poor's once said in a conference in 2015 that the key agenda for the Asia Pacific banks unlike the Europe banks is to manage the credit growth rather than working against the financial losses. The main challenge faced by the Asia banks especially for the Chinese banks is the ability to expand their balance sheet in tandem with the growing economies. Also, In China, the banks have more than sufficient amount to cover the NPLs but still imposed stricter capital controls in the past few years to avoid the problem arising from the excessive growth of such the inflation.

**Figure 5 Average Minimum Core Equity Ratio and Tier 1 Capital Adequacy Ratio in Hong Kong (Commercial Banks only)**
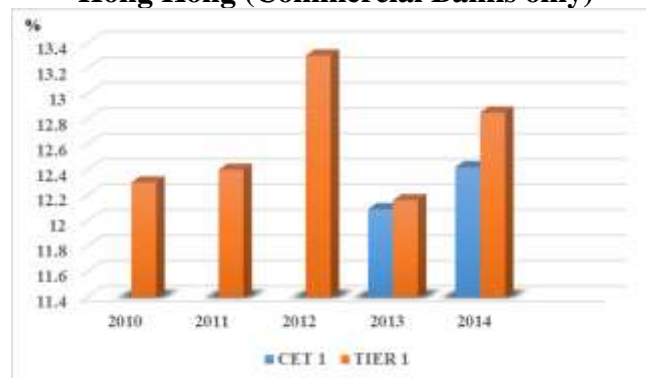


*Source: Savage (2015) from TheAsianBanker*

In general, we can see that both CEE and Asia countries have implemented some restrictions or increase the stringency after the 2008 financial crisis. Tight regulations is supposed to be able to control the risk-taking behaviour. However due to the fact that there are many different types of owners participate in the banking activities around the globe, the ownership structure could affect bank risks in any scenario Angkinand & Wihlborg (2010). This leads to the following discussion explaining how the banking industry's corporate governance structure different from the normal practice in other organizations as well as the possible interaction between banking regulation and bank governance.

## 2.4 Corporate Governance in Banking Sector

After the financial crisis in 2008, the weak and ineffective corporate governance structure in banking sector has started to be discussed if it is the main factor that contribute to such crisis. It is widely-known that banks are a highly-leveraged institutions and always has a balance sheet mismatch between the customers' deposits and the loans-out. The corporate governance in a bank differs from the standard practice in any other firms due to several reasons as follows:

1. Banks are subject to the regulations and supervision of the special authorities where the regulators set the restrictions and rules to obey, while bank supervisory in charges of the monitoring activities in the banks. This is essential due to the natural of high-leveraged banks which the banks' profitability is linked to the volume of lending activities to the creditors. Ceteris paribus, in return to the likelihood of the default risks faced by the banks, the depositors will demand for a higher risk premiums in compensate for the high risk insolvency. This explains why minimum capital requirements are fixed in the banking regulation regime.

2. The nature of principal-agent problem in a bank is more complex than the ordinary organizations since the asymmetry information involves not only between owners and managers but also other stakeholders such as depositors, regulators, government, and supervisors.

3. Due to the complexity and strict regulations as well as certain safety net, these could easily triggers the chance of the behaviour of the owners, managers and customers of the banks, that could influence in the undesirable behaviour of the management with more

incentives to take higher bank risk during the decision making process at the expense of the depositors.

4. Furthermore, the social costs implied in banking sector is higher with the bankruptcy case that can easily affect the other banks and regulators. For instance, the financial crisis back in year 2008, has affected the closure of many banks and then the new version of Basel III were quickly introduced later in year 2010 has caused the high costs for many individual banks.

5. High agency costs could incurred in banking sector due to the complex fiduciary relationships among banks and other stakeholders including the customers, borrowers, and regulators Marcinkovska (2012).

## 2.4.1 Different Bank Risk Incentives between Shareholders and Managers

From the corporate governance perspective, there are two types of agency problems as mentioned in Demsetz, Saidenberg & Strahan (1997). First, the shareholders could expropriate wealth from the depositors by increasing risk when the later has limited monitoring incentives which is related to the moral hazard issue. Secondly, in the absence of close monitoring by shareholders due to the separation of ownership and control as mentioned in the corporate governance theory above, managers often pursue their own objectives of getting their salary paid or to ensure their bonus with good bank performance, at the expense of the shareholders Jensen & Meckling (1976).

Later, Saunders, Strock & Travlos (1990) also shed light on the conflicting risk preferences of bank stockholders and managers. Similar to Demsetz et al. (1997) the stockholders can only be monitored and controlled imperfectly by the depositors (who is considered the principal of the deposits while stockholders the agent in the money depositing scenario) due to information asymmetry, thereby stockholders can usually increase their value of the call options even though it might increase the likelihood of risks in losing the underlying assets when the investment drop in value. However, the ability of the bank stockholders to increase the risk through call and put options is depending on the bank's managers. Managers who are in-charged in the banks' operation are usually risk-averse rather than being a risk-taker since a wrong decision might cause them lost in their human capital (salary), *refer to* Benston (1986). The question then become, if management stock options

could help to align the managers' goals with the shareholders' and further stimulate risk seeking behaviour, does the bank actually need their managers to take in more risks?

Up to this point, the discussion evolves the basic understanding of the regulation needs, capital regulation and governance phenomenon in a banking sector but the main focus is to look into the complementary effects of ownership structure and capital regulation in the risk-taking. Therefore, the following section will explore on how different ownership structures have different impacts on the bank risks.

## 2.4.2 Why is a Bank's Ownership Structure Important?

As already mentioned, corporate governance is generally related to the agency problems in an organization. This agency theory problem arises due to the conflict of interest between the management and the owners of the organizations, in which the roots of the problem can be linked to the separation of ownership and control of the firm Hasan & Butt (2009). Shareholders play major roles in the context of corporate governance in appointing the supervisory board, selecting the right board of directors, audit committees and external auditors, whereby being responsible to steer the strategic direction of the bank. Greuning, Brajovic Bratanovic, & Greuning (2003) advocates that total capital and nature of bank ownership the two fundamentals that contribute to the soundness of banking system and suggested the likelihood of state banks have higher chance than private owners to involve in any kind of imprudent practices. Therefore ownership review by assessing the shareholdings hold by the state, by the institutions, insider management and individuals are important. This is why it would be interesting to investigate the impact of different ownership structure of a bank on the risk-taking incentives and corporate governance theory is equally important in structuring banking regulation, considering bank has a more complex operation nature due to the mismatch in balance sheet as explained above.

In terms of the ownership structure, foreign ownership has been the trend in transition economies especially after the 1990s. Fundamentally, foreign investors are important in the banking sector for a couple of reasons, specifically foreign ownership ensure the independence of government that also reduces the likelihood of politicization of bank lending, thereby increase depositor confidence Bonin & Wachtel (1999). It is even more interesting when Radelet & Sachs (1998) stated that foreign bank ownership could reduce the serious consequences in Asia during the economic crisis in 1998-99.

**2.4.2.1 Foreign Ownership is a boost to Domestic Banking?**

In the context of ownership structure, generally it is divided into two categories (private ownership and public ownership). Private owners are the private investments either is owned domestically or is owned by foreign owners. In general, private owners' objective is to maximize profits and therefore tend to reduce credit risk such as non-performing loan as well as prefer low operational risk. It is important to note that privatization has impacts on bank risks since the openness of the market increase competition in the financial market, that after the privatization, there were reduced barriers in foreign investment and the privatized bank reduced their risk-taking (measured by Z-SCORE, ROE and ROA) during the post-privatization period, proved in Mohsni and Otchere (2014). While it could imply the conservative behaviour of the private owners after the privatization, there are two different types of owners (foreign and domestic owners) that should be supported with alternative views in the risk-taking behaviour.

In the Central Eastern Europe (CEE) region, from the end of privatization to before the financial crisis in 2008, big western banks (foreign-owned banks) play important positions in the CEE countries, providing the locals the efficient access to credit, sharing expertise in terms of risk management practice. Moreover, the existence of foreign ownership could mitigate the agency problems especially for foreign institutions present in strong shareholder protection countries like in the U.S., has lesser conflict of interest and shows better governance mechanism in the organizations, concluded in Aggarwal et al. (2011). Often the times, foreign owners induce the competitiveness in the banking sector and is often associated with higher risk (due to higher debts and higher volatility in return earnings as compared to domestic banks).

However, in the Chinese banking sector, Zhu, Li, Zeng & He (2009) has concluded that when the foreign investors owns more than 15% of the total bank capital, there was sign on risk improvement (indicated by decrease in credit risk). This supported the previous literature explored in Bonin, Hasan, & Wachtel (2005) that the ability of foreign banks to improve governance mechanism of the local banks to be more efficient and more financially stable due to improvement in risk management. Also, with the presence of foreign banks, it may provide healthy competition to the domestic banking by diversifying the financial services and therefore increase efficiency Lensink & Hermes (2004). Foreign banks that have less local expertise in the local environment which will not lead to decrease in risk through customer relationship, Haselmann & Wachtel (2007). In some cases, foreign ownership will

usually bring in new foreign managers who have limited knowledge about the operation of the companies and therefore in the case when the new foreign managers set inappropriate credit policy would lead to increase in credit risks Rokhim & Susanto (2011).

**2.4.2.2 Rationale of State Ownership in Banks and Expectations**

In general, state ownership is the amount of bank's capital actually owned by the state. Many European banks were bailed out by their national government ever since the recent financial crisis through a series of provisions that included state guarantees of uninsured debt as well as capital injection into the banks, also mentioned in Ianotta et al. (2012) shows that the importance role played by the European governments in the bank ownership. Based on State-aid figures displayed by European Commission, between October 2007 and end of 2011, the European governments have injected $605 billion approximately 440 Euros into the teetering banks as well as €1.1 trillion of guarantees, reported in The Economist (2013). We believe that this sort of guarantees will provide certain protection to those state-owned banks, especially when high government intervention is more likely when the state government is the ultimate owner in the banks. This has been proven in Faccio et al. (2006) that politically connected firms are significantly more likely to be bailed out than the peers. Therefore, this lead to the expectations that with state-owners in the banks would have less default risk due to higher protection.

Other standard supports of the need of state intervention are built on the following theories. First, state intervention play an important roles to maintain stability of banking system due to the special structure of banking system since the liabilities consists of demanded deposits while the assets loans could be highly illiquid. Also, government often plays role in the bail-out when bank fails. Secondly, some large private banks could be risk averse towards potentially profitable investments as they concern about the reputation cost due to externalities and their current significant market share could be a huge concern to invest in risk projects that could affect their charter value, agree with Levy-Yeyati et al (2004). This is the case when state intervention is important as an alternative sources of funding especially in the emerging markets. Lastly, state-owned banks could be helpful to promote financial access to the residents in the rural area. This is due to the fact that private banks are usually profit-oriented and do not have large incentives to open bank branches in rural areas. For example, in large country like Russia, 65% of the country is in a permafrost

region[4] with approx. 20 million inhabitants which only state-owned banks are willing to serve the population due to financial weakness in the private banks state interventions could solve this problem Hawkins & Mihaljek (2001). On the other hand, there is political views that put stance on the inefficiency caused by the politicians of not channel the funds to socially efficient users but rather utilizing the funds as a political tool for its own personal political goals, as widely cited in La Porta et.al. (2002).

There are other macro-level studies that contributed to different views on concluded that increase of state ownership contributed to the inefficiency of the financial system (Barth et al. (2001); Debray & Jin Wei (2005) and others). Overall, while there is a need for the state to intervene, the protection that state-owned banks could leads them to be more aggressive in bank decisions that could undermines the effectiveness of the market or in other words lower financial stability in the system. This will be one of the hypotheses that we are attempting to find out in the third model.

### 2.4.2.3 Institutional ownership

Since role of institutional owners are becoming more important Barry et al. (2011), it would contributes certain weighs when accessing banks' risk-taking behaviour. There is none however an exact definition that can simplified the coverage of institutional ownership. The most common characteristics is that institutional investors are not an individuals, rather, they are the legal entities. Some of the examples of institutional investors are the mutual hedge fund, insurance companies, investment funds and other equivalent organizations.

Therefore, the percentage of the shares owned by large owners (the top 30 shareholders) would be considered in this thesis for the ownership structure analysis. Theoretically, existence of institutional owners could solve the information asymmetry problem since they have more expertise in collecting investment information and therefore are better informed than other individual investors who are usually less superior (e.g., Kang and Stulz, 1997, cited in (Chen, El Ghoul, Guedhami, and Wang, 2014).

In short, different ownership structures (e.g. foreign ownership, state ownership and institutional shareholders) tend to have different impacts on the bank risk-taking. Besides that, as mentioned in 2.4.1 about the different risk incentives between shareholders and managers, managers are usually risk-averse but the situation could change when the

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[4] Based on BBC (2010), 65% of Russia sits on permafrost which is a permanently frozen layer underneath Earth

managers own certain amount of shares in the banks. Therefore, different ownership structures have different risk-taking effects while analysing the interaction between capital regulation and ownership structures will be the ultimate goal of this paper. In the next chapter, we will provide some previous evidences that are related to the three components (e.g. bank regulation, risk-taking incentives and ownership structures)

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layer which usually the temperature persists at 0C for minimum two years.

# Chapter 3: Literature Review, Research Questions and Hypotheses

This chapter will put a light on three parts of the literature, first with the relationship between the banking regulation of such capital requirement and the risk-taking incentives, continue with the relationship between the ownership structure and the risk-taking behaviour and lastly the association of ownership structure, capital regulation and risk-taking. Research questions are elaborated before illustrates the three major hypotheses of this study.

## 3.1 Related Literatures on Bank Regulation and Risk-Taking Incentives

Ever since the financial crisis in 2009, a series of literature that test on the relationship between changes in capital and risks due to the pressure towards bank regulation. Bessis (2010) once mentioned in his book titled "Risk management in Banking" that capital adequacy principle is the core concept in the risk regulations. This is due to the potential losses that could stemmed from the risks while each capital base could weigh how much risks (from a coefficient between 0% and 100%) that the banks actually exposed to. While capital adequacy principle was suggested as the starting point to manage the risk, the role of capital requirements might stimulate more risk-taking (portfolio asset risk) or less financial stability (Z-SCORE). There are also researches that investigated on banks' behaviour on the regulation of bank capital. As mentioned in the previous chapter, Basel Committees have increased the capital adequacy requirement for the banks in order to strengthen financial stability in the whole sector. Matejašák & Teplý (2007) had concluded that US banks and EU15 banks both raise their risk-taking incentive with higher capital adjustment. This is also align with the pioneer simultaneous model between the changes in asset risk and changes in capital in Shrieves & Dahl (1992) that the positive relationship will incurred when include some leverage- and risk-related cost elements that could drives the banks' behaviour. Implying different models, Awdeh, ELMoussawi, & Machrouh (2011), Jokipii and Milne (2011) both drive the same positive result between risk and capital while on the other hand, Zhang, Wu, and Liu (2008) concluded a negative relationship from their empirical testing.

Furthermore, Barth et al. (2004) commented that there are no clear indications if bank regulations would bring to a stable financial system. For example, there are conflicting view if any regulation is needed on foreign bank entry. While one suggests that effective regulation

could promote stability and therefore lower bank risks which are referring to bank's Z-SCORE, lesser regulation restriction could bring higher franchiser values to the banks and further enhance prudent risk-taking incentives (Keeley, 1990; González Rodríguez, 2003).

**Table 3 Overview of Key Empirical Works of Capital Requirement and Bank Risks (In Chronological Order)**

| Authors | Short Description | Samples and Methodology | Impact of Regulatory Pressure |
|---|---|---|---|
| **Shrieves & Dahl (1992)** | Investigate the relationship between changes in risk and capital | Cross-sectional analysis 1,800 FDIC-insured commercial banks between 1984 to 1986 using simultaneous equations models of changes in risk and capital method | Most banks mitigate the increases in capital requirement with increase ask risk-taking and vice versa |
| **Rime (2001)** | Capital requirements and bank behaviour for Switzerland | 154 Swiss banks within 1989-1995 using simultaneous model | Regulatory pressure increases capital to RWA ratio of the banks but no significant on bank-risk |
| **Heid, Porath & Stolz (2003)** | Capital Regulation on Bank behaviour for German Saving Banks | 550 German Savings Banks over 1994 to 2002 using 3SLS | Banks adjust capital faster than the risk. |
| **Roy(2005b)** | To study how G-10 banks have complied with the 1988 Basel Accord | 6 G-10 countries between 1988 and 1995 using a modified version of the model developed by Shrieves and Dahl (1992). | The evidence presented here shows that the impact of the 1988 Basel standards was not uniform across countries. |

| | | | |
|---|---|---|---|
| **Matejašák & Teplý (2007)** | Study how the European and American banks adjust their capital strategies towards the level of minimum capital requirement | 1240 banks from 2000 to 2005 Using simultaneous model and test robustness with 2SLS and 3SLS | Positive significant impacts for US and Europe banks to increase their risk |
| **Alkadamani (2015)** | Investigate on capital adequacy, bank behaviour and crisis for the Middle East countries. | 46 Commercial Banks between 2004 to 2014 using OLS, fixed effects and random effects while taking into account the economic stability | Banks improve capital adequacy by increasing capital ratio and decreasing bank risks, while economic crisis affect the changes in bank risks |
| **Zhang, Wu & Liu (2008)** | Capital adequacy Regulation on bank-risk-taking on Chinese Commercial Banks | Using 12 commercial banks in China from 2004 to 2006 using GMM estimation methods | Capital requirements have no risk-impacts on the Chinese Commercial Banks |

## 3.2 Related Literatures on Ownership Structure and Risk-taking Behaviour

There are existing research that examines on the relationship between bank risk and ownership structure. While Gorton and Rosen (1995) advocated that agency problem is the primary reason for the bank risk-taking during the 1980s, Demsetz et al. (1997) who used a factor analysis concluded that insider holders affect risk-taking through asset risk while block-holders affect risk-taking through leverage risk. In a country-specific analysis Chou & Lin (2011) analysed on 37 banks have shown that banks with higher inside management ownership and government ownership have higher overdue loans and maintains lower capital requirement.  This is the opposite scenario for banks with higher foreign ownership which

have higher regulatory capital and could influence the risk-taking behaviour of the insider managers when owning more stakes in the banks Bouwens & Verriest (2014) found evidence that regulation hardly impact bank managers with equity stakes in risk-taking.

The characteristics of the bank ownership structure also tend to have different results in different scenarios. Of such, the many cited paper Saunders et al. (1990) have concluded that stockholder-controlled banks take more risk than manager-controlled banks since they have the options to diversify their wealth investment unlike the managers are usually given high non-diversifiable human capital (such as salary) in the organizations. In terms of foreign-ownership, Jeon, Wu, Chen, &Wang (2016) concluded that foreign-owned banks have higher default risks than domestic banks. Iannotta et al. (2012) measure risk by issues and individual ratings proved that government-owned banks have less default risks than other private banks. However, Claessens et al. (2001) tested in developed and developing countries from the 1988 to 1995 concluded that increase in foreign ownership is connected with increase in risks for their domestic counterparts. In the Europe region, Barry, Lepetit &Tarazi (2011) tested on 249 banks proved that concentrated institutional shareholders have higher default risks in unlisted banks than in listed banks. In the MENA region, Srairi (2013), Moussa (2014) and Hammami & Boubaker (2015) concluded different results for different ownership structure as displayed in the table below.

**Table 4 Overview of Key Empirical Works of Ownership Structure and Bank Risks (In Chronological Order)**

| Authors | Short Description | Samples and Methodology | Impact of Ownership Structure on Bank Risk |
|---|---|---|---|
| **Barry, Lepetit & Tarazi (2011)** | Influence of different owners and effects of market discipline in the risk-taking of European Commercial banks | 249 European banks using ownership data from 1999 to 2005 | Default risk is higher with larger shares of institutional shares in the banks. Results also shows that inefficient higher risk-taking is curbed by the market forces. |

| Iannotta et al. (2012) | Study on the impact of government ownership on bank risk for European Banks (particularly on default risk and operating risk) | In total 210 banks from 2000 to 2009 were applied in the joint use of issuer ratings and individual ratings | Government-owned banks in average have lower default risk than their private counterparts due to governmental support |
|---|---|---|---|
| Srairi (2013) | Study on the bank-risk behaviour for conventional and Islamic banks in the 10 MENA countries | 175 banks from 2005 to 2009 using panel random effects model | Negative relationship between ownership concentration and risks while Islamic banks have lower credit risk than conventional banks |
| Moussa (2014) | To prove that ownership structure has significant influence on bank risk in the Tunisia | 19 banks in Tunisia over 2000-2010 using panel random effects | Negative effects between public ownership, foreign ownership and bank risk; Positive effects between private ownership and bank risk. Private-owned banks have the most risks. |
| Bouwens & Verriest (2014) | Study if managerial ownership take the similar level of risks as outside shareholders | 307 banks in 37 countries from 2000 to 2007 using OLS model clustering at country level | Managers who hold equity stakes take less risks than outsider shareholders; regulation hardly affects the risk-taking of bank managers who hold banks' stakes |
| Hammami & Boubaker (2015) | Examines impact of ownership structure on bank risk-taking | 72 commercial banks in 10 MENA countries from 2000 to 2010 | Negative relationship between ownership concentration and risks, family-owned |

| | | using panel random effects | banks take less risk, higher risk-taking in state-owned banks |
|---|---|---|---|
| **Jeon, Wu, Chen, & Wang (2016)** | How foreign ownership affect banks' risk-taking behaviour. | Bank-level panel data of more than 1,300 commercial banks in emerging markets from 2000 to 2013 | Result shows that generally foreign owned banks take more risks than the domestic banks which means less financial stability. |

## 3.3 Ownership Structure, Capital Regulation and Bank Risk-Taking

Capital regulation could serve as an instrument to align the shareholder's risk preference with banks' creditors see Jeitschko & Jeung (2005). This is also supported by Dolde & Knopf (2006) that the expropriation problems between shareholders and bank creditors are able to be evaded by capital requirements. With higher capital requirement, the shareholders would expect to absorb greater future possible losses as in Rime (2001) and therefore the bank would face lesser risk Konishi & Yasuda (2004). This implies that capital requirement is acting like a moderating effect between the owners and the bank risk level. Besides that Laeven & Levine (2009) also consider powerful outsider shareholders would decreases bank risks while effect of ownership concentration could increase capital adequacy ratio which was used as proxy for bank risk in Shehzad et al. (2010). In the same paper, Shehzad et al. (2010) advocated Demsetz & Lehn (1985) where highly regulated sector could cause effective discipline of managers therefore ownership concentration would matters less when the regulation became stronger in the sector.

There are also existing literatures that study the three elements of ownership structure, capital requirement and bank risks such as Rahman, Ahmad & Abdullah (2012); Ab. Jamil, Mohd. Said & Mat Nor (2015) using Malaysia case and the first empirical testing in Laeven & Levine (2009). Therefore, we would expect to see moderation effects of the capital adequacy ratio when interact with different ownership shareholdings and impact risk-taking incentives.

**Table 5 Overview of Key Empirical Works on Relationship among Ownership Structure, Capital Requirement and Bank Risks (In Chronological Order)**

| Authors | Short Description | Samples and Methodology | Impact of Ownership Structure and Bank Regulation on Bank Risk |
|---|---|---|---|
| **Haselmann & Wachtel (2007)** | Risk-taking by banks in the transition countries | Relying on EBRD's 2005 survey using Logit Model and 423 banks in 20 countries | No Specific ownership structure take excessive risk in the banks; no further risk-taking in the unsound institutional environment |
| **Laeven & Levine (2009)** | First empirical assessment on bank risk-taking, ownership and national regulation | Applying 270 banks for 48 countries in 2001 while testing with OLS and other instrumental variables | Powerful outsider owners take greater bank risk while effect of the same regulation on a bank's risk-taking would generate different results based on the ownership structure. |
| **Rahman, Ahmad, & Abdullah (2012)** | Empirical evidence about ownership structure and bank risk-taking as well as capital regulation effects | Study on Malaysian commercial banks from 1995- 2008 using general least square (GLS) and first difference method | Large shareholders do not necessarily increase bank risk but depends on the type of shareholders with different risk-taking impact. While higher capital requirement result in higher risk-taking. |
| **Bokpin (2015)** | Bank governance, regulation and risk-taking in Ghana | A sample of 26 banks in Ghana during the 2000 to 2013 was investigated using panel fixed effects model | Reserve requirement regulation to positively influence bank risk-taking therefore support the increase in capital adequacy requirement in Ghana |

| Ab. Jamil, Mohd. Said & Mat Nor (2015) | Impact of the three ownership structure (government, institutional and family) on bank risk-takings | Balance panel data for eight commercial banks in Malaysia during 2000 to 2012 | In the case of Malaysia commercial banks, minimal influence between CAR and ownership structure in determining bank risk-taking level |

## 3.4 Research Questions

There are changes of bank's ownership structure in Central Eastern Europe region ever since the privatisation as noted in the previous chapter (*see chapter 1*) as well the majority consensus about the impacts of higher capital ratios.. Therefore, this thesis will explore the findings in Laeven & Levine (2009) about the impact of bank regulations on bank risk based on difference of bank ownership specifically in the CEE and Asia regions in a micro-level analysis. The major features of the bank regulatory structures like capital adequacy requirements and deposit insurance are correlated with the incentives of different owners and therefore have been a focus of attention in recent years. To be more concrete, in this study, we are interested in analysing the impacts on bank risk-taking for European and Asian banks with the aims to answer the following research questions:

- Will the banks adjust their risk-taking incentives based on capital requirements?
- Does foreign-bank takes on more risks than domestic banks?
- Do different shareholdings that include insider shareholders, institutional shareholders and government shareholders have any impact on external factors of election and market forces?
- Does capital regulation acts as a moderating variable[5] for the insider and outsider shareholders (institutional shareholders and government shareholders) in influencing the bank risks taking incentives?

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[5] Capital Adequacy Ratio (CAR) as a measure for minimum capital requirement is assumed to be the moderating variable that changes (increases or decreases) the effects of the independent variables of such ownership shareholdings (INSMAN, INST and GOV) upon the Bank Details definition of the variables is displayed in the appendix *Table A.10*

- To what extent do the results support Laeven & Levine (2009) proposal that key bank regulations interact with ownership structure to shape bank's risk-taking?

The following will explores on the three hypotheses for the empirical testing of this study.

## 3.5 Hypotheses Built Upon Previous Literatures

In the study, we model the behaviour of mainly Central Eastern Europe banks and additional Asian banks and base our conclusion about the important connection between the bank regulation and governance theory for the future possible capital adequacy rules in Basel IV. In other words, we are assuming the future potential rules will react in the same ways as what happened in the past based on the individual banks behaviour based on the capital requirements policy.

Generally, based on our understanding on the banking's knowledge, economic theories and the existing available literatures, the following expectations can be drawn before conducting the research:

**Hypothesis 1:** Advocating Matejašák & Teplý (2007) and Shrieves & Dahl (1992) stance, there will be an increase in portfolio risk (with an increase in RWA/TA) when there is an adjustment in the capital requirement (increase), representing positive relationship of the two variables.

**Hypothesis 2:** Based on the theoretical explanations structured in the theory review (*see* Chapter 2), the foreign ownership has significant impacts on bank risks but it remains ambiguous across countries. We expect to see foreign ownership has significant impact on bank risk when the foreign-owned banks possess knowledge about the local banking sector. However, the results might differ when we include other shareholdings structure especially when presence of government in the banks during elections will cause different impacts. In addition to that, market forces can impact bank risk-taking either by decreasing the bank risk incentives. On the other hand, market forces can align the objectives of public banks to take higher risks in order to generate higher returns, which in turn increase in risks that can be expected in this case.

**Hypothesis 3**: As suggested by Laeven & Levine (2009) in support of the theoretical model suggested by Boyd & Hakenes (2012), the relationship between bank risk and capital regulations are dependent on the individual bank's ownership structure, further supporting that same capital regulation would have different effects on risk-taking. Therefore, ignoring the interaction between capital regulation and ownership structure can lead to incomplete analysis. As suggested in Laeven & Levine (2009), outsider shareholders who are the block shareholders take on more risks during the insurance of bank regulation. Grossman (1992) also suggested that bank managers would take on more risks when they are assured that the risks they are exposing to will be insured regardless of the next bank crisis. However, some shareholders would be afraid that bank regulators would resist more risk-taking in due of stringent environment. Therefore, risks exposure of the banks and the shareholdings of different ownership could be moderated (either increase or decrease) by the bank capital regulation in which the banks are operating in different environment.

In order to test the hypotheses and to answer the research questions, multiple regressions are used based on different empirical testing and analysis.

# Chapter 4: Empirical Evidence

Based on the theoretical review in Chapter 2, this thesis is based upon three main thereotical keystones. First theory is related to the bank regulation due to the different nature of the banks in the financial markets, especially when CEE countries are still new in the financial markets where the bank regulation is not as established as the developed economies. For example, deposit insurance, capital regulation and bank restriction are the essential regulatory measures that were widely discussed in Barth, Caprio, & Levine (2006), Laeven & Levine (2009), Bouwens & Verriest (2014) and others. Capital regulation especially has received high attention ever since the financial crisis happened in the late 2008 and early 2009 where many countries were obliged to increase their capital adequacy ratio. We however think that the existence of capital requirement while might induce banks to increase their capitals do not necessarily induce more risk-taking. It could be depending on the influential and the incentives of the different shareholders, which relates to the second theory.

While some literatures suggest foreign banks could act as the moderating force by inducing competition and improve the efficiency of the domestic banks Claessens et al. (2001), foreign banks tend to "cherry pick" the worthy clients and therefore weaken the efficacy of the host countries' policies (De Haas and Van Lelyveld, 2010, 2014; Wu et al., 2011 and Jeon et al., 2013, cited in Jeon, Wu, Chen, & Wang (2016)). State-owned banks is another important area supported by two different views (social and political view), *refer to* Sapeinza (2004). While social view state that state intervention is needed to correct any market failure, political view however see the private interest of the politicians in the banks. Besides that, other corporate governance researches cover other ownership shareholdings such as the institutional ownerships and insider management owners. Some researches included other endogenous study that interact with the ownership structure when analysing banks' risk-taking such as Setiyono & Tarazi (2014) explores the disclosure impact with ownership structure, Barry, Lepetit, & Tarazi (2011) identifies the co-existence of the ownership structure and market discipline to influence bank risks and others. From this perspective, we established that different ownership structure of the banks contribute to different risk-taking based on the objectives of the different shareholdings as well as the external environment.

The final theory is to connect regulation theory mentioned in theory one and the bank governance theory in theory two in analysing the impact on different types of bank risks. While the increase of capital regulation cause higher bank risk-taking which is especially

proven for the outsider shareholders *see* Laeven & Levine (2009). Saunders et al. (1990) argues that the reverse is more relevant since reduce in banking regulation will prompt insider managers to seek for higher risks. Relying on the insider shareholders and major outsider corporate shareholders and state owners, we attempt to figure out the impact of the bank risks.

## 4.1 Criteria of Data Selection

We employ a sample of data covers up to 14 countries in CEE region and 3 important countries in the Asia region from 2005 up to 2014. The primary research of the thesis will focus on the CEE region while three Asia countries are included in the analysis. In order for the 14 countries in the CEE to be included, the following criteria were first applied: (i) a country will have to belong to Central, South Eastern or Eastern Europe region and (ii) the bank assets of GDP in financial year of 2014 must exceed at least 50%. Since Poland, Romania, Czech Republic and Hungary play strong roles in the CEE region due to the fact of the high GDP position beside Russia, we are very interested to analyse the banking sector in this countries[6]. On top of that, other than the four highest GDP countries in CEE region, the CEE countries in the samples have at least 50% of their 5 largest banks on total assets, from as low as 54.3% in Bulgaria to as high as 89.6% in the Estonia. This proves that the CEE region's banks are quite high in concentration.

In the Asia region, Hong Kong is considered as the world's largest international banking centre in Asia Pacific region with high foreign ownership in the country end it is also an important offshore Renminbi Centre. Secondly, Singapore was considered as the country in the Asian markets to attract the largest amount of foreign direct investment in 2015 as reported by (TheBanker, 2016). In fact, both Hong Kong SAR and Singapore play important roles in the cross-border banking, both are the main net lenders to the emerging economies in Asia after the financial crisis in 2008 (BCBS, 2015. Furthermore, China is included in the sample selection due to two reasons. From the economics perspective, it is the largest economy in Asia Pacific while second largest economy in the world with US$10,449 billion nominal GDP in end of 2014 and it has been predicted to be at the top rank as the largest economy in the world in terms of real GDP by 2030 (PwC,2015). Furthermore, China's banking sector has the largest bank assets in the Asia Pacific region based on The Economic

Intelligence Unit's estimation of US$16,899 billion, extracted from SNL Financial report, while China Banking Regulatory Commission suggested higher figures of the aggregate bank assets of 172.3 trillion yuan as per 2014, approximately US$28550 billion instead. Therefore, including banks from China is crucial due to its strong economic position and large bank assets which far ahead of the Hong Kong (approx.US$2,377 billion total bank assets in 2014) and Singapore (approx. US$1,686 billion total bank assets in 2014), both figures obtained from the countries' commission website with author conversion using 13rd April 2016 conversion rate to US dollars.

Using Bankscope as the primary source, we ensured there is a minimum of 5 years' observations for each individual banks to ensure a balance analysis. List of countries included in our analysis are displayed as follows, begin with Central Eastern Europe and Asia thereafter.

**Table 6 List of Countries**

| Central and Eastern Europe | | |
|---|---|---|
| Albania (AL) | Czech Republic (CZ) | Romania (RO) |
| Belarus (BY) | Estonia (EE) | Russian Federation (RU) |
| Bosnia and Herzegovina (BA) | Hungary (HU) | Slovakia (SK) |
| Bulgaria (BG) | Latvia (LV) | Slovenia (SL) |
| Croatia (HR) | Poland (PL) | |
| Asia Pacific | | |
| Hong Kong (HK) | Singapore (SG) | China (CH) |

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[6] Russia owned Euro1,384 GDP followed by Poland (Euro 412), Czech Republic (Euro 155), Romania (Euro 151) and Hungary (Euro 103) which are the top four highest GDP as of 2014. Source: Raiffeisen RESEARCH,2015

## 4.2 Capital Regulation and Bank Risk-taking

This section is to study the first hypothesis if the changes in capital requirement have impact to the banks in adjusting their capital and risks. We will test the assumptions using the following model.

### 4.2.1 Model of Simultaneous Equation between Capital Requirements and Bank Risks

$$\Delta CAP_{j,t} = \Delta^d CAP_{j,t} + E_{j,t} \tag{1}$$

$$\Delta RISK_{j,t} = \Delta^d RISK_{j,t} + S_{j,t} \tag{2}$$

$$\Delta^d CAP_{j,t} = \alpha (CAP^*_{j,t} - CAP_{j,t-1}) \tag{3}$$

$$\Delta^d RISK_{j,t} = \beta (RISK^*_{j,t} - RISK_{j,t-1}) \tag{4}$$

$$\Delta CAP_{j,t} = \alpha (CAP^*_{j,t} - CAP_{j,t-1}) + E_{j,t} \tag{5}$$

$$\Delta RISK_{j,t} = \beta (RISK^*_{j,t} - RISK_{j,t-1}) + S_{j,t} \tag{6}$$

**Inspiration from Shrieves and Dahl (1992)**

The observed changes in the capital ($\Delta CAP$) in period $t$ can be identified from the discretionary changes of the capital ($\Delta^d CAP$) in the current target period $t$ and the period $t-1$, taking into account the random shocks $E_{j,t}$. Similar observed changes in risk ($\Delta RISK$) in period $t$ can be identified from the discretionary changes of the risk ($\Delta^d RISK$) in the current target period $t$ and the period $t-1$, taking into account the random shocks $S_{j,t}$. Discretionary changes of capital and risk are used because Shrieves and Dahl (1992) proposed the notion that banks may not be able to adjust the desired capital ratio and risk instantly from the requirement, hereby the changes from the period before is essential to capture the time taken for adjustments. From the models (1) to (6), we include relevant bank-controlled as well as macroeconomic variables in the models (7) and (8) to test the simultaneous relationship

between changes in capita; and changes it risks. The model to test the relationship between changes in capital and changes in risk will be tested using panel fixed effects and robustness check with the 2SLS and 3SLS using lagged capital and lagged risk as instrumental variables for the following specifications in (7) and (8)

$$\Delta CAP_{j,t} = \alpha_0 + \alpha_1 REG_{j,t-1} + \alpha_2 ROA_{j,t} + \alpha_3 BANKSIZE_{j,t} + \alpha_4 \Delta RISK_{j,t} + \alpha_5$$

$$CAP_{j,t-1} + \alpha_6 Yeardummy2008 + \ldots + \alpha_{12} Yeardummy2014 + \varepsilon_{j,t} \qquad (7)$$

$$\Delta RISK_{j,t} = \beta_0 + \beta_1 REG_{j,t-1} + \beta_2 LLOSS_{j,t} + \beta_3 SIZE_{j,t} + \beta_4 \Delta CAP_{j,t} +$$

$$\beta_5 BANKRISK_{j,t-1} + \beta_6 YEARDUM08 + \ldots + \beta_{12} YEARDUM14 + \upsilon_{j,t} \qquad (8)$$

**Inspiration from Shrieves and Dahl (1992)**

### 4.2.1.1 Data Coverage

This study covers 141 Central Eastern Europe banks and 51 Asian banks and after taking into account the changes in capital and bank risks as well as the lagging function, the total periods covers in his study is ranging from 2007 to 2014.

### 4.2.1.2 Variable Descriptions

In order to estimates the simultaneous specifications in (7) and (8), the following variables will be selected as per the explanation below.

*a)* **$\Delta CAP$** *and* **$\Delta RISK$**

Following the previous literature such as Jacques & Nigro (1997), Alkadamani (2015) and others we then defined capital as total regulatory capital or total capital over Risk Weighted Assets (RWA), while Bank Risks are the RWA to Total Assets, which is a proxy for credit risk that measures the portfolio risks for the allocation of different assets. Here both equations involved RWA since Rime (2001) suggested that RWA provides a good indication on banks' decisions in risk-taking since risk-weightings represents the economic risks in different assets categories. Both the changes of capital and changes in bank risk will be

calculated as per (5) and (6) above before proceed to the fixed effects and 2SLS and 3SLS estimation model.

### b) Other Variables to be Taken Into Accounts

Specifications (7) and (8) are tested using lagged capital ($CAP_{j,t-1}$) for (7) and lagged risk ($RISK_{j,t-1}$) in (8) while also including other variables size as the size of the banks (LNSIZE), profitability status of the bank in (7) (ROA), loans loss provisions (LLOSS) in (8), capital regulatory pressure (REG) which will be using the binary range (0,1) as well as including year dummy variables (dy2008 to dy2014) to capture macroeconomic shocks. Most of the previous literature applies the similar variables in the models, except for year dummy variables were used in few literature like Heid, Porath & Stolz (2003) and also in Matejašák & Teplý (2007) which in the case of analysing CEE banks' behaviour, similar models and variables will be applied.

### b(1) Bank Size (LNSIZE)

As suggested in Rime (2001) and others that bank size has impacts on risk diversifications, the nature of bank investment opportunities and the ability to access to capital, which may therefore influence the target capital and target risks in the equations. Aggarwal and Jacques (1997) stated that larger banks are usually holding less capital from the capital requirement regulation due to their better ability to increase capital than other smaller banks. Demsetz & Strahan (1997) shows that larger banks usually hold less capital and very likely to engage in higher risk lending activities, such as commercial and industrial lending Therefore, in order to capture the size effects and since LNSIZE is highly skewed, LNSIZE will be measured using the natural logarithm of the total assets owned by the banks. We proposed that LNSIZE has an inverse relationship with changes in capital while a positive relationship with changes in risk.

### b(2) Profitability measure (ROA)

Returns on Assets (ROA) is the common performance measurement that is usually used to reflects current profits of the banks which are in positive effects with the capital since banks usually rely on the retained earnings to raise their capital as banks is of a very low shareholder-equity business nature.

**b(3) Loans Loss Provisions (LLOS)**

This is an indicator of an estimation of the amounts needed to cover banks' future losses. Agreeing to Aggarwal and Jacques (1997) and Alkadamani (2015), loans loss provisions to total assets will be used as indicator and we are expecting a positive relationship between LLOS and $\Delta^d$ RISK since higher loans loss in the future would means that banks have to face with higher possible default risks and therefore higher risk asset allocation in the portfolio.

**b(4) Capital Regulatory Pressure (REG)**

Capital regulatory pressure is the contributing factor why banks adjust their capital ratio accordingly. This binary indicator will be used to identify how each different bank behave towards the national capital requirement in each country. There are several approaches that evolve ever since Shrieves and Dahl (1992)'s simple method that only take into account if the bank applies below 8% of capital ratio with 1 and 0 otherwise. Later, Aggarwal and Jacques (1997) proposed a more advanced approach called the prompt corrective action that take into account classification between capitalized and undercapitalized institutions which also applied in Rime (2001). Both of these methods are more direct that only emphasize one element (if the banks maintain capital below minimum level or the other hand) as commented in Roy (2005b) Therefore, in order to produce a stronger analysis, this study will implement a modified version of Roy(2005b) methods using two different approach of such (i) Gap Magnitude Approach and (ii) Capital Volatility Approach.

*b(4)(i) Gap Magnitude Approach*

This approach will be divided into two parts with the first binary (REG1) relies on the gap between the threshold and the capital ratio implemented by the banks, this threshold (TR) will be the minimum capital regulatory ratio set by the Basel Committee (8) as compared to the Capital Ratio, CR (including Tier 1 and Tier 2 Capital Ratio) set by different banks. When the banks comply lower capital ratio than the threshold of 8% the regulatory pressure of such will be the positive figure of the difference of *(threshold, TR less Capital Ratio, CR),* while 0 would be when the banks have higher capital ratio than the threshold. The reason of using 8% even though Basel III was announced in 2010 about the proposed introduction of

10.5% minimum capital adequacy ratio, was because the banks are still giving implementation time until 2018 for such implementation.

Thereby, the first **REG1** binary (0,1) approach = min (0,TR-CR) when CR<TR,

$$= 0 \text{ when CR>TR or CR=TR.}$$

While this approach seems to take into account the gap of the threshold and behaviour of banks towards capital requirement, the thresholds seems to be too generalised. In order to obtain a more accurate analysis, we modified the measurement of TR by taking the National Threshold set by regulators (NTR) based on different jurisdictions. The data is a country-based database from Helgi Library that complies data, particularly on Bank Capital Adequacy Ratio from different sources like the WorldBank, Bank for International Settlements and Federal Deposit Insurance Corporation or Federal Reserve Board.

Hereby, the second REG2 binary range will use a different thresholds based on national level threshold.

**REG2** (0,1) binary = min(0,NTR-CR), when CR<NTR,

$$= 0 \text{ when CR>NTR or CR=NTR}$$

*b(4)(ii) Capital Volatility Approach*

This is another advance method suggested by (Roy, 2005b) that capture the possible volatility of two banks regardless of maitaining the same capital ratio (CR).

**REG3** (0,1) binary = 1 if CR < (8 % + two years standard deviation of CR)

$$= 0 \text{ otherwise}$$

A quick look on **Table A.3** in appendix shows that the undercapitalized banks varies based on the different methods used to calculate capital regulatory pressure. While the GAP Magnitude approach when using country national bank adequacy ratio the percentage of regulatory pressure seems to increase tremendously to about 50.39% in overall as compared to the basic threshold of 8% used (a mere 2.18% of the samples are undercapitalized). The 50.39%% is even higher than 17.90% of undercapitalized banks which are the similar percentage covered in Roy (2005b) when using capital volatility approach. Before carrying out the estimation, it might cause preliminary conclusion that banks are not pressured with the minimum requirement but the country-specific capital adequacy ratio (REG2) seems to provide a 50-50 equal balance of the samples despite of the regions and could show a more reliable analysis.

**b(5) Year Dummy Variables**

Since the macroeconomic environment, particularly the financial crisis happened in the end of 2008 and beginning of 2009, in order to capture macroeconomic shocks, year dummy variables will be included capture further year specific effects. Therefore, this variable will be included in both the risk and capital equation. Due to missing values of capital ratio from Bankscope, in order to cover a more balance analysis, we will cover the period from 2007 t2014 (8 years period) for this simultaneous equations. 7 years of year dummy variables will be covered with 2007as reference period to avoid collinearity.

**b(6) Lagged Bank Risks (RISK $_{j,t-1}$), Lagged Capital (CAP $_{j,t-1}$) and Lagged Capital Regulatory Pressure (REG $_{j,t-1}$)**

Besides the above-mentioned variables, lagged bank risks will be used for the change in bank risk equation while lagged capital will be used in change in capital, as well as lagged capital regulatory pressure will be used in both equations to reflect previous capital regulatory pressure will have impacts on the changes in the capital and changes of risks.

## 4.2.2 Empirical Testing

### 4.2.2.1 Determining Estimation Method

In order to prove simultaneous estimation, fixed-effects panel model for all countries (including Asia region) will be used for the first baseline regression. This method is used in Alkadamani (2015) and Roy (2005a). For this estimation, the basic capital regulatory threshold level (REG1) will be used as a mesaure of capital regulatory pressure. Hausman Test was used before choosing fixed effects panel data.

$H_0$: Random Effects model is highly preferred

$H_1$: Fixed Effects model is highly preferred

Based on the results, p-value (0.0000) is so small that is definitely less than 0.05 for the 95% confidence level and hence null hypothesis of using random effect is rejected. In the fixed-panel model, robust standard errors are used to correct 'heteroscedasticity'. Later on, the estimation will be divided into two regions of CEE and Asia using national regulation threshold (REG2) and see if the result persists. In order to confirm the hypothesis if capital regulatory pressure has impact on the changes in capital and bank risks, 2SLS and 3SLS models were also used to compare with the fixed effects panel model since these approaches

could recognize the endogeneity of changes in capital and risk that unlike the fixed panel that only provide consistent estimation of the parameters. Both 2SLS and 3SLS techniques are very similar but 3SLS tend to take into account the cross-equation correlations and therefore in some extent is more efficient. We run both 2SLS and 3SLS to prove the hypothesis and found highly similar result. For the presentation of the result, we will rely on the 3SLS since both are of high similarity.

### 4.2.2.1 Descriptive Statistics

Using Bankscope as primary source, a balanced panel containing 192 banks from CEE and Asia regions were built. From the average capital ratio in the appendix, *Table A.1*, in general the countries show an increasing trend from 2007 to 2014 with average of 14.06% of capital ratio to 17.50% in 2014. When breaking into different regions, we see the different capital ratio trends in our samples that unlike Baltic countries with increasing trends all the way from 2007 till 2014 with the highest average among all regions across countries of 25.41% in 2014, CEE countries maintained the lowest capital ratio across the years as 12.75% in 2007 and increase about 25% of the capital ratio to 16% in 2014. The 25% increase from 2007 to 2014 is considerably low when compared to SEE region of 60% within the same period.

When looking at the correlation matrices (in the appendix, **Table A.4**), we observed a negative relationship between capital and changes in capital (with -0.3779). This implies that larger banks will usually hold less capital than their other counterpart. The correlation persists (-0.4068 for CEE while -0.2979 for ASIA) even though we run a region correlation matrices (not presented in this paper since it is very similar to the overall matrices). Also, there is a negative relationship between risk and changes in bank risks ( -0.999 for CEE banks and -0.5562 in Asia banks) suggests that riskier banks are taking less risks. This could also be identified with the overall decreasing bank risks in the average of bank risks since 2012 (appendix, *Table* **A.2).** One interesting trait that was identified was the negative correlation between changes in capital and changes in risks ( -0.0012) while looking into the region matrix (CEE has a negative -0.0023 matrix while ASIA a strong 0.3522). Shrieves and Dahl (1992) suggested that the negative correlation of changes in both capital and risks which might be due to the cross-sectional variation in terms of risk favour: of high risk aversion banks might opted high capital and low risk and vice versa. This differences prompted the motivation to look into a comparison approach between CEE and ASIA to see if the

hypothesis persists for both regions. Summary statistics for Model 1 can be found in appendix, ***Table A.6.***

### 4.2.2.2 Empirical Results

***Table 7*** below displays the combination of the result using different methods of Capital Regulatory Pressure. The first three columns display results that were conducted in fixed panel since OLS model consist of autocorrelation that could produce biased results. Similar approach of the fixed effect was adopted in the recent paper Alkadamani (2015). Firstly, when we run a panel fixed effects model for both regions, it rejected the hypothesis that changes in capital and changes in risk do not have impact on each other or not affected by exogenous and endogenous factors. A strong 99% confidence-level that changes in capital by 1% will cause 0.01 increase in the bank risks.

The main idea of this estimation is to find out if the banks in the CEE region have any adjustment towards bank risk and capital regulation. From the baseline regression, a positive relationship between REGt-1 (using the minimum 8% threshold) and capital adjustment, significant at 10%. It proves banks in both regions would react towards the minimum capital requirement. However, positive relationship was also identified with changes in bank risks even it is not significant. Further running the 3SLS technique, a negative relationship with 1% significant level on REG3t-1 and change in bank risks could be found which advocates the theory built at first place where banks would first built increase its capital level and then decrease the risk-taking, even for the CEE banks.

In terms of the changes in capital and changes in bank risks, the fixed model proves positive significant relationship in CEE region with the national regulation threshold approach but it was not significant regardless of the positive relationship in the 3SLS method using capital volatility approach. However, at this point, accepting the previous results of different signs (positive, negative or even insignificant) have been obtained in different estimations to prove the relationship between the capital and risk impacts, for the purpose of this master thesis, the major focus is to investigate if there are relationship between the ownership structure with the capital regulation when comes to risk-taking incentives. This model is conducted in order to prove the relationship of the capital and risk which we did not get a strong significant in the 3SLS estimation.

A preliminary result if relies on national regulation threshold (Reg3t-1) since it is more country specific, a strong 1% significant level supported the positive relationship in the

CEE regions. When further carries out the robustness check by dividing the countries into 5 regions as listed in *appendix **List 1(CEEu, SEE, BAL, CIS and ASIA)***, we found that CEEu, SEE and ASIA are have positive significant level on the two elements while BAL and CIS also shows positive coefficients (*results are not presented in this paper*).

Other results in relation to the other factors that could impact on the simultaneous relationship are disclosed as follows. LNSIZE has a positive relationship with both the capital and bank risk effect, significant at 1% level implies larger banks would complies with higher capital ratio, which contradicts with Roy(2005b) assumption that larger banks are closely related to the theory of too-big-to-fail and should possess lower capital ratio. This is however in support with Zhang, Wu and Liu (2008) explores on China commercial banks that concludes a positive relationship of bank size (LNSIZE) with the changes in capital and risks since larger bank have higher access to credit. The negative lagged of capital (CAPt-1) are significant at the three models proposed that when in both CEE and Asia region, the lower capital ratio in the previous period would cause the banks to increase their capital ratio (persists with the increasing total capital ratio from 2007 to 2014 in appendix, ***Table A.1***. Similar trends for the lagged bank risks The lagged level of risk (RISK$_{t-1}$) has a negative and significant effect on risk change in three models because the banks would decrease the change in risk in this period when there is increased risk taken in previous year. ROA has significant positive impact in changes in capital equation particularly in CEE region while negative significant in ASIA could be because of more profitable banks in CEE usually improve their capitalization through retained earnings while ASIA banks usually through issuance of shares due to more developed market in the samples like Hong Kong. Loans loss provisions (LLOS) in changes in bank risks model is ambiguous since it negatively impact the y-variable in fixed model particularly CEE region while being positively estimated in the 2SLS and 3SLS techniques with high 1% significant in CEE region. Lastly, year dummy variables are notably significant except yeardummy14 (represents 2014) in 3SLS estimation for the CEE region in the changes in risks equation.

### 4.2.3 Model 1 Concluding Remark and Further Investigation

In overall, based on the results obtained, we cannot reject the hypothesis 1 that increases in capital due to capital regulatory pressure will impact the bank risk changes positively regardless of the significance is not consistently strong across the estimation methods

# Table 7 Fixed Effects and 3SLS Estimation Results for Model 1

| | Fixed Effects: Gap Magnitude Approach using 8% as Threshold in REGt1 (REG1) | | Fixed Effects: Gap Magnitude Approach using National Regulation as Threshold in REGt1 (REG2) | | | | 3SLS Estimation: Using Capital Volatility Approach in REGt1 (REG3) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dependent Var | Δ CAPt | ΔRISKt | Δ CAPt | ΔRISKt | Δ CAPt | ΔRISKt | Δ CAPt | ΔRISKt | Δ CAPt | ΔRISKt |
| | Panel cross-countries [7] | | CEE region | | Asia | | CEE region | | Asia | |
| REGt-1^ | 0.9222 | 0.0054 | 0.074 | -0.0041 | 0.0226 | -0.0145 | 2.1675 | -0.1324 | 2.3915 | -0.0483 |
| | (0.5278)* | (0.0146) | (0.1134) | (0.0056) | (0.2689) | (0.0187) | (0.6217)*** | (0.0283)*** | (0.8626)*** | (0.0372) |
| CAPt-1 | -0.587 | | -0.5630 | | -0.6323 | | -0.266 | | -0.1206 | |
| | (0.0647)*** | | (0.0721)*** | | (0.0900)*** | | (0.022 )*** | | (0.0303)*** | |
| RISKt-1 | | -0.9997 | | -0.9997 | | -0.7221 | | -0.9996 | | -0.5252 |
| | | (0.0001)*** | | (0.00006)*** | | (0.1352)*** | | (0.0004)*** | | (0.0636)*** |
| LLOS | | -0.0929 | | -0.1688 | | 6.0605 | | 0.7659 | | 9.942 |
| | | (0.3504) | | (0.3432) | | (6.5508) | | (0.275)*** | | (4.534)** |
| ROA | 0.1376 | | 0.1388 | | -1.7634 | | 0.1961 | | -0.8776 | |
| | (0.084)* | | (0.0853)* | | (1.3605) | | (0.0575)*** | | (0.6906) | |
| LNSIZE | 0.9087 | 0.0601 | 1.1433 | 0.08014 | 0.5403 | 0.0186 | 0.0122 | 0.0227 | -0.1093 | 0.0074 |
| | (0.245)*** | (0.0144)*** | (0.191)*** | (01267)*** | (0.3554) | (0.0137) | (0.1139) | (0.0046)*** | (0.1418) | (0.0042)* |
| ΔRISK | 0.0093 | | 0.0092 | | 5.6530 | | 0.00042 | | 10.608 | |
| | (0.0012)*** | | (0.0011)*** | | (3.4801) | | (0.009) | | (2.293)*** | |
| ΔCAP | | 0.0005274 | | -0.00020 | | 0.0061 | | -0.0006 | | 0.01079 |
| | | (0.001) | | (0.0013 ) | | (0.0016)*** | | (0.0032) | | (0.0071) |
| YEARDUM08 | 0.0486 | 0.1123 | -0.3665 | 0.1244 | 0.4836 | 0.0142 | -0.349 | 0.1318 | 0.2700445 | -0.0073 |
| | (0.6085) | (0.02977)*** | (0.7375) | (0.0355)*** | (1.0469) | (0.0649) | (0.8472) | (0.0343)*** | (1.2208) | (0.0401) |
| YEARDUM09 | 1.7575 | 0.10359 | 2.1998 | 0.1431 | 0.5462 | -0.0585 | 2.407 | 0.1392 | 0.7274 | -0.0872 |
| | (0.8227)** | (0.0287) | (0.9278)** | (0.0358)*** | (1.5378) | (0.0338)* | (0.858*** | (0.0357 )*** | (1.264) | (0.040)** |
| YEARDUM10 | 0.9208 | 0.1066 | 0.2680 | 0.1412 | 2.1419 | -0.0405 | 0.031 | 0.1409 | 2.0129 | -0.0613 |
| | (0.732) | (0.0304)*** | (0.845) | (0.0373)*** | (1.330) | (0.0313) | (0.8639) | (0.0349)*** | (1.231) | (0.0414) |
| YEEARDUM11 | 0.1901 | 0.1080 | -0.2026 | 0.1385 | 1.0508 | -0.0112 | -0.4938 | 0.1491 | -0.2247 | -0.0194 |
| | (0.6408) | (0.034)*** | (0.7721) | (0.0425)*** | (0.9178) | (0.0302) | (0.8622 ) | (0.0350)*** | (1.224) | (0.0400) |

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[7] All countries here refer to 17 countries selected as the samples of the main thesis here, in which 14 countries from CEE region while 3 Asia countries including Hong Kong, Singapore and China.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **YEARDUM12** | 0.9822 | 0.0865 | 0.7427 | 0.1343 | 1.7341 | -0.077 | 0.8797 | 0.1461 | 1.652 | -0.0962 |
| | (0.6072) | (0.0339)** | (0.6926) | (0.0419)*** | (1.1663) | (0.0354) | (0.8620 ) | (0.0346)*** | (1.262) | (0.0407)** |
| **YEARDUM13** | 0.4673 | 0.0758 | 0.5996 | 0.0918 | -0.3034 | 0.0228 | 0.5746 | 0.0962 | -1.2012 | 0.0210 |
| | (0.6403) | (0.0339)** | (0.7438) | (0.0424)** | (1.0652) | (0.0342) | (0.8706) | (0.0351 )*** | (1.246) | (0.0412) |
| **YEARDUM14** | 0.8019 | 0.04379 | 0.7489 | 0.0599 | 1.0968 | -0.0440 | 0.5814 | 0.0531 | 0.9268 | -0.0661 |
| | (0.7008) | (0.0356) | (0.8213) | -0.0426 | (1.2283) | (0.0400) | (0.8725) | (0.0351) | (1.250) | (0.0400)* |
| **_cons** | 1.3747 | 0.0174 | -0.0220 | -0.0823 | 5.3776 | 0.1990 | 3.9159 | 0.3782 | 3.1947 | 0.2266 |
| | (2.2627) | (0.1164) | (1.9874) | (0.0948) | (3.6856) | (0.1387) | (1.1834)*** | (0.0443)*** | (1.9271)* | (0.0558)*** |
| **Observations** | 1526 | | 1120 | | 406 | | 1120 | | 406 | |
| **Number of groups** | 191 | | 141 | | 51 | | 275.88 | 8.12 | 101.38 | 240.78 |
| **Prob>F** | 0.000 | | 0.000 | | 0.000 | | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| **R-squared** | | | | | | | 0.1971 | 0.9999 | 0.2283 | 0.3911 |
| **R-sq within** | 0.3526 | 0.9999 | 0.3341 | 0.999 | 0.5003 | 0.4799 | | | | |
| **R-sq between** | 0.0005 | 0.999 | 0.0139 | 0.993 | 0.1049 | 0.1004 | | | | |
| **R-sq overall** | 0.1235 | 0.9998 | 0.1542 | 0.998 | 0.1183 | 0.3837 | | | | |

(Parentheses represent robust standard error); Significant level at 1%***,5%**and 10%*

Detailed description on variables can be found in appendix *Table A.10*.

## 4.3 Ownership Structure and Risk-Taking Behaviour

The issue of ownership structure is usually discussed in the international context mainly the US banks but still not well discussed in the CEE regions. Therefore, the purpose of this model is to test if the different ownership structure in CEE countries plus important Asia countries taken different risk-taking by taking into account the government electoral cycle, market discipline factors as well as controlling bank characteristics and country effects. The following displays some of the relevant previous literature and the findings.

### 4.3.1 Model 2 of the Ownership Structure and Bank Risk

This Model 2 examines the impact of different ownership structure (foreign ownership vs domestic banks) including other different shareholdings on the bank risk-taking. In order to test the second hypothesis mentioned in chapter 3, we would like to divide into three specifications below.

$$\text{RISK}_{i,t} = \beta_0 + \sum \beta_1 \text{FOREIGNOWN}_{i,t} + \sum \beta_2 \text{LNSIZE}_{i,t} + \sum \beta_{3\text{-}7} \text{BANK CONTROLS}_{i,t} + \sum \beta_{8\text{-}11} \text{COUNTRY CONTROLS}_t, + \mu_{i,t} \tag{1}$$

**Inspiration from (Setiyono and Tarazi, 2014)**

Where, RISK is either Z-SCORE, STDEVROAA, STDEVROAE or NPL. FOREIGNOWN is the dummy variable if the bank is foreign own and LNSIZE is the log of total bank's assets. This specification is about the effect of different bank's ownership on the bank risks for *i banks* within *t periods* with $\beta_0$ as the intercept term that will capture omitted variables and $\mu$ represents the error term.
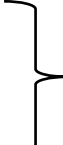
Based on specification (1), the major focus is to identify if foreign owned banks take more risks than the domestic banks in a cross-sectional level across all banks in the samples. Then the analysis will break into two part with specification (2) looking into state-ownership impacts based on impact on electoral cycle while specification (3) will allows us to test the effect of different ownership combinations in the bank risk-taking.

$$\text{RISK}_{i,t} = \beta_0 + \sum \beta_1 \text{FOREIGNOWN}_{i,t} + \sum \beta_2 \text{GOV}_{i,t} + \sum \beta_3 \text{GOVDUM50}_{i,t} + \sum \beta_4 \text{ELECTIONS}_{,t} + \sum \beta_5 \text{GOV*ELEC}_{i,t} + \sum \beta_6 \text{LNSIZE}_{i,t} + \sum \beta_{7\text{-}12} \text{BANK CONTROLS}_{i,t} + \sum \beta_{13\text{-}16} \text{COUNTRY CONTROLS}_{i,t} + \mu_{i,t} \tag{2}$$

$$\text{RISK}_{i,t} = \beta_0 + \sum \beta_1 \text{INSDMAN}_{i,t} + \beta_2 \sum \text{INST}_{i,t} + \sum \beta_3 \text{GOV}_{i,t} + \sum \beta_4 \text{GOVDUM50}_i +$$
$$\sum \beta_5 \text{ELECTIONS}_{,t} + \sum \beta_6 \text{LISTED}_{i,t} + \sum \beta_7 \text{GOV*ELEC}_{i,t} + \sum \beta_8 \text{GOV*ELEC*LIS}_+$$
$$\sum \beta_9 \text{INSDMAN*LISTED}_{i,t} + \sum \beta_{10} \text{INST*LISTED}_{i,t} + \sum \beta_{11} \text{GOV*LISTED}_{i,t} + \beta_{12} \text{LNSIZE}_{i,t} + \sum$$
$$\beta_{13\text{-}17} \text{BANK CONTROLS}_{i,t} + + \sum \beta_{18\text{-}21} \text{COUNTRY CONTROLS}_{i,} + \mu_{i,t}$$

<div align="right">(3)</div>

Where, similar RISK, FOREIGNOWN and LNSIZE are applied in specification (1) will be used in the (2) and (3) specifications. GOV is the percentage of government shareholdings, ELECTIONS is the dummy variable with 1 when there is election during the year, INSDMAN is the percentage of insider management shareholdings, GOV is the percentage of government shareholdings and LISTED is the dummy variable if it is a Listed Bank.

**GOV*ELEC, GOV*LISTED,**
**INSDMAN*LISTED, INST*LISTED,**        Interactive Terms with ELECTIONS
**GOV*ELE*LIS**                          or LISTED

<div align="right">**Inspiration from (Barry, Lepetit, & Tarazi, 2011)**</div>

### 4.3.1.1 Samples Data

The dataset includes 192 banks in the CEE region (141 banks) as well as Asia banks (51 banks). There are certain selection criteria that were applied. First, all the chosen banks must have minimum consecutive of four years data within the 2005 to 2014 in order to obtain sufficient information for the bank risk indicator (*Z-SCORE is the primary measure; also used standard deviation of ROA and ROE; Non-performing Loans and Risk Weighted Assets to Total Assets as alternative bank risk variables).* The Z-SCORE and NPL will be indicated in the natural logarithm format due to highly skewed measure. We obtained the financial information from 2000 to 2014 in order for the computation of the standard deviation of the recent three years of ROA. We mainly obtained unconsolidated accounts data from the Bankscope in order to avoid double counting scenario.

It is important to note that we do not take into account the market-related bank risk such as the market returns since majority of our samples are not listed in the stock exchange market. The annual financial data of the banks are obtained from the Bankscope Database of van Dijk. However, Bankscope only displays current shareholding information therefore the

ownership information was obtained from the annual reports of individual companies and then confirmed with the current shareholding percentage displayed in Bankscope. From the data collected ranging from 2005 to 2014, we decided to apply panel model for the estimation. Before conducting the regression, we use Hausman test to see which type of effects should be used. 'heteroscedasticity' is also tested after. Since some data like country-level variables like HHI, Country Z-score (BANK ZSCORE) only available until 2013. Model 2 focuses on 2005 to 2013 analysis but most of the variables will also be used in Model 3 analysis for the estimation from 2005 to 2014.

### 4.3.1.2 Variables Description

### a) Dependent variable, Bank Risk

The dependent variable RISK are identified in terms of default risk (Z-SCORE), asset risk STDEVROAA and STDEVROAE (measured by the standard deviation of returns of average assets and standard deviation of the return of average equity indicate the volatility returns of the banks) and non-performing loans ratio (NPL) (indicated by the impaired loans to total assets ratio). Since Z-SCORE has become a widely used indicator in the previous banking studies include Boyd and Graham (1993); Beck, Demirgüç-Kunt & Levine (2007) and Laeven & Levine (2009), it will be the primary risk measurement in this study as a proxy for insolvency (Roy, 1952). Insolvency is when a bank's available capital in insufficient to absorb losses, in which the probability of insolvency is expressed as probability (-ROA<CA). In this case, ROA is the return of assets while CA is the capital asset ratio (Boyd and Graham, 1993). If profits are expected to be normally distributed, the inverse probability of insolvency will then be (ROA+CA)/σ (ROA), while σ(ROA) is the Standard Deviation of ROA. Following the above-mentioned formula, we imply that a higher Z-SCORE indicates a more financial stability of the bank. After checking the normal distribution of Z-SCORE, we decide to use natural logarithm of Z-SCORE since it is highly-skewed. For the case of the CA, it is similar to use Equity to total assets, which will be used for this thesis. In order to compute standard deviation of ROA, three years of data are used. For example, standard deviation of ROA for year 2005 is based on data from 2003-2005 and so on.

Moreover, SDROA and SDROE both indicators are used as the measurement of income volatility as used in Barry et al. (2011), Setiyono and Tarazi, (2014), Hammami & Boubaker (2015) and others. The third risk measurement is the impaired loans ratio, since it has been regarded by International Financial Reporting Standard (IFRS) as the best measure

for problems loans. Therefore, impaired loans ratio (NPL Ratio) will be defined as the impaired loans to total assets with a higher ratio implies a higher risk based on the loan portfolio for each banks. Since more than 90% of our samples are commercial banks, which are highly lending-based activities, this is then a useful indicator to measure risk. Except Z-SCORE, higher ratio of the other risk measures indicate higher risk either on the assets or the loans portfolio credit risks.

### b) Independent Variables

The CEE countries serves as an interesting ground for the research of ownership structure due to large domestic banks and foreign-owned banks. Therefore, a dummy variable FOREIGNOWN will be used to identify if the bank is foreign owned or domestic bank if there is any foreign owners in total possess more than 50% of the shares. Exact shareholdings (in %) for three ownership structure (Insider Management Ownership, INSDMAN[8]; Institutional Shareholders[9], INST; and Government Shareholders, GOV[10]) will also be included for the analysis in specification (2) and (3) later. We exclude small individuals because it is usually not shown in the annual reports of the banks and therefore hard to quantify.

The main interaction variables above are the GOV*ELEC and OWNERSHIP*LISTED. The first GOV*ELEC variable is the interaction of two dummy variables to capture the impact if government-owned banks is subject to political influences especially during the elections period. This interaction is included in favour of few previous literatures that explored the effect of electoral cycles on government-owned banks risk using different methodology (in Iannotta et al. (2012); Dinç (2005) and others). In general, government ownership is needed as a protection in the face of market share but increase in government in the banks could be associated with higher risk-taking (therefore lower stability in the Z-SCORE while higher asset risk indicated in STDEVROAA or STDEVROAE) since the cost of excessive risk-taking will be covered by the government Demirgüç-Kunt and Detragiache (2002).

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[8] Insider management here refers to the top management, executives board directors who were granted certain amount of shares or equity in the companies. Family members who hold certain amounts of shares will also be counted as insider management ownership.

[9] Institutional Shareholders are mainly the insurance company, financial companies, mutual and pension funds).

[10] Government Shareholders are the national authorities who have strong political influence, could also include state pension fund, would be granted 100% owned state-owned if government hold the ultimate controlled in the banks.

Besides that the strong government protection would cause lower default risk in the banks Brown and Dinç (2011). However, the analysis will not be complete without taking into account the political influence. By including the electoral cycle, we could see the motivation of the risk-taking if involving any political motivations during the elections. While the rationale behind government-owned banks should be justified with more detailed analysis on the loans prices and borrowers features (which are not in this case), taking into accounts the limitation we expect that in generally there will be expansion in loan during the election years and therefore would expect a higher default risk and asset risks while lower financial stability during the elections. The second interactive variable measures the impact on the market discipline on different shareholders' risk-taking.

Market discipline is another important element structured in Basel II Capital Accord. Exploring market discipline is important since publicly-owned banks are usually held by larger number of shareholders and have more effective separation control between shareholders and managers in public banks but less efficient in decision making due to misalignment on the objectives with shareholders. Market forces is expected to monitor banks' behaviour therefore it will be not accurate to analyse shareholders' risk raking without taking into account market forces. We expect to see two different effects, (1) an increase in risks when the market align their objectives with the listed banks to take on more risks and (2) a decrease in risks taking when the market forces could moderate the banks' incentives who are risk takers, similar to  (Barry, Lepetit, & Tarazi, 2011).

Besides that, we include many bank and country control variables to reduce the unobservable factors that could affect both ownership and risks, suggested in Laeven & Levine (2009). Size of the banks (LNSIZE) is to capture different assets size among the banks in which natural logarithm is used as it is highly skewed.[11] Five Other bank control variables are the Net loans to total assets ratio (NLTA) to capture risk ratio, Equity to total assets (ETA) as leverage ratio to measure ability to meet obligations, Cost to Income Ratio (CI) to reflects operational efficiency, Loan loss reserves to gross loans (LLSGL) to reflect asset's quality of the banks and Loan impairment charges (NPL) to average gross loans as a proxy for non-performing loans for credit quality management. Additionally, country control variables are the Country HHI index, Country Z-SCORE, GDP per CAPITA and the annual inflation rate (INFL) to see the year to year changes in the consumer prices. Expectations of the control variables are displayed below at (*Table 8*)

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[11] Conduct normality test by using 'pnorm' command in Stata.

**Table 8 Summary of Bank-Specific Variables and Country Variables**

| Variables | Symbols | Expected Sign with Risk Measures |
|---|---|---|
| Natural logarithm of total assets | LNSIZE | Negative with Z-SCORE and Positive with other risks |
| Net loans to total assets ratio | NLTA | Ambiguous since high ratio indicates high default risks while low ratio indicates low interest income (low returns) |
| Equity to total assets ratio | ETA | Positive coefficient since higher capital equivalents to higher risks |
| Cost to income ratio | CI | Negative with Z-SCORE and positive with others since it indicates the weighs of operational costs over the banks' income |
| Loans loss reserve to gross loans | LLRL | Negative with Z-SCORE and positive with other risks |
| Loans impairment charges to average gross loans | LIMP | Negative with Z-SCORE and positive with other risks |
| Country Bank Concentration | HHI | Higher HHI indicates more concentrated of the banking sector and vice versa |
| Country level Bank Z-SCORE | Bank Z-SCORE | Indicates total bank risk faced by each country |
| GDP/CAPITA (Current US$) | GDP/CAPITA | Positive sign with Z-SCORE indicates higher economic growth higher financial stability while negative with other risks |
| Annual inflation rate (GDP Deflator annual %) | INFL | Negative sign with Z-SCORE and positive sign with others since higher inflation indicates higher risks |

*Source:* **Author's compilation**

## 4.3.2 Empirical Testing

### 4.3.2.1 Descriptive Analysis

**Figure 6** shows the mean of bank risks measured by default risk (ZSCORE), standard deviation of return on average assets and equity (STDEVROAA, STDEVROAE) , and impaired loans (NPL). Z-SCORE was in a declining trend until 2009 implies low financial stability and high risks when it started to increase till the peak of 100 in 2013. Besides that, we noted reverse scenario in the STDEVROAA with increasing mean of asset risks until 2009 and further declining till 2014. STDEVROAE is fluctuating until it highest 9.18 in year 2013, NPL identifies by impaired loans to total assets ratio also shows an increasing trend in its mean from 2005 to 2014. When look into the listed and unlisted banks (*Figure 7*), generally unlisted banks have higher max asset risks approximately 400 for STDEVROAE, which is five times higher than STDEVROAA and 54 STDEVROAE about 9 times higher than listed banks. The default risk (ZSCORE) however is about two times higher in listed banks than unlisted banks signifies more financial stability in the listed banks.. The detailed lists of the descriptive analysis can be found in *appendix, Table A.10.* Also, Model 2 summary descriptive can be found in, *Table A.7* and Banks Distribution can be found in *appendix, Table A.5* as well as Ownership Shareholdings by countries in *Table A.9.*

**Figure 6 Mean of Z-SCORE, STDEVROAA, STDEVROAE and NPL by Year (2005-2014)**
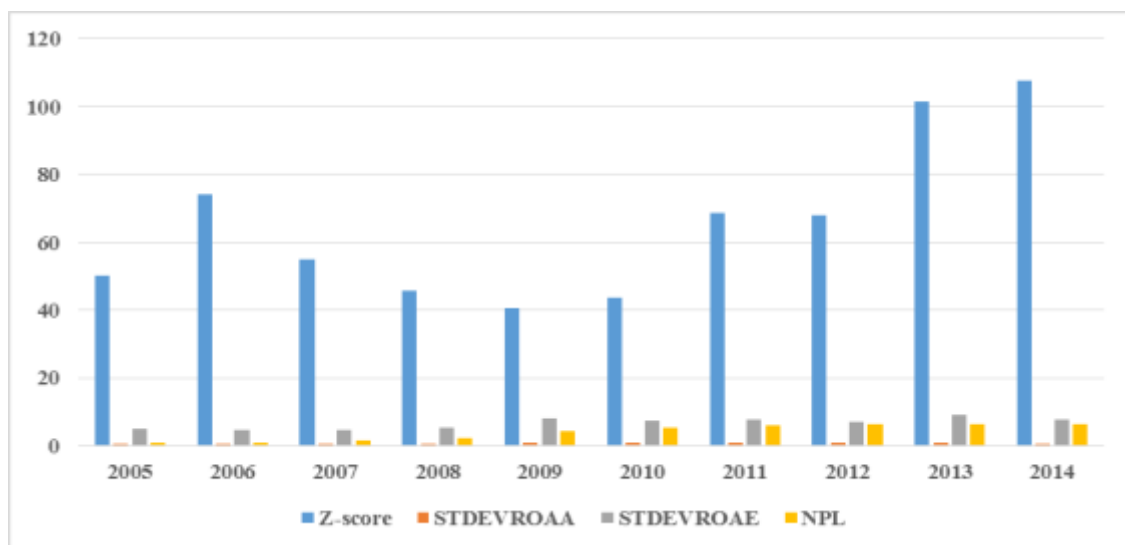
**Figure 7 STDEVROAA, STDEVROAE of Listed and Unlisted Banks (Min and Max throughout 2005-2014)**
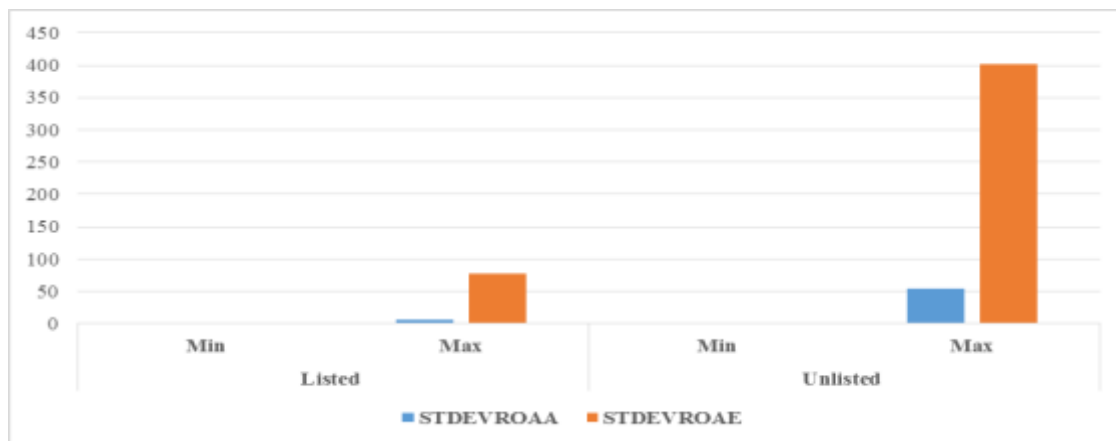


### 4.3.2.2 Hausman Specification Test

Based on the results, the p-value (0.0000) is significant at 1% implies that fixed effects is more consistent while the impact of explanatory variables on the dependent variable is the same for all individuals. Therefore, fixed model was adapted to run Model 2.

### 4.3.2.3 Heteroscedasticity Model

In order to identify the variables have the same variance. Testing 'heteroscedasticity' by using Breush-Pagan and Modified Wald tests helps to identify individual 'heteroscedasticity' which expects different variances between error terms and the same bank. From the result, it is a very high significant p-value which reject the null hypothesis that there is homoscedasticity, therefore there is ''heteroscedasticity' ' issue that could be solve by using clustering option[12] for the following model analysis whereby the code is the identifier that for all banks

### 4.3.2.4 Baseline Results

From the fixed effects estimation result in **Table 9 ,** we can see that foreign banks actually takes in less risk in general as well as in the CEE region. The effect of higher insolvency risk is stronger in the CEE region than our general samples which is significant at 5% significant level. This supports that when other factors are consistent, the high influx of

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[12] 'xtreg, fe cluster(code)' command in Stata.

foreign banks in the CEE countries has higher provision for credit losses thereby higher risks. This is quite similar to Jeon, Wu, Chen, & Wang (2016) result that tested on commercial banks samples in 36 emerging countries that foreign banks showed higher credit risks than their domestic counterparts. We then tested the same regressions only with commercial banks in the CEE to avoid any possible bias due to different in bank scope as suggested in Joen et al (2016), the results persist with negative coefficient at 5% significant level (result of regression is not shown in the paper since it is highly similar to the baseline regression).

When including major banks controlled variables such as the size of the banks, CEE banks show positive relationship with financial stability implies higher assets involves in lower risks which do not support the "too big to fail" scenario. Other bank variables such as net loans ratio and equity ratio that are significant with positive coefficients imply more loans and shareholders contribution subject to higher risks and low financial stability.

Further investigating model (2) estimation by taking into account election impact for government, foreign banks continue to show lower stability in column (4) as well as higher credit risk and portfolio risk indicated in column(7) and (8).

When we include the GOVDUM50 to capture the effect if any government officials (regardless of the origin of the countries) owns more than 50% of shares in the bank, unfortunately, the results do not show any significant result. Since Iannotta et al. (2012) suggested low default risk for the banks during the elections, we tried to interact the government owned shares (more than 50%) with the elections to see if politicians can impact bank behaviour in the CEE and Asia banks. The result shows banks have lower default risks with positive Z-SCORE coefficient of 0.207 for the government present in the unlisted banks as well as significantly lesser assets risks (lower STDEVROAA and STDEVROAE). This supports that involvement of the government officials in the banks could means higher loans approval to the worthy loans applicants and therefore higher default risk. This could be due to higher compliance of regulatory of the banks when the government owns the shares.

When we include the impact of market forces to see if market could moderate the impacts of shareholders' incentives as suggested by Barry, Lepetit, & Tarazi (2011) tested on different European commercial banks, we found that asset risks are significantly being impacted with the involvement. Based on *Table 10, i*n listed banks, insider owners have positive impacts on both asset risks (STDEVROAA and STDEVROAE), therefore, we can say that listed insider owners have higher assets risks than the unlisted insider owners. Similar scenario is found in the institutional owners.

When looking into government ownership, a reverse scenario can be seen in the government shareholders where generally presence of government shareholders bring higher asset risks in the banks (0.076 in STDEVROAA and 1.881 in STDEVROAE) but lower risks during the election (-0.345 STDEVROAA and -3.036 STDEVROAE). For the listed banks, presence of influential government (more than 50% shareholding) bring lower assets risks as compared to the unlisted banks with influential shareholdings, lower by -0.076 in STDEVROAA and -1.489 STDEVROAE. However, during the election term, listed banks with the presence of government have now higher asset risks than the counterparts signifies risker in the volatility of the returns in the listed banks during election period due to high possible future uncertainties in the market. The result also shows that when the government officials present in the listed banks, they face higher NPL ratio but during the electoral year, reverse scenario was noted that lower NPL ratio can be seen proved government officials are more prudent in approving loans provisions. Alternatively government variables are measured with dummy variable, classifies as 1 when government officials any shares in the bank. The variable was tested with interaction with elections and listed banks and the findings persists and due to high similarity with results when using GOVDUM50, the findings are not displayed in this table.

In terms of the bank controlled variables, LNSIZE shows an unexpected sign with positive coefficient with ZSCORE (0.335 at 1% significant level) in the CEE region shows that the large banks would take higher risks is not valid in this estimation.  For NTLA, it is always in positive coefficients with all variables suggested that increase in net loans does not necessarily means more risker bank by ZSCORE but it would means higher NPL risk that when the factors of election and market discipline were taking into account, significant at 1% level.  ETA is also in positive sign with Z-SCORE and STDEVROAA in which higher capital higher financial stability and more asset risk to the banks. For CI ratio that measures operational efficiency, it shows that the operational costs increase in both CEE (-0.007) and ASIA (-0.017) banks, there would be lower financial stability in the banks. Eventually loans loss reserve to gross loans (LLRL) and loans impairment charges (LIMP) are the proxy of default risks, where the results show expected sign of negative related to Z-SCORE and positive related to other signs although LIMP is not always significant. In terms of country-controlled variables, the bank concentration (HHI) and BANKZSCORE do not prove any significant level in any of the estimation. While generally GDP/CAPITA is negatively related to risk, INFL is positively related to all measure of risks in the estimation.

**Table 9 Result for Foreign Ownership in (1) and Effects of Electoral Cycle in (2)**

| | Fixed Effects: Foreign or Domestic (1) | | | Fixed Effects: Including Government Shareholdings (2) | | | |
|---|---|---|---|---|---|---|---|
| | Z-SCORE | Z-SCORE CEE | Z-SCORE Asia | Z-SCORE | STDEVROAA | STEDVROAE | NPL |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| FOREIGNOWN | -0.417* | -0.605** | 0.093 | -0.447** | -0.979 | -0.081 | 0.500** |
| | (0.220) | (0.251) | (0.299) | (0.225) | (1.211) | (2.354) | (0.205) |
| GOV | - | - | - | -0.008 | 0.043 | 1.067* | -0.020** |
| | - | - | - | (0.006) | (0.035) | (0.601) | (0.010) |
| GOVDUM50 | - | - | - | 0.072 | 0.193 | -7.709 | 0.096 |
| | - | - | - | (0.217) | (0.737) | (10.447) | (0.285) |
| ELEC | - | - | - | 0.064* | -0.023 | -0.563* | 0.130*** |
| | - | - | - | (0.040) | (0.052) | (0.288) | (0.031) |
| GOV*ELEC | - | - | - | 0.172* | -0.164 | -0.937 | -0.0558 |
| | - | - | - | (0.090) | (0.126) | (0.885) | (0.080) |
| INSDMAN | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - |
| INST | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - |
| LISTED | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - |
| INSDMAN*LISTED | - | - | - | - | - | - | - |

|  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| | - | - | - | - | - | - | - |
| **GOV*LISTED** | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - |
| **GOV*ELEC*LIS** | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - |
| **INST*LISTED** | - | - | - | - | - | - | - |
| | | | | | | | |
| **LNSIZE** | 0.137 | 0.335*** | 0.004 | 0.134 | -0.162 | -0.002 | 0.078 |
| | (0.104) | (0.068) | (0.058) | (0.103) | (0.129) | (0.299) | (0.050) |
| **NLTA** | 0.008* | 0.007* | 0.008 | 0.008* | 0.008 | 0.002 | 0.0285*** |
| | (0.004) | (0.004) | (0.011) | (0.004) | (0.014) | (0.027) | (0.004) |
| **ETA** | 0.038*** | 0.039*** | 0.076*** | 0.038*** | 0.065*** | -0.057 | 0.009 |
| | (0.012) | (0.011) | (0.026) | (0.012) | (0.025) | (0.056) | (0.008) |
| **CI** | -0.008*** | -0.007*** | -0.017*** | -0.008*** | 0.041** | 0.084*** | -0.0026* |
| | (0.002) | (0.002) | (0.005) | (0.002) | (0.020) | (0.017) | (0.001) |
| **LLRL** | -0.03** | -0.033** | 0.116 | -0.030** | -0.065 | 0.238 | 0.160*** |
| | (0.014) | (0.013) | (0.104) | (0.014) | (0.054) | (0.150) | (0.012) |
| **LIMP** | -0.196*** | -0.195*** | -0.385 | -0.194*** | 0.396*** | 2.871*** | 0.007 |
| | (0.030) | (0.030) | (0.254) | (0.030) | (0.123) | (0.745) | (0.024) |
| **GDP/CAPITA** | 0.000** | -0.0000155 | 0.000058*** | 0.0000266** | 0.00000799 | -0.0000795 | -0.0000282*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **INFL** | -0.020*** | -0.018*** | -0.0008 | -0.021*** | 0.038*** | 0.202*** | -0.011* |
| | (0.004) | (0.004) | (0.020) | (0.004) | (0.009) | (0.042) | (0.007) |
| **BANKZ-SCORE** | -0.011 | 0.013 | -0.028* | -0.010 | -0.023 | -0.092 | -0.007 |
| | (0.011) | (0.014) | (0.016) | (0.011) | (0.014) | (0.064) | (0.008) |
| **HHI** | -0.004 | -0.008 | 0.024** | -0.005 | 0.005 | 0.037 | -0.004 |
| | (0.006) | (0.006) | (0.009) | (0.006) | (0.006) | (0.038) | (0.004) |
| **_CONS** | 2.695*** | 1.567** | 1.421 | 2.842 | -1.900*** | -18.242** | -1.622*** |
| | (0.898) | (0.635) | (1.004) | (0.900) | (0.735) | (7.640) | (0.600) |
| **Observations** | 1549 | 1158 | 391 | 1544 | 1612 | 1608 | 1365 |
| **Number of groups** | 192 | 141 | 51 | 192 | 192 | 192 | 188 |
| **F-test** | 16.75*** | 19.170*** | 5.930*** | 29.34*** | 7.570*** | 10.29*** | 20.28*** |
| **R-squared** | | | | | | | |
| **R-sq within** | 0.2258 | 0.2716 | 0.1796 | 0.2312 | 0.4073 | 0.5291 | 0.4067 |
| **R-sq between** | 0.325 | 0.241 | 0.0145 | 0.2891 | 0.1219 | 0.0120 | 0.3061 |
| **R-sq overall** | 0.2501 | 0.2173 | 0.0137 | 0.232 | 0.1871 | 0.0367 | 0.3452 |

Z-SCORE and Non-Performing Loan ratio indicated in natural logarithm

(Parentheses represent standard error). Superscripts *, **and *** denote statistical significant at 10%, 5% and 1%. Detailed description on variables can be found in appendix *Table A.10*.

**Table 10 Results for All Types of Owners and Interact with Market Forces Variable**

| | Fixed Effects including other shares and interact with listed variables | | | |
|---|---|---|---|---|
| | Z-SCORE | STDEVROAA | STEDVROAE | NPL |
| | (8)^^[13] | (9) | (10) | (11) |
| FOREIGNOWN[#] | - | -0.931 | 1.040 | - |
| | - | (1.252) | (2.456) | - |
| GOV | -0.008 | 0.076** | 1.879*** | -0.042*** |
| | (0.022) | (0.035) | (0.654) | (0.016) |
| GOVDUM50 | -0.346 | 1.093 | -5.339 | 0.422 |
| | (0.401) | (1.933) | (26.346) | (0.531) |
| ELEC | 0.042 | -0.0236 | -0.589** | 0.120*** |
| | (0.039) | (0.052) | (0.282) | (0.032) |
| GOV*ELEC | 0.207* | -0.340** | -3.045*** | 0.024 |
| | (0.112) | (0.155) | (1.014) | (0.107) |
| INSDMAN | -0.005 | -0.0149 | -0.235*** | -0.00008 |
| | (0.011) | (0.012) | (0.084) | (0.017) |
| INST | -0.007 | -0.018* | -0.308** | 0.000 |
| | (0.012) | (0.011) | (0.127) | (0.012) |
| LISTED | -0.0006** | -0.0004 | 0.0002 | -0.00025 |
| | (0.000) | (0.0004) | (0.002) | (0.000) |
| INSDMAN*LISTED | 0.0002 | 0.051** | 0.460*** | -0.010 |
| | (0.014) | (0.025) | (0.146) | (0.020) |
| GOV*LISTED | 0.002 | -0.078*** | -1.486** | 0.029** |
| | (0.020) | (0.028) | (0.701) | (0.016) |
| GOV*ELEC*LIS | -0.005 | 0.490** | 5.922** | -0.236* |
| | (0.198) | (0.250) | (2.742) | (0.138) |
| INST*LISTED | 0.010 | 0.027* | 0.354** | 0.001 |
| | (0.014) | (0.014) | (0.147) | (0.012) |
| LNSIZE | 0.155 | -0.1555 | 0.077 | 0.077 |
| | (0.129) | (0.122) | (0.230) | (0.051) |
| NLTA | 0.0105** | 0.0086 | 0.003 | 0.0299*** |

---

[13] Time Series Effect is used in this case, result from "testparm" command in Stata

| | | | | |
|---|---|---|---|---|
| | (0.004) | (0.015) | (0.026) | (0.004) |
| **ETA** | 0.0423*** | 0.065*** | -0.042 | 0.007 |
| | (0.014) | (0.025) | (0.058) | (0.008) |
| **CI** | -0.008*** | 0.041** | 0.084*** | -0.0027* |
| | (0.002) | (0.020) | (0.017) | (0.001) |
| **LLRG** | -0.038** | -0.067 | 0.277* | 0.157*** |
| | (0.015) | (0.055) | (0.154) | (0.013) |
| **LIMP** | -0.165*** | 0.373*** | 2.342*** | 0.021 |
| | (0.031) | (0.125) | (0.339) | (0.020) |
| **GDP/CAPITA** | 0.0000377** | 0.0000035 | -0.00012** | -0.0000303*** |
| | (0.000) | (0.00001) | (0.0001) | (0.000) |
| **INFL** | -0.023*** | 0.037*** | 0.184*** | -0.009 |
| | (0.004) | (0.014) | (0.040) | (0.007) |
| **BANKZ-SCORE** | 0.003 | -0.0212 | -0.083 | -0.008 |
| | (0.011) | (0.014) | (0.066) | (0.008) |
| **HHI** | -0.006 | 0.0042 | 0.009 | -0.003 |
| | (0.006) | (0.006) | (0.043) | (0.004) |
| **_CONS** | 2.534** | -1.360 | -5.21 | -1.343 |
| | (1.530) | (0.860) | (9.94) | (1.029) |
| **Observations** | 1532 | 1598 | 1594 | 1357 |
| **Number of groups** | 192 | 192 | 192 | 188 |
| **F-test** | 80.13*** | 11.2*** | 12.17*** | 24.6*** |
| **R-squared** | | | | |
| **R-sq within** | 0.2312 | 0.4199 | 0.6337 | 0.4057 |
| **R-sq between** | 0.3500 | 0.0481 | 0.0022 | 0.1535 |
| **R-sq overall** | 0.2654 | 0.0928 | 0.0134 | 0.2051 |

Z-SCORE and Non-performing Loans ratio are indicated in natural logarithm

^^ Applied Time Series effects, but due to brevity, the coefficients of their regressions are not included in this table

# For this equations FOREIGNOWN is not included for Z-SCORE and NPL as when it was included in the fixed effect estimation, F-statistics and p-value cannot be defined. To avoid erroneous result, we decide not to include FOREIGNOWN into the analysis for the two risks. However, all the coefficients remain similar when we attempted the estimation with

FOREIGNOWN.

(Parentheses represent standard error). Superscripts *, **and *** denote statistical significant at 10%, 5% and 1%. Detailed description on variables can be found in appendix *Table A.10*.

### 4.3.3 Model 2 Limitations and Concluding Remarks

From the fixed effects estimation model, we realized some limitations such as the model does not allowed the estimation of time invariant dummy variable. When we attempted to include the Asia dummy or CEE dummy variables to capture the regional difference among the bank samples, both were dropped at different time due to high collinearity as they are considered as biased coefficients in the case of correlation between the dummy variable and the estimators. However, the aim of Model 2 is first to see if foreign-owned banks are riskier than domestic banks. Using FOREIGNOWN variable, we identify that foreign banks have higher default risk in general as well as in CEE countries. When including the effect of government shareholdings and the electoral cycle, the result persists. In addition to that, the aim of Model 2 is also to find out if different shareholding structure impacts the bank risks. We find that when including market disciplines into consideration, the three type of shareholders are significantly impacted with the asset risks (STDEVROAA and STDEVROAE) in which both unlisted insider management (INSDMAN) and unlisted institutional owners (INST) have lower assets risks than their counterparts in the listed banks.

A reverse scenario can be seen in the government shareholders where the impacts of government shareholdings in the banks are influenced by the election year, whereby listed banks significantly hold higher asset risks during the election but lower credit risks. For the unlisted banks, lower asset risks exist during the election since market forces could not impact the decision making of the private banks and therefore, less affected but credit risk is not significantly proven for unlisted banks at this point. We conclude that impact of government ownership on credit risk vary according to the status of bank if is listed or unlisted. Therefore, we can conclude that generally foreign ownership has higher default risks not including other risks than domestic banks. It is also important to include other shareholdings in the analysis to see if the election terms and market forces could impact the bank risks due to different incentives of different the shareholders and the market itself. Further with the results from Model 1 and 2, we would like to proceed with Model 3 to see if the interaction between ownership structure and capital regulation could be justified

empirically and accepting the limitation of the differences in the context of bank regulation and corporate governance Central Eastern Europe and Asia region. Taking into account serious endogeneity problem often highlighted in empirical governance research (*see* Setiyono & Tarazi (2014)) and our main variable of interest, ownership structure, is presumably endogenous. This is because different ownership structures may influence risks not mainly from the minimum capital requirement set by regulators but can be caused by the asymmetric information between the management and the owners. In that case, there will be inconsistency in the panel regression within the estimators. The following model will be using instrument variable (IV) model with gmm estimation method for our panel data Due to collinearity problem, we introduce the interaction variable (different shareholdings) with capital regulatory and deposit insurance one at each time.

## 4.4 Interaction between Ownership Structure and Regulation on Bank Risk

This section is to study the third hypothesis if the changes in capital requirement acts as moderating variable on different ownership structure to affect bank risks. This model is related to the third theory to connect regulation and the bank governance theory in analysing the impact on different types of bank risks. While the increase of capital regulation cause higher bank risk-taking which is especially proven for the outsider shareholders.

### 4.4.1 Model 3 Interaction between Bank Governance and Bank Regulation on Bank Risk-Taking

$$\text{RISK}_{i,t} = \beta_0 + \sum \beta_1 \text{FOREIGNOWN}_{i,t} + \sum \beta_2 \text{REG}_{i,t-1} + \sum \beta_3 \text{FOR*REG}_{i,t-1} + \sum \beta_4 \text{CAR}_{i,t} + \sum \beta_5 \text{CAPSTR}_{i,t} + \sum \beta_6 \text{ENTRY}_{i,t} + \sum \beta_7 \text{INSDMAN}_{i,t} + \sum \beta_8 \text{INST}_{i,t} + \sum \beta_9 \text{GOV} + \sum \beta_{10} \text{INSDMAN*CAR}_{i,t} + \sum \beta_{11} \text{INST*CAR}_{i,t} + \sum \beta_{12} \text{GOV*CAR}_{i,t} + \sum \beta_{13} \text{INSDMAN*CAPSTR}_{i,t} + \sum \beta_{14} \text{INST*CAPSTR}_{i,t} + \sum \beta_{15} \text{GOV*CAPSTR}_{i,t} + \sum \beta_{16} \text{LNSIZE}_{i,t} + \sum \beta_{17-19} \text{BANKCONTROLS}_{i,t} + \sum \beta_{20-22} \text{COUNTRYCONTROLS}_{i,t} + \mu_{i,x}$$ 
    (1)

Where, RISK, FOREIGNOWN, INSDMAN, INST, GOV and LNSIZE are similar to the previous Model (1) and (2); $\text{REG}_{t-1}$ is the lagged of capital regulatory pressure, a binary indicator with positive figure above 0 when the bank's capital ratio below 8% while 0 when it is above or equal to the minimum 8% ratio. CAR is the country's capital requirement. CAPSTR is the Overall Capital Stringency, ENTRY is the global regulation variable to see if any limitation on foreign ownership in each countries. FOR*REG is the interactive variable to see if foreign-owned banks reacted to lagged of capital regulatory pressure in (t-1)

Other interactive variables include

**INSDMAN*CAR, INST*CAR**  
**GOV*CAR[14], INSDMAN*CAPSTR**  
**INST*CAPSTR, GOV*CAPSTR[1]**

    Interactive variables between three types types of shareholders (INSDMAN, INST and GOV) with CAR and CAPST

Further explanations about the variables will be discussed below.

**Inspiration from (Leaven and Levine, 2009)**

### 4.4.1.1 Sample Data

In terms of the ownership data, we combine three different sources of data: Bankscope, (Claessens & van Horen, 2015) and individual banks' annual reports. In addition to that, banking regulation data is a mixture of data from Helgilibrary for country specific Bank Capital Adequacy Ratio (CAR), Bankscope for the bank specific Capital Ratio, Global Banking website for the Global Banking Regulation data set conducted in different years (2000, 2003, 2007 and 2010) for the Capital Stringency and Bank Entry Requirements. Due to robustness, several individual measures were used which all the individual and composite measures can be found in the appendix.

### 4.4.1.2 Variable Descriptions

#### a) Measurement of Bank Risk

Similar to Model 2, we are relying on Z-score as primary risks to represent solvency or default risks and other alternative risk measures including STDEVROAA and STDEVROAE for asset risks measure and NPL for credit risks.

#### b) Ownership-specific variables

The ownership-specific determinants of risk-taking behaviour that are employed in this study are insider management ownership, institutional ownership and government ownership. In order to measure the impact, accumulative percentage of top 30 shareholders are gained from the annual reports of the 192 banks from 2005 to 2014.

#### c) Interactive variables

By taking into account country's capital regulatory index, we choose Overall Capital Stringency index (CAPSTR) from the Global Banking website. CAPSTR shows if capital requirement reflects any risk elements and losses in market values before taking into account the minimum capital requirement. While NATCAR is the national capital adequacy ratio (CAR) set by different countries. Therefore, by interacting each ownership structure with CAPSTR and NATCAR we could compare if the shareholders take different risk-taking

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[14] For GOV*CAR and GOV*CAPSTR are all the government shareholdings interact with national minimum requirement and capital stringency,  unlike in Model 2 where the interaction is only including more than 50% of government share in the banks.

when before and when minimum capital requirement is being taken into account. Also, ENTRY is an indicator to capture any limitation for the foreign ownership in the banking sector in different banks. This indicator is included since we would like to examine if foreign banks are limited in from the regulation consideration.

### d) Bank-controlled variables

Similar to Model 1 and 2, Size of the bank which is measured by the total assets of the banks is included to capture the possible effect where larger banks might engage with riskier business lending activities Demsetz & Strahan (1997). Three other bank measurements of Equity to total assets (ETA), Net loans to total assets (NLTA) and Cost to income ratio is highly related to risk equation since NLTA represents a risk ratio therefore is expect to have negative correlation with z-score while positive correlated to NPL, ETA capture bank's ability to meet its obligation but the sign is ambiguous since high ratio signifies ability to meet its obligation but would have to forego investment opportunities, CI capture operational efficiency which is expected to be positive correlated with Z-SCORE and negative with other risks.

### e) Country-controlled variables

Three country-controlled variables including GDP/CAPITA, inflation rate (INFL) and real interest rate (REALINT) are added in order to check for specific country features, which can affect bank risk-taking decisions. We expect to see negative sign between GDP/CAPITA and Z-SCORE since higher economic prosperity signifies lower bank risk while negative coefficient with inflation since higher inflation signifies lower financial stability. The real interest rate (REALINT) takes into account interest rate after minus out inflation (INFL), where the banks could increase the nominal interest rate but inflation rate could decrease REALINT. Therefore, the sign for REALINT is ambiguous as REALINT may remain unchanged. However, if INFL remains unchanged, then increase in interest rate symbolizes less financial stability since the investment would become more risky to invest for the customers.

## 4.4.2 Empirical Testing

### 4.4.2.1 Baseline Regressions

As many previous governance-related studies usually suffer endogeneity problem *see* Setiyono & Tarazi (2014), we will then use instrumental variable (IV) model to estimate our panel data, similar to Schaffer (2010)[15]. In considering the suitable instruments to use for the estimation, we have chosen the year of establishment of the banks since the financial markets are still new in history but usually the foreign banks are of long history in which we see the older banks will usually have higher financial stability due to the more experience in the banking sector as compared to other competitors. Calomiris and Carlson (2016) also suggested that bank experience could be a heterogeneity that could affect bank risk management. This is also used as instrument in Laeven & Levine (2009). While Setiyono & Tarazi (2014) treated BANKAGE as exogenous regressor which is computed based on the bank's years of establishment (YOE) to see how long history of the banks. Based on the year that the bank was established (YOE), we compute the number of years it has been operating in specific years from 2005 to 2014. In this case, we expect that the older banks could have indirect effect on FOREIGNOWN and further impact risks. We conducted the endogeneity test to see if it is exogenous. The result shows p-value of (0.000) which reject the null hypothesis that treat BANKAGE as exogenous. Further Overidentifying Hansen test do not reject the validity of the BANKAGE being as instruments.

At first stage regression, BANKAGE will act as dependent variable, that the estimated values are then used to generate the IV regression. MARKETSHARE and LAGBANKRISKs are two excluded instruments that are assume to have indirect effects on bank risk through BANKAGE. Wald F-statistics is a test that check on the relevance of excluded instruments is however below the rule of thumb as per $10^{16}$(result of Wald F-statistics is not shown to conserve space). Regardless of that, we would compare the results with IV models concentrating on CEE countries only to see if the result of the interactive ownership and regulation persists. The first stage regression is using the formula of $BANKAGE_{i,t} = \beta_0 + \sum \beta_1 FOREIGNOWN_{i,t} + \sum \beta_2 REG_{i,t} + \sum \beta_3 FOR*REG_{i,t} + \sum \beta_4 CAR_{i,t} + \sum \beta_5 CAPSTR_{i,t} + \sum \beta_6 ENTRY_{i,t} + \sum \beta_7 INSDMAN_{i,t} + \sum \beta_8 INST_{i,t} + \sum \beta_9 GOV + \sum \beta_{10} INSDMAN*CAR_{i,t} + \sum \beta_{11} INST*CAR_{i,t} + \sum \beta_{12} GOV*CAR_{i,t} + \sum \beta_{13} INSDMAN*CAPSTR_{i,t} + \sum \beta_{14} INST*CAPSTR_{i,t} + \sum \beta_{15} GOV*CAPSTR_{i,t} + \sum \beta_{16}$-

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[15] The instrument variable models are using "xtreg2" with gmm fe robust module as per (Schaffer, 2010)

$_{19}$*BANKCONTROLS*$_{i,t}$ $_+$ $\sum$ *β$_{20-22}$ COUNTRYCONTROLS* $_{i,t,}$ $+\sum$ *β$_{23}$MARKETSHARE* $_{i,t}$ $+\sum$ *β$_{24}$ LAG of BANKRISKS*$_{i,t-1}$ $+$ **μ**$_{i,t}$ whereby Hansen Overidentifying Test conclude all instruments are valid instruments since the p-value in ***Table 11*** (1) to (5) are all statistically insignificant.

### 4.4.2.2  Baseline Regressions Result

In Model 2, we have explicitly investigated the association between ownership structure and bank risk-taking using the two external factors of election and market forces. Model 3 is mainly about the effects of capital regulation on the association. ***Table 11*** below displays the result for the Baseline IV model. We first examining the result without any interaction variables. When including the moderating variable CAPSTR and NATCAP, there is strong positive coefficients between the two variables and the LOGZSCORE, indicates higher financial stability of the banks when there is stricter in capital regulation. Both CAPSTR and NATCAP have positive coefficients that significant at 1% level shows that higher stringency (CAPSTR) and higher capital requirement set by countries (NATCAP) would ensure higher financial stability of banks by controlling the risk-taking of the banks. The lagged of capital regulatory pressure (REGt-1) is a binary indicator with positive figure above 0 when the bank's capital ratio below 8% while 0 when it is above or equal to the minimum 8% ratio. This lagged variable is included in the estimation to take into account if the banks are undercapitalized since regulatory pressure could positively impact the risk levels (Ben Naceur & Kandil 2009). However, it is not significant in Column (1) of the baseline IV-model. FOREIGNOWN is however significant shows the reverse result in Model 2 where the foreign banks was proven with higher default risks (negative coefficient -0.417 with Z-SCORE). This positive coefficient of 1.648 could be justified with the fact where including capital regulation into the analysis could moderate risks faced by the banks. Columns (2) to (5) show the result on the interactive moderating variables both CAPSTR and NATCAP.

When interact FOREIGNOWN with Lagged of Regulatory Pressure (REGt-1) we noted foreign banks which are undercapitalized usually face less risks (4.67 Z-score; -3.07 and -32.96 of STDEVROAA and STDEVROAE represent asset risks and -1.15 NPL). When looking into ENTRY variable that higher of ENTRY (lower foreign ownership restrictions)

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[16] For F-statistics above 10, it would be a strong instruments as suggested in (Stock, Wright and Yogo, 2012)

showed negative Z-SCORE and positive asset and credit risks (STDEVROAA, STDEVROAE and NPL) prove that even when using country-level regulation variable, higher foreign ownership means higher risks (in our case only the asset risks are significant). Furthermore, as our main aim of this estimation is to justify if capital regulation could moderate the ownership structure impacts on the bank risk-taking.

Earlier in Model 2, we see that unlisted banks insider owners and institutional owners take less asset risks (STDEVROAA and STDEVROAE) than listed banks. Here, result do not shows any significant level for both INSDMAN and INST regardless of the moderating variable of capital regulation. When interacting with CAPSTR, INSDMAN*CAPSTR shows higher financial stability (0.015 at 10% level) and less STDEVROAE (-0.107 at 10% level). Institutional shareholders however tend to have higher credit risks than before when facing higher stringency in capital regulation (0.0018 of NPL at 10% level). For government shareholding, to recap Model 2 results, using panel fixed effects model, the results show that during the election period banks with powerful government shareholders (50% and above) take less risk with 0.172 coefficient with ZSCORE at 10% level. When included the market forces by interacting with the listed bank variables, we see stronger negative coefficient with asset risks (STDEVROAA and STDEVROAE) prove the listed banks with significant influence of government could moderate the risk-taking of the banks. However, positive coefficients for GOV*ELEC*LIS in both asset risks imply that during election, the market forces could not help to decrease the risks taking level in the listed banks but instead the banks took higher risks. It could also be due to the public advocating the banks' objectives to take on more risks. However in Model 3, result for GOV*CAPSTR and GOV*CAR show opposite signs. In the case of the country's capital stringency, present of government in the banks prove generate lower risks (ZSCORE, STDEVROAE and NPL all show positive significant at 10% p-value) but the minimum requirement regulation do not moderate less risk-taking in the banks. Instead, the presence of government shareholders tend to increase bank's risk-taking when facing the national minimum requirement level.

**Table 11 Baseline IV models**

|  | ZSCORE | | STDEVROAA | STDEVROAE | NPL |
| --- | --- | --- | --- | --- | --- |
|  | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
| **BANKAGE** | -1.683*** | -2.131*** | 1.350*** | 12.437*** | 0.841*** |
|  | (0.477) | (0.722) | (0.454) | (4.318) | (0.293) |
| **FOREIGNOWN** | 1.648* | 1.785 | -1.277 | -9.944 | -0.571 |
|  | (0.994) | (1.210) | (0.810) | (7.463) | (0.507) |
| **FOR*REGt-1** |  | 4.667** | -3.072** | -32.959*** | -1.151* |
|  |  | (2.042) | (1.207) | (11.047) | (0.703) |
| **REGt-1** | -0.318 | -0.465 | 0.307 | 3.677* | 0.096 |
|  | (0.318) | (0.380) | (0.225) | (2.122) | (0.119) |
| **INSDMAN** | -0.040 | 0.034 | 0.010 | -0.192 | -0.012 |
|  | (0.039) | (0.060) | (0.041) | (0.371) | (0.027) |
| **INST** | 0.021 | 0.017 | -0.017 | -0.269 | -0.010 |
|  | (0.023) | (0.034) | (0.025) | (0.271) | (0.012) |
| **GOV** | 0.004 | 0.129** | -0.019 | 0.199 | -0.019 |
|  | (0.014) | (0.062) | (0.051) | (0.636) | (0.020) |
| **NATCAP** | 0.429*** | 0.690** | -0.400** | -3.813** | -0.205* |
|  | (0.141) | (0.312) | (0.195) | (1.808) | (0.123) |
| **INSDMAN*CAR** |  | -0.009** | 0.0057** | 0.054** | 0.002 |
|  |  | (0.004) | (0.003) | (0.027) | (0.002) |
| **INST*CAR** |  | 0.001 | -0.0004 | -0.001 | 0.0002 |
|  |  | (0.002) | (0.002) | (0.014) | (0.001) |
| **GOV*CAR** |  | -0.0084** | 0.005** | 0.041* | 0.002 |
|  |  | (0.003) | (0.002) | (0.021) | (0.001) |
| **INSDMAN*CAPSTR** |  | 0.015* | 0.001 | -0.107* | -0.002 |
|  |  | (0.008) | (0.002) | (0.051) | (0.004) |
| **INST*CAPSTR** |  | -0.003 | -0.014 | 0.006 | 0.0018* |
|  |  | (0.003) | (0.006) | (0.018) | (0.001) |
| **GOV*CAPSTR** |  | 0.0059* | -0.003 | -0.035* | -0.0024* |
|  |  | (0.003) | (0.002) | (0.021) | (0.001) |
| **CI** | 0.003 | 0.003 | -0.004 | -0.011 | -0.003 |

| | | | | | |
|---|---|---|---|---|---|
| | (0.005) | (0.005) | (0.004) | (0.054) | (0.002) |
| **ETA** | 0.033 | 0.035 | -0.015 | -0.157 | 0.035* |
| | (0.029) | (0.034) | (0.026) | (0.232) | (0.019) |
| **NLTA** | -0.016 | -0.025 | 0.023 | 0.240* | 0.026*** |
| | (0.014) | (0.020) | (0.015) | (0.142) | (0.008) |
| **ENTRY** | -0.348 | -0.368 | 0.379* | 3.687* | 0.076 |
| | (0.270) | (0.317) | (0.210) | (1.945) | (0.112) |
| **CAPSTR** | 0.759*** | 1.102** | -0.608** | -5.316** | -0.390*** |
| | (0.205) | (0.426) | (0.278) | (2.638) | (0.149) |
| **LNSIZE** | 0.944** | 1.152** | -0.607** | -5.014** | -0.328** |
| | (0.373) | (0.500) | (0.249) | (2.206) | (0.167) |
| **GDP/CAP** | 0.0009*** | 0.001*** | -0.0007*** | -0.0063*** | -0.00045*** |
| | (0.0002) | (0.0004) | (0.0002) | (0.002) | (0.0001) |
| **INFL** | -0.197*** | -0.224*** | 0.190*** | 1.561*** | 0.1084*** |
| | (0.056) | (0.073) | (0.047) | (0.438) | (0.042) |
| **REALINT** | -0.170*** | -0.200*** | 0.168*** | 1.503*** | 0.111*** |
| | (0.048) | (0.063) | (0.040) | (0.379) | (0.032) |
| **No. of observations** | 1323 | 1323 | | 1335 1335 | 1189 |
| **F-statistics** | 2.6*** | 1.42* | 1.47* | 1.39* | 4.99*** |
| **Underid test** | 12.55*** | 8.435*** | 9.447*** | 9.447*** | 5.643*** |
| **Hansen (Overid Test)** | 0.228 | 0.294 | 0.303 | 1.193 | 0.399 |
| **Endogeneity test** | 75.443*** | 73.883*** | 37.034*** | 29.087*** | 11.710*** |

Z-SCORE and Impaired Loans to Total Assets ratio (NPL) are measured in natural logarithm. (Parentheses represent robust standard error). Superscripts *, **and *** denote statistical significant at 10%, 5% and 1%. Detailed description on variables can be found in appendix *Table A.10*.

### 4.4.2.3 Analysis of Bank Risks Based on the Interactive Relationship of Shareholders and CAR

Our main interest of this paper is on the capital regulation, specifically on capital requirement. Therefore, in order to provide a clearer understanding on the significant interaction of certain shareholders and CAR (as presented in *Table 11*), the moderating effects of CAR on different types of shareholders are best shown by the figures below.

**Figure 8 Insider Shareholders and Z-SCORE1 (without log)**
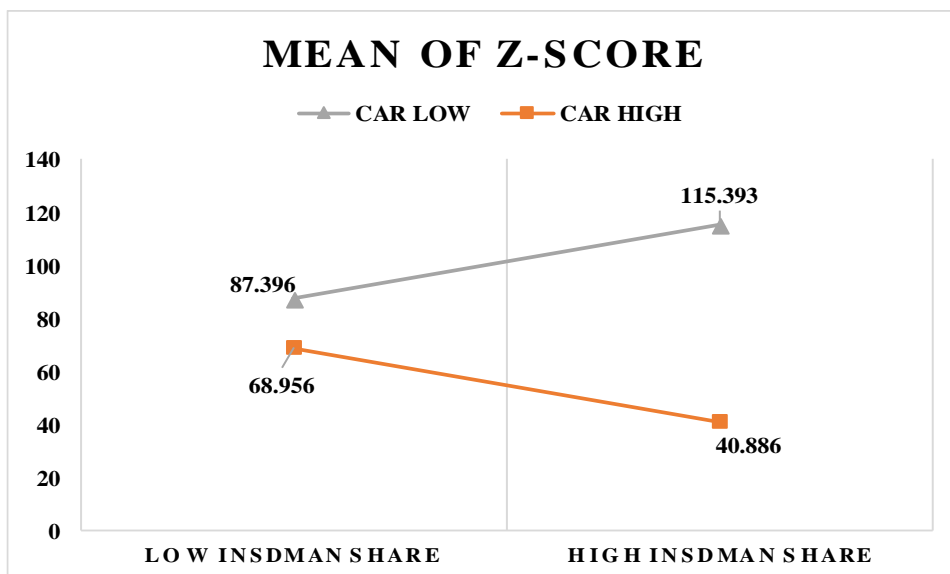


**Figure 9 Insider Shareholders and Asset Risks (STDEVROAA and STDEVROAE)**
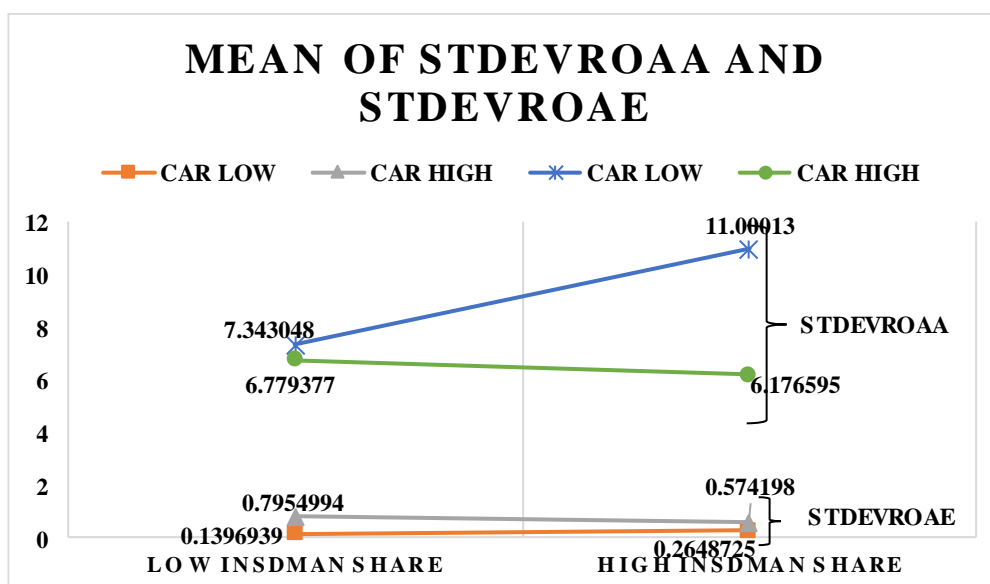


*Figure 8* shows that in a low CAR condition (below 8%), Z-SCORE of the lower insider ownership is at high level and subsequently increase to 115.39 when the insider shareholdings increase. In contrast, for the high CAR (above 8%) condition, we see a declining trend as the shareholdings increase. Therefore, when the CAR set by the national regulation is high in the CEE and Asia banks, as the insider management ownership increases, default risks will increase, which support the negative coefficient (-0.009) with log

of Z-SCORE proven at 5% significant level at this point. When using other alternative risk measures (STDEVROAA and STDEVROAE) as in *Figure 9*, we see the similar situation with either increase trend for risk measure in low CAR and then declining trend in high CAR or vice versa. The positive coefficients of (0.0057 in STDEVROAA and 0.054 in STDEVROAE) that statistically significant at 5% level are only reflected in low CAR condition for both risk measures. Therefore, the connection of high capital ratio would lead to high bank risk-takings (as proven in Hypothesis 2) is only valid for the default risk (Z-SCORE).

**Figure 10 Government Shareholders and Z-SCORE1 (without log)**
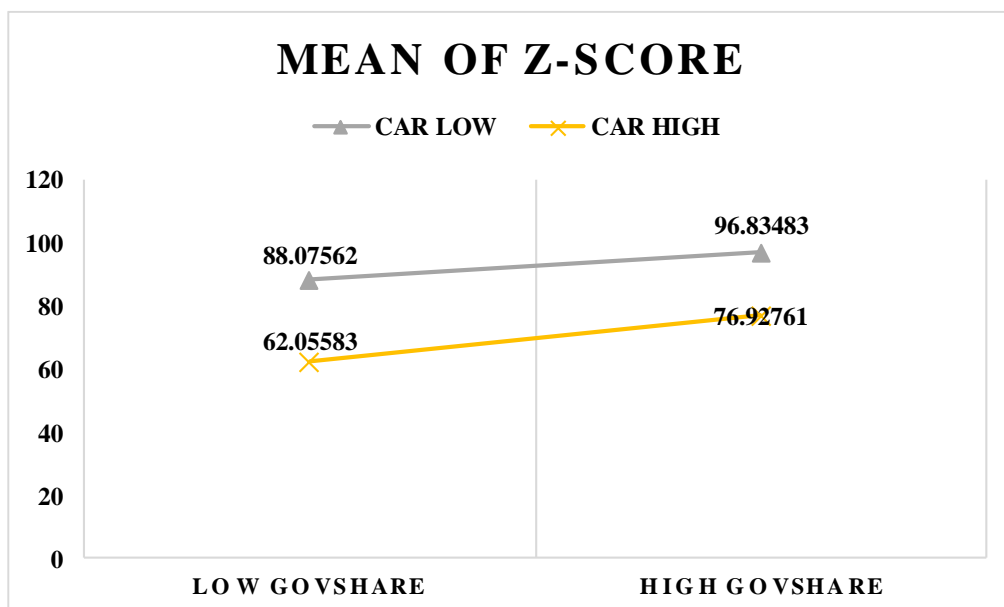


For government shareholdings (GOV), in *Figure 10,* we see both increasing trend for the low CAR and high CAR conditions when the government shares slowly increasing in the banks. This suggests that when the government share increases regardless of the CAR condition, probability of the bank's failure will be lower since increase trend in mean of Z-SCORE1. This differs from the negative coefficient (-0.0084) as shown in the IV model between GOV*CAR and Z-SCORE.

**Figure 11 Government Shareholders and Asset Risks (STDEVROAA and STDEVROAE)**
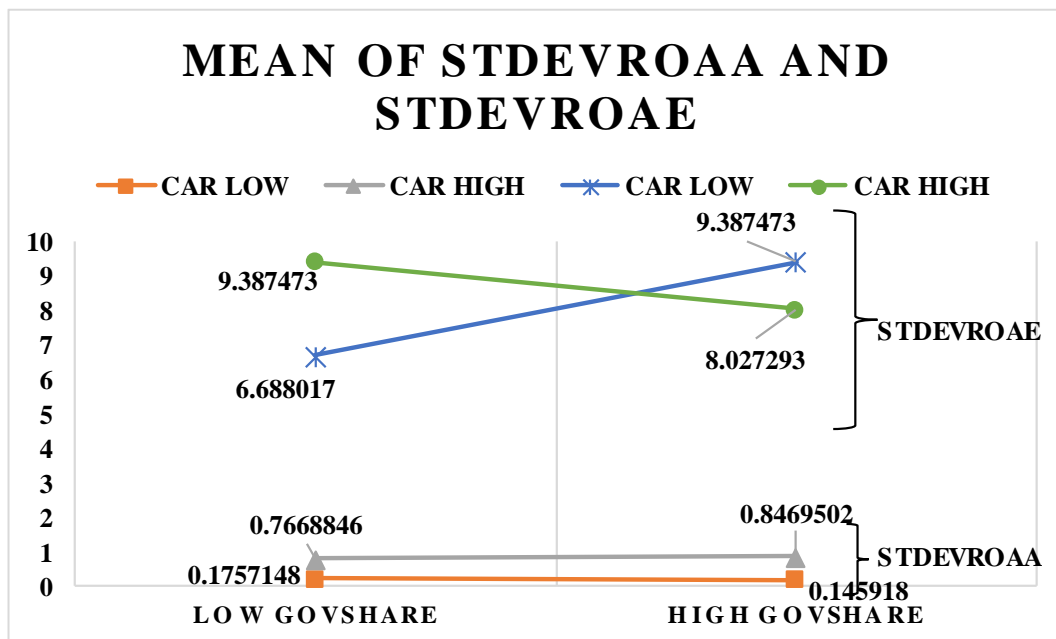


From *Figure 11*, there is however no consistency in the STDEVROAE since the increase in GOV will cause more asset risks (0.041 for GOV*CAR in IV model) is only proven in low CAR condition and not in high CAR condition. This means that, the expectation of high capital requirement and high risk-taking is not valid for STDEVROAE. On the other hand, STDEVROAA (0.005 of GOV*CAR) is consistent with the graph above where in high CAR condition, there is an increase in the mean of STDEVROAA. Therefore, at this point we can conclude that for GOV, high capital high risk scenario is only proven in STDEVROAA.

**4.4.2.4 Robustness Check: Situation in CEE countries**

Levine and Renelt (1992) suggests that the proposed model could be justified reasonably when the estimation done varies in robustness test that stimulated the same sign in the result and statistically significant. Therefore, in order to prove that, we include regulatory quality as instrument and test only with CEE countries (14 countries). This was applied by Setiyono & Tarazi (2014) and in Ciancanelli & Reyes (2001) who argue that external governance force might acts at banking sector and at individual banks level. Further inspired by previous literature, La Porta et.al (2002) state that supervisory agency may influence lending decisions if the bank is owned by single owner where the owner receives supports from politicians, usually in state-owned banks.

Therefore, this section will analyse if capital regulation acts as a moderating variable in the CEE countries that have shared certain similarities that they used to be members in the socialist camp and have gone through difficult but uncompleted systemic transformation, see, Jing (2014). We choose two indicators (Regulatory Quality and Government Effectiveness) as parts of the Worldwide Governance Indicator (WGI) to capture the perceptions on the ability to formulate new regulations and independence from political influence. We first adjust the two regressors into adjusted indicators of (ADJREGQUAL an ADJGOVEFFECT) so that higher indicators signify higher risks. Then, other variables including IFRS and BANKAGE are exogenous in this case. Preobrazhensky and McGee (2003) supported that by adopting International Accounting Standards (IAS), it could avoid distracting foreign capital. This is why most of the former Soviet republics put effort in converting their enterprises to IAS as IAS provide a reliable and true accounting information. Therefore, due to high recognition of IFRS as quality accounting standards, we assume that IFRS has an indirect effect to impact Bank Risk but high quality accounting standards is directly linked to good corporate governance to safeguard the interest of all parties.

BANKAGE is assumed to be an exogenous variable in this case as we see the estimation units of the WGI data changes significantly across years and therefore, experienced banks (identified by BANKAGE) might have different bank risks depending on the countries' governance like the effectiveness in formulating regulations and independence from political influence. In other words, BANKAGE is assumed to impact bank risks through Worldwide Governance Indicators (WGI). Similar to the baseline IV model, we checked the validity of all instruments with Hansen Test and Endogeneity Test individually if two adjusted regressors are endogenous. Results tabulated in ***Table 12*** *cannot* reject the null

hypothesis in Hansen Test and low p-value in Endogeneity Test confirm the validity of instruments as well as the endogenous status. The first stage regression is using the formula as follows

*Worldwide Governance Indicators (AdjREGQUAL or AdjGOVEFFECT)$_{i,t}$= β$_0$ + ∑ β$_1$ FOREIGNOWN$_{i,t}$+∑β$_2$REG$_{i,t}$+∑β$_3$FOR\*REG$_{i,t}$+∑β$_4$CAR$_{i,t}$+∑β$_5$CAPSTR$_{i,t}$+∑β$_6$ENTRY$_{i,t}$+ ∑β$_7$INSDMAN$_{i,t}$+∑β$_8$INST$_{i,t}$+∑$_{β9}$GOV+∑$_{β10}$INSDMAN\*CAR$_{i,t}$+∑β$_{11}$INST\*CAR$_{i,t}$+∑β$_{12}$GOV\*CAR$_{i,t}$+∑β$_{13}$INSDMAN\*CAPSTR$_{i,t}$+∑β$_{14}$INST\*CAPSTR$_{i,t}$+∑β$_{15}$GOV\*CAPSTR$_{i,t}$+∑β$_{16-19}$BANKCONTROLS$_{i,t}$+∑β$_{20-22}$COUNTRYCONTROLS$_{i,t}$,+∑β$_{23}$IFRS$_{i,t}$+∑ β$_{24}$ BANKAGE$_{i,t}$+ μ$_{i,t}$*

*Table 12* shows all significant results between the adjusted WGI and Bank Risks. We expect to see positive relationship for both adjusted WGI and Bank Risk indicators since lower ability to implement policies and lower independence of government power would means higher risks. However, the positive relationship assumption is only proven in ADJREGQUAL, thereby suggesting that when there is lesser freedom to formulate and implement new policies or regulations it will bring high risks to the banks. The strong 1% significant level in all ADJGOVEFFECT proves that present political influence is not necessarily bringing more bank risk to the CEE banks which further supports the benefits of state intervention in the banks. As previously compared to the Baseline IV, FOREIGNOWN shows a negative coefficients with Z-SCORE, suggested that Foreign-owned banks in CEE countries have higher financial stability (also being supported in Model 2). After looking into interactive terms of government shareholders (GOV) and regulation indicators (CAR and CAPSTR), we find different results using different instrumental variables. When ADJREGQUAL acts as instrumental, CAR moderates the risks by decreasing the bank risks (proven in Z-SCORE, STDEVORAE and NPL). In the case of ADJGOVEFFECT when it acts as instrumental, CAR increases the bank risk-taking of the Government-owned banks. Similar to the Baseline IV result, CAR is acting as a moderating variable for INSDMAN in asset risks (STDEVROAA and STDEVROAE) with increasing risk effect during the interaction. It is interesting to find that institutional shareholders in CEE countries reacted to the CAR with proven significance at 10% level in STDEVROAA (0.001 coefficient) and 5% level in STDEVROAE (0.016 coefficient) which suggests that corporate group in CEE might have the expertise in banking decisions and tend to take higher asset risks even when facing higher capital requirement. Looking at Overall Capital Stringency (CAPSTR), it proves the

consistent results in asset risks with negative coefficients for INSDMAN*CAR and INST*CAR. This suggests that without considering capital requirement both owners take lesser asset risks. Therefore, the statement about effects of capital regulation is to induce less risks and higher stability is valid.

On the other hand, we have also included other regulatory variable such as deposit insurance dummy variable (DEPINSUR) as a dummy variable measures as 1 when there is an explicit deposit insurance for the specific countries. The dummy variable interacts with the three types of shareholdings (INSDMAN; INST and GOV). INSDMAN*INS was dropped when using IV model due to collinearity problem while the interactive terms do not show statistically significant result (*results are not presented here).*

**Table 12 IV Model with CEE Countries only**

| | ZSCORE | | STDEVROAA | | STDEVROAE | | NPL | |
|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(1)** | **(2)** | **(1)** | **(2)** | **(1)** | **(2)** |
| **ADJREGQUAL** | -9.628*** | | 8.516** | | 71.02*** | | 14.536*** | |
| | (2.122) | | (3.520) | | (22.851) | | (2.271) | |
| **ADJGOVEFFECT** | | 4.232*** | | -3.395** | | -27.274*** | | -7.936*** |
| | | (1.062) | | (1.502) | | (10.361) | | (1.470) |
| **FOREIGNOWN** | -1.169*** | -0.612* | -0.815 | -1.196 | 3.200 | 0.397 | 0.828* | -0.024 |
| | (0.304) | (0.335) | (1.227) | (1.259) | (2.853) | (2.412) | (0.442) | (0.419) |
| **FOR*REGt-1** | 0.040 | 0.176 | 1.961 | 1.883 | 3.823 | 1.900 | -0.232 | 0.309 |
| | (0.479) | (0.372) | (1.530) | (1.504) | (13.994) | (13.264) | (0.861) | (0.466) |
| **REGt-1** | -0.123 | -0.401 | -1.219 | -1.045 | 5.635 | 8.164 | -0.042 | 0.441 |
| | (0.461) | (0.354) | (1.464) | (1.447) | (13.909) | (13.269) | (0.301) | (0.289) |
| **INSDMAN** | -0.031* | -0.003 | 0.009 | -0.002 | -0.125 | -0.202 | 0.059*** | 0.014 |
| | (0.018) | (0.017) | (0.026) | (0.028) | (0.188) | (0.204) | (0.021) | (0.021) |
| **GOV** | -0.018 | 0.006 | 0.051 | 0.033 | 1.376*** | 1.302*** | 0.043*** | -0.005 |
| | (0.014) | (0.016) | (0.033) | (0.033) | (0.380) | (0.384) | (0.016) | (0.017) |
| **INST** | -0.001 | 0.025* | -0.024 | -0.036* | -0.388* | -0.484** | 0.034** | -0.023 |
| | (0.012) | (0.013) | (0.022) | (0.022) | (0.230) | (0.230) | (0.015) | (0.016) |
| **NATCAP** | -0.046 | 0.030 | -0.107 | -0.128 | -0.655 | -0.878 | 0.247** | -0.014 |
| | (0.064) | (0.074) | (0.101) | (0.092) | (0.609) | (0.668) | (0.107) | (0.115) |
| **GOV*CAR** | 0.002** | -0.0015* | -0.001 | 0.001 | -0.014* | 0.007 | -0.003** | 0.003** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.007) | (0.008) | (0.001) | (0.001) |
| **INSDMAN*CAR** | 0.001 | -0.0004 | 0.001 | 0.002* | 0.008 | 0.017* | -0.001 | 0.0004 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.009) | (0.010) | (0.001) | (0.001) |
| **INST*CAR** | 0.0002 | -0.001 | 0.001 | 0.001* | 0.012* | 0.016** | -0.001 | 0.002 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.006) | (0.007) | (0.001) | (0.001) |
| **INSDMAN*CAPSTR** | 0.003 | 0.000 | -0.007* | -0.006 | -0.058** | -0.046** | -0.007* | -0.0002 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (0.003) | (0.002) | (0.004) | (0.004) | (0.023) | (0.023) | (0.003) | (0.003) |
| **INST*CAPSTR** | 0.000 | -0.003** | -0.004* | -0.001 | -0.047*** | -0.023* | -0.002 | 0.003 |
| | (0.002) | (0.001) | (0.002) | (0.002) | (0.014) | (0.012) | (0.003) | (0.003) |
| **GOV*CAPSTR** | -0.004** | -0.002 | 0.004 | 0.002 | -0.009 | -0.023 | 0.0003 | -0.001 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.014) | (0.014) | (0.003) | (0.003) |
| **CI** | -0.003 | -0.005** | 0.035*** | 0.038*** | 0.048 | 0.060 | -0.0004 | 0.001 |
| | (0.002) | (0.003) | (0.013) | (0.013) | (0.046) | (0.046) | (0.002) | (0.002) |
| **ETA** | 0.027* | 0.046*** | 0.084** | 0.065 | -0.094 | -0.197 | 0.032** | 0.020 |
| | (0.016) | (0.014) | (0.042) | (0.040) | (0.130) | (0.121) | (0.015) | (0.018) |
| **NLTA** | -0.001 | 0.009* | 0.034 | 0.032 | 0.072 | 0.019 | 0.044*** | 0.020*** |
| | (0.006) | (0.005) | (0.024) | (0.023) | (0.066) | (0.059) | (0.008) | (0.007) |
| **ENTRY** | -0.301** | 0.005 | 0.255 | -0.009 | 3.316** | 0.870 | 0.666*** | 0.2802** |
| | (0.141) | (0.100) | (0.285) | (0.223) | (1.323) | (0.830) | (0.196) | (0.116) |
| **CAPSTR** | -0.153 | 0.452*** | 0.639*** | 0.101 | 5.744*** | 1.235 | 0.640** | -0.281 |
| | (0.163) | (0.139) | (0.207) | (0.196) | (1.513) | (1.131) | (0.249) | (0.253) |
| **LNSIZE** | 0.027 | 0.289*** | -0.403** | -0.443** | 0.796 | 0.827 | 0.491** | 0.196 |
| | (0.112) | (0.085) | (0.185) | (0.182) | (0.669) | (0.608) | (0.200) | (0.215) |
| **GDP/CAP** | -0.0001*** | 0.0001** | 0.0001** | -0.00003 | 0.001* | -0.001** | 0.0002*** | -0.0001* |
| | (0.00003) | (0.00003) | (0.0001) | (0.00003) | (0.0004) | (0.0002) | 0.00004 | (0.00004) |
| **INFL** | -0.108*** | -0.059*** | 0.142*** | 0.098*** | 1.013*** | 0.649*** | 0.056*** | 0.010 |
| | (0.014) | (0.010) | (0.024) | (0.015) | (0.145) | (0.109) | (0.018) | (0.016) |
| **REALINT** | -0.127*** | -0.065*** | 0.141*** | 0.087*** | 1.187*** | 0.724*** | 0.091*** | 0.025 |
| | (0.018) | (0.016) | (0.028) | (0.022) | (0.183) | (0.175) | (0.019) | (0.017) |
| **No. of observations** | 980 | | 1025 | | 1025 | | 862 | |
| **F-statistics** | 10.52*** | 8.14*** | 4.13*** | 4.32*** | 5.64*** | 5.74*** | 8.88*** | 8.76*** |
| **Underid test** | 36.979*** | 63.354*** | 34.183*** | 67.626*** | 34.183*** | 67.626*** | 42.215*** | 48.283*** |
| **Wald F statistic** | 24.1 | 67.332 | 21.781 | 70.476 | 21.781 | 70.476 | 27.339 | 55.392 |
| **Hansen (Overid Test)** *p-value* | 0.066 | 1.46 | 0.004 | 0.837 | 0.205 | 2.491 | 1.317 | 0.383 |
| **Endogeneity test** *p-value* | 16.019*** | 27.677*** | 5.657** | 8.274*** | 8.607*** | 10.654*** | 50.815*** | 73.897*** |

Results of AdjREGQUAL are shown in Column (1) for respective risks, while Column (2) refers to results of AdjGOVEFFECT. Adjusted Worldwide Governance Indicators (WGI) of such AJDREGQUAL and AJDGOVEFFECT are the endogenous variables that acts as instrument for the IV model regression with 2 Steps GMM estimation while IFRS Standards and BANKAGE are the excluded instruments. Z-SCORE and Impaired Loans to Total Assets ratio (NPL) are measured in natural logarithm. (Parentheses represent robust standard error). Superscripts *, **and *** denote statistical significant at 10%, 5% and 1%. Detailed description on variables can be found in appendix *Table A.10*.

### 4.4.3 Model 3 Concluding remark

While Laeven & Levine (2009) focus on powerful outsider shareholders suggested that there is an interaction between ownership structure and bank regulation in determining the banks' risk exposure, our results are not in a strong position to prove capital regulation could act as a consistent moderating. As suggested in Bouwens & Verriest (2014), regulation barely weigh any impacts on the manager shareholders in the bank's risk-taking unlike outsider shareholders. Taking that into account, we include different types of shareholders in the analysis. For institutional shareholders (INST) all corporate group that has any influential shareholdings in the banks are included in the estimation, unlike other papers that focus specifically on certain major institutions. This is to cover all possibilities of outsider shareholders might have influence the bank risk-taking.

By using 2 Steps GMM estimation on IV models, we attempted to control the endogeneity problem since most of the data obtained is highly based on the financial information of the banks. Comparing the baseline regression results and the mean analysis as above, we can conclude that high capital requirement will lead to high chances of default risks for insider management shareholding (INSDMAN) while government shareholdings will have incurred higher asset risks (proved by STDEVROAA) when the capital requirement increase. In overall, CAR is acting as a moderating variables on different shareholders but the increasing effects can only be proven for INSDMAN and GOV based on different risk measure.

CEE banks share similar results for positive increasing effects of CAR on asset risks on INSDMAN and INST while government shareholders in CEE banks have different approaches to bank risk-taking highly depending on the country's governance situation. All in all, the hypothesis 3 of CAR is acting as moderating variable in the CEE and Asia banks is now proven.

# Chapter 5: Conclusion and Recommendations

The aim of this thesis is to add to the existing literature from Laeven & Levine (2009) concerning ownership structures, bank regulation and risk-taking by banks. As capital requirement became one of the important issues since the financial crisis 2008 and because of the high emphasis of the CAR in Basel III, it is therefore the main concern in this paper.

To investigate if the capital adjustments behaviour in the CEE countries and Asia Pacific countries are similar to the other developing and developed economies as tested in the existing literatures, we employ similar model that developed by Shrieves and Dahl (1992) on the simultaneous equations of changes in capital and changes in risks. To the best of our best knowledge, we are the first to focus on the CEE countries to test the association of ownership structure, capital regulation and bank risks. Furthermore, unlike most of the previous literatures that mainly focus on the concentrated ownership, we include different types of ownership (insider owners, corporate group and government shareholdings). From the empirical results, three main conclusions relating to the three proposed hypotheses are then formed.

1) Similar to other banks, CEE banks increase their capital level and take higher portfolio risk when facing strict capital regulation. However, the results differ when using different approaches to measure the regulatory pressure, which indicates that inaccurate results might have been generated in the previous literature that only rely on simple dummy variable if the banks maintain above or below 8% capital ratio. We relied on the national regulation threshold as it is more country-specific and the positive relationship between regulatory pressure (REG2) and the changes in both capital and risks, supporting Matejašák and Teplý (2007) and Shrieves and Dahl (1992) results.

   **Therefore, Hypothesis 1 is proven when supporting the positive impacts of both capital and risk-taking on regulatory pressure. Using fixed panel model and 3SLS, we explored on how the banks adjust their capital and risks level in which different regulatory pressure measurement (REG1, REG2 and REG3) contributes to different results.**

2) Although CEE foreign owned-banks in overall face higher risks than the domestic banks, we can only prove that foreign-owned banks in CEE countries have only higher default

risks than the local banks in the countries. It is also important to include other shareholdings in the analysis to see if the election terms and market forces could impact the bank risks due to different incentives for different the shareholders and the market itself. Government-owned banks are better off in the listed banks with lower asset risks but insider owners and institutional shareholders both face higher asset risks in the listed banks. Furthermore, during the election term, listed banks with strong government influence face higher asset risks showing the misaligned objectives between the market and the banks during election. This also supports the political view where the market is worry that government officials put individual interests in the banks.

**Therefore, Hypothesis 2 is supported with foreign-owned banks in CEE have higher default risks than domestic banks. Different owners have different risk-taking incentives. The analysis of government-owned banks draw different results when the election considerations and market discipline considerations are included (e.g., lower assets risks for listed government-owned banks only when it is not election year).**

3) Combining both hypotheses 1 and 2, we examine the interaction of CAR and different ownership types. While CAR acts as the moderating variables of the different ownership type, when we include deposit insurance scheme into the testing as it was included in Laeven & Levine (2009), the results are not significant to prove the complementary relationship between banking regulation and the ownership structure. Therefore, at this point, to answer the final research question of this thesis, only CAR and CAPSTR shows significant impact to act as moderating variable in the case of the CEE and three Asia Pacific banks.

**Thus, Hypothesis 3 is supported where CAR is acting as a moderating variables on different shareholders types where the increasing effects can only be proven for INSDMAN and GOV based on a different risk measure.**

**Limitations of the Study**

One of the important limitations of this paper is the difficulty in measuring the complementary relationship between banking regulation and bank governance as there is no

define rule to justify to what extent the governance theory actually weighs in banking regulation as there are many external factors which could impact the happenings in the banking sector. Laeven & Levine (2009) attempted different methods and included different variables to justify the importance of including the consideration of governance element (ownership structure as the main concern). This was done by identifying if CAR is acting as a moderating variable with different ownership in order to see if the theory claimed by Laeven & Levine (2009) actually persists. Therefore, since we can only reproduce Laeven & Levine (2009) results that same regulation have different impacts on different ownership types. For future research, it would be useful to find ways to quantify how different ownership react with capital regulatory pressure and further affect risks. Also, geographical comparison (e.g. U.S.A, MENA, EU, Asia and others) with a larger samples could be a good extension point.

From the findings of this study, we would like to bring up a statement in a conference last year titled "Basel III not seen as good fit for Asia banks" (Morrow, 2015). The primary goal of Basel III is to ensure that banks have sufficient capitals for any probable future financial crisis, that is to avoid any government bail-out. Maheshwari, an analyst from Standard & Poor's during the conference (Morrow, 2015) however once said that Asia would be more relaxed about the bail-out features emphasised in Basel III as compared to other peers in other regions like Europe. Urquhart (2010) states that while it could be true that the U.S. and European banks are emphasizing stricter capital requirements due to weaker capital positions, however, our results suggest that both the 141 CEE and 51 ASIAN banks adjusted their capital and risk level towards the capital regulation which implies that both regions are attempting to comply with the international Basel rule. It may be a fact that Asian crisis in 1997 had given the banks a great lesson to be better equipped with the future bank challenges that most of the banks in ASIA are well-capitalised. If that is true, meeting the new international capital requirement (Basel III) will not be unlikely a top agenda in Asian banks but would definitely be in CEE.

In conclusion, CAR has been proven for its role of moderating variable on the ownership structure to influence bank risk. Therefore, capital requirements do exist and they do matter jointly with the ownership structure.

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# List of appendices

# Appendices

**List 1: Division of Region**

| |
|---|
| **Central Eastern Europe and the Baltic States, CEEu** |
| Croatia |
| Czech Republic |
| Hungary |
| Poland |
| Slovak Republic |
| Slovenia |
| Bosnia and Herzegovina |
| |
| **South-Eastern Europe, SEE** |
| Albania |
| Bulgaria |
| Romania |
| |
| **CIS** |
| Belarus |
| Russia |
| |
| **Baltics Countries (BAL)** |
| Estonia |
| Latvia |

*Source: Author's own table, inspired from EBRD Working Paper (Fries and Taci, 2002)*

**Table A. 1 Average Total Capital Ratio from 2007 to 2014 by region (Parentheses show Number of observations by countries)**

|  | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
|---|---|---|---|---|---|---|---|---|---|
| CEE (562) | 12.75 | 12.74 | 14.73 | 16.10 | 14.80 | 16.12 | 16.42 | 16.22 | 14.99 |
| SEE (199) | 12.76 | 15.31 | 18.83 | 17.54 | 18.76 | 17.65 | 18.30 | 19.60 | 17.37 |
| CIS (253) | 17.42 | 18.73 | 24.20 | 20.93 | 19.14 | 20.25 | 18.91 | 17.46 | 19.62 |
| BAL (101) | 14.17 | 13.45 | 16.02 | 15.01 | 16.42 | 18.53 | 21.77 | 25.41 | 17.51 |
| ASIA (405) | 14.38 | 15.01 | 14.99 | 17.00 | 16.68 | 17.07 | 16.01 | 16.40 | 15.95 |
| Total (1520) | **14.06** | **14.71** | **16.97** | **17.26** | **16.65** | **17.42** | **17.31** | **17.50** | **16.50** |

**Table A. 2 Average Bank Risk (RWA/TA "credit risk") from 2007 to 2014 by region (Parentheses show Number of observations by countries)**

|  | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
|---|---|---|---|---|---|---|---|---|---|
| CEE (570) | 0.40 | 0.60 | 0.65 | 0.65 | 0.63 | 0.64 | 0.60 | 0.54 | **0.59** |
| SEE (191) | 0.51 | 0.65 | 0.72 | 0.69 | 0.72 | 0.70 | 0.60 | 0.58 | **0.65** |
| CIS (253) | 0.61 | 0.70 | 0.65 | 0.80 | 0.83 | 0.83 | 0.85 | 0.86 | **0.77** |
| BAL (101) | 0.92 | 0.90 | 0.87 | 0.78 | 0.66 | 0.72 | 0.59 | 0.45 | **0.74** |
| ASIA (406) | 0.52 | 0.56 | 0.49 | 0.50 | 0.52 | 0.48 | 0.56 | 0.52 | **0.52** |
| Total (1521) | **0.51** | **0.63** | **0.63** | **0.65** | **0.65** | **0.64** | **0.63** | **0.59** | **0.62** |

**Table A. 3 Number of observations that do not fulfil the threshold based on different regulatory methods (REG) within 2007 to 2014**

| | REG1 (Gap magnitude approach using basic 8% as threshold) | | | REG2 (Gap magnitude approach using national regulation as threshold) | | | REG3 *(minimum requirement + two years std dev of one specific bank)* | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Undercap | % | Total | Undercap | % | Total | Undercap | % |
| CEE | 519 | 16 | 3.08 | 519 | 297 | 57.23 | 576 | 116 | 20.42 |
| SEE | 189 | 0 | 0.00 | 189 | 105 | 55.56 | 192 | 26 | 13.54 |
| CIS | 240 | 5 | 2.08 | 240 | 115 | 47.92 | 256 | 39 | 15.23 |
| BAL | 98 | 3 | 3.06 | 98 | 43 | 43.88 | 104 | 17 | 16.35 |
| ASIA | 379 | 7 | 1.85 | 319 | 158 | 41.69 | 408 | 76 | 18.63 |
| Total | 1425 | 31 | 2.18 | 1425 | 718 | 50.39 | 1536 | 275 | 17.90 |

**Table A.4 : Pearson Correlation Matrixn(Cap Volatility Approach Using minimum capital requirement plus standard deviation)**

| | Δ CAPt | REG3t-1 | CAPt-1 | Riskt-1 | ROA | LLOS | LNSIZE |
|---|---|---|---|---|---|---|---|
| **REG3t-1** | 0.2627*** | | | | | | |
| | (0.000) | | | | | | |
| **CAPt-1** | -0.3779*** | -0.4182*** | | | | | |
| | (0.000) | (0.000) | | | | | |
| **Riskt-1** | 0.0013 | -0.0193 | -0.0118 | | | | |
| | (0.960) | (0.449) | (0.642) | | | | |
| **ROA** | 0.0385 | -0.1119*** | 0.062** | 0.0127 | | | |
| | (0.132) | (0.000) | (0.015) | (0.619) | | | |
| **LLOS** | -0.0073 | 0.0553** | -0.0325 | -0.0047 | -0.7795*** | | |
| | (0.775) | (0.030) | (0.204) | (0.856) | (0.000) | | |
| **LNSIZE** | -0.0254 | -0.2226*** | -0.0755*** | 0.0085 | 0.1601*** | -0.1082*** | |
| | (0.322) | (0.000) | (0.003) | (0.741) | (0.000) | (0.000) | |
| **ΔRISKt** | -0.0012 | 0.016 | 0.0133 | -0.9999*** | -0.0122 | 0.0062 | -0.0073 |
| | (0.964) | (0.530) | (0.603) | (0.000) | (0.635) | (0.807) | (0.774) |
| Superscripts *, **and *** denote statistical significant at 10%, 5% and 1%. | | | | | | | |

**Table A.5: Banks Distribution, Market Shares and Weighted Shareholdings**

| Countries | Code | No. Banks | FOR | DOM | MrtShare | Wgh INSD | WghINST | WghGOV |
|---|---|---|---|---|---|---|---|---|
| **Albania** | Al | 5 | 4 | 1 | 43.51 | 0.41 | 75.87 | 0.00 |
| **Belarus** | BY | 10 | 8 | 2 | 75.12 | 0.00 | 18.55 | 93.87 |
| **Bosnia and Herzegovina** | BA | 6 | 6 | 0 | 44.76 | 0.00 | 94.34 | 4.96 |
| **Bulgaria** | BG | 13 | 9 | 4 | 83.92 | 11.77 | 81.27 | 13.07 |
| **China** | CH | 28 | 9 | 19 | 56.35 | 0.00 | 40.37 | 48.33 |
| **Croatia** | HR | 16 | 13 | 3 | 63.95 | 0.00 | 23.65 | 2.10 |
| **Czech Republic** | CZ | 16 | 7 | 9 | 83.41 | 0.32 | 94.57 | 5.94 |
| **Estonia** | EE | 4 | 3 | 1 | 71.14 | 2.15 | 97.83 | 0.00 |
| **Hong Kong** | HK | 16 | 14 | 2 | 91.90 | 0.65 | 93.66 | 32.23 |
| **Hungary** | HU | 6 | 5 | 1 | 66.79 | 1.03 | 98.46 | 0.00 |
| **Latvia** | LV | 9 | 6 | 3 | 63.01 | 15.93 | 72.68 | 0.00 |
| **Poland** | PL | 11 | 9 | 2 | 61.12 | 0.00 | 52.42 | 9.53 |
| **Romania** | RO | 7 | 6 | 1 | 50.06 | 0.04 | 86.51 | 0.00 |
| **Russia** | RU | 22 | 7 | 15 | 70.08 | 0.91 | 50.34 | 50.59 |
| **Singapore** | SG | 7 | 1 | 6 | 53.63 | 0.00 | 85.97 | 0.00 |
| **Slovakia** | SK | 6 | 4 | 2 | 79.64 | 18.78 | 76.36 | 0.00 |
| **Slovenia** | SL | 10 | 7 | 3 | 64.95 | 0.00 | 20.29 | 75.96 |
| *Total Banks* | | *192* | *118* | *74* | - | - | - | - |

Data is aggregated based on 192 banks from the listed 17 countries, number of selected banks for each countries as displayed in Column (3), in which only the active banks from Bankscope are selected. Foreign banks and Domestic banks samples for each countries are displayed above. Column (4)to (9) tabulated above is based on 2014 data, market share is computed using weighted total bank assets, three other categories of shareholdings are selected and are displayed in country level data using weighted average of shares per year (market share of each bank as weigh basis. The sum of the three types of shareholdings do not necessarily sum up to 100 since there are shareholdings owned by small individuals(each holding less than 5% shares in the banks) that are not the major concern in this paper since they exerts limited influence in the banks. For INST Share, it includes all organizations mainly the corporate group that have shares in the banks, while for GOV Share, we also take into account the Global Ultimate Owners (GUO) including the government of other countries.

**Table A.6: Summary statistic of data used in Model 1 (All Variables from 2007-2014)**

| Variable | Obs. | Mean | Std. Dev. | Min | Max | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| Δ CAPt | 1536 | 0.72 | 7.60 | -70.00 | 80.20 | **0.00** | 0.00 |
| ΔRISKt | 1536 | -0.50 | 20.68 | -810.21 | 2.45 | 0.00 | 0.00 |
| REGt-1 (REG1) | 1536 | 0.03 | 0.32 | 0.00 | 6.60 | 0.00 | 0.00 |
| REGt-1 (REG2) | 1536 | 1.15 | 2.23 | 0.00 | 20.80 | 0.00 | 0.00 |
| REGt-1 (REG3) | 1536 | 0.21 | 0.41 | 0.00 | 1.00 | 0.00 | 0.86 |
| CAPt-1 | 1536 | 15.61 | 11.22 | 0.00 | 130.00 | 0.00 | 0.00 |
| RISKt-1 | 1536 | 1.12 | 20.68 | 0.00 | 811.04 | 0.00 | 0.00 |
| ROA | 1529 | 0.66 | 3.25 | -94.33 | 9.53 | 0.00 | 0.00 |
| LLOS | 1535 | 0.01 | 0.03 | -0.05 | 0.73 | 0.00 | 0.00 |
| LNSIZE | 1526 | 8.60 | 2.41 | 0.00 | 15.03 | 0.00 | 0.00 |

**Table A.7: Summary statistic of data used in Model 2 (All Variables from 2005-2013)**

| Variables | Obs. | Mean | Std. Dev. | Min | Max | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| Z-SCORE (LOG) | 1565 | 3.47 | 1.21 | -1.83 | 7.79 | 0.00 | 0.00 |
| STDEVROAA | 1634 | 0.79 | 2.48 | 0.00 | 54.46 | 0.00 | 0.00 |
| STDEVROAE | 1630 | 6.68 | 13.78 | 0.00 | 401.71 | 0.00 | 0.00 |
| NPL (LOG) | 1390 | 0.64 | 1.53 | -4.15 | 4.66 | 0.00 | 0.00 |
| FOREIGNOWN | 1709 | 0.58 | 0.49 | 0.00 | 1.00 | 0.00 | - |
| INSDMAN | 1712 | 4.21 | 16.26 | 0.00 | 100.00 | 0.00 | 0.00 |
| INST | 1716 | 76.86 | 33.10 | 0.00 | 100.00 | 0.00 | 0.65 |
| GOV | 1718 | 15.44 | 32.72 | 0.00 | 100.00 | 0.00 | 0.00 |
| GOVDUM50 | 1728 | 0.15 | 0.36 | 0.00 | 1.00 | 0.00 | 0.00 |
| ELEC | 1728 | 0.40 | 0.49 | 0.00 | 1.00 | 0.00 | - |
| LISTED | 1728 | 0.30 | 0.46 | 0.00 | 1.00 | 0.00 | 0.00 |
| LNSIZE | 1686 | 8.30 | 2.60 | 0.00 | 14.95 | 0.00 | 0.00 |
| NLTA | 1683 | 56.30 | 17.97 | 0.00 | 96.05 | 0.00 | 0.00 |
| LLSGL | 1683 | 4.35 | 4.69 | 0.00 | 47.75 | 0.00 | 0.00 |
| ETA | 1683 | 11.12 | 7.35 | -13.71 | 96.66 | 0.00 | 0.00 |
| CI | 1683 | 54.70 | 30.70 | 0.00 | 594.36 | 0.00 | 0.00 |
| LIMP | 1683 | 1.39 | 2.27 | -3.69 | 35.95 | 0.00 | 0.00 |
| HHI | 1712 | 59.39 | 25.82 | 7.25 | 100.00 | 0.00 | 0.00 |
| BANK Z-SCORE | 1728 | 17.15 | 12.61 | 2.41 | 57.90 | 0.00 | 0.00 |
| GDP/CAPITA | 1728 | 13737.95 | 10222.19 | 1740.10 | 55979.76 | 0.00 | 0.00 |
| INFL | 1728 | 5.79 | 9.32 | -9.69 | 75.44 | 0.00 | 0.00 |

**Table A.8: Summary statistic of data used in Model 3 (All Variables from 2005-2014)**

| Variable | Obs. | Mean | Std. Dev. | Min | Max | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| ZSCORE (LOG) | 1751 | 3.50 | 1.25 | -1.83 | 7.79 | 0.0000 | 0.0000 |
| STDEVROAA | 1824 | 0.78 | 2.42 | 0.00 | 54.46 | 0.0000 | 0.0000 |
| STDEVROAE | 1820 | 6.81 | 15.80 | 0.00 | 401.71 | 0.0000 | 0.0000 |
| NPL | 1566 | 0.68 | 1.55 | -4.68 | 5.03 | 0.0000 | 0.0002 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FOREIGNOWN | 1900 | 0.58 | 0.49 | 0.00 | 1.00 | 0.0000 | 0.0000 |
| REGt-1 | 1728 | 0.03 | 0.32 | 0.00 | 6.60 | 0.0000 | 0.0000 |
| INSDMAN | 1902 | 4.28 | 16.52 | 0.00 | 100.00 | 0.0000 | 0.0000 |
| INST | 1905 | 76.73 | 33.28 | 0.00 | 100.00 | 0.0000 | 0.8402 |
| GOV | 1909 | 15.54 | 32.86 | 0.00 | 100.00 | 0.0000 | 0.0000 |
| NATCAP | 1917 | 14.94 | 3.72 | 2.30 | 31.80 | 0.0020 | 0.0000 |
| ENTRY | 1810 | 7.36 | 1.00 | 4.00 | 8.00 | 0.0000 | 0.0000 |
| CAPSTR | 1694 | 4.49 | 1.85 | 1.00 | 7.00 | 0.0000 | 0.0000 |
| CI | 1876 | 8.36 | 2.59 | 0.00 | 15.03 | 0.0000 | 0.0000 |
| ETA | 1873 | 54.80 | 31.33 | 0.00 | 594.36 | 0.0000 | 0.0000 |
| NLTA | 1873 | 11.10 | 7.13 | -13.71 | 96.66 | 0.0000 | 0.0000 |
| LNSIZE | 1873 | 56.25 | 17.83 | 0.00 | 96.05 | 0.0000 | 0.0000 |
| GDP/CAP | 1920 | 14020.31 | 10433.42 | 1740.10 | 56284.58 | 0.0000 | 0.0000 |
| INFL | 1920 | 5.50 | 8.98 | -9.69 | 75.44 | 0.0000 | 0.0000 |
| REALINT | 1884 | 2.52 | 6.01 | -33.65 | 28.69 | 0.0000 | 0.0000 |

**Table A.9: Ownership Shareholdings by Country**

**Panel A: Insider Management Shareholdings by Country**

| | Obs. | MEAN | S.D. | MIN | MDN | MAX |
|---|---|---|---|---|---|---|
| Al | 45 | 3.99 | 5.32 | 0 | 1.52 | 18.12 |
| BA | 60 | 0.00 | 0.00 | 0 | 0 | 0 |
| BG | 129 | 7.94 | 19.51 | 0 | 0 | 85 |
| BY | 100 | 5.39 | 19.75 | 0 | 0 | 77.01 |
| CH | 280 | 0.00 | 0.00 | 0 | 0 | 0 |
| CZ | 160 | 0.43 | 5.44 | 0 | 0 | 68.87 |
| EE | 40 | 25.00 | 43.85 | 0 | 0 | 100 |
| HK | 159 | 3.76 | 11.76 | 0 | 0 | 53.51 |

| | | | | | |
|---|---|---|---|---|---|
| HR | 160 | 0.00 | 0.00 | 0 | 0 | 0 |
| HU | 60 | 0.37 | 0.85 | 0 | 0 | 3.1 |
| LV | 89 | 18.79 | 25.47 | 0 | 0 | 100 |
| PL | 107 | 0.00 | 0.00 | 0 | 0 | 0 |
| RO | 70 | 0.30 | 1.34 | 0 | 0 | 8 |
| RU | 213 | 13.71 | 29.61 | 0 | 0 | 100 |
| SG | 70 | 0.00 | 0.01 | 0 | 0 | 0.02 |
| SK | 60 | 1.67 | 12.91 | 0 | 0 | 100 |
| SL | 100 | 0.00 | 0.00 | 0 | 0 | 0 |
| Total | 1902 | 4.28 | 16.52 | 0 | 0 | 100 |

**Panel B: Institutional Shareholdings by Country**

| | Obs. | MEAN | S.D. | MIN | MDN | MAX |
|---|---|---|---|---|---|---|
| Al | 48 | 83.67 | 27.2 | 3.52 | 98.24 | 100 |
| BA | 60 | 80.66 | 37.44 | 0 | 98.85 | 100 |
| BG | 129 | 87.2 | 22.73 | 0 | 99.9 | 100 |
| BY | 100 | 29.7 | 45.06 | 0 | 0 | 100 |
| CH | 275 | 61.88 | 33.13 | 0 | 55.63 | 100 |
| CZ | 160 | 88.88 | 25.64 | 14.19 | 100 | 100 |
| EE | 40 | 74.73 | 43.7 | 0 | 99.47 | 100 |
| HK | 159 | 86.59 | 22.98 | 0 | 100 | 100 |
| HR | 160 | 93.92 | 11.31 | 54.04 | 100 | 100 |
| HU | 60 | 98.62 | 2.88 | 89.1 | 100 | 100 |
| LV | 87 | 72.68 | 31.56 | 0 | 89.02 | 100 |
| PL | 107 | 65.8 | 27.08 | 10.24 | 71.03 | 100 |
| RO | 70 | 91.46 | 15.49 | 30.42 | 99 | 100 |
| RU | 220 | 71.69 | 38.04 | 0 | 97.71 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| SG | 70 | 86.94 | 17.69 | 35.14 | 100 | 100 |
| SK | 60 | 94.38 | 14.71 | 0 | 99.5 | 100 |
| SL | 100 | 68.67 | 35.75 | 0 | 89 | 100 |
| Total | 1905 | 76.73 | 33.28 | 0 | 98.39 | 100 |

**Panel C: Government Shareholdings by Country**

| | Obs. | MEAN | S.D. | MIN | MDN | MAX |
|---|---|---|---|---|---|---|
| Al | 49 | 0.19 | 0.77 | 0 | 0 | 3.17 |
| BA | 60 | 16.67 | 37.58 | 0 | 0 | 100 |
| BG | 129 | 17.51 | 36.12 | 0 | 0 | 100 |
| BY | 100 | 69.01 | 44.96 | 0 | 97.96 | 99.99 |
| CH | 276 | 17.22 | 27.2 | 0 | 0 | 100 |
| CZ | 160 | 16.15 | 32.85 | 0 | 0 | 100 |
| EE | 40 | 0 | 0 | 0 | 0 | 0 |
| HK | 159 | 28.68 | 43.5 | 0 | 0 | 100 |
| HR | 160 | 3.3 | 12.83 | 0 | 0 | 52.83 |
| HU | 60 | 0 | 0 | 0 | 0 | 0 |
| LV | 86 | 0 | 0 | 0 | 0 | 0 |
| PL | 110 | 8.97 | 19.36 | 0 | 0 | 56.52 |
| RO | 70 | 0 | 0 | 0 | 0 | 0 |
| RU | 220 | 18.62 | 35.65 | 0 | 0 | 100 |
| SG | 70 | 0 | 0 | 0 | 0 | 0 |
| SK | 60 | 0.01 | 0.02 | 0 | 0 | 0.04 |
| SL | 100 | 19.9 | 37.27 | 0 | 0 | 100 |
| Total | 1909 | 15.54 | 32.86 | 0 | 0 | 100 |

**Table A.10: Definitions of Variables**

| Variable Symbols | Variable Names | Descriptions / Measurements | Sources |
|---|---|---|---|
| **Dependent Variable: Bank Risks** | | | |
| **ZSCORE** | Z-score | Proxy of Default risk; (ROA + EA) / SDROA | BankScope; Author's Calculation |
| **STDEROAA** | Volatility Asset Risks | Volatility; Standard deviation of last three-year return on average assets | BankScope; Author's Calculation |
| **STDEVROAE** | Volatility Asset Risks | Volatility; Standard deviation of last three-year return on average equity | BankScope; Author's Calculation |
| **NPL** | Impaired Loans to Total Assets Ratio | Proxy of Credit Risks | |
| **RWATA** | Portfolio Risks<br>1. RWA= K/CAR<br>2. Bank Risk= RWA /TA | Portfolio assets ; Risk Weighted Assets including Basel II to total assets; Assume that banks with high risk aversion takes in higher capital ratios and low risks while banks with low risk averse takes in low capital ratios and high risk. | BankScope; Author's Calculation |
| **RISK$_{t-1}$** | Lagged of Bank Risk | Use in Model 1 to represent lagged of bank risk | Author's Computation |
| **Independent Regulation Variables: Capital Requirement** | | | |
| **CR** | Bank Capital Ratio | Minimum total capital ratio or total regulatory ratio including tier 1 and tier 2 remained by each banks | Bankscope |
| **CAPt1** | Lagged of Bank Capital Ratio | Use in Model 1 to represent lagged of bank capital ratio (t-1) | |
| **NATCAP** | Minimum National Bank Capital Ratio | Country level minimum total regulatory ratio based on tier 1 and tier 2 | Helgi Library |
| **Independent Regulation Variables: Regulatory Pressure** | | | |
| **REGt1 (REG1)** | Lagged of Regulatory Pressure for Gap Magnitude Approach | Binary approach(0,1) = min (0,TR-CR) when Threshold (TR) > Bank's Capital Ratio (CR); or else 0 for CR>TR or CR=TR. Measured in period (t-1) | Helgi Library; Author's Computation |
| **FOR*REGt1** | FOREIGNOWN*REGt1 | Interactive Variable to see how foreign-owned banks react with the lagged of regulatory pressure | Author's Computation |
| **REGt1 (REG2)** | Lagged of Regulatory Pressure for Gap Magnitude Approach (National Regulation as Threshold) | Binary approach (0,1) = min(1,NTR-CR), when National Threshold (NTR)> Bank's Capital Ration (CR); or else 0 for CR>NTR or CR=NTR. Measured in period (t-1) | Helgi Library; Author's Computation |

| REGt1 (REG3) | Lagged of Regulatory Pressure for Capital Volatility Approach | Binary approach (0,1)=1 if Bank's Capital Ratio is below (8%+Standard Deviation of Bank's Capital Ratio); or else 0. Measured in period (t-1) | Helgi Library; Author's Computation |
|---|---|---|---|
| **Independent Variables: Interactive Variable of Ownership Shareholdings and CAR Using GAP Magnitude Approach (Used in Model 3)** | | | |
| **INSDMAN*CAR** | Insider Ownership with CAR | Interactive Variables to See if CAR is acting as moderating variable for different type of ownership | Author's Computation |
| **INST*CAR** | Institutional Owners with CAR | Interactive Variables to See if CAR is acting as moderating variable for different type of ownership | Author's Computation |
| **GOV*CAR** | Government Owners with CAR | Interactive Variables to See if CAR is acting as moderating variable for different type of ownership | Author's Computation |
| **Year Variables** | | | |
| **YEARDUM08--- YEARDUM14** | Dummy Variables 2008 to 2014 | Using 2007 as reference point, Year dummy variables are used to capture macroeconomic effects of different countries | Author's Computation |
| **Independent Governance Variables: Bank Ownership** | | | |
| **FOREIGNOWN** | Ownership Dummy | Dummy Variable with 1 represent foreign-owned bank while 0 as domestic bank; Foreign ownership is when the total foreign owners above 50% of the entity | Bankscope; Claessens & van Horen, 2015 |
| **INSDMAN** | Insider Managerial Ownership | Percentage of top management's shares in a company (including top 30 shareholders) | BankScope;Annual Reports |
| **INST** | Institutional Ownership | Percentage of large institutitions' shares (including top 30 shareholders) | BankScope;Annual Reports |
| **GOV** | Governmental Ownership | Percentage of state-owned organisations and government controlled shares (including top 30 shareholders and ultimate shareholding) | BankScope;Annual Reports |
| **GOVDUM50** | Government Dummy | Dummy Variable with 1 if the banks have government shares abve 50% and 0 otherwise | BankScope;Annual Reports |
| **ELEC** | Elections Dummy | Dummy Variable with 1 if there was any national election going on in the country in the year | Thornsten B., George C., Alberto G., Philip K., and Patrick W. (2001). |
| **GOV*ELEC** | GOVDUM50 and Elections | Interactive Variables between GOVDUM50 and Elections | Author's Computation |
| **LISTED** | Listed Bank Dummy | If the banks listed in any stock exchange market to capture market discipline effects | Claessens & van Horen, 2015, |
| **INSDMAN*LISTED** | Insider Ownership & Listed Banks | Interactive Variables between Insider Management | Author's Computation |

| | | Ownership and Market Disciplines | |
|---|---|---|---|
| **INST*LISTED** | Institutional Owners & Listed Banks | Interactive Variables between Institutional Owners and Market Disciplines | Author's Computation |
| **GOV*LISTED** | Government Owners & Listed banks | Interactive Variables between GOVDUM50 and Market Disciplines | Author's Computation |
| **GOV*ELEC*LIS** | Government, Elections & Listed Bank | Three Ways Interactive Variables between GOVDUM50, ELEC and LISTED | Author's Computation |
| **Independent Variable: Global Banking Variables (Used in Model 3)** | | | |
| **ENTRY** | Country Restriction on Foreign Ownership | Whether foreign banks can easily own domestic banks and any restriction for foreign banks to enter the country's local banking sector, 0-4 with the higher figure the lower stringency in the country | World Bank |
| **CAPSTR** | Overall Capital Stringency | To reflect if the capital requirement contains certain risk and certain market value losses from capital before taking into account minimum capital adequacy; from 0-7 with the higher means higher stringency | World Bank |
| **INSDMAN*CAPSTR** | Insider Ownership & CAPSTR | Interactive Variable between specific ownership with CAPSRR | Author's Computation |
| **INST*CAPSTR** | Institutional Owners & CAPSTR | Interactive Variable between specific ownership with CAPSRR | Author's Computation |
| **GOV*CAPSTR** | Government Shares & CAPSTR | Interactive Variable between specific ownership with CAPSRR | Author's Computation |
| **Bank Variables** | | | |
| **LNSIZE** | Natural Logarithm of Total Assets | Used to approximate the Total Bank Size based on Total Assets. Since it is largely skewed, logarithm helps to smooth out the large differences. | Bankscope |
| **LLOS** | Loans Loss Provisions to Total Assets Ratio | Estimation of the amounts needed to cover banks' future losses. | Bankscope |
| **ROA** | Return on Average Assets (%) | Performance measurement to reflects current profits of the banks | Bankscope |
| **NLTA** | Net Loans to Total Assets Ratio | Represents a risk ratio to show the percentage of loans portfolio accounted for the total assets. | Bankscope |
| **LLRL** | Loan Loss Reserves to Gross Loans Ratio | Asset quality measurement to show how much loans portfolio is neeed to set aside for charge-off | Bankscope |

| ETA | Equity to Total Assets Ratio | Measurement of Leverage ratio to see bank's ability to meet its obligation | Bankscope |
|---|---|---|---|
| CI | Cost to Income Ratio | Operational efficiency measurement of the income needed for operational costs | Bankscope |
| LIMP | Loan Impairment Charges to Average Gross Loans Ratio | Proxy to show non-performing loans by comparing impairment losses and the size of loan portfolio | Bankscope |
| **Host country specific variables** | | | |
| HHI | Bank Concentration | Capture three largest commercial banks in the banking sector as for the country banking concentration | World Bank |
| BANK Z-SCORE | Bank Z-score | Measure country's risk of default based on z-score | World Bank |
| GDP/CAPITA | GDP per Capita (current US$) | Gross Domestic Product divided by Midyear Population | World Bank |
| INFL | Annual inflation rate (GDP Deflator annual %) | Indicates rate of price change in the economy while inflation is measured by annual growth rate of GDP implicit deflator. | World Bank |
| REALINT | Annual real interest rate (%) | Lending Interest Rate adjusted for inflation as measured by the GDP Deflator | World Bank |
| **Instrumental (IV) Regression, Endogenous Variables : Bankage and WGI data** | | | |
| BANKAGE | History of the banks | Based on year of establishment and compute the history of the banks | Claessens & van Horen, 2015; Bloomberg; Bankscope |
| **Worldwide Governance Indicator (WGI) REGQUA** | Regulatory Quality | Using estimate standard units from -2.5 to 2.5 with higher values signify ease of government to implement new regulation. | WGI Data from Kaufman, Kraay & Mastruzzi (2010) |
| **ADJREGQUAL (RQ)** | Adjusted Regulatory Quality | It is adjusted using 0-(RQ) formula with the higher values would now means more difficult for government to implement sound regulations to promote private sector development, therefore higher bank risk. | |

| GOVEFFECT | Government Effectiveness | Using estimate standard units from -2.5 to 2.5 with higher values signify higher government effectiveness, | |
| ADJGOVEFFECT (GE) | Adjusted Government Effectiveness | It is adjusted using 0-(GE) formula with the higher values would now means less independence from political pressures, therefore more bank risks potential. | |
| **Excluded Instruments** | | | |
| **BANKAGE** | History of the banks | Based on the year that the bank was established, we compute the number of years it has been operating in specific years from 2005 to 2014. | Claessens & van Horen, 2015; Bloomberg & Bankscope |
| **IFRS** | Accounting Standards Quality Dummy | Considering countries applying IFRS as high quality international accounting standard. Classified as 1 for countries either are permitted to or are required to apply IFRS whilst 0 as low quality accounting standards where only domestic accounting standards are permitted. | Iasplus.com. (2016). |
| **MARKETSHARE** | Market Share of Banks | Computed based on the total assets of the bank out of the total assets in the banking sector as a whole | Raiffeisen RESEARCH, Bankscope and Central Banks Statistics |
| **LAGBANKRISK** | Lag of Bank Risks | Is the risk measure in period t-1 | Bankscope |