Tomas Bata University in Zlín
Faculty of Management and Economics

Doctoral Thesis

The Capital Regulation Implementation Supervision Used In Vietnamese Commercial Bank Sector

Bankovní regulace a dohled uplatňovaný v rámci komerčních bank ve Vietnamu

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ABSTRACT

State Bank of Vietnam (hereafter SBV) set a plan of full application of Basel supervision and regulation framework (Basel III). By the end of 2018, all commercial banks should comply with the regulation. In 2010 SBV issued regulatory framework which incorporates some principles and rules of Basel II. Before the full implementation of the regulation, a pilot study is currently being conducted. This pilot study will demand a reliable analysis in order to deepen banking regulations and to make the banking system sound, transparent and prepared for further development. In this thesis, the author reviews the current state of knowledge related to banking regulation, conducts an empirical analysis and synthesises findings. Most importantly, the author suggests indicators which should be monitored, the author further points to the most vulnerable and problematic issues Vietnamese commercial banks face and proposes a methodological framework which should be followed to achieve successful transition to a new banking environment under the Basel III framework. Given the complexity of the studied area, this thesis focuses mainly on capital regulation and supervision. On average, the empirical evidence shows that Vietnamese commercial banks have pursued credit growth at a higher priority than capital regulation requirements. Retained earnings and risk-weighted assets are permutations to account for the bulk of both higher risk-weighted capital ratio and capital-to-total-assets ratio, while the shares issuance has played a lesser role. The author finds that the manner of adjustment by the Vietnamese commercial banks to the capital target led to a loss in efficiency. Also, the empirical analysis was conducted on the same sample as the original Pilot program. Using quantitative analysis, this thesis also acquires a deeper understanding of the associations between the capital regulation implementation and the operation of banking business, and the associations between the capital regulation implementation and bank efficiency, adding a case study of the Vietnamese commercial bank sector in the pilot period of the regulatory application Basel framework. These contributions could be beneficial to both theory and practice.

ABSTRAKT

Státní banka Vietnamu (SBV) stanovila plán implementace Basilejského regulačního rámce (Basel III). Do konce roku 2018 by všechny komerční banky měly dodržovat toto nařízení. V roce 2010 vytvořila SBV regulační rámec, který naplňuje některé zásady a pravidla Basel II. Před zavedením zmíněného regulačního rámce se v současné době provádí pilotní studie. Tato studie vyžaduje spolehlivou analýzu s cílem prohloubit bankovní regulaci a učinit bankovní systém zdravý, transparentní a připravený pro další rozvoj. V rámci této práce autor zkoumá současný stav v oblasti bankovních regulací, provádí empirickou analýzu a syntetizuje získané poznatky. Následně autor navrhuje ukazatele, které by měly být v této souvislosti sledovány. Autor dále poukazuje na nejproblematičtější oblasti týkající se vietnamských komerčních bank a navrhuje metodologický rámec, který by měl být dodržen za účelem úspěšné transformace na nové bankovní prostředí v rámci Basel III. Vzhledem k rozsáhlosti řešené problematiky se tato práce zaměřuje především na regulaci kapitálu a dohled nad ním. Empirické důkazy poukazují na fakt, že vietnamské komerční banky upřednostňovaly růst úvěrů před požadavky kapitálové regulace. Nerozdělený zisk a rizikově vážená aktiva jsou permutacemi, které se podílejí na převážné většině poměru rizikově váženého kapitálu a kapitálu k celkovým aktivům, zatímco emise akcií hrály menší roli. Autor zjistil, že změny prováděné vietnamskými komerčními bankami za účelem dosažení kapitálového cíle, vedly ke ztrátě efektivity. Provedená empirická analýza byla realizována na stejném vzorku jako původní pilotní program. Tato práce prostřednictvím kvantitativní analýzy přináší hlubší pochopení mezi vztahem implementace kapitálové regulace a fungováním bankovního podnikání, a mezi vztahem implementace kapitálové regulace a efektivnosti bank. Práce také přináší případovou studii vietnamských komerčních bank v pilotním období regulačního uplatňování Basilejského rámce. Prezentované výsledky přináší jak teoretické, tak praktické poznatky.

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1. INTRODUCTION

This thesis is aimed at the supervision of the capital regulation implementation in Vietnamese commercial banks (hereafter VcB). It concerns VcB which have adopted the Basel standard.

In 1988, the Basel Committee issued regulations as guidelines for banking regulations: the "1988 Basel Accord" or Basel 1, Basel 2 in 2004, and Basel 3 in 2010. All three regulations have shared the same core, consisting of three pillars related to capital regulation, supervision and information publishing. Basel 3 adds more technical details for applications. Besides the implementation by the Basel Committee members, the Basel standard is voluntarily applied by non-member countries.

In order to become more integrated with the international environment, the State Bank of Vietnam has issued several documents which specify the requirements and regulations to VcB. In which, the requirement of the minimal amount of own capital was issued in 2006, topics of capital ratio, risk-weighted assets (RWA); maximum ratio of lending loans in 2010 (SBV, principle number 13, 2010). Recently, in early of 2015, the SBV selected ten commercial banks in the pilot study to test the application of some Basel regulatory standards. Then, after the evaluation of the pilot study period in 2018, all commercial banks in Vietnam will have to apply Basel regulation (SBV, decree number 1601, 2014).

To achieve the target, the SBV has to employ both administrative and economic instruments for their regulation and supervision on the commercial banks such as interest rates, monetary policies, compulsory reserves and some other tasks. These actions suppose to not only to create an environment suitable for a stable economic development but also let the commercial banks do their own business safer. Meanwhile, along with the adoption process, commercial banks should consider the ways to reform in a stable and efficiently.

This thesis considers the indicators and approaches to access the capital regulation implementation and supervision for Vietnamese commercial banks. By examination Basel pilot implementation empirical results of Vietnamese commercial banks in the period from 2008/Q3 to 2015/Q3. To examine the implementation, the author uses partial adjustment model and regression to assess the implementation process to target capital and the optimal of banks' ROA along with the process to achieve the target. The process is a good opportunity for an empirical analysis to study economic integration in case of a country, where the Basel regulatory implementation is at the starting stage. The growth of Vietnam's GDP in 2008/Q1 was 7.4%; in 2011/Q1, the beginning of the post-regulation period, GDP growth was 5.43%; in 2015/Q4 the GDP growth was 7.01%. Meanwhile, the CPR1 was 6.43%, 7.7% and 5.8% respectively.

On average, the empirical evidence shows that Vietnamese commercial banks pursued credit growth at a higher priority than capital regulation requirements. Retained earnings and risk-weighted assets are permutations to account for the bulk of both higher risk-weighted capital ratio and capital-to-total-assets ratio, while the shares issuance played a lesser role. In the post-regulation period, the banks adjusted to the risk-weighted capital target lower than in the pre-regulation period. The adjustment to the capital-on-total-assets ratio was inverted in comparison with the risk-weighted capital. The author has found that the manner of adjustment by Vietnamese commercial banks to the capital target led to a loss in efficiency. Whereby, the findings of this thesis suggest the indicators, information that should be monitored for more regulatory constraints to the capital improvement of the VcB in order to strengthen and control the Basel regulation implementation of the VcB.

2. CURRENT STATE OF THE TOPIC

This study is mostly concerned with the regulatory framework and bank supervision. Analyses of these topics have to be based on relevant information. Therefore, this chapter will be structured to depict important dimensions of the phenomena studied. First is Basel Committee regulatory framework, second is bank supervision, third is the effect of macroeconomics on banks' regulation and the bank efficiency when compliance the regulation requirement. The collection for the review consists of the papers published in peer-reviewed journals, working papers, operational research and expert systems.

2.1. Basel Committee Regulatory Framework

Basel Committee regulatory framework has three pillars. Those are minimum capital requirement, supervisory review process, and market discipline.

In this part, the author reviews previous studies of the first pillar of Basel core principle that is minimum capital requirement. The reviews suppose to find which factors were used to examine the performance of banks to achieve the regulations, what were the associations between the regulations and the elements of bank's balance sheet when banks adopted the Basel regulations. The regulation has three objectives. The first objective is the requirement of capital ratio, the second objective are the risk-weighted assets of bank, and the third is the leverage ratio of the bank.

The citation of these articles were divided into three groups. The first one is about capital ratios (Tier 1 & Tier 2) and capital leverage, the second one is included Risk-Weighted-Assets (RWA), and third one is the leverage ratio of the bank. Additionally, at the end of this review, the summary and the research gap will emphasise the suggested research question or study's hypothesis.

2.2. Capital Ratio

In the 1970s, a ratio called "ABC" was the ratio of actual bank capital to the capital desired by the appropriate regulator. The desired level of capital was derived by a complex numerical calculation and was decided on a case by case basis (see Peltzman, 1970). In December 1981, the Federal Reserve and the Office of the Comptroller of the Currency (OCC) announced a common set of standards to apply to all the banks which they regulate.

Two seminal papers (Ediz et al., 1998; Rime, 1998) dealt with partial adjustment of US models on non-US bank capital data. Ediz et al. use quarterly data of 94 UK banks over the time period 1989/Q4 to 1995/Q4. Rime (2001) analysed annual data of 154 Swiss banks in the period 1989 to 1995. Both papers use dummy variables for capital pressure which equals to one when a bank's capital ratio is above the regulatory minimum. The gap between the capital pressure zone and the regulatory minimum varies across banks. It is hypothesised that the gap is proportional to the

time-series standard deviation of the bank's own capital ratio. Additionally, Rime (2001) concluded that: The positive relationship between changes in risk and changes in the ratio of capital to total assets should not be interpreted as an unintended effect of higher capital requirements on banks risk-taking.

Aggarwal and Jacques (1997) find that the impact of The Federal Deposit Insurance Corporation Improvement Act (FDICIA) regulation on banks' long-term targets for the Tier 1 ratio actually exceeds that for total capital and that convergence of the Tier 1 ratios to its long-run average is somewhat quicker. Actually, US banks were more constrained by their leverage ratios than by the Basel-Accord Tier 1 and Tier 2 ratios. This study may explain that when ratios are based on narrow-equity measures, most banks had chosen the Tier 2 ratio capital broad-equity-based.

2.2.1. Capital regulation of Risk-Weighted-Assets (RWA)

Gorton & Winton (2003) pointed out that raising capital requirements forces banks to supply fewer deposits. As a result, banks' liquidity positions were weakened. This finding supported for Boot and Thakor (1997) that raising equity capital is more expensive than deposits, an increase in risk-based capital requirements leads to the reduction of banks' lending.

Bordeleau et al. (2009) suggested that a leverage ceiling would be a useful tool to complement risk-weighted measures and mitigate procyclical tendencies in the financial system. Adrian and Shin (2010) found that Basel III had fixed some mistakes contained in previous versions before. It has the applying for more approaches to measure RWA, input the leverage ratio, buffer for RWA capital considering both on and off balance sheet, required for liquid assets. Using the formula of Basel, the authors found that outflows and inflows depend on only a few sources. When cash flow is dependent on a few sources, it is limited to extend credit.

Based on the monthly data from a German bank, Grosse and Schumann (2014) found that cyclical behaviour is slow but not too slow, and the lag is just a few months to affect the buffer.

Allen et al. (2012) proved that the reduction in cost of equity almost entirely offsets the increase in funding that comes from the shift from a relatively low-cost debt to relative high-cost equity. Allen et al. (2012) stated that "This buffer may be drawn in stress time, but the bank's ability to distribute earnings will be constrained". And to add capital requirements, but to the constraint on institutions with substantial exposure (low-risk weight assets), the bank will reject to hold traded securities or mortgage lending. Additionally, (Belas et al., 2011; Belas et al., 2012; Cipovova & Belas. 2012) study risk approach under Basel 3, found that advanced methods for credit risk measurement are more flexible on class change of corporate exposures in the portfolio. Internal rating is worked out a much lower capital adequacy than the standardised approach without assigning external rating.

In a study by Distinguin et al. (2013), the authors employed the vector autoregression (VaR) model with two ratio definitions, which are Tier 1&2 capital to risk-weighted assets and Tier 1 capital to risk-weighted assets. The authors recognised that large and small banks may have different scope to manage their business, even the activities are different from the proposed Basel III, and the differences were recognised through the RWA approach.

Clark and Jokung (2015) highlighted that higher leverage increases the return on assets, given that banks can increase their return on assets and their assets by reducing their capital requirements. So, a system of highly leveraged banks (high investment coefficients and high return on assets) is more volatile (less stable) and less sensitive to regulatory intervention than a system with higher capital requirements.

Shimizu (2015) examined Japanese banks' adjustment behaviour of capital ratio and found that banks adjusted the composition of their assets faster than their asset size to achieve the RWA targets; to achieve the capital ratio targets, the banks adjusted their level of regulatory capital faster than their RWA; and banks that had less capital surplus shifted their portfolio composition toward lower-risk assets without reducing the total assets.

2.2.2. Leverage Ratio

The study of bank capital leverage started with the issuing of Basel 1. Before Basel 3, some researchers mentioned the relationship between off-balance sheet (OBS) and bank risk (see Berger et al., 1995; Angbazo, 1997; Boot, 1997). Breuer (2002) provides measures of implicit leverage in derivative contracts. Blum (2008) states that leverage should be reported to identify a bank's risk. Bordeleau et al. (2009) proved that the stabilisation of Canadian banks could be based on their constraint of a lower leverage ratio in comparison with the leverage ratio of banks in the United States.

The 2014 Basel 3 leverage ratio framework and disclosure requirement is incomplete. The Basil Committee expects to complete the definition by 2017.

The requirement on the bank's leverage ratio was introduced in Basel III in 2010. The objective of which is to improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source, thus reducing the risk of spillover from the financial sector to the real economy. The basis of the calculation is the average of the monthly leverage ratio over the quarter based on the definitions of capital (the capital measure) and total exposure (the exposure measure) (Basel Committee on Banking Supervision, 2011). In 2014 the Basel Committee issued a formula for it (Basel Committee on Banking Supervision, 2014):

$$\text{Leverage ratio} = \frac{\text{Capital measure}}{\text{Exposure measure}} \quad (2.2\text{-}1)$$

The numerator of formula (2.2-1) is Tier 1 under the risk-based framework, while the elements in the denominator are (i) On-Balance-Sheet exposures; (ii) Off-Balance-Sheet exposures; (iii) derivative and securities transaction exposures. Thus, the review of these elements is respective.

i. On-Balance-Sheet Exposures

Koch (2014) develops a new approach, Koch employs cointegration and vector error correction models (VECMs) analysis to analyse the change of all German banks in period 2002 to 2010. The analysis is to derive cointegration relationships between various liability components and "balance sheet total". Koch found two reactions of banks due to their activities in short-run or long-run, in which the reactions of short-run are almost from derivations of long-run. Where all elements of on-balance-sheet liability are adjusted by risks on the equity market, bond and debt in domestic. These findings prove that banks with global operations deemed "systemically relevant", and the increase of their leverage shows that international banks expose their risk as their world-wide activities. The regulator might use such the analysis methods of Koch to assess the short-run reactions of banks to developments on different financial markets, and measures the counter-cyclical capital of long-run liability ratios.

By studying the effects of the leverage ratio requirement in part V of Basel III for lending of banks and its stability, Kiema and Jokivuolle (2014) believed that this new complement of regulations will lead to a reduction in the banks' risk. To support the encouragement of this new regulation, the authors divided loans into high-risk and low-risk categories for high-risk and low-risk firms respectively and employed a single risk-factor model. Regarding discussion, the authors assumed that regulators, banks, and borrowers base their actions on common estimates of loan default probabilities. The study showed that low leverage ratio contributes to gross factors which are optimal for bank lending and decrease the probability of bank failures. And the authors concluded that they encourage for a tighter leverage ratio requirement for higher stability of banks. Bargigli et al. (2014) based on a similar idea and the approach way as Kiema, the authors agree with previous studies that leverage has a relationship with banks' stability. In addition, the authors use data from Japanese banks to prove that if the increase of market concentration affects banks, leverage ratio will grow and makes banks lead to an unstable credit period. Bargigli et al. (2014) supposed that the additional parameter can modify the skewness of bank degree and credit simulated distributions for the simulation models with real data on credit networks.

ii. Off-Balance-Sheet Exposures

Karim et al. (2013) use logic approach and Granger-cause test to investigate banking crises in 14 OECD countries, authors recognise that off-balance-sheet correlates with GDP growth, and the fluctuation of real house price causes the change of off-balance-sheet. The authors suggest that off-balance-sheet exposure should be

considered as a direct regulation because of its impact on the crisis probability. Additional, Jarrow (2013) proves that value at risk (VaR) and collateral have the same probability of insolvency, but VaR estimates cannot compare across firms. So, Jarrow suggests that banks only need to report their "haircut" and this information will provide the regulators the relevant leverage ratios that regulators might compare banks each other.

Use an adverse selection hypothesis approach, Duran and Lozano-Vivas (2013) analyses data from banks of European Union in period from 1996 to 2009. This study shows that if the assets quality of off-balance-sheet is high, the ratio of off-balance-sheet to total assets is negative relationship with insolvency and portfolio risk; if assets quality on off-balance-sheet is low, the ratio is positive relationship with liquidity and credit risk. These findings illuminate the need the market discipline requirement of Basel 3. Moreover, analysing the "credit immigration" of collateral derivatives, Sakurai and Uchida (2014) recommended that off-balance-sheet leverage makes default risk of derivatives dealers increase.

iii. Derivatives and Securities Transaction Exposures

Gibson and Murawski (2013) investigated the effects of margining while banks use credit derivatives. The authors developed three optimistic margins hypotheses of credit derivatives which are based on the assumption that banks' objectives are to completely hedge their exposure to market risk, and they are to hedge themselves from interest rate risk. Gibson and Murawski (2013) found that the margin from credit derivatives increase default risk, and have "an ambiguous effect on welfare in the banking sector". The authors believed the ways banks get the optimal margins are caused by default risk mechanism that they chose. Whatever, the assumptions of Gibson and Murawski (2013) are too strong and ignore the act of speculators. On the similar approach line as Gibson, Sakurai and Uchida (2014) developed the "credit immigration" of collateral derivatives to fill the gap of this factor which belongs to off-balance-sheet leverage into derivatives activities study. The authors use "a jump-to-default model" to prove their opinion. Sakurai and Uchida (2014) assured that a rehypothecation derivative dealer can earn from this instrument by its positive relationship with default risk of rehypothecation, and it is the price of a derivative trade. Sakurai et al. believed that "over-collateralization by Initial Margin plays an important role in determining the relationship between the risk and the return of rehypothecation.". As the result, the authors propose "a derivative pricing framework with bilateral counterparty credit risk that determines the amount of rehypothecate collateral".

Mayordomo et al. (2014) studied the impact of financial derivatives on the contribution of the individual bank to systematic risk. The authors used five measures of the individual contribution of banks to systematic risk: DCoVaR, DCoES, Asymmetric DCoVaR, Gross Shapley Value (GSV) and Net Shapley Value (NSV).

The sample for the examine is data of 95 U.S. bank holding companies from 2002 to 2011. The authors point out that except interest rate derivatives, foreign exchange and credit derivatives distribute to the systematic risk. The findings of Mayordomo et al. (2014) are the sceptic that most types of derivatives do not all contribute to the systematic risk. The authors recommend the more supervision on the derivatives activities of banks.

Keffala (2015) employed Generalised Methods of Moments and data from 66 banks of emerging countries in period from 2003 to 2011 to investigate the effect of derivatives on bank stability. Keffala suggested that option and future style of derivatives can be considered as risky derivatives of banks. However, in this study, credit risk is one of many explanatory variables which are used in the model. Additionally, Alnassar and Chin (2015) reviewed several relevant articles which were published before the Basel 3, the authors conclude that the use of credit derivatives are mostly as hedging instruments, and the credit derivations have the relationship with bank's size, distress costs, capital position and level of credit risk. So, the authors supposed that the hedging instruments can be predicted through the use of hedging theories.

Summary of the regulations: Almost al of the researchers encourage for the need to strengthen the capital regulation management. The authors suggest several indicators and its measurements for the analysis. These indicators can be grouped into three categories, those are (i) the proxy indicators of capital regulation requirements, (ii) the proxy indicators for the bank operation, and (iii) the proxy indicators of bank's performance. In the empirical studies, the authors mostly use regression to analyse the association between the three groups of the proxy indicators.

2.3. Bank Supervision

During the time of issuing the Core Principles, Basel Committee also issued the guidance for the Core Principles. Recently, the Core Principles for Effective Banking Supervision (BIS, 2012), and this document has 29 principles for a framework of minimum standards for sound supervisory practices and is considered universally applicable. Those principles are broadly categorised into two groups: the first group (Principles 1 to 13) focuses on powers, responsibilities, and functions of supervisors, while the second group (Principles 14 to 29) focuses on prudential regulations and requirements for the banks. The original Principle 1 has been divided into three separate Principles, while new principles related to corporate governance, and disclosure and transparency, have been added. This accounts for the increase from 25 principles (Basel 2) to 29 Principles.

These Core Principles mentioned about the preconditions as follows:

"…

- Sound and sustainable macroeconomic policies;

- A well-established framework for financial stability policy formulation;
- A well developed public infrastructure;
- A clear framework for crisis management, recovery and resolution;
- An appropriate level of systemic protection (or public safety net);
- And effective market discipline." (Basel Committee on Banking Supervision, 2011)

Unlike the regulations, the supervision is not attractive much of research. On the one hand, the supervisions have followed the guidance of principles. On the other hand, the supervisory are based on the criterions of regulations. Despite the studies about supervision were focused on the regulations for banks and the significant of the supervision, they were not separated from regulation and be seen as the only one chapters.

Supporting for previous studies, (Angkinand, 2009a) showed that "banking regulation and supervision of bank capital adequacy requirements are not made the cost of banking increased. In addition, Kilinc and Neyapti (2012) showed that the basic expectations regarding the positive effects of regulation and supervision on the growth rate, output, credit, investment, wages and profits; and its negative effects on the interest rate.". Furthermore, Klomp and Haan (2012) found that "banking regulation and supervision has an effect on the risks of high-risk banks, do not have a significant effect on low-risk banks.", similar as banking risk, bank regulation and supervision are multi-faceted concepts. In addition, Barth et al. (2013) suggested that "tighter restrictions on bank activities are negatively associated with bank efficiency, while greater capital regulation stringency is marginally and positively associated with bank efficiency.". Authors also find that a strengthening of official supervisory power is positively associated with bank efficiency only in countries where supervisory authorities are independent.

Some other researchers studied more focused on the structure of supervision. These studies aimed to find out which structure of the supervision will be more efficient than the other. Davis and Karim (2008) found that "the size of the country and its degree of openness are important for supervision.". Additional, good governance and central bank's autonomy are important drives of prudential supervision integration.

Davis and Karim (2008) assessed the logic and signal extraction early warning systems (EWS) for banking crises on a comprehensive common dataset. Authors suggest that "logic is the most appropriate approach for global EWS and signal extraction for country-specific EWS.". Furthermore, it is important to consider the policy maker's objectives when designing predictive models and setting related thresholds. Sevim et al. (2014) studied presents uniqueness in that decision support

model developed in this study artificial neural network (ANN) and logistic regression models. The model uses basic macroeconomic indicators to predict crises.

Barrell et al. (2010) employed logic crisis models estimated for OECD countries, author finding strong effects from capital adequacy and liquidity ratios as well as property prices and unweighted bank capital adequacy impact on banking crisis probabilities. Furthermore, the model to detect increases in crisis probabilities out-of-sample tends to exclude more traditional variables such as GDP growth, inflation and real interest rates.

Caggiano et al. (2014) approached EWS with to a multinomial logit model. This study examined many macroeconomic indicators and only two bank's indicator; those are leverage and liquidity. The results show that moving from a binomial logit model to a multinomial logit model improves the predictive power of the EWS. The results have important policy implications at a time when financial regulators and central banks in low-income countries are reassessing their financial regulatory agenda in the context of reforms adequacy rules, but authors also suggested that EWS are useful tools for policymaking but should never substitute the judgment of financial regulators. In addition, Babecký et al. (2014) approached by VaR and found that if the ratio of domestic private credit to GDP deviates more than 2% from its trend value, policy makers should take a warning signal that risk of future banking.

Summary of the supervisions: The supervision should look at the compliance of banks about the regulation and predict the risks of the banking business. Supervision has a positive effect on the growth of banks. It is better if supervision is independent of both the central bank and the commercial bank. The degree of openness of market in a country is positive with supervision. The studies about efficiency of supervision are used to employ the logistic regression method. DEA can also be used for analysing the efficiency of the supervision. The interbank capitals are not benchmark or approach for the supervision.

2.4. The Effect of Macroeconomics on Regulation

Before analysing the early warning, the author believes that banking business must correlate with macroeconomics. So, regulation, supervision, and the early warning should consider macroeconomics at its relative in general economics.

There are two segments for this study; one is the effect of some main macroeconomic indicator on the bank's regulation and the other is the effect of monetary policy on bank's regulation.

Allen et al. (2012) found the association between the new regulation requirement and the cost of the bank through the analysis the effect of monetary policy on banks. This study also encouraged the ideas that the government should support banks through the monetary policy.

Coffinet et al. (2012) provided the loan growth and the business cycle indicators, in which, the interest rate and the inflation rate are the elements to calculate the loan growth indicate, and the GDP growth is used to calculate the business cycle. The authors found that GDP is a negative effect on the capital buffer and positive effect on loan growth. Additionally, at the individual, the loan growth and the capital buffer are two-way causality with GDP.

The study of Shaw et al. (2013) found that monetary policy affects to lending of banks indirectly through macroeconomic. Show et al. also found that if a bank has a full constraint of high-quality capital as the recommend regulation from Basel. In a study of Balasubramanyan and Van Hoose (2013), authors demonstrated that in a situation in which regulators prohibit banks applying securities to fulfil the liquidity-coverage-ratio constraint or in which banks simultaneously confront risk-based capital regulation while facing rigidities in their equity capital positions and become more responsive to shocks to market interest rates. In addition, Buncic and Melecky (2013) suggested that when using the macroeconomic as interest, real GDP growth, and lending rate in stress test, the stress scenario should consider the adverse forecast confidence interval.

Calmès and Théoret, (2014) used multi regression model include only one lagged variable to test the macroeconomic uncertainty effect to bank's assets portfolio. When macroeconomic uncertainty and macroeconomic risk increase. Macroprudential policies should track the non-interest income activities of big banks closely. Authors pointed out that public information about the composition of these activities is still seriously missing or difficult to access.

Summary of the effect of macroeconomics on regulations: In almost all of the studies the macroeconomic indicators are used as the elements to calculate the proxy indicators of the bank as mentioned in the summary of 2.2 above. In addition, other studies found that the correlation between macroeconomic indicators and banks regulation is weak and occur in lag with the change of macroeconomics and monetary policy.

2.5. Regulation and Bank Efficiency

Many studies have analysed the relationship between the capital regulation and the efficiency of the bank. Majority of the studies supposed that the capital regulation and the efficiency of bank have a positive relationship. The authors have showed that banking regulation and supervision of bank capital adequacy requirements do not make the cost of banking increased (Angkinand, 2009a; Angkinand, 2009b; Fiordelisi et al., 2011; Barth et al., 2013; Lee et al., 2013; Manlagnit, 2015; Apătăchioae, 2015; Pessarossi & Weill, 2015). In addition, Kilinc and Neyapti (2012) proved that the basic expectations regarding the positive effects of regulation and supervision on the growth rate, output, credit, investment, wages and profits. Moreover, the authors also

suggested that the efficiency of capital regulation should be considered when the capital requirement implementation runs in a different environment of the situation.

2.6. The Regulatory Background of Vietnamese Banking Industry and Research Gaps of the Regulation in Vietnam

Vietnam is a developing country, where the economic integration is still in progress. Before 2000, all Vietnamese banks belonged to the government. At present, 36 out of 37 banks in Vietnam are joint-stock commercial banks. The most important evolution for Vietnamese commercial banks is the Laws for Vietnamese credit institutions issued in 2010. Accordingly, the Basel regulation requirement is being adopted. In the official letter number 1601/2014-NHNN/TTGSNH dated Mar 17th, 2014 by the State Bank of Vietnam, the governor conveyed that the State Bank of Vietnam intended to apply the full Basel regulation requirement into all Vietnamese commercial banks in 2018. The process is a good opportunity for an empirical analysis to study and to contribute the case of an economic integration as well as the case of a country, where the Basel regulatory implementation is at the starting stage. Whereby, this thesis might contribute some suggestion for the capital regulation implementation and supervision of such this implementation.

Until 2014, in Vietnam, there are two management agencies to supervise the commercial banks. Those are the Committees of National Financial Supervision and Department of legislation which is belonging to the SBV.

In 2006, the SBV issued the requirement of minimal amount of own capital, topics of capital ratio, risk-weighted assets (RWA). In 2010, maximum ratio of lending loans issued (SBV, principle number 13, 2010). In this thesis, the author follows up some principles of these document to create some indicators that introduced in section 3.5 below. Recently, in early of 2015, the SBV selected ten commercial banks for the pilot study to test the application of some Basel regulatory standards. Then, after the evaluation of the pilot study period will be in 2018, all commercial banks in Vietnam will have to apply Basel regulation (SBV, decree number 1601, 2014). Together with the principles issued, the financial statement and information disclosure are required ascendingly.

The recent regulations of SBV were based on some separate parts of Basel regulatory framework. Also, it doesn't update some other regulations of the Basel III as well. Most of the previous studies about bank regulation in Vietnam were made by qualitative approach. So, the pilot period of regulatory Basel framework in Vietnam is absolutely the need of the empirical study from this period to develop the framework that accordance with the Basel regulatory framework. Thus, the regulations should still be an interesting topic for empirical research as long as the applying of Basel regulation. Additionally, Basel applying is a process whereby the VcB need time horizon to adopt the regulation requirement. Thus, the author decides

to use partial adjustment models (here after is PAM) to analyse the implementation of the VcB. Using the PAM, the author could address not only the factors that effect on the capital requirement implementation, but could also describe the responsiveness of the long-run level and short-run of the VcB's adoption toward the capital regulation requirement. Additionally, the author also wants to detect whether the recent capital regulation implementation improved the VcB's efficiency or not. Moreover, the author suggests a consideration to the interbank capital in the case of the capital regulation implementation process of the VcB and expects to contribute this matter to the empirical studies as well as a consideration matter for the supervision. According to the author's knowledge, in Vietnam, until the time of this thesis is finished, there is no others thesis is similar to this thesis in both the topic and the approach method.

3. OBJECTIVE OF THE THESIS

The Basel application and the situation of Vietnamese banking industry are the significant topics for research. In this thesis, the author conducts an empirical analysis research. To support the Basel application, the analysis not only point out the factors that effect the implementation of the VcB as well as the impact of the regulation requirement on bank's efficiency, but also compare the situations of pre- and post-regulation period and the speed of the adoption. Pointing out the effective factors and the impact of the implementation on bank's efficiency should be useful for both the regulator and the VcB to manage and control banking business in the Basel regulation adequacy; to contribute to empirical studies with an empirical analysis of the Basel regulation implementation in case of Vietnam. And the thesis meets its objective.

3.1. Objective of the Thesis

3.1.1. Research Idea

Based on the capital adequacy requirement of Basel and the examination of the capital regulation adoption of Vietnamese commercial banks in the period from 2008 to 2015, in which from 2008/Q3 to 2010/Q4 was the pre-regulation period and from 2011/Q1 to 2015/Q4 was the post-regulation period.

3.1.2. Research Problem

To analyse the implementation process of the Vietnamese commercial banks toward the capital regulation target and the effect of this process on banks' efficiency. This analysis aims at recognising the factors that should be monitored and considered when applying the Basel regulation and to suggesting relevant supervision practices for the application of the Basel accord in Vietnamese commercial banks system.

3.1.3. Objective of the Thesis

To suggest an approach that is applicable to Vietnamese Commercial Banks system. This approach will be built upon state-of-the-art bank's regulation and supervision methods used, focused on capital regulation requirement in accordance with the Basel regulatory framework.

3.2. Research Questions

Following the literature, the empirical analysis of the Basel regulation implementation of some countries, the measurement of variables, and the findings from the previous relevant studies. The author recognise the approaches and the decision of some countries for the applying Basel regulation, what indicators they observe, methods of the regulation, and their criterion suggestion. To achieve the objective of this thesis, the author generates the research question and emerge the study's hypothesis, as below:

Research Question 1: Which factors or indicators should be monitored in the capital regulation supervision? Did the factors or indicators have different importance in the pre & post-regulation periods?

This question is generated from the fact that different countries use different criteria and methodologies even the Basel framework is used. The question more focuses on the application of Basel regulation in VcB, especial the capital regulation requirements. The author will define the variables, place assumptions, formula the study's hypothesis. The expected result from an empirical analysis the data of VcB will uncover and list out the criteria and methods that should be supervised or controlled to compliance the Basel regulations.

Research Question 2: How did the recapitalisation associate with the ROA?

Before a launch of regulation, there are cares always raise from both the academic point of view and the practice about its efficiency, and the trend of ROA is the most concerned. Question number two is to detect whether the implementation improves or debases the ROA of the VcB. The author would provide the empirical evidence to answer this question. The author supposes that the empirical evidence could be more convincing to encourage the capital requirement implementation and consider the effective implementation process.

Research Question 3: What should regulatory and supervisory rules be applied in the Vietnamese commercial banks to achieve sound and efficient banking system?

The answers for research question number three is the core contents in the process. And the final recommendation from this process is expected to meet the objective of this thesis.

3.3. Hypothesis

Following previous relevant studies, to answer to the research question number one and suggest the criterion to research question number two, author emerges two hypotheses. They will be tested and experimented with quantitative empirical analysis methods.

3.3.1. The Indicators of Bank Operation Influence on the Capital Regulation Implementation of Banks

Several previous relevant studies find the association between the capital regulation requirement and the capital management through the proxy indicators from banks' financial statement and some calculation on it. Kilinc and Neyapti (2012) proved that the basic expectations regarding the positive effects of regulation and supervision on the growth rate, output, credit, investment, wages and profits; Bargigli et al. (2014) concluded that the increase of leverage is associated with the credit in the interbank capital market; Gombola et al. (2016) confirm the relationship between loan loss

provision ratio and many capital regulation indicators in the period after the financial crisis.

H_1: The "Bank operations" factor was a significant determinant of the capital prudential ratios when they recapitalised in the period from 2008/Q2 to 2015/Q4 in the sector of Vietnamese commercial banks. And diferent between the pre-regulation (from 20108/Q1 to 2010/Q4) and port-regulation (from 2011/Q1 to 2015/Q4).

The capital prudential ratios are the capital ratios that calculated follows the Basel framework. The operation indicators of banks are provided from the Basel's documents, the theoretical literature, and harmonised to suitable for the empirical analysing the VcB's data. These indicators are listed in Table 4.2 – 1 below.

3.3.2. The Capital Regulation Implementation and Banks' ROA

H_2: The level of capital prudential indicators were positively associated with the banks' ROA.

In the market economic regime, almost all of the adjustments based on the economic relationship. Thus, the regulation, the supervision or the control on the banks' activities must consider the efficiency. The author believes that once the regulation requirement should be built together with the policy which connects to the banks' efficiency. Thereby, the author adds the efficiency analysis to this thesis to give the recommendation convincible for the application. To do so, the author hypothesis the **H_2** to examine the connection between the capital regulation implementation and the ROA. The expectation that the result might indicate the consideration of the regulatory and control that do not harm the banks' efficiency represented by the ROA.

The performance indicators are listed in table 4.2 – 1 (the thirteen to fifteen). Besides these indicators, the unobserved factor is a new variable, generated from the estimation of regulatory compliance, added to consolidate the empirical evidence.

There is some important information that effects on the variation of bank's regulatory compliance but cannot measure as the other indicators in the financial statement. The capital regulation indicators are ratio calculations, where numerator is bank's capital and denominator is risk-weighted assets. Some relevant studies showed that decision for bank's financial management effect on the behavior of adjusting denominators of capital ratios upon the introduction of Basel's regulations (Shimizu, 2015), and risk decisions of financial intermediaries are simultaneously made with perceptions on expected profits (Delis & Tsionas, 2012). In addition, Kilinc and Neyapti (2012) showed that the basic expectations regarding the positive effects of regulation and supervision on the growth rate, output, credit and including profits as well. At the same time, Allen et al. (2012) supposed that the Basel regulation requirement made cost of the bank increase and tighten the outcome of bank.

The author believes that the independent variables in this thesis cannot explain almost all of the variation of banks' regulatory compliance. Since the findings from relevant research, the regulation adoption is ambiguous. Relevant studies argued that the impact of regulation on bank's performance is positive (Angkinand, 2009a; Angkinand, 2009b; Fiordelisi et al., 2011; Kilinc and Neyapti, 2012; Barth et al., 2013; Lee et al., 2013; Manlagnit, 2015; Apătăchioae, 2015; Pessarossi & Weill, 2015). Therefore, the author supposes that the residual of the fitted regression of PAM might contain information of the financial management decision of banks in the data and this term might effect on ROA. The expected result of the difference between the pre-regulation and post-regulation also gives an important evidence to learn from the regulatory implementation. So, the analysis results of H_2 in this thesis should hint the recommendation for the regulatory control in the case of Vietnam.

4. RESEARCH METHODOLOGY

This thesis is conducted by quantitative. In which, the quantitative focus on the empirical analysis to estimate the impact of the relevant factors on the two groups that hypothesised. Regression is used for the analyses and to suggest the criteria and the regulatory supervision mechanism for the regulation implementation.

To achieve the objective, the author planned to work with two processes as follows:

First: The quantitative process. In this process, the author uses regression analysis for the empirical analysis. The target of this process is to indicate the implementation speed, how the factors contributed to the capital regulation implementation of the VcB.

Analysing the Capital Regulation Implementation

This process has two steps. ***Firstly***, to assess the capital regulation implementation of the VcB, the author uses the partial adjustment models (hereafter PAM) to estimate the adjustment speed of the capital ratios. In order to recognise whether there are any changes between the pre- and post-regulation periods, the author analyses the data collected from the financial statement of the VcB and it is the unbalanced panel data. Recently, PAM have been significantly used for empirical analysis studies of the capital structure and its adjustment. In the study of Ly et al. (2017), to investigate the effect of Net Stable Funding Ratio adjustment speed on the systemic. In Shimizu (2015) to analyse the adjustment of denominators capital ratio in Japanese banks. And in Cook & Tang (2010) to estimate the impact of macroeconomic factors on the speed of capital structure adjustment. This thesis is in the same line with these studies that have the deal with the empirical analysis of an implementation process by using PAM. And it is the first study of this topic to use the PAM in Vietnam.

The estimation is to get the adjustment speed of the capital ratios and estimate the contribution of the factors in the adjustment channels that build the capital ratios. In other words, the speed of VcB to achieve one percent change of the capital prudential ratios. The dummy variables are added to detect the different effect of the regressors in the pre- and post-regulation period. The author expects that this technique could give some evidence of differences between these two sub-periods. This expectation result might indicate the trend that the VcB changed along with their capital regulation implementation. The evidence from the first step could provide the answer for the questions: “How do the VcB implement the capital regulation requirement in throughout the periods, and is there any difference of the implementation between the pre and post-regulation period?”, and “What are the indicators that should be monitored or considered to supervise the capital regulation implementation?”.

Analyse the Influence of the Capital Regulation Implementation on the Bank Efficiency

Secondly, a concern of all the business is the efficiency. ROA is the most used to assess the profitable of the firms, especial in the banking industry. To answer the question: "whether the manner of the adjustment by the Vietnamese commercial banks to the capital target leads to the efficiency for the banks?", the author collects the evidence from **three records**. ***The first*** is the line charts of ROA versus the two capital ratios. These charts provide a vision of the ROA trend in throughout the periods. ***The second*** is the estimations in which the explanatory variables are the same in the estimators for the adjustment speeds of the capital ratios; in the models, the ROA respectively replaces the position of the capital ratios and without the dummy variables. The author expects that these estimations could provide evidence to prove that the associations between ROA and the influence factors of the capital ratios' adjustment speed are similar. ***The third*** is the other changes that influence on the capital ratios' adjustment speed also effect on the ROA. On the one hand, the models of the capital ratios' adjustment speed have six factors used to analyse the contributions. Actually, the adjustment speed of the capital ratios is effected by much more factors than that. On the other hand, the residual term calculated from the model could imply some other relevant unobserved influences that explain for the predicted variable. Thus, the author decides to use the residuals of the PAM fitted as an addition information with the second record to consolidate the results. The residuals are saved after estimated the adjustment speed of the capital ratios by PAM without dummy variables. Finally, to collect the third record, the addition information is the regressor added to the regression to analyse the association with the ROA. If the additional information will statistically significant influence on ROA, the author will get a stronger evidence. It means that almost all of the manner of the adjustment by the Vietnamese commercial banks to the capital target connects to the efficiency of the banks.

The dependent variables in the models are the new criteria launched as the pilot for the adoption of full Basel regulation in 2018. The independent variables are the proxies of the banks' stability and the proxy of banks' earning on assets, the ingredients of the financial statement, and the indicators related to macroeconomics. The expectation from these analyses that to identify which indicator the VcB should be controlled for a speedy regulatory compliance. Additional, the outcome from this step also supports the author the appropriate confidence intervals of the variables. These information could be used to suggest the criteria of the factors that should be monitored and considered.

In this step, the tests before and after the regressions are done to recognise the violations against the assumptions. The adjustments or appropriate remedy will be given for each of the violations incurred.

The evidence from the first step could hint on the direction for the analyses that how to control the contribution of the relevant factors towards the capital regulation implementation in accordance with Basel regulatory framework.

Finally: The author suggests an approach applicable at Vietnamese Commercial Banks system. This methodology will be built upon state-of-the-art bank's regulation and supervision methods used in accordance with Basel regulatory framework.

4.1. The Models

The validity of H_1 and H_2 will be decided upon answering from the regression estimations, and the several relevant tests. The regression model formed for the hypothesis respectively as follow:

$$Y_{mit} = \beta_{m0} + \sum_{n=1}^{n} \beta_{mn} X_{nit} + \phi D_{ir} + \sum_{n=1}^{n} \beta_{mn} X_{n,i,t} \times D_{ir} + \sum_{h=1}^{h} \delta_{mh} C_{hit} + \varepsilon_{mit} \quad (4.1\text{-}1)$$

$$ROA_{it} = \alpha_0 + \sum_{k=1}^{k} \alpha_{kit} P_{kit} + U_{mit} + \varphi D_{ir} + \sum_{k=1}^{k} \alpha_{k,i,t} P_{k,i,t} \times D_{ir} + u_{it} \quad (4.1\text{ - }2)$$

Where Y_m are respectively the proxies of regulation indicators, *m(1,2);* X_n are respectively the proxies of bank's operation indicators, *n(1,7)*; P_k are respectively the proxies of banks' performance indicators, *k(1,2);* C_h is the control variable, *h=1, (m, n, k and h* are listed in table 3.5 – 1*)*. D is dummy variable for the pre and post-regulation periods, this variable take value 1 for the post-regulation period (*r;* from 2011/Q1 to 2015/Q4) and 0 in the pre-regulation period (from 2008/Q1 to 2010/Q4). *t* is quarter *t* in the full period, *i* is bank *i.* U_m are unobserved factor estimated from (4.1-1).

Together with the estimation, the test with dummy variable is conducted to detect the difference effect of the regressors, the author expects that this analysis could give some evidence of differences between the two sub-periods.

The partial adjustment models:

In long-run the regulation or the bank's performance indicator is a function of the factors that effect on its

$$Y^*_{i,t+1} = \sum_{j=1}^{j} \beta_j X_{j,i,t} \quad (4.1-3)$$

Where Y are respective the regulation and the bank's performance of bank i, the X_j are the vector of factors jth those affect the adjustment speed of the dependent variable, t is the quarter point time in the period from 2008Q1 to 2015Q4.

$$Y_{i,t} - Y_{i,t-1} = \lambda\left(Y^*_{i,t} - Y_{i,t-1}\right) + \varepsilon_{i,t} \qquad (4.1-4)$$

$$Y_{i,t} = \sum_{n=1}^{n}(\lambda\beta_n)X_{n,i,t} + (1-\lambda)Y_{i,t-1} + (\lambda\delta_h)C_{h,i,t} + \varepsilon_{i,t} \quad (4.1-5)$$

Accordingly, the dummy variables are added to model (1), it modified to:

$$Y_{m,i,t} = \beta_{m,0} + \sum_{n=1}^{n}\left(\lambda_m\beta_{m,n}\right)X_{n,i,t} + \sum_{n=1}^{n}\left(\lambda_m\beta_{m,n}\right)_d X_{n,i,t} \times D_{i,1}$$
$$+ (1-\lambda_m)Y_{i,t-1} + (1-\lambda_m)_d Y_{i,t-1} \times D_{i,1} + \sum_{h-1}^{h}(\lambda_m\delta_h)C_{h,i,t} + \varepsilon_{m,i,t} \qquad (4.1-6)$$

4.2. Variable Definition

According to the concerning and suggestion from the previous relevant studies, author suggests a list of the variables and their measurements for the empirical analysis of the VcB data. The first and the second indicator are the capital regulation these are the dependence variables for model (4.1-5), (4.1-6); The ROA is the dependence variable for model (4.1-2) and (4.1-5). Indicators from the fourth to the twelfth are the independence variables for model (4.1-5) and (4.1-6). Indicators from thirteen to seventeen are the independence variable for model (4.1-2). These indicators are as follow:

Table 4.2-1 Variable summary

Variable	Description	Calculation	Related suggestion
CPR1 *(m = 1)*	Capital prudential ratio 1	$\frac{\text{Tier 1}_t}{\text{Total assets}_t}$	Basel framework Bordeleau et al. (2009); Distinguin et al. (2013b); Gombola et al. (2016)
CPR2 *(m = 2)*	Capital prudential ratio 2	$\frac{\text{Tier 1}_t}{\text{Average RWA}_t}$	Gombola et al. (2016) (Lepetit et al. (2015) (*)
ROA	The return on average total assets	$\frac{\text{Net income}_t}{\text{Average total assets}_t}$	
$CPR1_{t-1}$	First lag of CPR1	$\frac{\text{Tier 1}_{t-1}}{\text{Total assets}_{t-1}}$	
$CPR2_{t-1}$	First lag of CPR2	$\frac{\text{Tier 1}_{t-1}}{\text{Average RWA}_{t-1}}$	
Share_G (n = 1)	The growth of common share number	$\frac{\text{Share number}_t - \text{Share number}_{t-1}}{\text{Share number}_{t-1}}$	(**)
RE_S (n = 2)	Retained earnings to common share number	$\frac{\text{Retained earnings}_t}{\text{Share number}_t}$	(**)

TGL_TA (n = 3)	Total non-bank lending to total assets	$\frac{\text{Total non - bank lending}_t}{\text{Total assets}_t}$	Coffinet et al. (2012); Allen et al. (2012); Jokivuolle et al. (2015); Song&Ryu., (2016)
IBL_Ch (n = 4)	The change of the interbank lending	$\frac{\text{Interbank lending}_t - \text{Interbank lending}_{t-1}}{\text{Interbank lending}_{t-1}}$	Koch(2014) (**)
Depo_Ch (n = 5)	The change of the deposits	$\frac{\text{Total deposits}_t - \text{Total deposits}_{t-1}}{\text{Total deposits}_{t-1}}$	Koch(2014); The Federal Deposit Insurance Corporation(FDIC). Shimizu (2015) Gombola et al. (2016)
RWA_Ch (n = 6)	The change of the average risk-weighted assets.	$\frac{\text{Average RWA}_t - \text{Average RWA}_{t-1}}{\text{Average RWA}_{t-1}}$	Cohen et al. (2014) Shimizu (2015)
Log_TA	The characteristic of the bank based on total assets	$\text{Log(Total assets}_t\text{)}$	Cook&Tang (2010); Shimizu (2015); Ly et al. (2017)
LP_TA *(k = 1)*	Total loss provision to total assets	$\frac{\text{Total loss provition}_t}{\text{Total assets}_t}$	Lindquist (2004); Distinguin et al. (2013a); Gombola et al. (2016) (**)

LA_TA *(k = 2)*	Loan loss allowance to total assets	$\frac{\text{Loan loss allowance}_t}{\text{Total assets}_t}$	Chang et al. (2008) Gombola et al. (2016)
IER *(k = 3)*	Interest earning ratio	$\frac{\text{Interest earning}_t - \text{Interest expenditure}_t}{\text{Total liabilities \& Shareholder equity}_t}$	(*)
U_{31}	The residual generated from the CPR1 estimated	Residual is calculated when CPR1 is estimated by model (5.2-1)	(**)
U_{32}	The residual generated from the CPR2 estimated	Residual is calculated when CPR2 is estimated by model (5.2-2)	(**)

(*): Indicator recently used in the VcB; (**): Suggest by author

Source: Author

4.2.1. Capital Prudential Ratio 1 (CPR1)

After the financial crisis 2007, the leverage in bank regulation was mentioned as an addition indicator for the capital regulation. Then, the Basel 3 introduce a leverage calculation for the regulation requirement. In this thesis, the author follows a leverage calculation used in Bordeleau et al. (2009). The build of this indicator is:

$$\text{CPR1} = \frac{\text{Tier1}_t}{\text{Total assets}_t}$$

Bordeleau et al. (2009) used this leverage ratio to prove that the Canadian banks were more stable than the banks of the United States and the banks in EU. Gombola et al. (2016) use this indicator as an alternative leverage with Basel's leverage to show that the earning and the leverage of the United States banks have a positive relationship over the period from 1999 to 2013. Bordeleau et al. (2009) also used an autoregressive regime-switching model to analyse the relationship behaviour of bank leverage and capital growth in Canada, the USA and EU. And Bordeleau et al. (2009) concluded that leverage be viewed as one component of the regulatory regime, rather than as a substitute for other risk-management and supervisory practices.

The author will analyse the effects of the bank's stability indicators and bank's performance indicators on the CPR1. The author expects that the result could hint how to control the LeR1 toward the regulation requirement through the effective factors. However, CPR1 and CPR2 have only one difference in its denominator that is risk-weighted assets. Idea is to recognise whether the risk-weighted assets or actual assets could show a brighter signal thereby the supervision should be more focused on CPR1 or CPR2.

4.2.2. The Capital Prudential Ratio 2 (CPR2)

This is an indicator that alternates to the capital regulation recommend by the Basel Committee in the latest regulation requirement – The Basel 3. Distinguin et al. (2013b) suppose that this calculation might be managing the different components of regulatory capital differently. Most of the relevant scholar articles, researchers often use this indicator or the modification of it. In this thesis, the author uses the original that issued in Basel 3. The calculation of it is:

$$CPR2 = \frac{Tier1_t}{Average\,RWA_t}$$

Where Tier1 and risk – weighted assets are defined in appendix number 1 of the principal number **13**/2010/TT-NHNN date May 20th, 2010. Almost the definition and criteria for the Tier1 and risk-weighted assets are same as the definition of Basel regulation, but differ to the capital ratio of the Basel, the numerator of CPR2 has only tier1 capital. The author expects that these result could show the impact of the stable indicator on this capital prudential ratio.

Some previous relevant studies confirm that higher capital has a negative association with the liquidity creation (Diamond and Rajan, 2000, 2001; Gorton and Winton, 2000). These negative effect suggestions of capital on liquidity creation depend on deposit insurance coverage being incomplete, a similar situation of Vietnam banking industry until this time. While some other suppose that the higher capital enhances the ability of banks to create liquidity because it allows them to absorb greater risk (Bhattacharya and Thakor, 1993; Repullo, 2004). In the same line with the second point of view, Bordeleau et al. (2009) recognise that when the ratio of Tier1 to risk – weighted assets of banks are march or higher than the benchmark of the regulation requirement, the bank can easy to raise their precautionary buffer quickly and Distinguin et al. (2013a) suppose that banks operate with the sufficient capital could observe losses if they were forced to liquidate assets. The theories suggest a causal relationship from capital (an indicator is similar to the CPR2) to liquidity creation (see Berger & Bouwman, 2009). In this thesis, CPR2 is at the position of a dependent variable in model (5.2-4) for the PAM processing. The author expects to get the adjustment speed of CPR2, whereby the author could have the information that how long it takes for adjustment of CPR2 to its target and which factor that could influence the adjustment.

4.2.3. The ROA

The **ROA** is a basic indicator that most used to access the efficiency of firms especial in banking industry. As mentioned at 2.3, base on the previous studies which supported that the capital prudential ratios could have a positive association with ROA. The empirical evidence is expected to provide conviction about the efficiency of the capital regulation implementation to add evidence to the previous studies. The expected result could give information to support and encourage the launch of the capital regulation and could hint for the relevant control.

4.2.4. The One Lag of the Capital Ratios

According to formula (4.1-6), the $\mathbf{CPR1_{t-1}}$ and $\mathbf{CPR2_{t-1}}$ are generated to estimate the adjustment speed of the **CPR1** and **CPR2** respectively. The estimated speeds of the adjustments show that how long it takes the VcB to reach a one percent target change of these capital ratios. These measurements are similar to the Basel regulations. These results could imply the implementation speed of the VcB to achieve the capital regulation requirements. This is the core expectation result of the author.

4.2.5. The Number of Shares

The growth of common shares' number represents the share issuances of the VcB. This indicator is named Share_G, explains for the growth of bank's tier 1 capital. Share_G is a ratio, calculated by the difference of the number of common shares at time t and t-1 divided to the number of common shares at time t-1.

$$\text{Share\_G} = \frac{\text{Share number}_t - \text{Share number}_{t\text{-}1}}{\text{Share number}_{t\text{-}1}}$$

Assume that the other factors are constant, an increase of Share_G makes the tier 1 increase and lead to an increase of the capital ratios. Thus, Share_G is expected to show a positive influence to the capital ratios. But the association of the Share_G for the ROA might be ambiguous.

4.2.6. Retained Earning Ratio (RE_S)

$$\text{RE\_S} = \frac{\text{Retained earnings}_t}{\text{Share number}_t}$$

The retained earnings on common shares of the VcB is a ratio counted by the retained earning divided to the number of common shares. It is denoted as **RE_S**. The retained earnings is net income minus dividends. A high **RE_S** means a high scale of retained earnings to the common shares. The more retained earnings, the more the tier 1 is increased, meaning that the numerator of the capital ratios be increased. The expectation for the relationships between **RE_S** and the capital ratios are positive.

Moreover, an increase of **RE_S** might imply that the bank's profitability is better, therefore, a positive relationship between ROA and **RE_S** is expected.

4.2.7. The Total Non-bank Lending Ratio (TGL_TA)

Lending is the most operation of the commercial banks. The lending is combined the non-bank lending and interbank lending. The gross loans of non-bank lending ratio denoted as **TGL_TA**, calculated by the gross loans of non-bank lending divides total assets:

$$\text{TGL\_TA} = \frac{\text{Total non - bank lending}_t}{\text{Total assets}_t}$$

In the capital requirement regime of Basel 2 & 3, the lending growth continuously was reported by the Basel committee (see Cohen et al., 2014). On the other hand, the capital regulation requirements could constrain the deposits (Gorton & Winton, 2003) and the additional of the leverage regulation requirements, both the requirements make bank must consider the lending operation while the funding sources were limited. Therefore, the banks' corresponding loans must be operated by the combination of non-bank lending and interbank lending. Accordingly, the non-bank lending and the interbank lending could have different associations with the capital ratios as well as with the ROA. In addition, two close related indicators calculated the change of non-bank lending and non-bank to RWA also used to provide more information for the analyses.

4.2.8. The Interbank Lending Change (IBL_Ch)

IBL_Ch is named to represent the change of the interbank lending in between the time *t* and *t – 1*. The calcualtion of IBL_Ch is as folow:

$$\text{IBL\_Ch} = \frac{\text{Interbank lending}_t - \text{Interbank lending}_{t-1}}{\text{Interbank lending}_{t-1}}$$

These different calculations of the two lending categories are to avoid a high correlation when both the **TGL_TA** and the **IBL_Ch** are the predictor variables in the same model.

Koch (2014) analysed the adjustment of Germen banks' leverage, and supported to the previous studies that the banks' leverage shifted between non-bank debts and interbank market in normal situation and cut down its leverage mainly by the interbank capitals adjustment.

Some relevant studies supposed that the interbank lending is two way associations with the capital ratio, while the banks had a lower capital than the requirement and also had surplus liquidity assets tend to shift to a lower RWA, there shifts were to optimal the capital structure or to adopt the capital regulation requirement. Therefore,

the author also approached these two measurements for the interbank lending. The first is the interbank lending to total assets actual:

$$\text{IBL\_TA}_t = \frac{\text{Interbank lending}_t}{\text{Total assets actual}_t}$$

The second is the interbank lending to risk-weighted assets:

$$\text{IBL\_RWA}_t = \frac{\text{Interbank lending}_t}{\text{Risk - weighted assets}_t}$$

However, the use of both these measurements was not efficient and caused the multicollinearity in the PAM, whereby, the author uses these measurements the addition information for the analyses on their charts.

The IBL_TA represents the proportion of the interbank lending to the total assets actual and the concept is to examine whether the banks shrink or increase their lending to the interbank market. In the situation of the VcB, where almost all the VcB had a lower capital than the regulation requirement, the author expect that IBL_TA might have a negative association with the capital prudential ratio in the whole period and a positive association in the post-regulation period. The second measurement is the proportion of the interbank lending to RWA. This measurement is to compare with the first measurement. These two approaches are to provide more information for the analyses and comparison.

4.2.9. The Deposit Change (Depo_Ch)

The deposits are the most funding source of the commercial banks. As mentioned above, the deposits connect to the banks' lending and the bank's leverage.

Gorton & Winton (2003) point that raising capital requirements forces banks to be supplied fewer deposits. As a result, banks' liquidity positions were weakened. This finding supports for Boot and Thakor (1997) that raising equity capital is more expensive than deposits, an increase in risk-based capital requirements tend to the reduction of banks' lending. In the case of the VcB, throughout the post-regulation period, total assets of the VcB increased 212.7%, while the scale of the lending to non-bank on total assets increased continuously from 38.9% to 48.3%. This matter propounds that the relationship of loans and the deposits with the capital ratios should be considered highly in the capital regulation implementation of the VcB.

On the view of that, the deposits might have a relationship with the capital ratios and theoretically have a positive relationship with the ROA. This indicator is named **Depo_Ch**, calculated by:

$$\text{Depo\_Ch} = \frac{\text{Total deposits}_t - \text{Total deposits}_{t\text{-}1}}{\text{Total deposits}_{t\text{-}1}}$$

This is a predictor variable, is added to the PAM to examine the association of this change with the capital ratios and the ROA, expected to show an empirical evidence from the regulation implementation of the VcB.

4.2.10. The Change of the Average Risk-weighted

The readjustment of the risk-weighted assets to achieve the target of capital to risk-weighted ratio was addressed in previous studies (Shimizu, 2015; Craig et al., 2015; Heider et al., 2015; Gacia -de-Andriain et al., 2016). In this study, the readjustment is calculated under a ratio:

$$\text{RWA\_Ch} = \frac{\text{AverageRWA}_{t} - \text{AverageRWA}_{t\text{-}1}}{\text{AverageRWA}_{t\text{-}1}}$$

A change of the average risk-weighted assets might imply that the banks reallocated their risky assets. Whereby, this change is a regressor variable, named **RWA_Ch**, added to analyse its influence on the capital ratios. Because the **RWA_Ch** reflects the change of the denominator of the CPR2, relevantly, the movement of **RWA_Ch** is expected to have a negative association with the capital ratios. And, if the empirical analysis shows a negative association between the **RWA_Ch** and the ROA, the positive relationship between the capital ratios and the ROA will be confirmed ultimately.

4.2.11. The Bank Size (log_TA)

In the capital structure studies, the authors frequently added a variable in their models which represent the characteristics of firms or banks as the control variables. This factor is the natural logarithm of bank's total assets, called **log_TA** (Cook & Tang, 2010; Hovakimian & Li, 2011; Shimizu, 2015; Ly et al., 2017; Tung, 2017), was added to the models of this article. Economically, assume that all the other factors are constant, when the **log_TA** increases, it might cause a decrease of the capital ratios or ROA. Therefore, the **log_TA** is expected to have a negative association with the predicted variables

4.2.12. The Loss Provision Ratio (LP_TA)

Loss provision ratio represents the provision loss of the banks' risky assets, named **LP_TA**. This indicator is the predictor variables for the ROA only, calculated as below:

$$\text{LP\_TA} = \frac{\text{Total loss provition}_{t}}{\text{Total assets}_{t}}$$

In Distinguin et al. (2013), the authors included the riskiness of bank assets in the regulatory capital equation to analyse the relationship between bank regulatory capital and liquidity, that is a ratio of loan loss provisions to total loans as a proxy of asset

risk. The author found that banks increase their capital ratios when they face higher credit risk. This association made Distinguin et al. (2013b) to give an empirical to confirm that capital is accumulated to face unexpected losses. Additionally, in addition, the Basel III accords has tightened requirements on leverage and liquidity and could have affected earnings and capital management. Gombola et al. (2016) found empirical evidences that loan loss provision has a significant positive relationship with leverage ratio that is measured by the Tier 1 ratio (similar to CPR1 in 4.2.1) Following these findings, the author adds this indicator to model (4.1-2), it is an independent variable. The author expects that empirical result of this indicator could give information for the credit risk in the time of the capital regulation implementation. Economically, both **LP_TA** and **LA_TA** are negative influence on the ROA.

4.2.13. The Loss Allowance Ratio (LA_TA)

Loan loss allowance divided to total assets represents the reserve for bad loans. On the other hand, the loss allowance divided to total assets could also represent the risks that the banks stand. The author adds this indicator to model (4.1-2), it is an independent variable, and expects that empirical result could give information to enhance whether the launch of the capital regulation requirements made the bank efficiency became better or worse. This indicator is denoted as **LA_TA**, calculated as below:

$$\text{LA\_TA} = \frac{\text{Loan loss allowance}_t}{\text{Total assets}_t}$$

Economically, **LA_TA** are negative influence on the ROA.

4.2.14. Interest Income Rate (IER)

$$\text{IER} = \frac{\text{Interest income - Interest expenditure}}{\text{Total liabilities \& share holder equity}}$$

The VcB is recently using this ratio to measure the efficient use of liabilities. The author uses this indicator in order to have the evidence of the association between it and ROA during the whole period, especially in the post-regulation period. The expectation is a positive association in the post-regulation period. The result could be a convincible empirical for the capital regulation implementation.

4.2.15. The Residuals From the Adjustment Estimates

The residual generated from the model (4.1-5) estimated, denoted as $\mathbf{U_{31}}$ and $\mathbf{U_{32}}$, respectively are the residuals from the CPR1 and CPR2 estimations. Statistically, these residuals are the unobservable factors that relate to the adjustment speed estimations. Some relevant studies show that decision for bank's financial

management effect on the behavior of adjusting denominators of capital ratios upon the introduction of Basel's regulations (Shimizu, 2015), and risk decisions of financial intermediaries are simultaneously made with perceptions on expected profits (Delis & Tsionas, 2012; Lepetit et al., 2015). Furthermore, the author believes that the independent variables in this thesis cannot explain almost all of the variation of bank's regulatory compliance. Therefore, the author supposes that the residual of the PAM fitted might represent the financial management decision and this term might effect on ROA.

Whereby, to add more information with the other evidences, the author adds the $\mathbf{U_{31}}$ and $\mathbf{U_{32}}$ respectively together with the LP_TA, LA_TA, IER to explain the ROA through the model (4.1-2). The author expects that these residuals might have a statistically significant association with the ROA to provide the additional explanation together with the other explanatory variables above. Thereby, the collected evidence must be stronger for a conclusion connects the fluctuation of the ROA with the capital ratio adjustment manner of the VcB.

4.3. Overview of the Processing

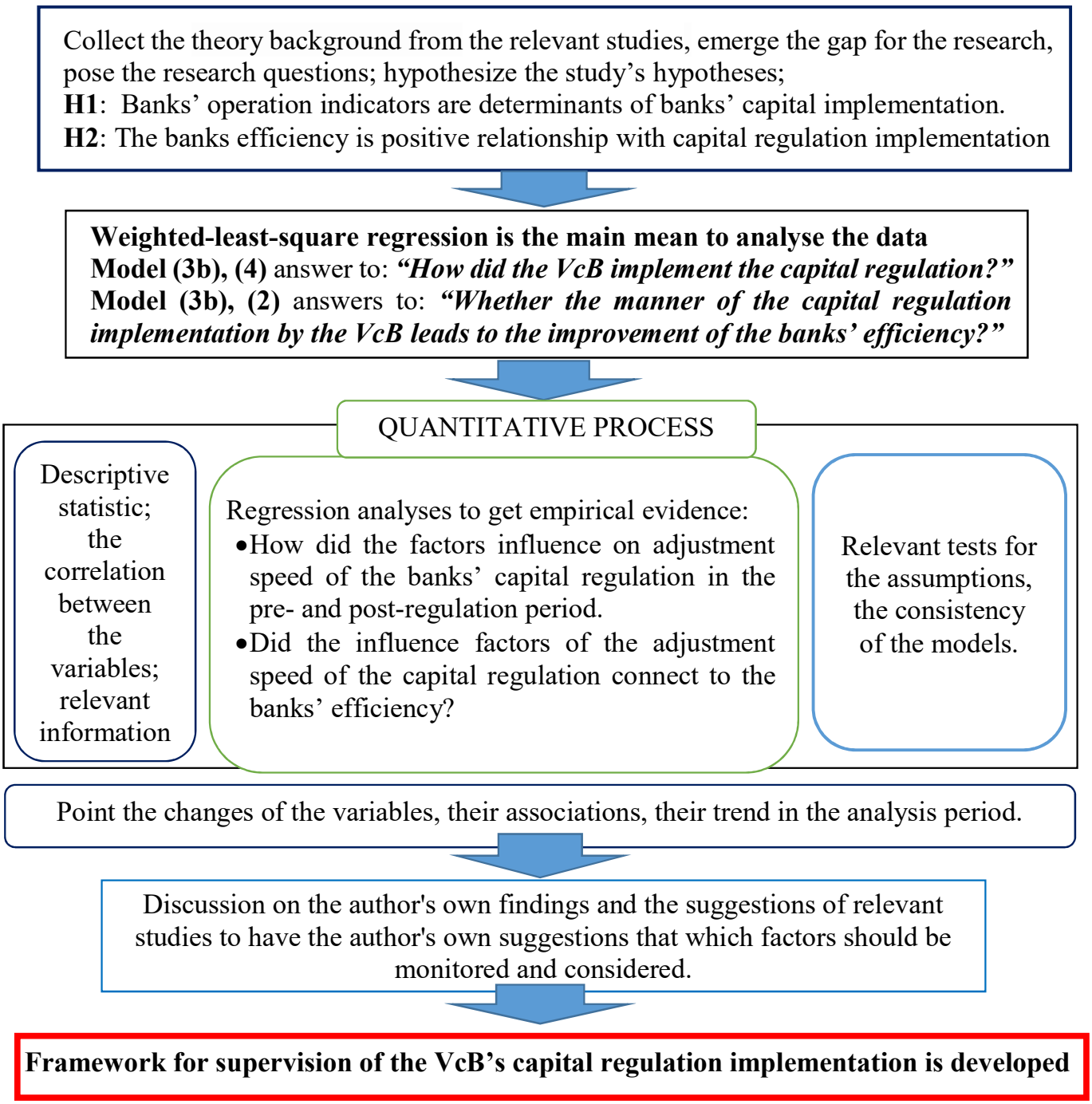
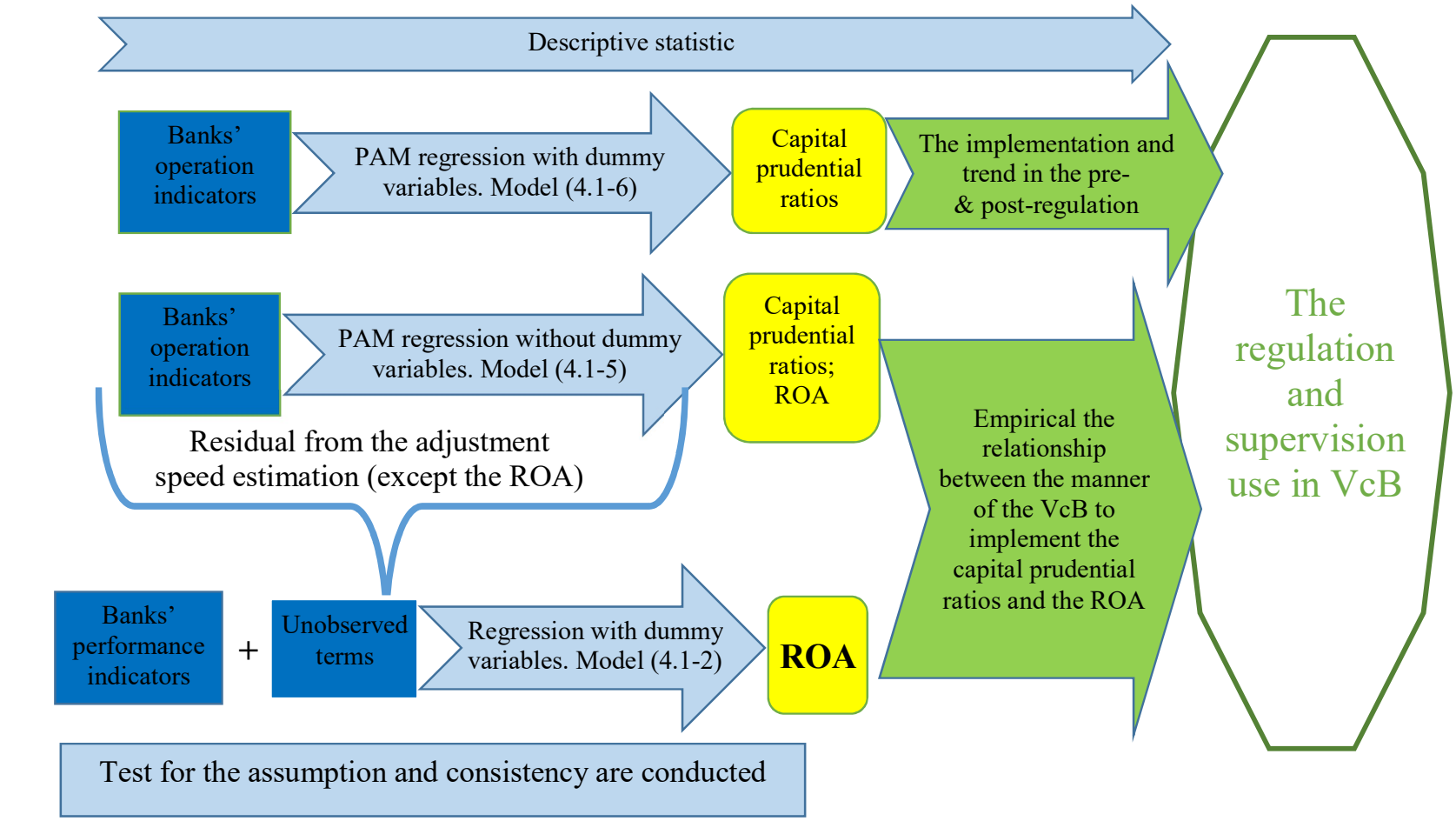


Figure 4.3-1 Conceptual framework Source: Author



Source: Author

Figure 4.3-2 Quantitative process

4.4. Data

Panel data from Data stream of the Thomson Reuters selected from the quarterly released financial statements of VcB which are available in the period from 2008/Q3 to 2015/Q4, only 09 VcB's financial statement are available in the period. The dataset used for the analyses includes 225 observations from these banks, of which 6/9 banks had information in both sub-periods, the dataset is an unbalance panel data, summary of the observations is shown in Table 4.4 – 1.

Table 4.4-1 Summary the available banks' data

Bank	Full name	Number of quarter observed	Total assets average (billion VND)*
ACB	Asia Commercial Joint Stock Bank	32	243,295
BID	Bank for Investment and Development of Vietnam	15	747,070
CTG	Vietnam Commercial Bank for Industry and Trade	28	455,005
EIB	Vietnam Export Import Bank	28	176,794
MBB	Military Commercial Joint Stock Bank	16	264,516
NVB	National Citizen Commercial Joint Stock Bank	19	39,011
SHB	Saigon Hanoi Commercial Joint Stock Bank	27	216,331
STB	Sai Gon Thuong Tin Commercial Joint Stock Bank	32	180,163
VCB	Joint Stock Commercial Bank for Foreign Trade of Vietnam	28	525,185
Total: 9		225	

USD/VND= 22,700 (on Oct 26, 2017). Source: Calculated by the author.

The regression estimations used this Panel data. Besides the variables listed in Table 4.4 – 1, the author also provides more information of the relevant indicators. Additional, the author calculated and shows the charts of the variables in the averages. These charts and the relevant information are the addition information together with the description statistic give a clearer imaging of the analyses.

5. RESULTS FROM QUANTITATIVE ANALYSIS

5.1. Summary of Descriptive Statistic

In this section, the author shows the information of descriptive statistic. For a convenient view, the author interprets the information of the dependent variables first, then the independent variables.

Table 5.1 – 1 provides descriptive statistic of all indicators that were introduced in section 4.2. In which the first and the second are dependent variables for model (4.1-5) and model (4.1-), the third to the eighth indicators are independent variables of these models; ROA is a dependent variable of model (4.1-2) and (4.1-5), the other remainders are the explanatory variables for ROA in model (4.1-2).

Table 5.1-1 Data summary

Name	vars	N	Mean	Sd	median	Min	max	se
CPR1	1	225	0.0727	0.0234	0.0693	0.0397	0.1790	0.0016
CPR2	2	225	0.0742	0.0222	0.0726	0.0387	0.1662	0.0015
Share_G	3	225	0.0496	0.1406	0.0000	-0.0653	0.8354	0.0098
RE_S	4	225	0.1575	0.0922	0.1482	-0.0620	0.3663	0.0064
TGL_TA	5	225	0.4549	0.1043	0.4639	0.2359	0.6336	0.0072
IBL_Ch	6	225	0.0646	0.2800	0.0440	-0.4524	1.2850	0.0195
Depo_Ch	7	225	0.0566	0.1001	0.0483	-0.1517	0.3656	0.0070
RWA_Ch	8	225	0.0543	0.1058	0.0406	-0.1821	0.3983	0.0074
log_TA	9	225	14.3441	0.3639	14.3665	13.4552	14.9572	0.0253
ROA	10	225	0.0025	0.0018	0.0025	-0.0038	0.0060	0.0001
LP_TA	11	225	0.1216	0.1039	0.0960	0.0021	0.4987	0.0072
LA_TA	12	225	0.0077	0.0037	0.0076	0.0022	0.0163	0.0003
IER	13	225	0.7260	0.2191	0.7242	0.2922	1.2952	0.0152

Source: Calculated by the author

Figure 5.1 – 1 provides the line charts of the variables which are used in the regression analyses by models (4.1-5) and (4.1-6). The three in the first row of this figure is information of CPR1, CPR2 and ROA respectively; the second and the third rows is information of the independent variables of the models (4.1-5) and (4.1-6).

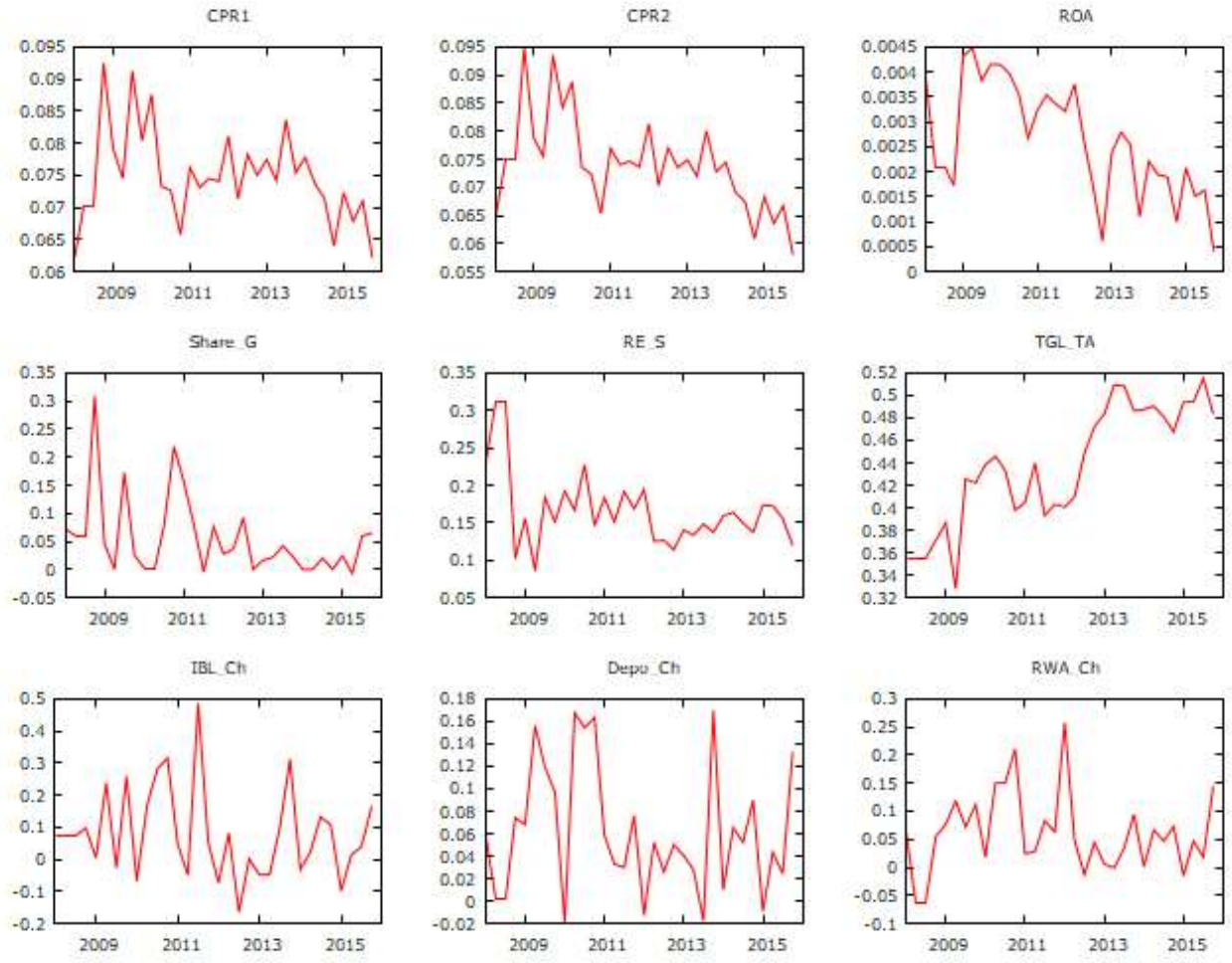


Figure 5.1-1. Line charts the variables of model (4.1-5), (4.1-6), in averages

Source: Author

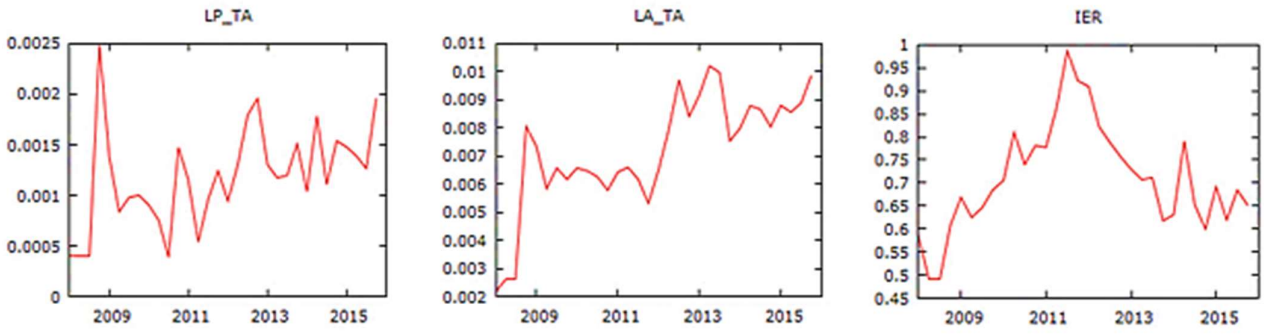


Figure 5.1-2 Line charts the variables of model (4.1-2), in averages

Source: Author

5.1.1. The Capital Prudential Ratios – CPR1 & CPR2

Figures 5.1 – 3, 5.1 – 4 provide the information about the CPR1, CPR2 and the ROA. The information shown in these figures are in the form of the average.

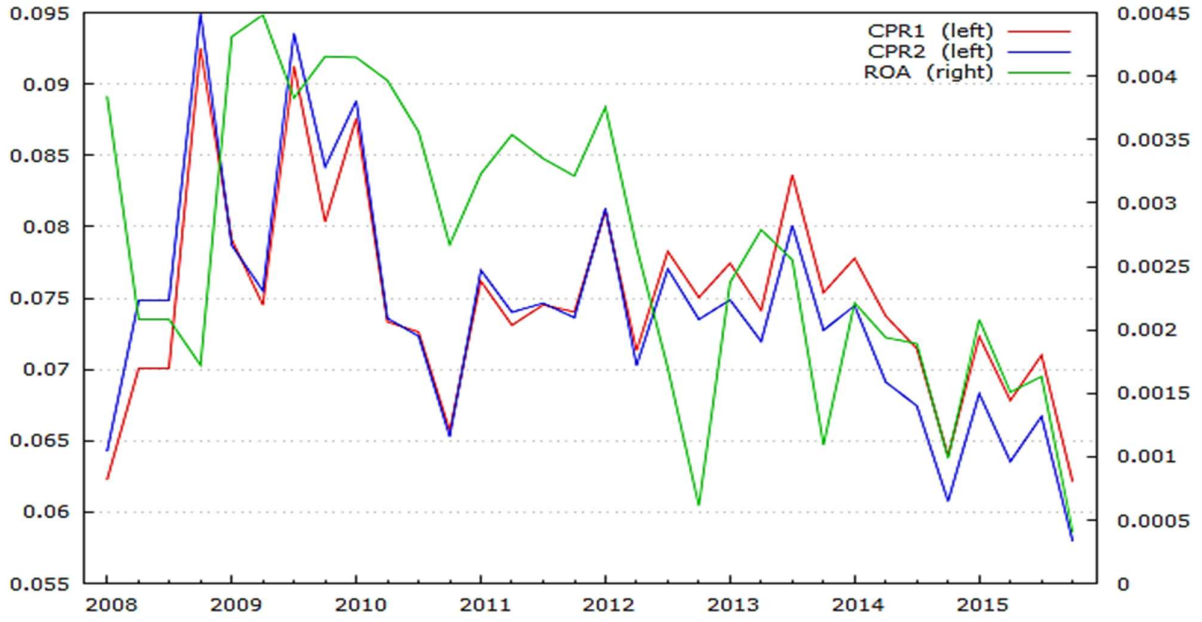


Figure 5.1-3 Line charts of the dependent variables, in averages

Source: Author

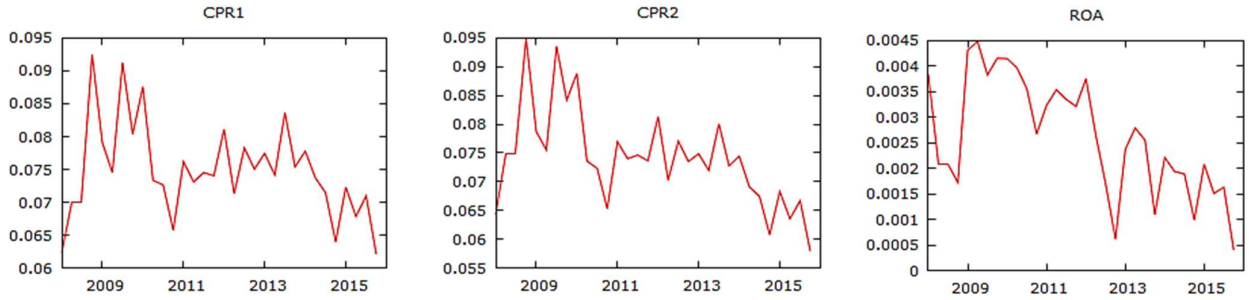


Figure 5.1 - 4. Line charts the dependent variables, in average, separated

Source: Author

In the pre-regulation period, the fluctuation amplitude of both CPR1 and CPR2 was higher than in the post-regulation period. However, in the pre-regulation period, the average of the capital prudential ratios was higher than the average of the capital prudential ratios in the post-regulation period. At the end of the whole period, the related figures show that CPR1 and CPR2 have both slightly dropped under 6%. The CPR1 was 6.43%, 6.53% and 5.8% in the first quarter of 2008, the fourth quarter of 2010 and the fourth quarter of 2015, respectively; while the capital to risk-weighted assets was 6.23%, 6.57% and 6.21% in the first quarter of 2008, the fourth quarter of 2010 and the fourth quarter of 2015, respectively. It means that in the post-regulation

period the capital ratios that were calculated on both book value and risk-weighted assets became lower. In the pre-regulation period, sometimes the CPR2 was higher than the CPR1, but in the post-regulation period, the CPR2 was always higher than the CPR1. The information implies that in the post-regulation period, the VcB average of RWA increased more than the increase of the total assets.

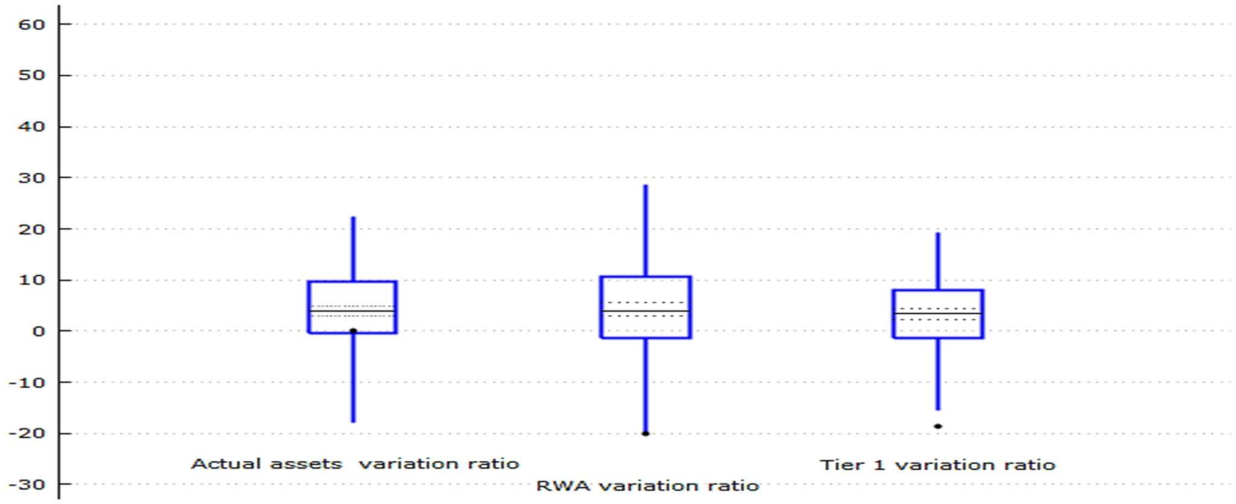


Figure 5.1-5 The box plots of the capital prudential ratio components.

Source: Calculated by the author

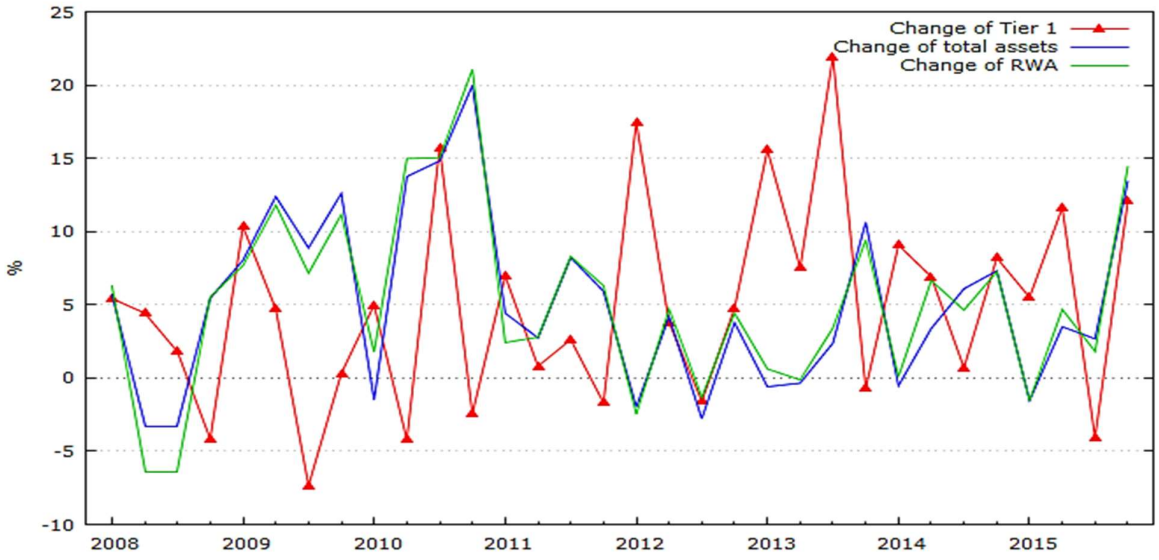


Figure 5.1-6 Line chart the percentage change of total assets, RWA and Tier 1, in average.

Source: Calculated by the author

Figure 5.1 – 5 shows the box plots of the capital prudential ratios' components. The Tier 1 is the numerators of both the CPR1 and CPR2. While denominator of the CPR1

is total assets and denominator of the CPR2 is average RWA. The box plots show the variation of the components in throughout the periods.

Figure 5.1 – 5 and Figure 5.1 – 6 add the information that the fluctuation amplitude of RWA was higher than that of the total assets. However, the contribution of RWA to the fluctuation of the CPR2 in the post-regulation period kept the percentage of CPR2 at a higher level than that of CPR1. In addition, Figure 5.1 – 6 indicates that in the post-regulation period both the total assets and the RWA varied less than in the pre-regulation period and almost all of the fluctuations were upper zero, meanwhile the Tier 1 had many times moving under zero. Consequently, these charts could imply the decrease of both the capital prudential ratios in throughout the periods.

According to the information of its components, banks show a lightly decrease. In addition, on December 30th, 2016 the State Bank of Vietnam issued circulars number 41/2016/NHNN to conduct the regulation requirement implementation to the VcB. In which, the requirement for CAR ratio (this ratio was mentioned at 4.2.2) was reduced from 9% to 8%. This matter could give an evidence with the variation of CPR2 about the reduce of this indicator. This is a considerable signal for the regulator and supervisor about the capital regulation implementation especially is the risk-weighted assets management.

5.1.2. The ROA

ROA varies within -0.38% and 0.6%. In Figure 5.1 – 6 ROA shows an ascending reduce trend. In average, the ROA in the pre-regulation period varied in a higher percentage level than that in the post-regulation. Throughout the periods, the ROA was 0.38% in the first quarter of 2008 and 0.04% in the forth quarter of 2015. The trend of the average ROA is similar to the trends of the capital prudential ratios and might be in the line of the studies support a positive association between capital regulation and the earning of banks.

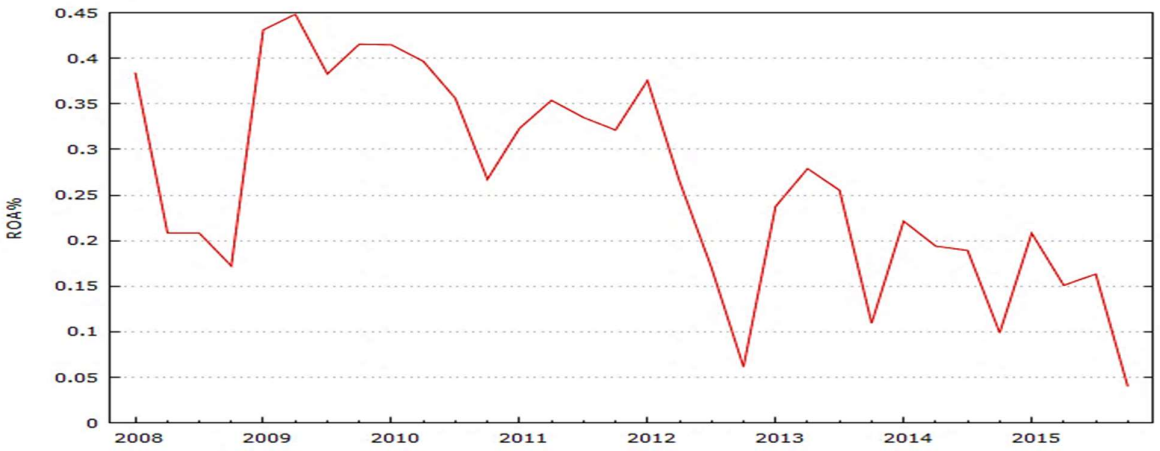


Figure 5.1 -7. Line charts ROA, in average.

Source: Author

5.1.3. The Number of Common Shares – Share_G

The Share_G at *t* compares with *t – 1* fluctuates in between -0.07 and 0.84. Line chart of the Share_G in Figure 5.1 – 8 reports that in the post-regulation period, the VcB reduced their activities of the issuance shares in compare with the pre-regulation period. In the pre-regulation period, the Share_G varied in between zero to 0.31, but in the post-regulation period, the fluctuation was in between zero to 0.094, lower than a half of the fluctuation in the pre-regulation period. The information indicated that the Share_G did not have the large fluctuation as before or the VcB might less use the issuance share as a main source to increase their own capital. In early of the post-regulation period, the VcB had sharp increase of the Share_G, then the increase of the Share_G was smaller ascendingly until the end of the post-regulation period, visually, the Figure 5.1 – 9 indicated that at 2014/Q2, 2015/Q1 and 2015/Q2, the Share_G got the increases at these point times, but those were not large as the previous. Meaning that at the end of the post-regulation period, some issuance shares were done but with a small number of new shares.

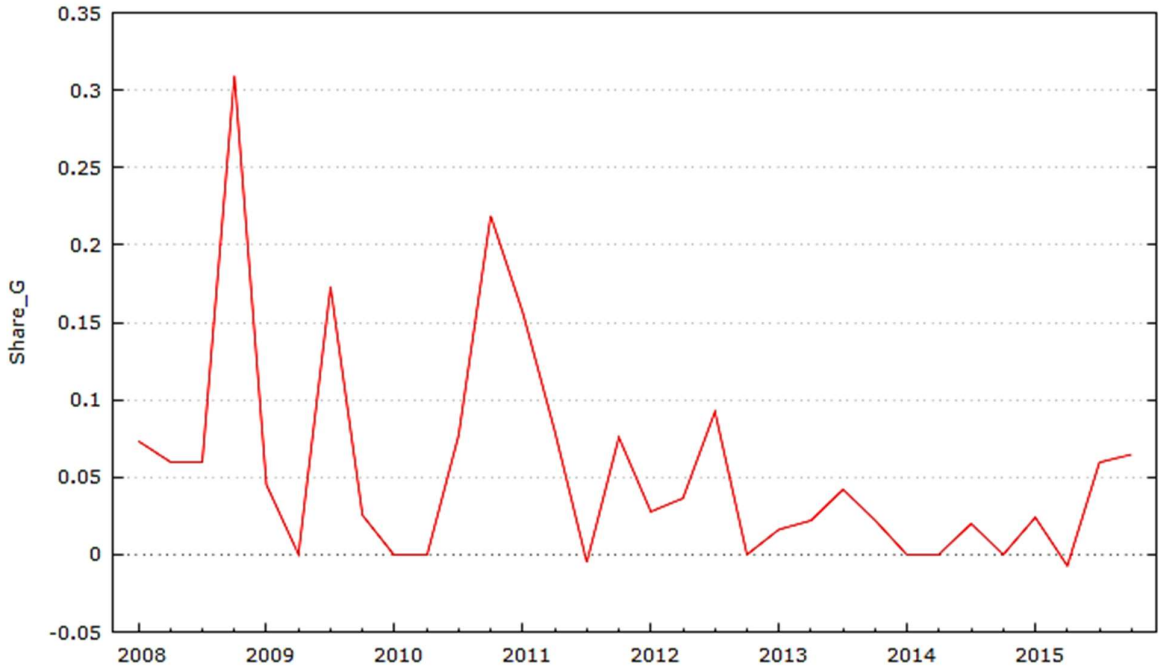


Figure 5.1 -8. Line chart of Share_G, in average.

Source: Author

Figure 5.1 -9 The number of common shares, in average

Source: Author

5.1.4. The Retained Earnings To Number of Shares – RE_S

Figures 5.1 – 10 and 5.1 – 11 show the line charts of the RE_S and it components. In average, in the pre-regulation period and early of the post-regulation period, the RE_S fluctuated with a higher level than its fluctuation from the middle to the end of the post-regulation period. In 2012, the RE_S decreased continuously almost all of this year, but then it moved up from 2013. Thank to the increase of the retained earnings from 2013, the RE_S reached a level similar to its record in 2011 at 0.17 but still lower than its average in the pre-regulation period. The information implies that the VcB might intend to keep the RE_S stable in throughout the periods.

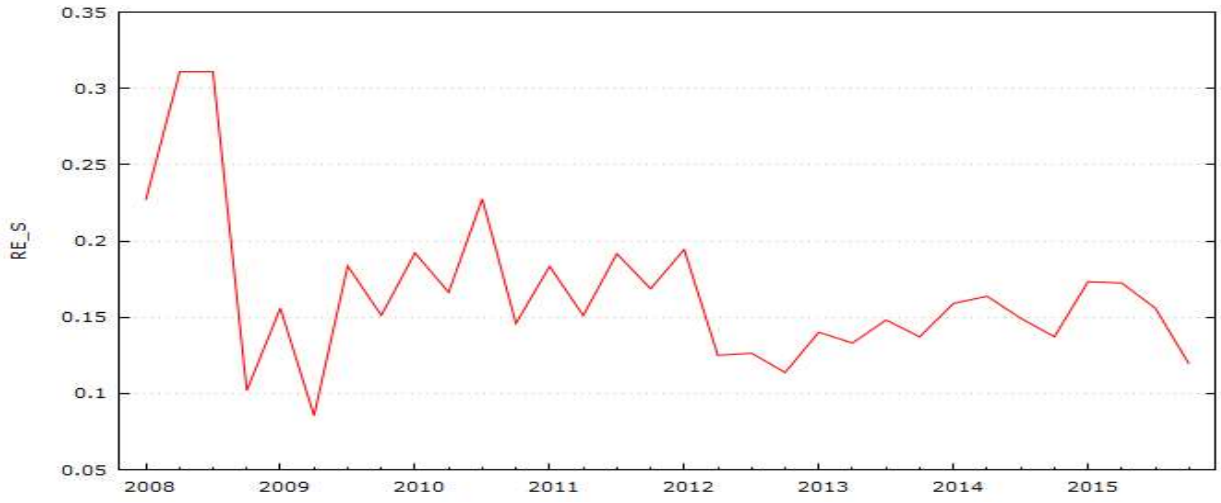


Figure 5.1-10 . The retained earning to number of common shares.

Source: Author

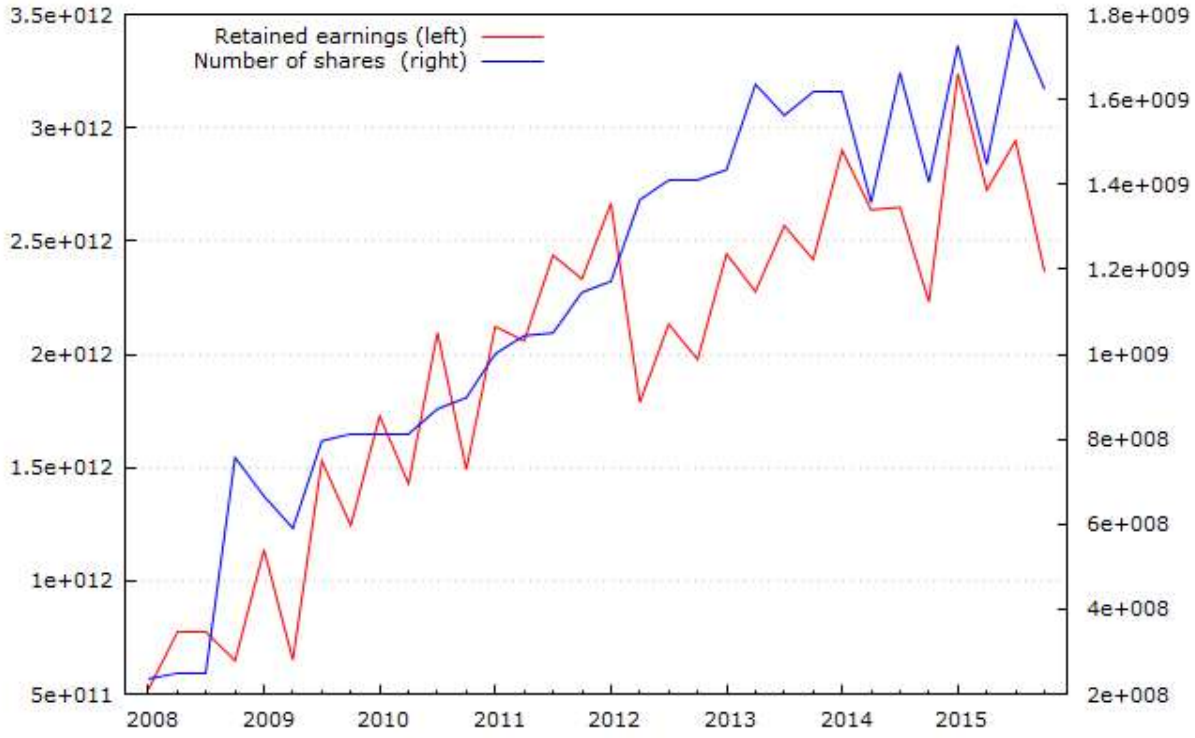


Figure 5.1-15.1-11 The retained earnings versus the number of common shares.

Source: Author

5.1.5. The Non-bank Lending To Total Assets Ratio – TGL_TA

The line charts of non-bank lending and its relations are shown in Figures 5.1 – 12, 5.1 – 13 and 5.1 – 14. Figure 5.1 – 12 show the line chart of TGL_TA ratio, while Figure 5.1 – 13 indicates the trends of Vietnam's GDP versus the TGL_TA, and Figure provides a visible of the TGL_TA versus the non-bank lending to RWA.

Figure 5.1.12 shows that almost the throughout periods, the TGL_TA ratio was creased continuously. This trend was co-direction with the trend of GDP shown in Figure 5.1 – 13. On the other hand, Figure 5.1 – 14 indicates that the calculation of non-bank lending to RWA show a smaller result than the calculate on total assets. In the pre-regulation period and in early of the post-regulation period, these two approaches of non-bank lending show almost the same fluctuations and too close each other. But from the third quarter of 2012, the calculate on RWA became far and far from the TGL_TA. This detail could imply that from the end of 2012, the scale of non-bank lending to RWA became smaller than before.

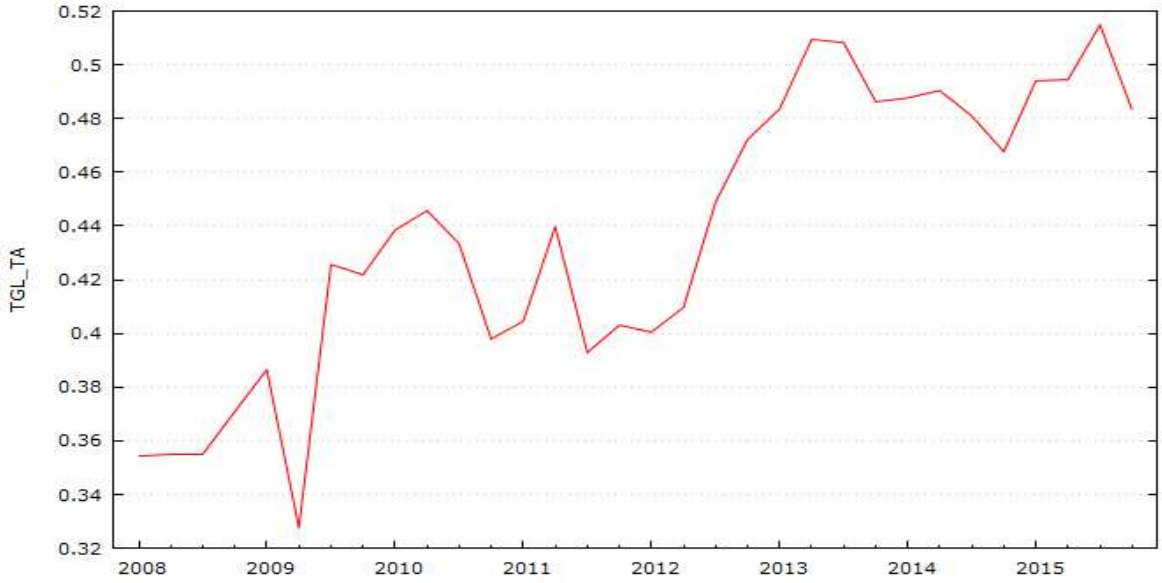


Figure 5.1-12 The non-bank lending to total assets.

Source: Author

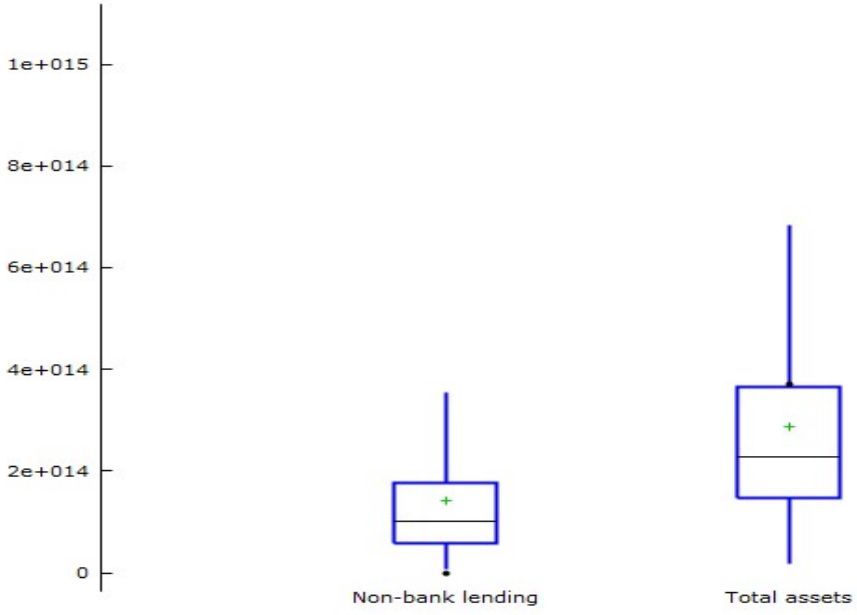


Figure 5.1-13 Box plot the components of TGL_TA.

Source: Author

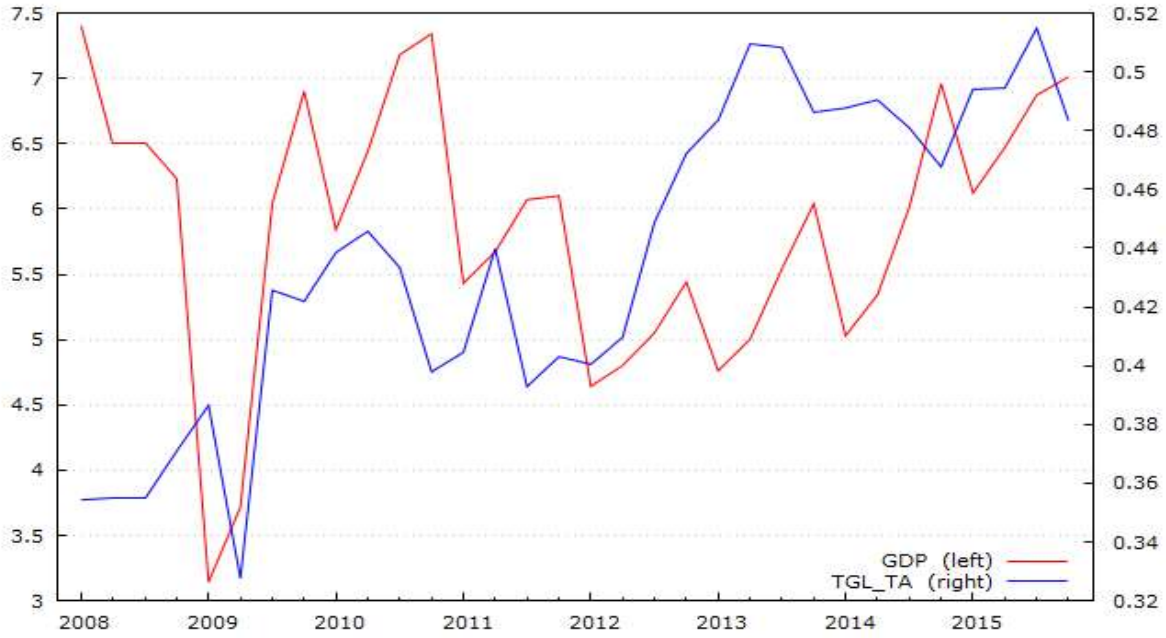


Figure 5.1-14 Line chart the GDP and the ratio of non-bank lending to total assets, in average.

Source: Author

Figure 5.1-15 Line chart the ratios of non-bank lending to total assets and to RWA, in average.

Source: Author

5.1.6. The Change of the Interbank Lending – IBL_Ch

In overall, the IBL_Ch increase in throughout the periods but at a very low degree. In the pre-regulation period, the IBL_Ch had only two time move a little bit under zero at 0.06. But in the port-regulation period the IBL_Ch had several times moving under zero, in which in four quarters continuously from the second quarter of 2012, the IBL_Ch was under zero and also got the deepest reduce at 0.17 in that time. Meanwhile, the TGL_TA increased sharply. The trend of the interbank lending to total assets adds the information that might imply that from the second quarter of 2012 to the second quarter of 2013 the VcB the decrease of the interbank lending to cover the increase of the non-bank lending.

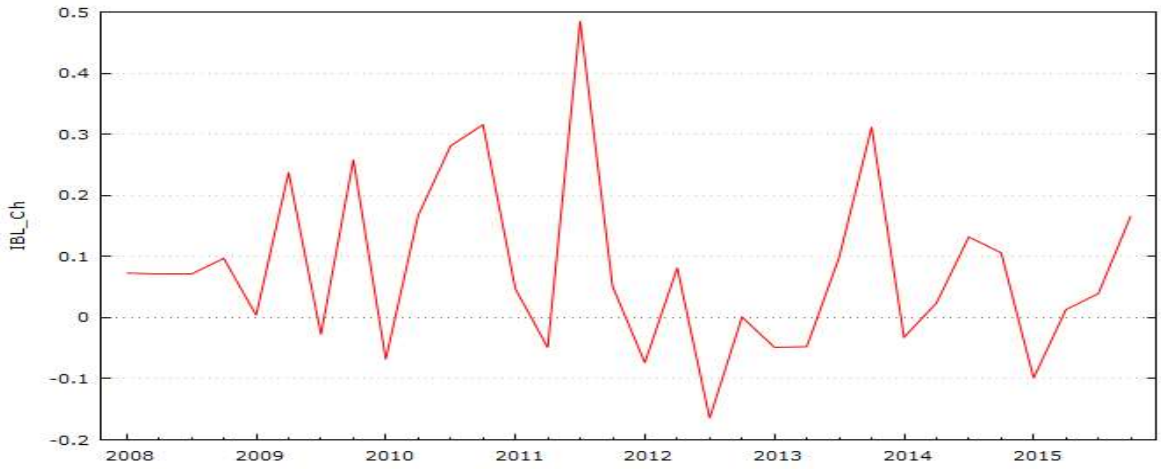


Figure 5.1-16 Line chart the change of interbank lending, in average.

Source: Author

Figure 5.1-17 Line chart the ratio of interbank lending to total assets, in average.

Source: Author

5.1.7. The Change of the Deposits – Depo_Ch

The information of the deposits provides that almost all of throughout the periods, the VcB increased this main funding source. The scales of the deposits to total liabilities and to total assets shown in Figure 5.1 – 18 indicate that the ratio of the deposits in the total liabilities became higher especially in the post-regulation period. While the ratio of the deposits funded the total assets increase with a lower scale but had a similar trend to the deposits to liablities.

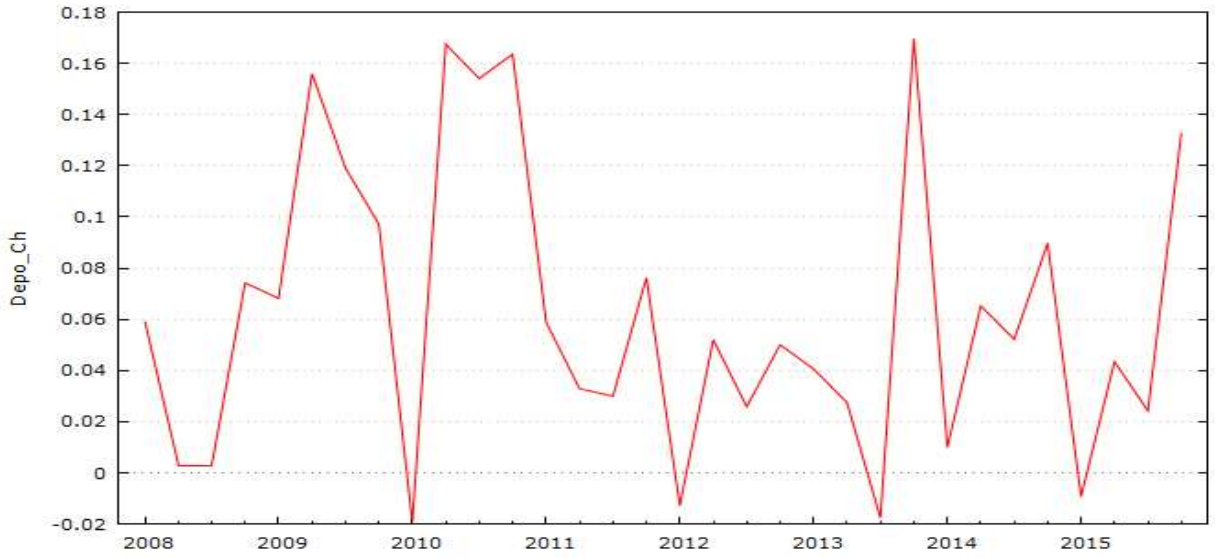


Figure 5.1-18 Line chart the change of deposits, in average.

Source: Author

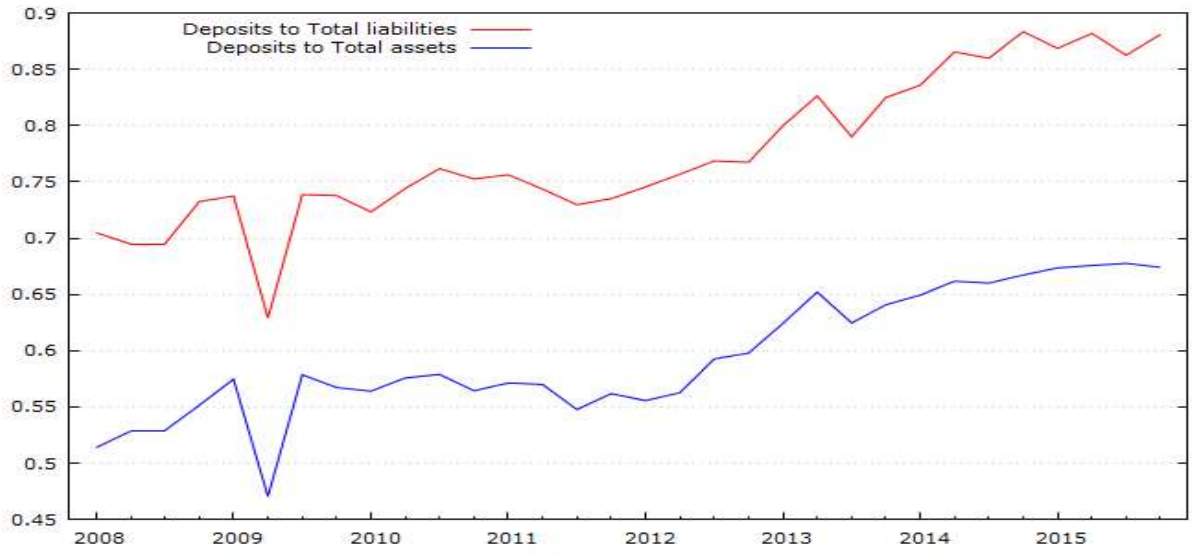


Figure 5.1-19 The ratios of deposits to total liabilities and deposits to total assets.

Source: Author

5.1.8. The Change of the RWA – RWA_Ch

After the second quarter of 2008 until the and of the post-regulation period the RWA increased continuously, RWA had only two times got very a few reduce in the second quarter of 2012 and in the fourth quarter of 2014. The highest increase was in the fourth quarter of 2011. In overall, the increases of the RWA in the pre-regulation and early of the post-regulation were higher than from the second quarter of 2012 till the end the post-regulation.

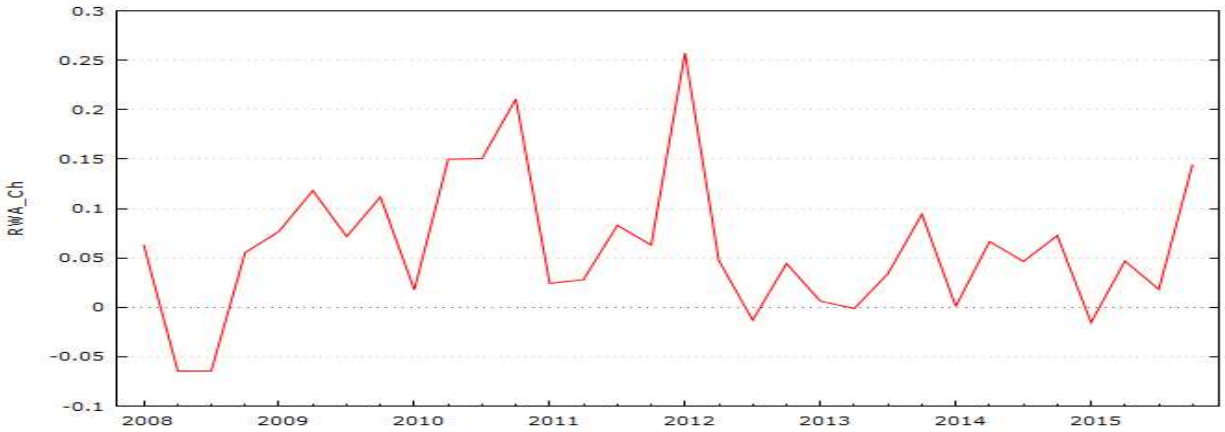


Figure 5.1-20 Line chart the change of RWA, in average.

Source: Author

Even thought the high increase of the RWA in this time did not cause a high increase of the RWA scale to the total assets as shown in Figure 5.1 – 20. However, that was the time the TGL_TA increased sharply while the interbank lending had a strong reduce. This time was also the time recorded the decreases of the retained earnings, ROA and the capital prudential ratios.

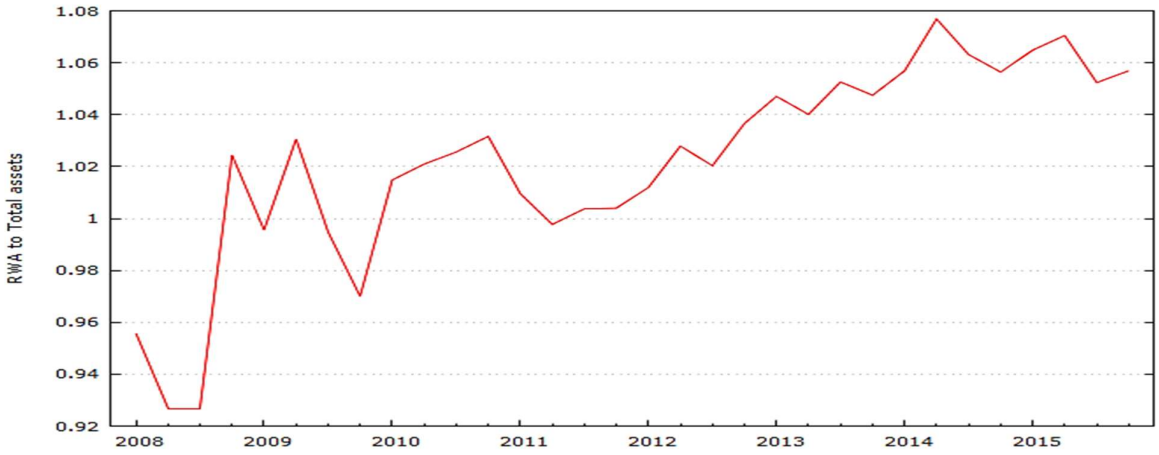


Figure 5.1-21 Line chart the ratio of RWA to total assets, in average.

Source: Author

5.1.9. The Ratio of Loss Provision to Total Assets

Figure 5.1 – 21 shows that except a very high ratio of the LP_TA at quarter third of 2008, in the post-regulation period the LP_TA was higher than its level in the pre-regulation period. Figure 5.1 – 22 adds the information that the direction of the LP_TA was similar to the directions of the RWA to total assets and two other approaches of the loss provision those are loss provision divided to RWA and divided to non-bank lending. The charts imply that the fluctuation direction of the LP_TA was similar to the fluctuation directions of the non-bank lending and the RWA

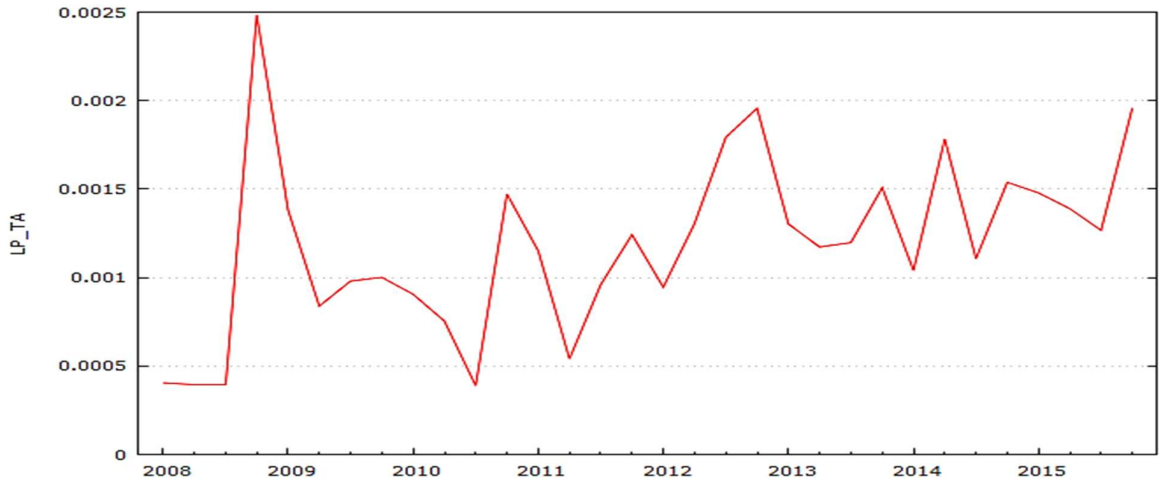


Figure 5.1-22 Line chart the ratio of loss provision to total assets, in average.
Source: Author

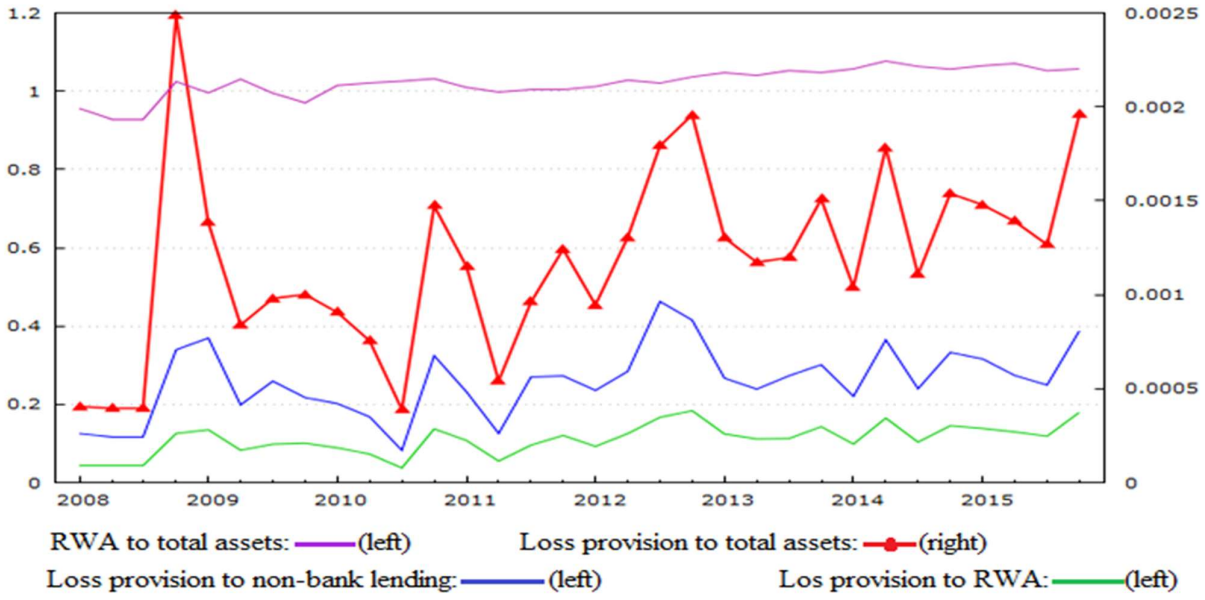


Figure 5.1-23 Line chart the ratios of loss provision to total assets, to non-bank lending, to RWA; and RWA to total assets; in average.

Source: Author

5.1.10. The Ratio of Loss Allowances To Total Assets

LA_TA had a sharp increase in the second quarter of 2008, then it was almost stable until the launch of capital regulation requirement. In the post-regulation, LA_TA had a lowest value in the third quarter of 2011 before got in the second increase. In the second increase, LA_TA grew continuously in three quarters from 0.05 to almost 0.1. After the second sharp increase, LA_TA kept on its increasing with an ascending trend until the end of the post-regulation period. An alternative calculate which divides the loss allowance to RWA showed an almost the same trend as the LA_TA. The line charts of a calculation on non-bank lending also provides a similar trend to the LA_TA, while the chart of RWA divides to total assets just indicates a similar increase trend to the LA_TA. The information of LA_TA could hint that the loss allowance might positive increase together with the increase of non-bank lending and the RWA, meaning that recently the business of the VcB might became riskier.

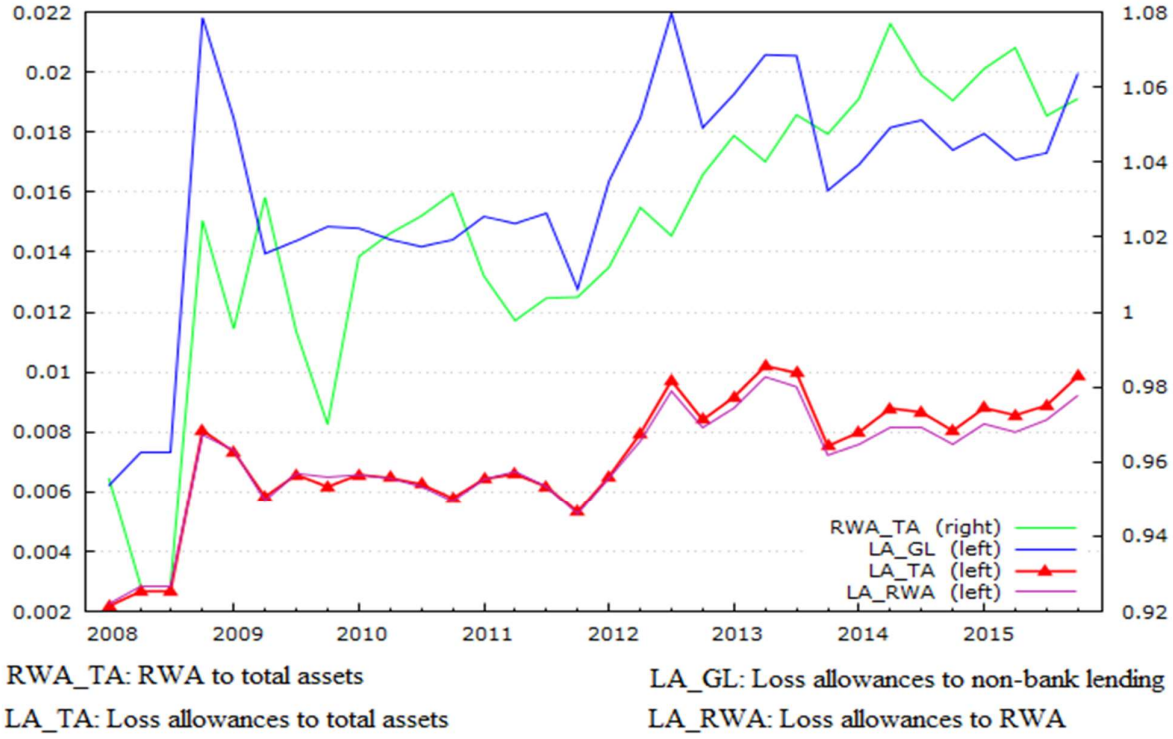


Figure 5.1-24 Line chart the ratio of loss allowances to total assets, in average.

Source: Author

Line chart of LA_NL in Figure 5.1-1 reports that this variable had an increase in early of the post-regulation period then keep a variation between 0.016 and 0.020, a higher level than its variation in the pre-regulation. Figure 5.1 – 14 shows that during the pre-regulation period, LA_NL of the VCB bank was highest in compare with the others. Even though the LA_NL chart of the VCB bank quiet differed to the others,

but the line chart of LA_NL in Figure 5.1 – 1 provided a general trends of the banks in the sample. Together with the relevant charts, Figure 5.1 – 15 reports that the increase of LA_NL was mostly contributed by the evolution of loan loss allowance. It means that in the post-regulation period, the riskiness loan ratio was higher than in the pre-regulation period, in other words, in the post-regulation period, the VcB did their business with a riskier loan in compare with the pre-regulation period.

5.1.11. The Ratio of Interest Income - IER

Line chart of IER in Figure 5.1 – 24 shows that this ratio continuously increased from early of 2008 till first half of 2012 when it got the highest value, then IER continuously dropped in five quarters. IER stopped its drop at almost 0.6 in quarter third of 2013, then varied between 0.6 and 0.8 till the end of the post-regulation period. Figure 5.1 – 26 provides a clear similar variation to the average variation. The box plots of IER's components provides that the variation of the interest income was the largest, then second large was the interest expenditure variation. The box plot of IER shows that this ratio always varies upper zero while its components were varied between under and upper zero, meaning that the numerator and the denominator of this ratio had a positive association.

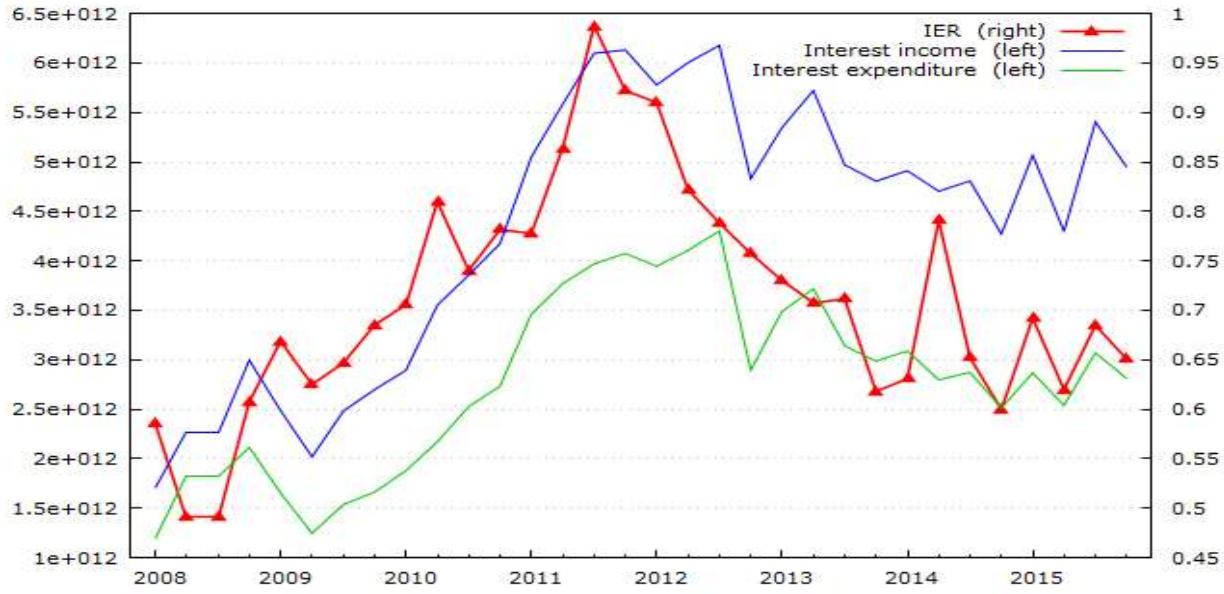


Figure 5.1-25 Line chart the IER, interest income and interest expenditure. In average.

Source: Author

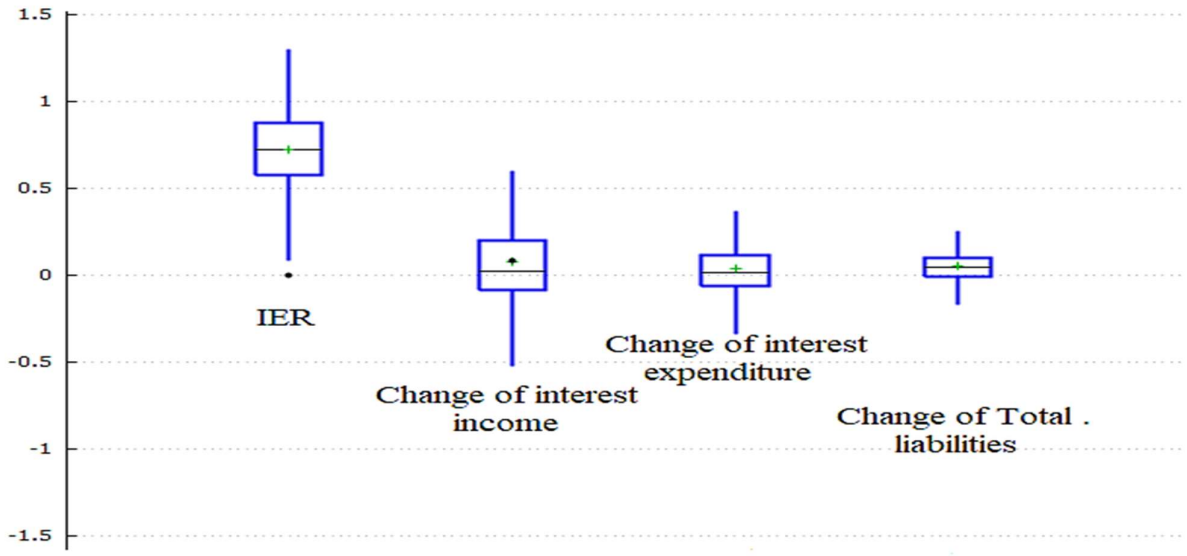


Figure 5.1-26 Box plot the IER, the change of interest income, interest expenditure and total liabilities.

Source: Author

Summary the Descriptive Statistic:

In the post-regulation CPR1, CPR2 and ROA had a simultaneous decline.

The Share_G had the fluctuations upper zero but in the post-regulation period this indicator showed a less increase of the share number than in the pre-regulation period.

Almost of throughout the periods the RE_S varied upper 0.1, from 2013, the RE_S increased ascendingly but within a lower level than before.

The TGL_TA increase continuously throughout the periods, especial in one year after the launch of the capital regulation requirement. Meanwhile, the interbank lending was almost invert. The trend direction of the TGL_TA looked similar to the one of Vietnam's GPD.

The Deposits were ascending increase but the gap between the deposits and the total assets descended.

In the post-regulation scale of the RWA to total assets increased ascendingly. Connect with the others relevant indicators, while the RWA increase, the scale of the non-bank lending, the scale of the loss provision to total assets, the scale of the loss allowance to total assets increase as well. Meanwhile, the capital prudential ratios, the ROA, the interbank lending and the IER decrease. Only the RE_S looked most stable at all.

The information hints that the VcB did not concentrate on the capital regulation implementation, while the increase on the total assets together with the increase of the RWA recently might lead to the business of the VcB became riskier and loss of efficiency.

5.2. Result From Regression Analysis

Table 5.2 – 1 shows the correlation of all independent and dependent variables used in the regression analyses. The IBL_Ch, Depo_Ch, RWA_Ch and log_TA influence negatively on CPR1 and CPR2 (p-value<0.01), indicating that the higher the interbank lending or higher deposits, the lower capital prudential ratios banks get or invert. While the Share_G, RE_S and TGL_TA effect positively on the CPR1 and CPR2 (p-value<0.01), implying that the banks' capital prudential ratios might improve when the non-bank lending grows or when the banks could increase the retained earnings. In addition, the capital prudential ratios positively correlate with the ROA but negatively correlate with the LP_TA and LA_TA, this information might indicate that the banks could have efficiency when their capital improved, and the loss leads to the decrease of the capital regulation implementation as well as the decrease of the ROA. The information in this table is also consistent with the regression results of models (5.2-1), (5.2-2) and (5.2-3) and (5.2-4) below.

The PAM for CPR1 and CPR2 are without dummy variable, model (4.1-5) adapted:

$$\begin{aligned}CPR1_{i,t} &= \beta_{1,0} + (\lambda\beta_{11})Share\_G_{i,t} + (\lambda_1\beta_{12})RE\_S_{i,t} + (\lambda_1\beta_{13})TGL\_TA_{i,t} + \\ &(\lambda_1\beta_{14})IBL\_Ch_{i,t} + (\lambda_1\beta_{15})Depo\_Ch_{i,t} + (\lambda_1\beta_{16})RWA\_Ch_{i,t} + \\ &(1-\lambda_1)CPR1_{i,t-1} + (\lambda_1\beta_{17})log\_TA_{i,t} + U_{31,i,t}\end{aligned} \quad (5.2\text{-}1)$$

$$\begin{aligned}CPR2_{i,t} &= \beta_{2,0} + (\lambda_2\beta_{21})Share\_G_{i,t} + (\lambda_2\beta_{22})RE\_S_{i,t} + (\lambda_2\beta_{23})TGL\_TA_{i,t} + \\ &(\lambda_2\beta_{24})IBL\_Ch_{i,t} + (\lambda_2\beta_{25})Depo\_Ch_{i,t} + (\lambda_2\beta_{26})RWA\_Ch_{i,t} + \\ &(1-\lambda_2)CPR2_{i,t-1} + (\lambda_2\beta_{27})log\_TA_{i,t} + U_{32,i,t}\end{aligned} \quad (5.2\text{-}2)$$

The U_{31}, U_{32} are saved to be the regressors in model (5.2-7) and (5.2-8) below.

The PAM for CPR1 and CPR2 with dummy variables, model (4.1-6) adapted:

$$\begin{aligned}CPR1_{i,t} &= \beta_{1,0} + (\lambda_1\beta_{11})Share\_G_{i,t} + (\lambda_{1d}\beta_{11d})Share\_G_{i,t}\times D_{i,1} + (\lambda_1\beta_{12})RE\_S_{i,t} + \\ &(\lambda_{1d}\beta_{12d})RE\_S_{i,t}\times D_{i,1} + (\lambda_1\beta_{13})TGL\_TA_{i,t} + (\lambda_{1d}\beta_{13d})TGL\_TA_{i,t}\times D_{i,1} + \\ &(\lambda_1\beta_{14})IBL\_Ch_{i,t} + (\lambda_{1d}\beta_{14d})IBL\_Ch_{i,t}\times D_{i,1} + (\lambda_1\beta_{15})Depo\_Ch_{i,t} + (\lambda_{1d}\beta_{15d})Depo\_Ch_{i,t}\times D_{i,1} \\ &+ (\lambda_1\beta_{16})RWA\_Ch_{i,t} + (\lambda_{1d}\beta_{16d})RWA\_Ch_{i,t}\times D_{i,1} + (1-\lambda_1)CPR1_{i,t-1} + (1-\lambda_{1d})\ CPR1_{i,t-1}\times D_{i,1} + \\ &(\lambda_1\beta_{17})log\_TA_{i,t} + \varepsilon_{1,i,t}\end{aligned} \quad \mathbf{(5.2\text{-}3)}$$

$$\begin{aligned}CPR2_{i,t} &= \beta_{2,0} + (\lambda_2\beta_{21})Share\_G_{i,t} + (\lambda_{2d}\beta_{21d})Share\_G_{i,t}\times D_{i,1} + (\lambda_2\beta_{22})RE\_S_{i,t} + \\ &(\lambda_{2d}\beta_{22d})RE\_S_{i,t}\times D_{i,1} + (\lambda_2\beta_{23})TGL\_TA_{i,t} + (\lambda_{2d}\beta_{23d})TGL\_TA_{i,t}\times D_{i,1} + \\ &(\lambda_2\beta_{24})IBL\_Ch_{i,t} + (\lambda_{2d}\beta_{24d})IBL\_Ch_{i,t}\times D_{i,1} + (\lambda_2\beta_{25})Depo\_Ch_{i,t} + (\lambda_{2d}\beta_{25d})Depo\_Ch_{i,t}\times D_{i,1} \\ &+ (\lambda_2\beta_{26})RWA\_Ch_{i,t} + (\lambda_{2d}\beta_{26d})RWA\_Ch_{i,t}\times D_{i,1} + (1-\lambda_2)CPR2_{i,t-1} + (1-\lambda_{d2})\ CPR2_{i,t-1}\times D_{i,1} + \\ &(\lambda_1\beta_{27})log\_TA_{i,t} + \varepsilon_{2,i,t}\end{aligned} \quad \mathbf{(5.2\text{-}4)}$$

The model to analyse the effect of the capital implementation on the ROA also is model (4.1-5), adapted:

$$ROA_{i,t} = \beta_{3,0} + \beta_{31}Share\_G_{i,t} + \beta_{32}RE\_S_{i,t} + \beta_{33}TGL\_TA_{i,t} + \beta_{34}IBL\_Ch_{i,t} + \beta_{35}Depo\_Ch_{i,t} + \beta_{36}RWA\_Ch_{i,t} + \beta_{37}\mathbf{CPR1}_{i,t-1} + \beta_{38}log\_TA_{i,t} + U_{33,i,t} \quad (5.2 - 5)$$

$$ROA_{i,t} = \beta_{4,0} + \beta_{41}Share\_G_{i,t} + \beta_{42}RE\_S_{i,t} + \beta_{43}TGL\_TA_{i,t} + \beta_{44}IBL\_Ch_{i,t} + \beta_{45}Depo\_Ch_{i,t} + \beta_{46}RWA\_Ch_{i,t} + \beta_{47}\mathbf{CPR2}_{i,t-1} + \beta_{48}log\_TA_{i,t} + U_{34,i,t} \quad (5.2 - 6)$$

Diagnostic tests for panel were conducted. The tests show that fixed effect is consistency for the models fitting. According to this result, the author saved the residuals from fixed effect model to use in the next analyses. In addition, the multicollinearity testable regressions reported that the Variance Inflation Factor (hereafter VIF) of the models (5.2-1) and (5.2-2) is less than 2, there is no multicollinearity problem to the models (5.2-1) and (5.2-2). Meanwhile, the VIF test for the models with dummy variables had a few potential issues (see Appendix 1).

5.2.1. The Adjustment Speed Estimate

There are two groups of the models to estimate the adjustment speed of the capital prudential ratios. Table 5.1 – 2 reports the estimations of models (5.2-1) and (5.2-2), these estimations were without the dummy variables. Table 5.2 – 3 and Table 5.2 – 4 provide the results of estimated models (5.2-3) and (5.2-4), these tables show the results of regressions with the dummy variables for the pre- and post-regulation periods. Almost all of the coefficients in Table 5.2 – 2, Table 5.2 – 3 and Table 5.2 – 4 consist with the correlation information in Table 5.2 – 1.

The R-squares in Table 5.2 – 2, Table 5.2 – 3 and Table 5.2 – 4 demontrade that the models have a very good estimation to explain the variation of CPR1 (0.91 and 0.93) and CPR2 (0.94 and 0.90). In Table 5.2-3, the R-squared of bank-fixed effect with the dummy variables show the explanatory power is higher (0.92) in comparison with the one of pooled regressions (0.89), whereby, the adjustment speeds were estimated by bank-fixed effect with dummy variables showing a higher speed of the adjustment than the one of pooled. This information might hint that there are some differences between the banks from the powerful effects of their capital regulation adjustment speed. From the author's point of view, the figures are 92% and 89% of model (5.2-3), and 92% and 92% of model (5.2-4) are the high explanations, and the author decided to use the results of the fixed effects in almost all of the explanations and the discussions in this thesis. However, the estimations from pooled effects reported to add information together with the main based results and for the comparisons in the analyses.

Table 5.2-1 Correlation matrix

	CPR1	CPR2	CPR11	CPR21	Share_G	RE_S	TGL_TA	Ch_IBL	Depo_Gw	RWA_Gw	log_TA	ROA	LP_TA	LA_TA	IER
CPR1	1	0.985	0.906	0.890	0.014	0.025	0.097	-0.133	-0.133	-0.141	-0.392	0.158	-0.190	-0.114	0.176
CPR2		1	0.891	0.896	0.009	0.033	0.170	-0.156	-0.147	-0.133	-0.367	0.112	-0.099	-0.051	0.223
CPR11			1	0.987	-0.051	-0.091	0.042	0.076	0.103	0.153	-0.411	0.067	-0.143	-0.163	0.109
CPR21				1	-0.071	-0.083	0.101	0.093	0.104	0.146	-0.382	0.036	-0.093	-0.112	0.145
Share_G					1	-0.055	-0.086	0.043	0.170	0.216	-0.014	-0.015	0.139	-0.012	-0.091
RE_S						1	0.098	0.008	-0.098	-0.072	0.448	0.446	0.048	0.400	0.339
TGL_TA							1	-0.210	-0.090	-0.162	0.406	-0.022	0.326	0.477	0.277
Ch_IBL								1	0.397	0.637	-0.002	-0.003	-0.041	-0.131	-0.145
Depo_Gw									1	0.728	-0.048	0.017	0.110	-0.127	-0.122
RWA_Gw										1	-0.069	-0.052	0.222	-0.118	-0.141
log_TA											1	0.163	0.334	0.535	0.181
ROA												1	-0.279	-0.049	0.407
LP_TA													1	0.406	0.197
LA_TA														1	0.241
IER															1

Source: Calculated by the author

i. The CPR1

Column (2) of Table 5.2 – 2 show the adjustment speed estimate of model (5.2-1). Overall, the adjustment speed estimate of CPR1 is faster than the adjustment speed of the CPR2. The adjustment speed of the CPR1 tells that in a quarter, the VcB adjusts 19.9% (1 – 0.801) the gap of their one percent change of the CPR1. In another words, according to the estimation, the VcB need mostly one year and a half to reach one percent change of their CPR1 target (100%/19.9%/quarter=5.03 quarters). The estimation with the dummy variables in the model (5.2-3) shows that in the pre-regulation period the CPR1 adjusted with a slower speed than that in the post-regulation period. It took the CPR1 a little bit more than one and a half year to achieve one percent chance of the CPR1 in the pre-regulation period (100%/16.6%/quarter=6.02 quarters), then the adjustment speed had a small increase in the post-regulation period. It took almost one and a half year for such the same achievement of the CPR1 (100%/18.14%/quarter=5.51 quarter) in the post-regulation period.

ii. The CPR2

Column (6) of Table 5.2 – 2 shows the adjustment speed estimate of the CPR2. Overall, the adjustment speed estimate of the CPR2 adjusted at 15.84% per quarter (1 – 0.8416). In throughout the periods, this adjustment speed tells that, in a quarter VcB adjusts 15.84% the gap of one percent change of the CPR2. In another words, according to this estimation, the VcB need almost seven quarters to reach their one percent change of the CPR2. The results of the estimation by model (5.2-4) with dummy variables indicate that in the pre-regulation period the adjustment speed of the CPR2 is faster than that in the post-regulation period. In the pre-regulation period, the VcB needed less than six quarters to achieve one percent change of the CPR2. Then, in the post-regulation period, the VcB needed almost seven quarters for such the same achievement.

Overall, without dummy variable in the model, the CPR1 adjusted faster than the CPR2 (19.9% per quarter versus 15.84% per quarter). While, the estimations those has dummy variables show a little bit differences. In the post-regulation period, the CPR1 got a faster adjustment speed than that in the pre-regulation (18.14% per quarter in the post-regulation period versus 16.60% per quarter in the pre-regulation period), meanwhile the CPR2 was contrary (14.94% per quarter in the post-regulation period and 18.99% per quarter in the pre-regulation period). Meaning that during the whole sub-periods, in the case of the VcB, the capital prudential ratio that calculated on risk-weighted assets got more difficult to achieve its target than calculated on actual assets especially in the post-regulation period. However, the charts of these indicators indicated that even though Tier 1 increased, but both of the capital prudential ratios decreased in throughout the periods. Thus, the situation could be caused by both the total assets and the RWA increased all the times with the higher level than the increase of the Tier 1. And in the post-regulation period, the adjustment speed of the CPR2 decreased because the fluctuation amplitude of the RWA became smaller.

Table 5.2-2 Regression of partial adjustment models – equation (5.2-1) and (5.2-1)

Dependent variable	CPR1						CPR2					
WLS estimation	Within			Pooling			Within			Pooling		
	(1)		(2)	(3)		(4)	(5)		(6)	(7)		(8)
Share_G	0.0297	***	0.1492	0.0244	***	0.1654	0.0225	***	0.1421	0.0291	***	0.1584
	(0.0011)			(0.0006)			(0.0005)			(0.0009)		
RE_S	0.0460	***	0.2313	0.0362	***	0.2458	0.0524	***	0.3307	0.0344	***	0.1873
	(0.0040)			(0.0005)			(0.0006)			(0.0016)		
TGL_TA	0.0133	***	0.0669	0.0139	***	0.0945	0.0116	***	0.0730	0.0177	***	0.0962
	(0.0022)			(0.0006)			(0.0009)			(0.0012)		
IBL_Ch	-0.0074	***	-0.0374	-0.0013	***	-0.0089	-0.0010	***	-0.0062	-0.0078	***	-0.0422
	(0.0006)			(0.0002)			(0.0002)			(0.0008)		
Depo_Ch	-0.0219	***	-0.1102	-0.0131	***	-0.0892	-0.0121	***	-0.0763	-0.0265	***	-0.1440
	(0.0021)			(0.0006)			(0.0004)			(0.0018)		
RWA_Ch	-0.0312	***	-0.1568	-0.0551	***	-0.3742	-0.0565	***	-0.3569	-0.0258	***	-0.1407
	(0.0031)			(0.0006)			(0.0006)			(0.0026)		
$CPR1_{t-1}$	0.8010	***	**[0.1990]**	0.8527	***	**[0.1473]**	--		**--**	--		**--**
	(0.0108)			(0.0016)								
$CPR2_{t-1}$	--		--	--		--	0.8416	***	**[0.1584]**	0.8163	***	**[0.1837]**
							(0.0023)			(0.0044)		
log_TA	-0.0061	***	-0.0305	-0.0082	***	-0.0555	-0.0039	***	-0.0243	-0.0087	***	-0.0474
	(0.0015)			(0.0002)			(0.0003)			(0.0003)		
Multiple R-square	0.91			0.93			0.94			0.90		

Number in square parenthesis [ ] are the values of λ, numbers in parenthesis ( ) are the standard errors. Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

Source: Calculated by the author

Table 5.2-3 Regression of partial adjustment models – equation (5.2-3)

WLS estimators	Dependent variable: CPR1			
	Within		Pooling	
	Short-run	Long-run	Short-run	Long-run
	(1)	(2)	(3)	(4)
Share_G	0.0363 ***	0.2187	0.0360 ***	0.2402
	(0.0003)		(0.0006)	
RE_S	0.0626 ***	0.3771	0.0524 ***	0.3467
	(0.0009)		(0.0008)	
TGL_TA	0.0083 ***	0.0437	0.0156 ***	0.0821
	(0.0009)		(0.0004)	
IBL_Ch	-0.0056 ***	-0.0337	-0.0064 ***	-0.0427
	(0.0003)		(0.0031)	
Depo_Ch	-0.0250 ***	-0.1506	-0.0271 ***	-0.1808
	(0.0010)		(0.0010)	
RWA_Ch	-0.0289 ***	-0.1741	-0.026 ***	-0.1734
	(0.0017)		(0.0001)	
$CPR1_{t-1}$	0.8340 ***	[**0.1660**]	0.8501 ***	[**0.1499**]
	(0.0012)		(0.0009)	
log_TA	-0.0090 ***	-0.0542	-0.0085 ***	-0.0567
	(0.0006)		(0.0005)	
Dummy	0.0017 ***	0.0102	0.0002 ***	0.0013
	(0.0002)		(0)	
Share_G:Reg	-0.0071 ***	0.1610	-0.0092 ***	0.1566
	(0.0052)		(0.0004)	
RE_S:Reg	-0.0196 ***	0.2370	-0.0203 *	0.1859
	(0.0005)		(0.0088)	
TGL_TA:Reg	0.0052 ***	0.0744	0.0017 .	0.1011
	(0.0011)		(0.0009)	
IBL_Ch:Reg	-0.0010 ***	-0.0364	-0.0011 **	-0.0441
	(0.0003)		(0.0005)	
Depo_Ch:Reg	0.0043 ***	-0.1141	0.0048 ***	-0.1303
	(0.0012)		(0.0015)	
RWA_Ch:Reg	0.0026	-0.1450	-0.0020 **	-0.1403
	(0.0018)		(0.0001)	
$CPR1_{t-1}$:Reg	-0.0154 ***	[**0.1814**]	-0.0212 ***	[**0.1711**]
	(0.0033)		(0.0020)	
Multiple R-squared:	0.92		0.89	
Hausman Test for regressors within versus random chisq = 125.57, df=9, p-value < 2.2e-16				

Number in square parenthesis [ ] are the values of λ, numbers in parenthesis ( ) are the standard errors. Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 Source: calculated by the author

Table 5.2-4 Regression of partial adjustment models – equation (5.2-4)

WLS estimators	Dependent variable: CPR2			
	Within		Pooling	
	Short-run	Long-run	Short-run	Long-run
	(1)	(2)	(3)	(4)
Share_G	0.0368 ***	0.1938	0.0360 ***	0.2049
	(0.0002)		(0.0006)	
RE_S	0.0669 ***	0.3523	0.0522 ***	0.2968
	(0.0008)		(0.0037)	
TGL_TA	-0.0045 ***	-0.0237	0.0155 ***	0.0814
	(0.0013)		(0.0014)	
IBL_Ch	-0.0008 **	-0.0042	0.0026 ***	0.0145
	(0.0003)		(0.0004)	
Depo_Ch	-0.0100 ***	-0.0527	-0.0036 **	-0.0205
	(0.0009)		(0.0012)	
RWA_Ch	-0.0671 ***	-0.3533	-0.0599 ***	-0.3409
	(0.0014)		(0.0016)	
$CPR2_{t-1}$	0.8101 ***	[**0.1899**]	0.8243 ***	[**0.1757**]
	(0.0018)		(0.0066)	
log_TA	-0.0084 ***	-0.0442	-0.0090 ***	-0.0512
	(0.0002)		(0.0006)	
Dummy	0.0006 **	0.0032	0.0011 ***	0.0063
	(0.0002)		(0.0002)	
Share_G:Reg	-0.0093 ***	0.1841	-0.0092 ***	0.1793
	(0.0003)		(0.0004)	
RE_S:Reg	-0.0178 ***	0.3286	-0.0255 ***	0.1783
	(0.0011)		(0.0023)	
TGL_TA:Reg	0.0117 ***	0.0482	-0.0012	0.0953
	(0.0015)		0.0018	
IBL_Ch:Reg	-0.0011 ***	-0.0127	-0.0042 ***	-0.0110
	0.0004		(0.0005)	
Depo_Ch:Reg	0.0031 **	-0.0462	-0.0041 ***	-0.0515
	(0.0010)		(0.0009)	
RWA_Ch:Reg	0.0076 ***	-0.3983	-0.0021 .	-0.4147
	(0.0011)		(0.0012)	
$CPR2_{t-1}$:Reg	0.0405 ***	[**0.1494**]	0.0262 ***	[**0.1495**]
	(0.0067)		(0.0077)	
Multiple R-squared:	0.92		0.92	

Hausman Test for regressors within versus random, chisq = 80.355, df=9, p-value = 1.374e-13

Number in square parenthesis [ ] are the values of λ, numbers in parenthesis ( ) are the standard errors. Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 Source: calculated by the author

5.2.2. The Influence Factors on the Capital Regulation Implementation

In this section, the author interprets the result of the independent variables in models (5.2-3) and (5.2-4) mainly. The interpretation in this section concerns the calculation results only, discussion is conducted in the next section.

According to the statistically significant that higher than 90%, all of the independent variables contributed to the adjustment speeds of the capital regulations. In which, in the post-regulation period, only the RWA_Ch in model (5.2-3) did not influence on the CPR1 (p-value>0.1) compare with the pre-regulation period. While the dummy variables in the model (5.2-4) had the statistically significant for all of the independent variables (p-value<0.01), meanwhile, all the independent variables had the different influences to the CPR2 in the post regulation.

Columns (2) and (4) in Table 5.1 – 3 and Table 5.1 – 4 show the calculations of the β and λ, in which the variables added "Reg" together with its name show the β and λ for the post-regulation.

i. The Growth of Common Share Number – Share_G

The Share_G estimates are in columns (2) of Table 5.1 – 3 and Table 5.1 – 4 and show a positive effect on the capital ratios (p-value<0.01). The result is consistent with the expectations and economics. The dummy of this indicator shows a statistically significant decrease of its contribution to the adjustment of the capital ratios in the post-regulation period.

In the pre-regulation period, the coefficient of the Share_G reports that this indicator was the second magnitude factor influencing the CPR1. Then, even though its influence had a decrease but the Share_G still is the second magnitude factor that influenced the CPR1.

The Share_G was the third magnitude in six factors influencing the CPR2. This influence had a small decrease in the post-regulation period, but its influence degree was not different. The results imply that the Share_G is more sensitive to the CPR1 than to the CPR2. These results might reflect that for the VcB; the issuance shares were not the most important channel to built the capital prudential ratios. Thus, the reduction of the new issuance shares in the post-regulation period might be caused by this reason.

ii. The Retained Earnings Ratio – RE_S

The coefficients of the RE_S in the columns (2) of Table 5.1 – 3 and Table 5.1 – 4 show that this indicator is the highest influence factor on the CPR1, while is the second influence magnitude factor on the CPR2. All the estimations of the RE_S report the statistically significant positive associations, consist with both the expectation and economics. Similar to the results of the Share_G, the estimates of the RE_S in the post-regulation also show few decreases in its coefficients, but the influence degrees were unchanged. Thus, the effect of the RE_S is more sensitive to

the CPR1 than to the CPR2. This is the factor reported the most stable in throughout the periods as its most important channel to build the capital prudential ratios. This result could add with the findings of Gombola et al. (2015) about the relationship of banks' capital ratio is positive relationship with banks' earnings.

iii. The Non-bank Lending Ratio – TGL_TA

The TGL_TA estimates are statistically significant negative association with the CPR2 in the pre-regulation period then positive in the post-regulation period, while the predictions of TGL_TA for the CPR1 show the statistically significant positive in whole the sub periods. The difference association of the TGL_TA and the CPR1 in between the sub-periods imply that other approaches to the assets rating might carry others analysis results. In this case, the association between the TGL_TA and the CPR2 in whole the sub-periods could report the different trends of this association between the two sub-periods, meanwhile, the actual assets approach could not. Connect to the description statistic, the change of the influence direction of the CPR2 might reflect the visible difference from the charts of the TGL_RWA versus TGL_TA from the middle to the end of the post-regulation. The information could consolidate the empirical evidence to imply that the increase of the non-bank lending was together with the increase of the RWA. This empirical evidence is not actually a contrast evidence with the findings of Coffinet et al. (2012). But this result is in a same line with the findings of Shaw et al. (2013), Mosk et al. (2013), Karmakar et al. (2015) and Lepetit et al. (2015) that to respond the capital requirements, banks accumulate more equity instead of cutting back on lending.

iv. The Change of the Interbank Lending – IBL_Ch

The coefficients of the IBL_Ch report the least influence of this indicator on both the capital ratios. In the post-regulation period, the coefficients of IBL_Ch showed a higher influence on both the capital ratios than in the pre-regulation period, but still the least influential factor that had a negative effect on the CPR1 and CPR2. However, the separation of the interbank lending from of the bank's total lending to examine how this factor influence on the capital regulation implementation is a new approach. Therefore, the statistically significant negative effect of the IBL_Ch on the capital ratios in whole the sub-periods indicates that this part has a different trend to the remained of banks' lending. In the previous studies concerned above, the researchers did not analyse association between the capital regulation and the interbank lending separately from the total lending. Whereby, these IBL_Ch estimations are the novel findings, could add to the empirical evidence of the capital regulation implementation especially is the case of the Basel application in a developing country.

v. The Change of the Deposits – Depo_Ch

The coefficients of the Depo_Ch in the columns (2) of Table 5.1 – 3 and Table 5.1 – 4 are the statistically significant negative association with both the capital ratios in throughout the periods. In the post-regulation period, the Depo_Ch showed a small

decrease of it influence on the capital prudential ratios but the still a negative association with them. The Depo_Ch was a higher influence on the capital prudential ratios than the IBL_Ch. This result might support the suggestion of Gorton & Winton (2003) that raising capital requirements force banks to be supplied fewer deposits, but in an opposite way. That is, throughout the periods, the banks' capital prudential ratios descended. Meanwhile, the deposits ascended consequently. However, the coefficients of the Depo_Ch had a reduce in the post-regulation period might imply that the regulations made the banks be supplied a fewer deposit than before. Connecting this result with the information of TGL_TA, the empirical evident means that the adjustment speed of CPR1 and CPR2 could be increased when the gap between deposit volume and credit volume becomes smaller or invert. This result is consistent with the suggestion of Clark and Jokung (2015) that higher leverage increases the return on assets, this given that banks can increase their return on assets and their assets base by reducing their capital requirements.

vi. The Change of the RWA – RWA_Ch

In the columns (2) of the Table 5.2 – 3 and Table 5.2- 4, the estimates show that the RWA_Ch is the highest influence on the CPR2, while the influence of RWA_Ch on CPR1 is the third magnitude, smaller than the influence of RE_S and Share_G. In addition, the estimation of RWA_Ch in the post-regulation reported in column (2) of Table 5.2 – 3 is not statistically significant, while in Table 5.2 – 4 the estimates show the statistically significant higher negative influence of the RWA on the CPR2 in post-regulation period than before. Connect these results with the correlation coefficient between log_TA and the RWA_Ch, the matter might indicate that in the post-regulation period, the VcB increased their average RWA while the size of the total assets also increased but these increases did not have a relationship or the fluctuation of the average RWA might be different from the fluctuation of the total assets.

5.2.3. The Capital Implementation and the Banks' ROA

In this section, the author interprets the two records concerned in section 4 above. Those are the estimations of ROA use model (4.1-5) (equations (5.2-5) and (5.2-6)) – the second record; the estimations of ROA use model (4.1-2) (equations (5.2-7) and (5.2-8)) – the third record. These records are to answer for the research question: "whether the manner of the adjustment by the Vietnamese commercial banks to the capital target leads to the efficiency for the banks?".

vii. The Second Record

The second record is the estimation result from the equations (5.2-5) and (5.2-6). In Table 5.2 – 5, columns (1), (2) show the estimation of equation (5.2-5) and columns (3), (4) show the estimation of equation (5.2-6). The ROA is estimated with the same factors that estimated the adjustment speed of the capital ratios. Almost all of the coefficients in Table 5.2 – 5 are consistent with the correlation in Table 5.1 – 1. Except for the estimates of the IBL_Ch and the Depo_Ch, the remains estimated by the fixed

effects are consistent with the correlation coefficients. Practically, in general, lending to the non-bank is often riskier than lending in the interbank markets. Therefore, with the same volume of the loan, the lending bank must reserve a bigger buffer for the loss provision of the non-bank lending than the reserve for interbank lending. Thus, the interbank could have a positive relationship with the ROA while the non-bank lending had a negative relationship. In addition, according to the charts in Figure 5.1 – 17, the fluctuation of the Depo_Ch became narrower than before, this situation might be reflected by the positive relationship between the ROA and the Depo_Ch. There was evidence that the Share_G in model (3b.3) had a negative association with the ROA.

Table 5.2-5 Regression equation (5.2-5) and (5.2-6)

Dependent variable	ROA			
	Model (5.2-5)		Model (5.2-6)	
WLS estimators	Within	Pooling	Within	Pooling
	(1)	(2)	(3)	(4)
Share_G	-0.00001*	0.00008***	0.00001	0.00014***
	(0)	(0.00002)	(0.00001)	(0.00001)
RE_S	0.00114***	0.00091***	0.00112***	0.00089***
	(0.00002)	(0.00002)	(0)	(0.00003)
TGL_TA	-0.00066***	-0.00021***	-0.00066***	-0.00024***
	(0.00001)	(0.00003)	(0)	(0.00003)
IBL_Ch	0.00004***	0.00007***	0.00003***	0.00077***
	(0)	(0)	(0)	(0)
Depo_G	0.00023***	0.00028***	0.00021***	0.00028***
	(0.00002)	(0.00004)	(0.00001)	(0.00003)
RWA_Ch	-0.00049***	-0.00051***	-0.00049***	-0.00057***
	(0.00003)	(0.00003)	(0.00002)	(0.00003)
$CPR1_{t-1}$	0.00010	0.00010	--	--
	(0.00008)	(0.00018)		
$CPR2_{t-1}$	--	--	0.00056***	0.00061**
			(0.00004)	(0.00021)
log_TA	-0.00016***	0.00004*	-0.00014***	0.00008***
	(0.00001)	(0.00002)	(0.00001)	(0.00002)
Multiple R-square	0.51	0.53	0.51	0.30

Numbers in parenthesis ( ) are the standard errors. Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

Source: calculated by the author

The second record, overall shows that all of the factors that influence on the speed of the capital regulation implementation statistically significant effect on the ROA. The R-square in Table 5.2 – 5 is significant to explain the ROA, indicates that the manner that the VcB implemented the capital regulation requirements were highly connected to the banks' ROA.

Theoretically, the estimates of the RE_S, Depo_Ch and the log_TA are consistent and confirmed. While the Share_G might evidence that the improvement of the banks' own capital is a positive relationship with the banks' earnings, supports and adds an evidence with Gombola et al. (2015).

In addition, in the two parts of the banks' lending, the statistically significant negative influence of the TGL_TA on the ROA indicates that the increase of the non-bank lending ratio did not support to the ROA. while the IBL_Ch evidenced an inverse. These findings add to the previous studies a detail of the banks' lending behaviour in the Basel capital regulatory regime. That is, in the case of Vietnam, in the banks' total lending, the increase of interbank lending could contribute to the improvement of the ROA while the remains might cause the increase of the credit risk, thereby the ROA became worse.

The RWA_Ch estimate shows a negative relationship with the ROA, similar to its relationship with the capital ratios. The influence of RWA_Ch is thee third magnitude in the six estimator variables and statistically significant. The result indicates that when the VcB shift to a higher average RWA, their ROA might be inferior and inverse otherwise.

viii. The Third Record

In this section, the author reports the estimation result of the capital regulation requirement implementation influence on the ROA, the regression model (4.1-2) adopted and used for the analyses. Three effective factors are expected to have the effect on ROA as models below:

$$\begin{aligned} \text{ROA}_{i,t} &= \alpha_{0,31} + \alpha_{1,31}\text{LP\_TA}_{i,t} + \alpha_{2,31}\text{LA\_TA}_{i,t} \\ &\quad + \alpha_{3,31}\text{IER}_{i,t} + \alpha_{4,31}\mathbf{U31}_{i,t} + \text{Dummy}_{i,1} + u_{31,i,t} \end{aligned} \qquad (5.2\text{ - }7)$$

$$\begin{aligned} \text{ROA}_{i,t} &= \alpha_{0,32} + \alpha_{1,32}\text{LP\_TA}_{i,t} + \alpha_{2,32}\text{LA\_TA}_{i,t} \\ &\quad + \alpha_{3,32}\text{IER}_{i,t} + \alpha_{4,32}\mathbf{U32}_{i,t} + \text{Dummy}_{i,1} + u_{32,i,t} \end{aligned} \qquad (5.2\text{ - }8)$$

Table 5.2 – 5 shows the correlation of the variables in models (5.2-7) and (5.2-8). The correlation provides a negative relationship between LP_TA, LA_TA and ROA, while the others independent variables are positive relationship with ROA. The information of this table is similar to the expectation of the author and also consistency with the regression result of model (5.2-7) and (5.2-8) which shown in Table 5.2 – 6 below.

Table 5.2 – 6 reports the regression estimation. The R-squares in this table provide that the models have an average estimate level to explain the variation of ROA. The Hausman test indicates that fixed effects is consistency. This information might hint that there are some differences between the banks from the effective effects of the capital regulation implementation. However, on the author's point of view, the same

R-square at 67.77% and 68.16 of bank-fixed effects from the regressions are a good result that carried out from just four explanatory variables of the models. The dummy variables confirm a difference between the pre and post-regulation of ROA at 99% of statistically significant, meaning that this factor has a statistically significant difference effect on the ROA after the launch of capital regulation requirement.

Table 5.2-6 Correlation matrix of the variables in models (5.2-7) and (5.2-8)

	ROA	LP_TA	LA_TA	IER	U_{31}	U_{32}
ROA	1	-0.298	-0.069	0.476	0.141	0.164
LP_TA		1	0.439	0.176	0.112	0.052
LA_TA			1	0.223	-0.016	0.002
IER				1	0.005	-0.059
U_{31}					1	0.898
U_{32}						1

Source: Calculated by the author

Table 5.2-7 Regression the models (5.2-7) and (5.2-8)

Dependent variable:	ROA			
	Model (5.2-7)		Model (5.2-8)	
WLS	Within	Pooling	Within	Pooling
	(1)	(2)	(3)	(4)
LP_TA	-0.00093 ***	-0.00070 ***	-0.00088 ***	-0.00065 ***
	(0.00001)	(0.00001)	(0.00002)	(0.00002)
LA_TA	-0.01319 ***	0.00069	-0.01279 ***	-0.00014
	(0.00078)	(0.00042)	(0.00048)	(0.00040)
IER	0.00034 ***	0.00050 ***	0.00037 ***	0.00047 ***
	(0.00001)	(0)	(0)	(0)
U31	0.00565 ***	0.00525 ***		
	(0.00029)	(0.00030)		
U32			0.00635 ***	0.00683 ***
			(0.00020)	(0.00021)
Dummy	-0.00005 ***	-0.00013 ***	-0.00006 ***	-0.00011 ***
	(0)	(0)	(0)	(0)
Multiple R-square	67.77	42.75	68.16	46
Hausman Test	chisq = 1104, df = 5, p-value < 2.2e-16		chisq = 1772.4, df = 5, p-value < 2.2e-16	

Numbers in parenthesis ( ) are the standard errors. Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

Source: Calculated by the author

The third record supports all the author's expectations of the relationship between the ROA and LP_TA, LA_TA, IER, U_{31} and U_{32}. In which, the relationship between the ROA and LP_TA, LA_TA, IER are economically confirmed, similar to the findings of of Lee et al. (2013) that the capital improvement of commercial banks in middle income Asian countries has a negative effect on risk while also has a positive effect on profitability. Moreover, the relationship between the ROA and the residuals provides an evidence that almost all of the influences which connect to the adjustment of the capital ratios also effect on the ROA, in the case of the VcB. This result might hint a connection with the findings of Gombola et al. (2015) about the relationship of banks' capital management behaviour with their earning management, this relationship would be a part of the unobserved term mentioned above.

ix. The Expected Loss – LP_TA and LA_TA

Both the LP_TA and LA_TA are statistically significant negative influence on the ROA. In which the LA_TA shows a higher coefficient than that of the LP_TA, meaning the loss allowances was more influence on the ROA than the loss provision. Actually, when the banks reserve for buffer for the expected loss, the allowance buffer has a higher loss probability default than the buffer for the loss provision. The loss allowance is calculated on the bad loans and the bad investments, while the loss provision is the figure in advance found the exposure of the loans or investments. Therefore, the LA_TA with a higher coefficient than the LP_TA indicates the damage that stands by the ROA clearly and practically.

x. Interest Income Rate – IER

IER shows a statistically significant positive effect on ROA, meaning that in the whole period, the coefficients of the IER is smallest in the independent variables of the model (2a) and (2b). The very low coefficient of IER reports that IER had a very little effect on ROA. However, this information provides a confirmation that the interest income rate was statistically significant positive effect on ROA and in the post-regulation period it had a similar trend to the ROA, the descending.

xi. The Unobserved Terms From the Regulation Implementation Estimates – U_{31} & U_{32}

Both of the residuals from regression models (5.2-1) and (5.2-2) has a statistically significant influence on the ROA. Moreover, the coefficient of the U31 from regression model (5.2-1) is lower than the one of the U31 from model (5.2-2). Meaning that the capital management based on the RWA has a higher significant positive effect on ROA than the capital management that found the assets actual. These empirical evidences confirmed the expectation of the author, in the same line with a finding of Hoque et al. (2015) that a higher capital regulation control leads to a higher bank's performance. This result also added an empirical evident to the

suggestion of Pessarossi & Weill, (2015) that capital requirements can improve cost efficiency.

5.3. Discussion the Empirical Analysis

In this section, the author discusses the capital regulation implementation, the following evidence regarding the adjustment speed analysis: (i) the CPR1's adjustment speed in the pre-regulation was slower than that of the CPR2 but was inverted in the post-regulation, and overall the adjustment speed of CPR1 was faster than that of the CPR2, and the power of channels that built the capital prudential ratios; (ii) the change the ROA in the two sub-periods; (iii) the scholarly views on these issues.

5.3.1. Adjustment Speed Toward the Capital Regulation and the Contribution Factors

In this section, the author organise the independent variables into three groups to represent three channels contributing to the adjustment of the capital ratios; those are the RWA channel, the equity channel with the Share_G and the RE_S, and the operating channel with lending and deposits.

i. Adjustment Speed and the Contribution of the RWA

Overall, in one quarter, the adjustment speed of CPR1 was 19.9 while the one of CPR2 was 15.84. It means that the adjustment of capital prudential ratio which calculated on RWA adjusted more slowly than the capital that was calculated on the assets actual; it takes almost a year for the adjustment to reach the capital prudential ratio (CPR1 and CPR2) target. Compared with the analyses of De Jonghe & Öztekin (2015), the average adjustment speed estimate, which is not driven by a developed versus developing country distinction, across 64 countries in a year, is 29.7%. The adjustment speed of the VcB was almost twice as fast (19.9 x 4 and 15.84 x 4), the adjustment speed of the CPR1 higher than the maximum, which is 74% in Panama. De Jonghe & Öztekin (2015) found that undercapitalised banks mainly increase in the capital ratio using equity issuances to recapitalise rather than downsizing the bank. And the authors also confirmed that bank profitability increases during inflationary periods, creating more financial flexibility, leading to faster adjustment.

Base on the approach of Shimizu (2015), the capital adjustment speed Japanese banks that calculated on the RWA was higher than calculated on the assets actual. Shimizu explained that this phenomenon could cause by mainly two reasons: the prolonged era of zero interest rates of bond in Japan; a launch of government to postpone the repayment of the SMEs' outstanding loans. The first reason provided an increase of the deposit supply function. Under the balance sheet conditions, the Japanese banks found it difficult to quickly contract their assets. Hence, the Japanese banks chose portfolio risk adjustment rather than size adjustment. The second reason made the Japanese banks slowly adjusted their total assets to avoid the substantial regulatory costs incurred by reducing total assets.

In the case of Vietnam, all of the VcB in the dataset analysed of this thesis are undercapitalised banks. In the pre-regulation period, the adjustments of both the capital prudential ratios looked similar to the argument of Shimizu (2015). But in the post regulation period, the adjustment speed of the CPR2 had a significant reduce (from 18.99% in the pre-regulation to 14.94% in the post-regulation), became slower than the adjustment speed of the CPR1. Because of the prolonged downturn of the stock market in Vietnam which occurred from 2009 till 2014, almost all the VcB did not use equity issuances to recapitalise as the priority solution. Instead, the VcB kept a stable retained earnings as the most source to build their CPR1, while the RWA was the strongest factor to influence on the adjustment of the CPR2. The stable of the RE_S could indicate a good strategy of the banks to develop their own capital, while the TGL_TA got a stronger influence in the post-regulation period than in the pre-regulation period. The latter implies that the banks' assets became larger together with the riskier reflected through the RWA. Once the non-bank lending amount became larger, it actually represents the highest proportion of the RWA, and consequently, the RWA influenced stronger to the adjustment speed of the CPR2 than CPR1, meaning that the VcB chose size adjustment together with the riskier portfolio adjustment.

On the other hand, the situation and the relationship of the capital ratios and the RWA also indicates a similar empirical evidence to a conclusion of Song & Ryu (2016). That is, when the adjustment speeds of the CPR1 and CPR2 became significant different each other, the gap between the capital ratios became wider and encouraged the RWA to increase. This matter will deteriorate the improvement of the banks' own capital. Thus, in order to control for a good capital regulation implementation, the regulators should consider the gap between the to capital prudential ratios.

In Vietnam, on the one hand, the SBV not only set the credit risk criteria but also set the asset risk criteria. On the other hand, the SBV allows the banks adopt the IRB approach. However, the criteria list of risk weights was issued by the SBV did not classify the credit assessment for the counterparty, in stead, there were the groups of the counterparties. Therefore, even though if a counterparty belongs to a group that credit risk classified at 50% (by the SBV). This borrower might be assessed at a low grade (a B- for example at 100% credit risk-weighted, by an external credit rating agency), but the lender bank cannot calculate the 100% risk-weighted. Instead, the lender must count at the 50% because of the formula to the group. Subsequently, the average RWA is calculated in the VcB somehow do not reflect the real and updateable of the risk weights through the counterparty. Thus, the regulation and supervision should carry a reasonable approach which would be updateable to complement the risk weighs list of the SBV.

ii. Contribution of the Share_G and the RE_S

As discussed above, because of the prolonged downturn of the stock market in Vietnam which occurred from 2009 till 2014, almost all the VcB did not use equity issuances to recapitalise as the priority solution. Instead, the VcB kept a stable retained earnings as the most source to build their CPR1. The retained earnings is a good source for own capital developing. However, the weak of this source is its limit of the volume for the improvement of the capital aggregation, it could not contribute to a requirement for a fast capital improvement. While the issuance share is often the quickest way to increase the bank's equity, but it might lead to the lost power of the dominance shareholder. Therefore, a bank has a too high coefficient of this influence factor on the capital improvement might imply a limit capacity to improve it capital. The banks might build a higher rate for this source, but this matter leads to a reduction of the earning per share, then the fact that the new share issuance might difficult to get the target successfully. Thus, the harmonisation control the Share_G and RE_S should combine the pros and aims of these indicators in the context of the economic environment.

iii. Contribution of the Lending and the Deposits

The TGL_TA and the Depo_Ch were almost the least influence factors on the adjustment speed of the capital prudential ratios. The information of these factors provides that the leverage of the VcB got a higher level than an already high before. However, the influence magnitude of these variables could imply that the VcB did not encroach on the lending and deposit for the capital regulation implementation. About this matter, Hoque et al. (2015) stated that a system of highly leveraged banks and high return on assets is less stable and less sensitive to regulatory intervention than a system with higher capital requirements. This argument could be appropriate to the situation of the VcB's capital regulation implementation. When the leverage of the VcB was high already, the banks were less sensitive to regulatory requirement. Consequently, in the post-regulation period, the VcB did not compliance their capital regulatory while their assets, RWA, loans and deposits increased continuously. The reduction of CAR requirement from 9% to 8% (the circulars number 41/2016/NHNN on December 30th, 2016 issued by the State Bank of Vietnam) could implies how the VcB were difficult to achieve the capital requirement target and confirms the empirical analyses of the author about the CPR2.

The IBL_Ch was the factor had least influence on the adjustment speed of the capital ratios, in the post-regulation period, the coefficients of this indicator showed an increase. Economically, a cut down of this lending might be to cover the increase of the non-bank lending, shift to other assets or reduce the total assets. The analysis information related to the interbank lending indicates that in the post-regulation period, the sharp cut down of the interbank lending might be to cover the TGL_TA increase or shifted to other assets rather than to reduce the total assets size. Even though this matter indicated a positive effect on the adjustment speed of the capital ratios, but, on the other hand, the cut of the interbank lending might cause a systemic risk to the VcB as argued in Tung (2017).

5.3.2. Capital Implementation and the ROA

The three records support the author that the manner of adjustment to the capital target by Vietnamese commercial banks leads to efficiency for the banks.

For the banking industry to report its efficiency, higher returns or a better manage the various risks and other cost advantages in a specific period compared to one other period. Aggregated bank profitability is usually measured with regards to the ROA. On the other hand, the implementation leads to some changes related to the banking business such as the interest earning and expenditure.

The increase of new share issuance might cause the cost equity increased, then harmed the ROA. This might be the reason why the VcB did not use this channel as the priority source to build the capital ratios.

According to the report above, the ROA of the VcB was decreased in the post-regulation period. At the same time, the capital prudential ratios decreased as well. These trends could imply that the ROA has a positive association with the CPR1 and CPR2. All of the independent variables in models (5.2-5) and (5.2-6) show statistically significant influence on the ROA.

All of the independent variables in models (5.2-7) and (5.2-8) also reported the statistically significant influence on ROA. LA_TA had the highest effect on the ROA. The IER shows the smallest effect on the ROA, while the residuals from models (5.2-1) and (5.2-2) shows a higher influence on ROA compared with the influences of the LP_TA and the IER.

i. The Expected Loss Increased and Effected on the ROA

Gombola et al. (2016) supposed that the banks with high leverage are more likely to engage in earnings and capital management behavior than the banks with low leverage when leverage increases. Furthermore, the authors supposed that the buffer for loss provision might smooth the earnings. Although in the pre-regulation period, the leverage of the VcB was high, in the post-regulation the leverage increased more while the ROA decreased.

The purpose of the Basel regulatory framework is to strengthen the stability of the banking system worldwide, in which, the capital regulation requirement of the Basel framework is supposed to improve the stability of banking. Supposing that the LP_TA and the LA_TA could represent the certain of the banking business situation, an increase of these indicators could imply a worse business situation bank faces, or inverse otherwise. The coefficients of the indicators in Table 5.2 – 6 provide that these variables represent a statistically significant negative effect on the ROA and the coefficient of the LA_TA is higher than that of the LP_TA. Meaning that the VcB's ROA stood the loss of the bad loans and bad investment more than the loss provision. Whatever, the LP_TA and LA_TA increases, they associate with the decrease of

ROA. This result consistency the findings of Lee et al. (2013) that the capital improvement of commercial banks in middle income Asian countries has a high negative effect on risk while also has a positive effect on profitability. Therewith, the increase of both the LP_TA and LA_TA also imply the increase of expected loss, reflects the increase of riskier loans and the RWA, it leads to a constraint on the size of the portfolio. Dia (2013) identified this matter and argued that when banks face a similar case as this case, they would minimise the variability of the total amount of loans and deposits, whereas loans and deposits are tightly linked together, and cost on loans also generates a nonlinear adjustment cost on deposits. Therefore, in order to minimise the adjustment of the loans and the deposits quantities, banks smooth interest-rates shocks to borrowers, not passing the higher cost fully. That could be the additional reason made the significant change of IER which will be mentioned next below.

ii. The IER Was the Least Influence Factor on ROA

The coefficient of IER is statistically significant positive effect on ROA. This small coefficient indicates that the VcB did not use their assets efficiently and might have the surplus liabilities. Economics meaning, the increase of expected loss and the change of the Vietnamese government about the management policy on the interest rate could be the two reasons made the IER had a very small positive coefficient with the ROA. For the first reason, the increase of LP_TA and LA_TA could understand as the increase of risks, this phenomenon was evidenced and confirmed in the relevant studies as mentioned above. The increases of both the LP_TA and LA_TA constrained on the bank's portfolio. When the loan demand increase while the deposits also get a higher scale on the total assets. Consequently, the gap between the earning from lending interest rate and the expenditure for the deposit interest become wider. Similarly, the VcB had a similar situation. The deposits were increase continuously as well as the loans. At the same time, the expected loss increased, then the matters might cause the influence of the IER on ROA with a specific way. The second reason, in 2011, a new rule of Vietnamese's law was launched in which a clause allows the interest rate be negotiable and independent of the basic interest rate of the State Bank of Vietnam. The rule triggered off the competition in the VcB each others. But according to the analyses above, the VcB tended to do business riskier rather than an interest rate competition. Obviously, the gap between the interest rate income and the interest rate expenditure became wider. However, the increase of this gap was smaller than the growth of the liabilities; thereby, the IER got a similar direction to the ROA, the reduction trend.

iii. The Residual From Models (5.2-1) and (5.2-2) Shows a Higher Influence on the ROA

As expected, both of the residuals from models (5.2-1) and (5.2-2) confirmed a statistically significant positive effect on ROA. Theoretically, this matter could be due to the positive relation between risky activities and profits, with larger average risk

weights being associated with more profitable business. Therefore, these results could be interpreted that a part of the VcB's capital implementation shared to the effective of ROA, especial in the post-regulation period, the decision for bank's financial management might reflect through the behaviour of adjusting the CPR2 with perceptions on expected profits (Delis & Tsionas, 2012; Lepetit et al., 2015; Shimizu, 2015). Moreover, connecting with the argument of Hoque et al. (2015) about the relationship between efficient and bank's capital, the result also hints that along with the regulation requirement compliance of the VcB, the bank's could have a higher positive relationship between the efficiency and their capital ratio which calculated on the RWA than calculated on total assets. Finally, the higher effect of the residual that generated from the CPR2 estimated means that the management decisions on RWA of the capital regulation implementation were a more significant effect on the ROA. Thus, the rating approach is the main point to monitor the RWA valuation of the bank.

5.3.3. Scholarly Views On These Issues

Theoretically, the increase of banks' lending contributes to economic growth but it needs to be controlled by some instruments. Monetary policy and capital regulation requirement are popular and used to control lending of the banks. Analysing the influence of these two instruments, Aiyar et al. (2016) found evidence in British banks that the capital regulation requirement policy was a more significant effect to control the credit supply than the monetary policy. The reason that monetary policy had a greater effect than the capital requirement policy because small banks could not access the non-depositary debt markets as large banks when they faced monetary policy, so they could not avoid the cost of funding loans from a variety of domestic macroeconomic shocks. In the situation of the VcB, the author supposes that the monetary policy effect is different from the argument of Aiyar et al. (2016) because all the VcB have the same problem as the small British banks about the ability to approach the non-depositary debt markets and this market of Vietnam is not developed at the same level as in the developed countries. Moreover, the analyses above provide the positive association between non-bank lending and the capital prudential ratios. Therefore, if monetary policy is used to control lending of VcB, there will have no different effect of this instrument on all the VcB. In addition, even thought almost all of the VcB's lending were positive influence on the capital ratios, but the effects were not too high to get a bad impact from the monetary policy. Therefore, when the lending will be controlled by the monetary policy, the policy builder might achieve the credit control target. But, on the other hand, the cost funding of loans might increase and makes the IER worse, then the banks' ROA, while the adjustment of the capital ratios might be less harmful.

The lending scale and its volume calculation are as comfortable as the deposits calculated. Both the total loans and the total deposits are always available on balance sheet of every bank. Assume that the deposit volume is unchanged, if the volume of loans increase, it might cause the increase of CPR1 or CPR2. This matter implies that

to increase the capital prudential ratios, the VcB maximise the use of the deposits. Assume that the VcB try to increase their capital by retained earnings. To do so, the lending is continuously increased to maximise the earning contribution of this business. If the banks cannot mobilise to increase the deposits, while the non-depositary markets are not available, they will switch to an alternative fund, the interbank capital. Consequently, the interbank lending could be priority be decreased to have a more impact on the adjustment speed of the capital prudential ratios. According to the analyses above, the interbank lending represented by the IBL_Ch could confirm that this scenario might exist in throughout the period. Additionally, analyse the same data as the data used in this thesis, Tung (2017) detected that in the post-regulation, the VcB's interbank lending was decreased, the lending to non-bank could caused the decrease of the interbank lending. This additional information implies that the lending of the VcB is financed by the deposits and cutting interbank lending, especial in the post-regulation period and leads to a potential of systemic risk through the cut of the interbank lending (see Tung (2017). Thus, the capital regulation requirement should consider together with the systemic risk via the interbank change.

Concerning to control the increase of lending, on the point of view of a bank regulator, some researchers suggested that the regulation should have a threshold for the banks' leverage and control the increase of banks' lending together with the increase of banks' equity or banks' leverage benchmark, strengthen the deposit insurance management, control the systemic contagion risk via the interbank lending and so on (Bordeleau et al., 2009; Distinguin et al., 2013; Lepetit et al., 2015; Gombola et al., 2016; Tung, H.T., 2017). However, according to the relevant estimations above, even thought the lending and the deposits evidenced that they contributed to the adjustment speed, but their contribution is not significant as the contribution of the change of RWA. Therefore, the author supposes that the most matter to pay attention should mention is the RWA control as bellow.

Concerning to the risk-weighted assets adjusting to achieve the capital regulation requirement, Jokipii & Milne (2011) found that banks with small capital buffers rebuild an appropriate capital buffer by raising capital together with lowering risk. Well capitalised banks were contrary, their capital buffers were maintained by increasing risk when capital increases. Additionally, Cipovova & Belas (2012) highlighted that the different methods for credit risk measurement are more flexible on class change of corporate exposures in portfolio, the banks could choose a method which has calculated the lowest amounts of capital requirement, lead to the distortion ratings to work out with a much lower capital than the requirement. Accordingly, these findings imply for the case of the VcB three points that the regulator should pay attention. First, the need to improve banks' capital. Second, consider to monitor the change of riskiness asset portfolio. Therefore, third, supervise the method that banks used for the credit risk measurement.

Practically and empirically, the banks which have a capital ratio that lower than the requirement often shift their risk-weighted asset portfolio to achieve the regulation

requirement. In the case of the VcB, on the one hand, the State Bank of Vietnam set the risk-weighted for every asset of the VcB. On the other hand, the credit risk-weighted measurement or rating is handled by banks themselves. If the VcB want to lower their riskiness assets, the most available assets for the risk-lowering should be the loans, to do such the lowering, banks might shift their lending from the higher risk loans to the lower risk loans by using the bias rating. Therefore, to avoid the distortion ratings, the supervision must follow up the rating or credit risk measurement. Fratzscher et al. (2016) Suggested that to assess the influence of capital regulation on domestic credit growth and banking stability, the capital regulation measurement should consider whether valuation gains may count towards the capital base or which rating based approaches are used to calculate the minimum capital requirements.

6. RECOMMENDATIONS

In this section, the author combines his the own findings with relevant suggestions from previous studies to suggest the indicators that should be monitored and considered to control the capital regulation implementation of VcB.

According to the empirical analyse above, to supervise the capital regulation implementation of the VcB, the supervisor should select the information based on the factors that influence the adjustment of the banks' capital. The author lists the indicators in two groups. The first group is the list of indicators that connect to the capital implementation; the second group is to consider the policy while controlling the implementation. The indicators are listed in an ascending order based on their influence level on the capital adjustment or their association with the banks' ROA.

6.1. The Indicator for Regulation and Supervision

6.1.1. The Capital Ratios

First, the author suggests using the two capital prudential ratios, those are CPR1 and CPR2. The regulation requirements for the achievement could consider the adjustment speed estimated in this thesis.

The related information to calculate these indicators is always available in the financial report of the VcB. In which, the supervisor should pay attention to the risk-weighted measurement and the approach that banks used. The difference between the actual adjustment speeds and the expected adjustment speed of these indicators also hints at their financial management decision for their efficiency (represented by the regression residuals influence on the ROA as analysed above) and the shift from the high to the low RWA or inverted. To control the implementation of the banks, the regulators might estimate the adjustment speed of the capital ratios. As pointed out in Song et al., (2016), when the gap between actual capital and target capital is narrower, the lower the growth rate of total assets, RWA, and loan requirements, and the capital to total assets increases with a higher degree than the capital to the RWA. The estimated result provides the image how the banks adopted the regulation requirement, whereby, using the models for the estimation, the regulators might consider the policy for the capital requirement implementation control.

6.1.2. Complementing the RWA

The RWA_Ch evidenced the highest contribution to the adjustment speed of the capital ratios. The RWA itself does not provide the information that the supervisors need. It makes sense when it is a component of an indicator of the banks. To have adequate regulation and supervision, the author proposes the need to complement the RWA in its calculation. The complementation is the reasonableness and updateable risk-weights together with an addition disclosure – the information of the off-balance sheet.

About a reasonable and updateable risk weights. The RWA is determined and used by the Basel committee. Accordingly, the RWA is used to calculate the capital adequacy ratio (the CAR) in many countries (including Vietnam). The Basel committee also allows the banks to calculate the RWA on a standardised or internal ratings-based (IRB) approach. In Vietnam, on the one hand, the SBV not only set the credit risk criteria but also set the asset risk criteria. On the other hand, the SBV allows the banks to adopt the IRB approach. Thereby, a reasonable and updatable risk weight is needed for effective regulation and supervision.

Again, look at the example at (*i*) in 5.3.1, if a counterparty belongs to a group that credit risk classified at 50% (by the SBV). And, on the other hand, this borrower might be assessed at a low grade (a B- for example at 100% credit risk-weighted, by an external credit rating agency), but the lender bank cannot calculate the 100% risk-weighted. Instead, the lender must count at the 50% because of the formula to the group. Wherefore, a bank wants to lend to this client and prevents loss, that bank must choose a high "hair cut" on the client's collateral or reserves an equivalent loss provision against real riskiness. However, both of the solutions might lead to the less competitive of that bank. The bank must choose between the safe and risky lending for its decision, but the risky one did not base on a real and update of credit assessment.

The second issue concerns to RWA is the off-balance sheet disclosure. This matter was pointed in the new leverage regulation of the Basel 3 and used to calculate the CAR. The lack of this information could result in an unreal calculation of RWA (the amount of the letter of credit opened by a bank, the value of the collaterals held by a bank and the percentage of the "hair cut" on these properties for example). If the calculation of RWA is a shortage of this information lacking, the RWA will not reflect precisely the risky that the bank can cover.

The recommendation for RWA regulation and supervision are to improve the risk assessment and to implement the disclosure the RWA of the off-balance sheet.

6.1.3. The Retained Earnings

The RE_S represents the retained earnings of the VcB evidenced a highest contribution to the build of the capital ratios. The author supposes that if the ROA of the VcB will be better than pervious, the VcB may increase the degree of the RE_S and the capital regulation implementation must work healthier. However, the banks cannot maximise the percentage of this ratio so much as they want. Assume that there is no change of the share number and other factors in the model (4.2-5). Using the model (5.2-1), (5.2-2), (5.2-5) and (5.2-6), the banks may simulate a breaking-point at how high the RE_S should be to reach the maximum influence on the improvement of the capital ratios. And not damage the ROA, as well as not impair the market value of their equity incidentally.

6.1.4. The Issuance Shares

The analyses provided empirical evidence that in the post-regulation period the VcB did not use this source as the priority channel to build the capital ratios. The situation that in the post-regulation period the stock market in Vietnam was dropped down made costly the new equity. On the other hand, the less used of the issuance shares might also evidence a high estimate of the RE_S. Therefore, if the regulators need a prompt increase of the banks' equity, the regulation requirements must consider the macroeconomic situation. During the recession time, the regulation requirement should be issued together with a policy that could encourage the banks to decide a new share issuance, a temporary change of the income tax for example.

6.1.5. The Lending Indicators

The author suggests a separation of the lending total to non-bank lending TGL_TA and interbank lending IBL_Ch. These lending indicators have different association with the capital ratios and also have different influence on the ROA. Moreover, the control of the lending leads to other potential scenarios. Therefore, the fluctuation of the lending should be separated and controlled with other policies. Whereby, the non-bank lending should have an approach as shown bellow:

This indicator is a positive influence on the capital ratio adjustment and has a higher influence on the CPR2 than on CPR1. On the other hand, TGL_TA has a negative influence on the ROA. Therefore, the supervision on this indicator could evaluate the capital regulation implementation trend. During the time of the capital regulation requirement, if the coefficient of this factor becomes higher than the others, meaning the banks focus more on the increase of lending than the use of the other channel for their capital regulation implementation.

To complement the non-bank lending information, the TGL_TA should be used together with some addition indicators as follow:

$$\text{TGL\_RWA} = \frac{\text{Total non - bank lending}}{\text{RWA}}$$

When the line charts of these two lending indicators are getting a sharp increase, and they are going to separate each other, meaning that the credit growth contemporary with the rise of the RWA and it will be time to use the instruments to control the credit growth.

The evolution of the IBL_Ch was empirical a negative association with the improvement on the capital ratios. On the other hand, the interbank lending is a channel to provide the short-term liquidity for the banks (see Garcia et al., 2016; Craig et al., 2015). A sharp cut down this lending might lead to potential systemic risk in after one year, and if there will be no change, this potential systemic might become the most threat after two years from the occurred of a reduction (see Tung, 2017). Thereby, the supervision should pay attention to the trend of this lending. A warning should be released if the banks reduce their interbank lending continuously.

6.2. The Indicators Help Refer to the Improvement of the Capital Ratios Indirectly

6.2.1. The Loss Provision

The LP_TA had a statistically significant negative influence on ROA. The increase of this ratio reflects the riskier assets that the bank is holding and it is regulated for the loss provision for the RWA by the Basel 3. Actually, the provision is the buffer reserved in advance to cover the expected loss if it occurs. Thus, the loss may or may not happen. The surplus of the buffer will be accounted into the income for the next period. The situation is expected to have a positive effect on the ROA or retained earnings then could improve the capital ratios. Whatever, the high rate of this ratio sounds the unhealthy of the banks' business and might unpredictable. Therefore, when the estimation of the LP_TA is going up close to zero or might not statistically significant associate with the ROA, that implies of the good risk management, or invert otherwise.

6.2.2. The Loss Allowance

When the scale of the loss allowance to total assets increase, the matter could imply that the bank's bad loans and/or lousy investment portfolio are expanded. If the estimation reports a statistically significant negative coefficient higher than the coefficient in the previous, meaning that the banks face more loss than the loss during the last. Thus, the monitoring of the LA_TA should consider both the fluctuation of the ratio and the variation of its coefficient from the estimation result of the models (5.2-7) and (5.2-8), especial the model (5.2-8).

6.2.3. The Interest Earning Ratio

IER had a minimal influence coefficient on the ROA, this indicator could indicate the efficient of the liabilities use through its coefficient in the regression model (5.2-7), (5,2-8). A high degree of this coefficient would imply that the banks minimise the surplus financing and improve the asset use. Indirectly, this improvement encourages the improvement of the capital implementation. Otherwise, the supervisors might suggest a process of cutting down the liabilities for the development.

6.3. The Regulation and Supervision

6.3.1. Regulation

i. Capital Regulation Requirements

Require the capital regulations with both the approaches, the calculate on the assets actual and the calculate on the RWA included RWA of the off-balance sheet. Require the application refer to the adjustment speed estimation for the capital regulation requirements. The author supposes that the adjustment speed estimated above should be a reasonable speed for the implementation. So, the regulators should tighten the capital regulation implementation at that degree to a prompt healthy the banks' assets portfolio and decides some necessarily control to improve the application. The control

might base on the policy made by considering the relevant indicators used in this thesis.

ii. Issue an Updateable RWA Calculation

The average RWA is calculated in the VcB somehow do not reflect the real and updateable of the risk weights through the counterparty. Thus, the regulation and supervision should carry a reasonable approach which would be updateable to complement the risk weighs list of the SBV.

6.3.2. Supervision

i. Supervising the Degree of the Capital Ratios

According to the regulation requirement, the supervisors monitor the evolution of the capital degree and report the timely deviation for the appropriate regulatory action.

ii. Supervising the Speed of the Implementation

The supervisors may supervise the capital requirement implementation by using the PAM models as used in this thesis. According to the previous studies and the estimated results in this thesis, the adjustment speed of the VcB at around 70%/year should be a reasonable speed for the implementation, and the supervisors may use this level as a benchmark for the supervision.

iii. Supervising the Gap Between the CPR1 and CPR2

Additionally, the supervisors might take the information from the gap between the capital ratios. If this gap became wider and encouraged the RWA to increase. This matter will deteriorate the improvement of the banks' own capital. Thus, to control for a proper capital regulation implementation, the supervisors might go in advance with the forecasting the fluctuation of the assets and the RWA to simulate the adjustment speed. Thereby, the supervisors may evaluate in advance whether the banks might achieve the capital regulation requirements in a given time or not.

iv. Supervising the Fluctuation of the RWA

The RWA fluctuation causes the negative association with the capital ratios. The RWA also indicate how risk the banks face for their business. The supervisors may observe the ratio of the RWA to total assets together with the RWA_Ch. When both these indicators increase continuously means that the banks' going to break the benchmark of the capital to RWA then potential harm to the capital implementation. On the other hand, the RWA has a similar influence degree to the RE_S but with an opposite direction. Thus, assume that the contributions of these indicators might offset each other, if the result close to zero, meaning that the time to a more tighten the capital implementation and confine the growth of the RWA. Besides, the RWA must be a positive association with the LP_TA. Therefore, the monitoring of the RWA should together with the control of the LP_TA. Moreover, when the estimation of the

LP_TA is closer to zero or insignificant, meaning that the banks' manage their risk very well, or invert otherwise.

v. Supervising the Evolution of the Retained Earnings

The RE_S is a stable source and most contribution factor to build the bank's capital. The supervisors may simulate a breaking-point at how high the RE_S should be to reach the maximum influence on the improvement of the capital ratios. And not damage the ROA, as well as not impair the market value of the banks' equity. In the time the stock market shrunk, the influence of the RE_S should be higher than the impacts of the other factor on the capital improvement. Meanwhile, if the RE_S shows a weak influence on the adjustment speed of the capital ratios, the situation might imply that the banks did not concentrate enough on the capital improvement or the banks' efficiency did not afford to cover this factor.

7. CONTRIBUTION TO SCIENTIFIC AND PRACTICAL KNOWLEDGE

7.1. Contribute To Scientific Knowledge

According to the achievement of this thesis, the study could contribute to scientific knowledge in the follow ways:

7.1.1. Developing and Introducing Models, Indicators That Could Be Used For Regulation and Supervision in Vietnamese Commercial Bank Sector

The models used in this thesis are significant to solve the research problem of the thesis. The models have the great explanation, consistency and reasonable to help the author achieve the aim of this thesis.

All the variables are useful and may represent the substantial activities of the banking and the related regulations. The regulators and supervisors may refer or use directly the models as well as the variables for the regulation and supervision.

7.1.2. Proving Approaches, Findings and Suggestions From Previous Relevant Studies

The author reviewed the previous studies and chose a method that seemed appropriate to solve the research problem of the thesis. Accordingly, the approach of this study dealt with the research problem of this thesis successfully. Develop from the findings and suggestions of the previous studies, the author also introduce the usefulness of these studies for the application in the case of the VcB. The providing shall be interesting on the relevant studies in the same line with this thesis and the researchers, regulators, supervisors may refer to the application in some cases.

7.1.3. Acquiring a Deeper Understanding of the Associations Between the Capital Regulation and the Banking Business, and the Relationship Between the Capital Regulation and Banks Performance

Through this study, the results added some empirical evidence supporting previous studies and the specific case of the VcB. The addition of empirical evidence actually contributed to a deeper understanding of the associations between the capital regulation and the banking business, and the relationship between the capital regulation and banks' performance. The confirmation consolidated the relevant findings, while the case of VcB could enrich the knowledge about a banking system in a specific economic environment.

7.1.4. Adding a Case Study of Vietnamese Commercial Bank Sector In the Pilot Period Of the Regulatory Application Basel Framework

The pilot for the full launch of Basel regulation in Vietnam is a very good situation for the study, especial the empirical analysis. The empirical analysis result in this thesis is the first analysis of its kind in this field. Furthermore, this study could be a case study of Vietnamese commercial bank sector in the pilot period of the regulatory

application Basel framework and might be useful for the research in a similar situation where the implementation of the Basel regulation is in the beginning.

7.2. Contribute To Practice Knowledge

Following the contribution to science knowledge, my thesis could have some contribution to practical knowledge as shown below:

7.2.1. Providing Critical Evaluation of the Capital Regulation, Its Association With the Channels That Built the Capital Ratios and the Bank Efficiency In the Implementation

On the one hand, the author provided empirical evidence of the capital implementation of the VcB, on the other hand, the author also indicated how the banks' efficiency associates with the implementation. The information is not only focused on the Basel application, but also consider the most important target of the business, the efficiency. Thereby, the result of this study might more convincible for the practise because of its concerning the efficiency of the implementation.

7.2.2. The Usefulness Of this Study's Approach

The significant explanation of the approach used to solve the research problem could be useful to apply in such the similar research. When the researchers aim to calculate the implementation of a new regulation launch, especially concerns the capital structure, the approach used for this thesis might be appropriate for their consideration.

7.3. Contribute To Education

The approach of this study indicated that the empirical analysis is appropriate to be used for objectives similar to the aim of this thesis. Academically, the successful use of the adjustment speed for the interpretations of this thesis might confirm that the PAM applicable to deal with the capital structure and the panel data analysis. Additionally, this study might be a case study of research in a similar situation where the implementation of the Basel regulation is in the beginning or might be applied to assess the capital implementation, the change of capital structure.

8. CONCLUSION

The objective of this thesis is to suggest a methodological approach applicable to Vietnamese Commercial Banks system. This approach will be built upon state-of-the-art bank's regulation and supervision methods used, focused on the capital regulation requirement in accordance with the Basel regulatory framework. The author used the empirical analysis approach to achieve the objective.

Through the examination how chosen pilot banks in Vietnam have taken action to achieve required capital regulation requirements in the context of the Basel regulation frameworks. The author uses partial adjustment models to analyse the banks' quarterly financial statement releases from 2008/Q1 to 2015/Q4, for which from 2010/Q4 to 2015/Q4 was the post-regulation period. On average, the empirical evidence shows that Vietnamese commercial banks pursued credit growth at a higher priority than capital regulation requirements. Retained earnings and risk-weighted assets are permutations to account for the bulk of both higher risk-weighted capital ratio and capital-to-total-assets ratio, while the shares issuance played a lesser role. In the post-regulation period, the banks adjusted to the risk-weighted capital target slower than in the pre-regulation period. The adjustment to the capital-on-total-assets ratio was invert in comparison with the adjustment of the risk-weighted capital. The author finds that the manner of the adjustment by the Vietnamese commercial banks to the capital target led to a loss in efficiency. The result implies the need for high tighten the capital regulation implementation to the Vietnamese commercial banks.

The analyses also indicate the need to complement the RWA calculation, monitoring and control of the factors which had high contribution on the implementation of the VcB. Those are the RWA, the retained earnings and the issuance share. The results also provide the information that the supervisors, the regulators and the policy-makers should pay attention to have a convincible decision for their regulation and supervision. The approach, models, variables in this thesis could be useful and applicable in both the relevant research and in practice.

Before the full implementation of the regulation, Pilot study is currently being conducted. Follow up the knowledge related to the banking regulation, this thesis achieved its objective. The empirical analysis was conducted on the original Pilot program and suggested indicators which should be monitored. The author also pointed the most vulnerable and problematic issues Vietnamese commercial banks face and propose a methodological framework which should be followed to achieve a successful transition to a new banking environment under the Basel III framework. This thesis also acquires a deeper understanding of the associations between the capital regulation and the stability of banking business, and the associations between the capital regulation and banks' performance, and adds a case study of Vietnamese commercial bank sector in the pilot period of the regulatory application Basel framework.

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Appendix 1 – Variance Inflation Factor

Model								
Variable	5.2-1	5.2-2	5.2-3	5.2-4	5.2-5	5.2-6	5.2-7	5.2-8
Share_G	1.082874	1.221454	3.395325	3.760888	1.280294	1.283497	--	--
RE_S	1.310572	1.380476	1.466987	3.520914	1.495596	1.491018	--	--
TGL_TA	1.462651	1.388352	1.463184	1.466849	1.524108	1.446493	--	--
IBL_Ch	1.810509	2.004751	2.058713	2.213643	2.179897	2.183106	--	--
Depo_Ch	2.176602	2.148610	2.149435	2.291371	2.279633	2.285909	--	--
RWA_Ch	3.215201	3.548061	3.677613	4.350328	4.145073	4.220911	--	--
log_TA	1.995293	1.930835	2.067699	2.106163	2.011159	2.009974	--	--
$CPR1_{t-1}$	1.389127	--	1.427460	--	1.430401	--	--	--
$CPR2_{t-1}$	--	1.372173	--	6.052538	--	1.401119	--	--
Dummy	--	--	1.435264	1.725287	--	--	1.063605	1.063617
Share_G_Reg	--	--	3.291625	3.520914	--	--	--	--
RE_S_Reg	--	--	5.403750	6.087092	--	--	--	--
TGL_TA_Reg	--	--	7.008813	8.103398	--	--	--	--
IBL_Ch_Reg	--	--	5.835767	8.403038	--	--	--	--
Depo_Ch_Reg	--	--	4.263516	4.420795	--	--	--	--
RWA_Ch_Reg	--	--	4.136704	6.109094	--	--	--	--
$CPR1_{t-1}$_Reg	--	--	6.773348	--	--	--	--	--
$CPR2_{t-1}$_Reg	--	--	--	7.100688	--	--	--	--
LP_TA	--	--	--	--	--	--	1.277727	1.260495
LA_TA	--	--	--	--	--	--	1.324819	1.318669
IER	--	--	--	--	--	--	1.061719	1.066473
U_{31}	--	--	--	--	--	--	1.018028	--
U_{32}	--	--	--	--	--	--	--	1.007748

Source: Calculated by the author

Ho Thanh Tung

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