

IN SEARCH FOR ISLAMIC MACROPRUDENTIAL POLICY: CONCEPT AND PRACTICE IN INDONESIA

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ABSTRACT

The aims of this study, at first, is to examine some macroprudential instruments practice, i.e. reserve requirement (RR), as proxy by demand deposit (giro wajib minimum GWM) ratio, and capital buffer toward credit growth for conventional and Islamic banks in Indonesia. The study also measures the impact of macroeconomic variables and micro-banking specific factors toward credit growth. By doing so, the study also examine how different are Islamic banks in Indonesia from conventional banks in terms of macroprudential instrument and micro-banking variables. All the data were retrieved from Bank Indonesia website from January 2002 until August 2014. The study employs Vector Error Correction Model (VECM) to analyse the impact of the macroprudential instrument, macroeconomic variables, and micro-banking variables toward credit growth, as well as to examine and compare independent variables of credit growth of conventional and Islamic banks.

Our results indicate that macroprudential policy based on GWM instrument positively influence the credit growth of conventional and Islamic banks in the long run. From macroeconomic factors, the credit growth in the long run is positively affected by GDP and negatively affected by interest rate (BI Rate) and inflation (LCPI). In addition, credit also affected by third party funds (LDPK) and NPL ratio. Interestingly, there is a different impact of capital buffer instrument toward credit growth between conventional and Islamic banks. While capital buffer has positive impact on credit growth for conventional banks, in contrast, capital buffer instrument has negatively affected the financing growth of Islamic banks in Indonesia

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1. CHAPTER ONE : INTRODUCTION

Financial instability has a direct impact on the economic instability that will lead to economic crisis, or recession. Historically, Indonesia experienced with two global financial crisis, namely 1997/1998 crisis and 2008/2009 crisis. If in the 1997/1998 crisis Indonesia trapped into the acute crisis, whereas in 2008/2009 crisis Indonesia has shown a resilient performance amid uncertainty in the global economic situation. In spite of this success, as part of financial institution, we still face some challenges ahead which are triggered by the specific case particularly banking liquidation in Indonesia. In the future, with the number of shocks faced by financial institutions, it may affect and spread out quickly due to the interconnectedness and lead to systemic risk. This condition is worsened by pro-cyclical behaviour of those institutions in the economy. Thus, the Islamic banking system has an inherent situation toward pro-cyclicality (Borio, 2003). When there are changes in the financial market, both financial and non-financial institutions with similar risks can emit similar common reactions, creating collective behaviour that amplifies the economic cycle fluctuations (Utari & Trimurti, 2010).

The key in managing macroeconomic stability not only in controlling domestic and external imbalances, but also financial imbalances, such as credit growth, asset prices, and risk-taking behaviour in the financial system (Utari and Trimurti, 2010). This policy must be taken based on the past evidence, whereby, financial imbalances are the key factor for the great depression 1929/1930, Japan financial crisis 1990, and Asian financial crisis 1997. Therefore, controlling financial market as a whole system is very critical in managing economic condition as a prerequisite for economic development.

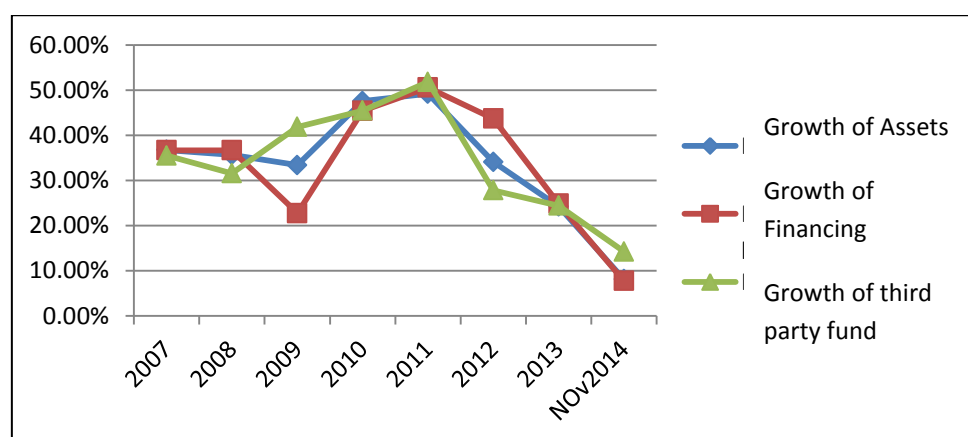
Currently, in Indonesia there are dual model of banking system, namely conventional and Islamic. The Islamic financial services industry (IFSI), with its inclusive proposition, has grown in size and geographic coverage, now encompassing new jurisdictions and more institutions. Islamic banking in the early 2000s was a niche market in most jurisdictions with only a few institutions offering basic depository and financing instruments. This was coupled with low awareness and demand for Islamic banking services, particularly in Asia Pacific and developed markets.

Islamic banking in Indonesia begins with the presence of Bank Muamalat Indonesia (BMI) which was established in 1992. Until 1998, BMI is still the only Islamic bank in Indonesia. In 2005, the number of Islamic banks has reached 20 units with 3 *Bank Umum*

Syariah (BUS) and 17 *Unit Usaha Syariah* (UUS) (Karim, 2013: 25). As for today, in Indonesia there are 12 *Bank Umum Syariah* (BUS) dan 22 *Unit Usaha Syariah* (UUS) (Otoritas Jasa Keuangan, 2015).

Although the growth of Islamic banking industry is very rapid, the market share of Islamic banking is still stagnant at around 5%. In addition, when viewed from the growth of assets, the amount of financing, and the amount of third party fund (DPK) BUS and UUS during the last three years (in figure 1.1), the trend is decline significantly.

Figure 1.1 . Growth of Asset, Financing, and Third Party Fund (DPK) Islamic Banking (BUS and UUS) in December 2007-November 2014



Source: Otoritas Jasa Keuangan, 2014

According to the IFSB Islamic Financial Services Industry Financial Stability Report (2013), Islamic banking remains the pillar of most Islamic assets, developments are seen across all asset classes and beyond traditional products and services. The Report outlines that the Islamic banking industry charted a compound annual growth rate (CAGR) of 38.5% between 2004 and 2011. Therefore, with the a significant growth and market share of Islamic bank, the position of Islamic bank in the whole Indonesian economy is more vulnerable. Thus, Islamic banking as a whole financial system have to be adressed in macroprudential policy.

The issue how to define and develop the macro-prudential policy in Indonesia in the paradigm of dual banking system (conventional and islamic) is still under debate. Moreover, even in the monetary policy literature, according to Tomuleasa (2013) research on macroprudential policy is still in its infancy and appears far from being able to provide a sound analytical underpinning for policy frameworks. This may be due to two main reasons (Utari and Trimurti, 2010). First, the macro-prudential approach has come to play a role in

policy discussions only very recently. Second, it reflects a lack of established models of the interaction between the financial system and the macro-economy.

According to International Monetary Fund (2012), macroprudential policy aims to maintain stability of a whole financial system through the restriction of systemic risk. In addition, Bank International Settlement defines macroprudential policy as a set of policy intended in restricting the systemic risk and its cost. Moreover, According to the Governor of National Bank of Romania (Isarescu, 2011), macroprudential policies consists in measures to ensure the health of the financial system, or to prevent the loss of control regarding the problems for a specific part of the financial system. In case of Indonesia, Bank of Indonesia (2013) defines macroprudential policy as policy set by central bank, to improve the resilient of financial system and to reduce the systemic risk that can interfere monetary stability.

There are some studies related to the macroprudential policy. The studies conducted by Borio (2003), shows that a successful macroprudential policy will lead to the final objective of the microprudential policy, so the microprudential policy is subordinated to the macro policy, which is targeting the entire financial system. Carson (2003), believes that regardless of the performance of the macroprudential policies, it can't be considered good enough to substitute the effective macroeconomic policies, meanwhile he is suggesting a combination of macroeconomic policies and also prudential ones to avoid shocks in the economy. In the opinion of Cerutti (2015), the macroprudential policy distinguishes from other economic policies, not only through flexibility and lower costs, but also through the two dimensions addressed, namely the time dimension and the cross-sectional one, so this marks a major distinction between the macroprudential policy and the microprudential one, in terms of objectives, mechanism and tools for transmission.

Although in the conventional literature, there are some studies on the issue of macroprudential policy, however, in the Islamic financial system, this study is still very rare. Therefore, the objective of this research is aimed to discuss the Islamic macroprudential assessment in Indonesia. In addition, this research are focused on how to develop macroprudential especially for Islamic financial system. This study focused on the effect of macroprudential instrument, macroeconomic factors, and micro-banking factors toward credit growth. We try to address the question whether macroprudential instrument, macroeconomic factors, and micro-banking variables have a relationship with credit growth (or financing growth in Islamic banks).

This paper contributes to the literature by investigating the influence of macroprudential instrument, macroeconomic factors, and microbanking factors on credit

growth behavior (or financing growth) since empirical works on this topic are relatively scarce. The macroprudential instrument included are GWM ratio and capital buffer, as being practiced in Indonesia. Our analysis, hence, might be further enriching our understanding of the credit growth behavior and its relations with various components of macroeconomic variables and micro banking variables. Therefore, this study attempts to fill this gap by exploring the effect of macroprudential instruments, macroeconomic variables, and micro-banking variables toward credit (or financing) growth in Indonesia and favor Indonesian Government in develop a sustained macroprudential policy in Indonesia.

The rest of the paper is organized as follows; in section II, we provide literature review. Section III outlines the data methodology. Section IV details results and discussions. Finally, we conclude in section V with conclusion of main findings and policy recommendations.

2. CHAPTER TWO: LITERATURE REVIEWS

The literature presented in this section begins with the definition of macro prudential and the following subsection reviews the differences between micro and macro prudential. The next part will be discussed about the availability of macro prudential tools in Indonesia. In addition, there will elaboration of empirical reviews involving both conventional and Islamic banking with regards macroprudential assessment and credit buffer. Lastly a discussion on the research gap will also be presented in this section.

2.1 *Macroprudential Policy: Definition and Scope*

As mentioned by Flannery and Sorescu (1996), Governor of Bank of Romania, macroprudential policies is becoming an essential tool in ensuring the health of country financial is in the good position. Macroprudential implementation will make sure the achievement of microprudential specific purpose, being so the microprudential policy will be part of coordinating tool with the macro policy to achieve better financial system. The recent crisis such as US Subprime crisis, Greece debt crisis, 2010 etc have highlighted the management of systemic risk need to be carefully designed and should not be ignored. Those entire financial and economic crises have let to recognition of policy in managing systemic risk such as macroprudential policy in maintaining healthier financial position.

Specifically, the notion idea of macroprudential policy is to limit the spread of systemic risk; risk where it indicates the collapse of the entire financial market. If the systemic risk is not well managed, then it will cause hazardous to the country economic system. The effects could be in the form of unemployment, inflation, decrease in income, exchange rate volatility etc. By enforcing effective macroprudential policy, such as monitor carefully the gaps with regards regulatory, information and close data will be results in proper management of systemic risk.

To realize the outcome of macroprudential policy, this policy must be properly structured in the way of good supervision and enforcement, using appropriate fiscal and monetary policies. According to Utari and Arimurti (2012), there are three main goals to be achieved by implementing macroprudential policy such as:

- i) overcoming imbalances of financial position
- ii) reducing systemic risk exists in the market in order to minimize the market volatility and
- iii) monitor the financial institution by discouraging them from taking any risk that arises from systemic risk.

IMF Financial report on policy survey in 2010, has identified four main pillars where the macroprudential policy can help to mitigate it, namely (see Figure 2.1),

- Risks attached to the credit- driven assets price volatility
- Risks that exists due to the excessive leverage activity
- Liquidity risk and volatility in capital flow including foreign exchange market.

Figure 2.1. Macroprudential Policy Objectives

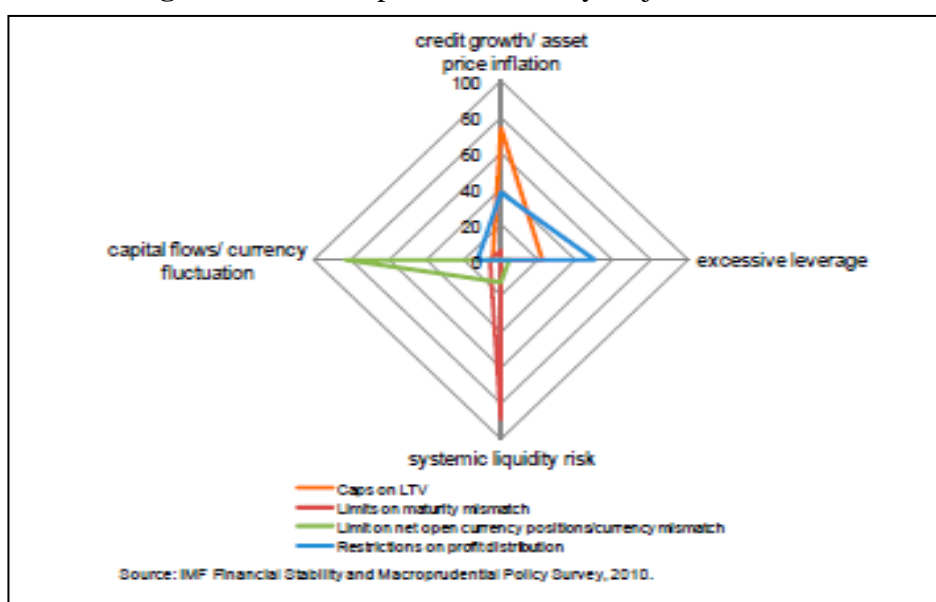


Table 2. 1. Macroprudential Instruments/tools

1. Risk measurement methodologies	Examples
<i>By banks</i>	Risk measures calibrated through the cycle or to the cyclical trough
<i>By supervisors</i>	Cyclical conditionality in supervisory ratings of firms; Develop measures of systemic vulnerability (e.g. commonality of exposures and risk profiles, intensity of inter-firm linkages) as basis for calibration of prudential tools; Communication of official assessments of systemic vulnerability and outcomes of macro stress tests;
2. Financial reporting	
Accounting standards	Use of less procyclical accounting standards; dynamic provisions
Prudential filters	Adjust accounting figures as a basis for calibration of prudential tools; Prudential provisions as add-on to capital; smoothing via moving averages of such measures; time-varying target for provisions or for maximum provision rate
Disclosures	Disclosures of various types of risk (e.g. credit, liquidity), and of uncertainty about risk estimates and valuations in financial reports or disclosures
3. Regulatory capital	
Pillar 1	Systemic capital surcharge; Reduce sensitivity of regulatory capital requirements to current point in the cycle and with respect to movements in measured risk; Introduce cycle-dependent multiplier to the point-in-time capital figure; Increased regulatory capital requirements for particular exposure types (higher risk weights than on the basis of Basel II, for macroprudential reasons)
Pillar 2	Link of supervisory review to state of the cycle
4. Funding liquidity standards	Cyclically-dependent funding liquidity requirements; Concentration limits; FX lending restrictions; FX reserve requirements; currency mismatch limits; open FX position limits
5. Collateral arrangements	Time-varying Loan-to-value (LTV) ratios; Conservative maximum loan-to-value ratios and valuation methodologies for collateral; Limit extension of credit based on increases in asset values; Through-the-cycle margining
6. Risk concentration limits	Quantitative limits to growth of individual types of exposures; (Time-varying) interest rate surcharges to particular types of loans
7. Compensation schemes	Guidelines linking performance-related pay to ex ante longer-horizon measures of risk; back-loading of pay-offs; Use of supervisory review process for enforcement
8. Profit distribution restrictions	Limit dividend payments in good times to help build up capital buffers in bad times
9. Insurance mechanisms	Contingent capital infusions; Pre-funded systemic risk insurance schemes financed by levy related to bank asset growth beyond certain allowance; Pre-funded deposit insurance with premia sensitive to macro (systemic risk) in addition to micro (institution specific) parameters
10. Managing failure and resolution	Exit management policy conditional on systemic strength; Trigger points for supervisory intervention stricter in booms than in periods of systemic distress

Source: Adapted from Galati & Moessner (2013)

As describe above, the focus of this policy is to stabilize the aggregate provision of financial intermediation services to the real economy. However, the majority of instrument under macroprudential tools are follows the existing the microprudential criteria. The previous literature reveals that macroprudential tools can in various categories, one of the best examples are extracted from Galati and Moessner (2013) (See Table 2.1 above).

2.2 *Difference between Microprudential and Macroprudential Policies*

As depicted by Borio and Drehman (2009b), the goal of macroprudential policy is to reduce the systemic risks that have significant macroeconomic costs. Hence, it would be better in understanding the concept of macroprudential by distinguish both micro and macroprudential, as suggested by Borio (2003) where both of these policies can be discussed from different characterisation as mentioned below (see table 2.2);

Table 2.2 Differences between Macro and Microprudential Policies.

Details	Macroprudential	Microprudential
Proximate objective	Reduce the financial distress attached in the entire financial market	Limit the individual institution distress
Ultimate objective	Avoid facing the macroeconomic costs that related to financial volatility risk	Give priority to the consumer protection (investor/ depositor)
Risk characteristics	Mainly focus on endogenous factor such as collective behaviour	Mainly focus on exogenous factor such as individual agents
Relationship across institutions	Very important	Irrelevant
Coordination of prudential controls	Follow top - down approach in terms of system wide risk	Follow bottom - up approach in dealing with risks of individual institution

Source: Galati & Moessner (2013)

2.3 Macroprudential Availability in Indonesia

When it comes to the Indonesia context, there are several or some of the macroprudential instruments have been used it and apply to counter the economy problem for the macroprudential tools that have been used in the Indonesia as stated in Committee on the Global Financial System (CGFS). Some of tools have been used to achieve specific economic benefits and maintained healthier financial system. Since the macroprudential policy can help in various ways in enhancing economy system, hence the policymaker will try their best to implementing it by coordinating new organisation or adapting in the existing institution to implement this policy by it must be well informed by monetary, fiscal and other government agencies regarding the major and minor responsibilities.

Basically, the CGFS has divided macroprudential policy into five broad categories which are; i) credit markets, (ii) measurement of balance sheet strength of bank and other lending institutions, (iii) solving the problem related to the capital flow volatility, (iv) tools used by authorities in assessing the macroprudential policy and (v) inputs applied in macroprudential assessments.

Table 2.3. Examples of Macroprudential Tools Used in the Context of Indonesia

Macroeconomic objectives	Macroeconomic prudential tools implemented	Key Objectives to be achieved from implementation
<u>Credit market</u> i) Credit policy	Prohibition of excessive lending rupiah to non-residents	To stabilize volatility of Indonesian rupiah (IDR)
	Implement minimum rate of statutory requirements.	To maintain statutory requirement within the range of 78 –LDR-100 To control lending activity.
<u>Measurement balance sheet strength of bank and other lending institutions</u> i) Interconnectedness in the financial system.	Intensive supervisory to systemic institution Banks are not allows to give credit to related party by more than 10 percent.	To reduce the risk- taking by banks especially systemic risk.
	ii) Monitoring banks' liquidity resilience.	Monitoring liquidity resilience using the concept of 2 liquidity ratio Monitoring account receivable of bank liquidity position.
<u>Capital flow volatility</u>	Implement minimum holding period for Bank Indonesia bills, 1 month holding period and 6 month holding period.	To control short – term and long-term speculation activity.
	Change of Bank Indonesia bills from 1 month bill to 9 or 12 months.	To limits the supply of Bank Indonesia bill in the market.
	Increase Forex reserve from 1 percent to 8 percent.	To control liquidity management of Forex market. Allow more banks to involve in the Forex activity.
<u>Tools used by authorities in assessing the macroprudential policy</u>	Assessment of financial system stability.	To make sure that the public understand the financial stability issues and how to Bank Indonesia make use of proper policies to mitigate financial issues.
<u>Inputs to macroprudential</u>	Household survey Credit information	N/A
	Financial stability	To maintain good financial health
	Macro stress test	To measure shock of economic problem to maintain bank resilience.

Source: Utari and Arimurti (2012)

2.4 Empirical Reviews on Macroprudential Assessments

The basic ideas of financial satiability and systemic risk have been clearly depicted by previous literatures. Most of the studies are based on empirical justification on macroprudential assessment and its role in enhancing financial stability. The analysis part in quantify financial stability can be in the forms of financial distress on balance sheet, early

warning indicators, key monitoring points based on Vector Autoregression model (VARs) modelling and finally macro stress tests. In the study by Carson and Ingves (2003) and Bordo et al. (2000), the market indicators that normally used to measure Financial Soundness are based on equity and credit default-swap and other financial engineering instruments. In addition, balance sheet variables are also used in measuring financial distress such as non-performing loan, total deposit (cash), liability to total capital etc (Bongini et al, 2002).

In the study conducted by Segoviano and Goodhart's (2009), they have proposed an approach to detect the systemic impact of individual institutions by take into account banks' probability in defaults. On the other hand, Gauthier et al. (2010) incorporating variables on banks' loan book, risk exposures, and on interbank linkages as well as over the counter (OTC) derivatives for the Canadian financial institutions to measure overall risks and total bank's risk contribution change once bank statutory requirement varies. The paper uses five different methodologies in derived systemic risk contributions such as VaR, incremental; VaR, two different of Shapley values and CoVaRs. The analysis reveals that macroprudential capital allocations will be differ by 50 percent from realized capital levels. The result is also give similar outcome where all the risk allocation mechanism give benefits in the sense that improving financial stability.

In addition, Reinhart and Rogoff (2008) concluded that the banks may expose to crisis due to the general features such as fall in asset prices which may cause negative impact to the economy (harm the economic growth, decrease in GDP), followed by high level of debt. All these issues have been burden for upcoming future generation. This study was conducted using 21 banks.

Using the robust time- series analysis, Maino et al. (2013), carry out the study to see in what extent macroprudential tool can be applied in mitigate risks facing the banking sector at Mongolia. The result reveals that flexible monetary and fiscal policies and high level of credit activity, contributes to the commodity boom in Mongolia. The rising interconnectedness, increase in dollarization and the other issues can be solved using macroprudential policy where it can harmonize fiscal and monetary policy adjustments in avoiding unnecessary vulnerabilities in the banking industry.

Cerutti (2015), stated that the use of macroprudential policy have been success and used widely by 119 countries. Emerging country is the one that prefer to use macro prudential policy especially the one related to foreign exchange. A noble to point to note that the effects of macroprudential policy are poor in financially developed country and open based economies. Interestingly, the greater use can be found in higher cross – border lending and

borrowing. This study was carried out using the robust econometric technique, namely, Arellano – Bond Generalize Method of Moments (GMM), time period were spanned from 2000 to 2013 covering 119 countries.

In order to see the impact of macroprudential policy within the framework of Dynamic Stochastic General Equilibrium (DSGE), Angeloni and Faja (2009) did a study and found that there would be tighter monetary policy where it will decrease the bank leverage and risk. Moreover, the authors also reveal that the pro-cyclical capital ratio tends to destabilize and cause harm to economy system even though the policy is carefully designed and implemented. Therefore, there must be proper monitoring management system in looking into this matter and hope to bring impactful results.

In the context of Indonesia, Utari (2012) performed Contingent Claim Approach (CCA), to disputes the relationship between default risk of probability of major banks with the selected macroeconomic variables and micro characteristics of bank specific factors. The findings indicate that there is strong association of macro and micro specific factors towards banks probability of default. In addition, the negative relationship between GDP and probability is found to have inverse relationship and interestingly the relationship between stock market index and probability to default has positive relationship. This paper also highlights the importance to have better macroprudential policy in enhancing economy system and lead to the better financial health.

Tomuleasa (2015) did a study to highlights the common issues related to macroprudential policy key objectives and its challenges faced. The author found that with the supportive macroprudential policy, it will help to protect investors and financial market from exposing to the higher systemic risk. The reason could be good flexibility, well informed and high level of transparency and lower costs of implementation. This study was conducted by reviewing previous literatures.

In the context of Islamic banking, particularly in Indonesia, Nursechafia and Abduh (2014), attempted to address the long – run association of Islamic banks sustainability in response to volatility of macroeconomic variables using time – series analysis. Using calendar time – series data, from 2005 until 2012 (monthly basis), the results from variance decomposition (VDC) and impulse response function (IRF) reveals that there is long-run association between credit risk ratio with the selected macroeconomic variables. Negative relationship can be found among exchange rate, supply side-inflation and growth with credit risk whereas money supply and interbank money market have positive relationship with credit risk rate. Even though this paper clearly illustrated the key relationship between

macroeconomic variables and credit risk rate but it seems that this paper do not utilizes the specific factors of banks in assessing the credit risk such as loan to deposit ratio, third party fund, financing to deposit ratio which may have direct impact on credit buffer. These informations are clearly absence from this paper and it subject to criticism.

In contrast, Imadduddin (2007) concludes that the performance of Islamic banking in Indonesia relatively low compared to conventional system when it comes to credit default management. This study adopted calendar time-series monthly basis from January 2003 till April 2006 and econometric modelling. This study probably subject to certain condemnation because the time horizon used are less and there will be possibility where it can influencing the robustness of outcome. In addition, discussion on macroprudential policy was limited. On the other hand, applying Autoregressive Distribution Lag (ARDL) modelling, Adebola et al. (2011) did a study to measure the macroeconomic determinants of non-performing financing (NPF) in Malaysia and the proxies used are industrial production index, interest rate and producer price. This finding revealed that the interest rate seems to be main determinant of non – performing financing rate movement where it has positive relationship with NPF. This study seems to be too general and more focusing on the determinants of NPF rather than assessing the macroprudential policy and credit buffer. NPF is playing an important role particularly on macroprudential policy and credit buffer, but less emphasis was given in this paper and obviously subject to criticism

Kardar (2011) did a study to briefly discuss an overview of financial system in Pakistan and further elaborates on macroprudential policy development. By taking into account various perspective in discussion, the author's reveals that macroprudential surveillance structure is influenced by analytical, institutional and political factors, and these need to be addressed through effective coordination between the key stakeholders. In addition, microprudential policy still plays an important role in ensuring financial system stability, requiring the supervisors to strike a balance between the macro and micro approaches. Due to complexity involved in both conventional and Islamic banking, the author argued that there is a need for proper framework for macroprudential policy in assessing credit risk in conventional and Islamic banking since the banking sector plays an important role in maintaining good financial system.

In conclusion for literature review, it can be clearly noted that only few studies have explicitly covered on macroprudential policy in the context of Indonesia covering both conventional and Islamic banking. Since the Indonesia is a one of the large countries within the Asean region and worldwide, being so there must be much attention given to this aspect

in order to maintain better financial system, to improve transparency. The government need to focus on this matter as it will affect the investment activities from institutional investors and MNCs. In addition, the previous studies generally focuses on framework point of view with less concentration given to the what variables that may influence the assessment of macroprudential policy and credit buffer by incorporating both macroprudential instruments and macroeconomic variables particularly on banking sector since the banking sector plays an important role determine country financial health. With this gap and initiative, the current study has motivated to undertake in-depth analysis on the assessment of macroprudential and credit buffer in Indonesia particularly concentrates on both conventional and Islamic banking.

3. CHAPTER THREE: DATA AND METHODOLOGY

3.1. Data

In this study, we use time series in the form of monthly basis from the period of January 2002 until August 2014. The study covering 152 number of observations for each conventional and Islamic banks. The data were obtained from Bank Indonesia website. The macroeconomic variables were transformed into natural logarithm function, such as LGDP, LDPK, LCPI. While variables such as NPL and LDR (for conventional bank), NPF and FDR (for Islamic Banks), BI Rate, and GWM, BUFFER remain. The data used in this study specifically is defined in table below.

Table 3.1. Variables and Sources of Data

Variable	Definition	Ref	Source
<i>LCREDIT</i>	Total Credit	Conventional Bank	Bank Indonesia
<i>LFIN</i>	Total Financing iB	Islamic Bank	Bank Indonesia
<i>BUFFER</i>	CAR (Actual) – CAR (Target)	Macroprudential Instrument	Bank Indonesia
<i>RGWM</i>	Ratio Demand Deposit / Third Party Fund	Macroprudential Instrument	Bank Indonesia
<i>LDPK</i>	Total Third Party Funds		Bank Indonesia
<i>LGDP</i>	Gross Domestic Product	Macroeconomic Variables	Bank Indonesia
<i>LCPI</i>	Consumer Price Index	Macroeconomic Variables	Bank Indonesia
<i>BIRATE</i>	Bank Indonesia Interest Rate	Macroeconomic Variables	Bank Indonesia
<i>NPL</i>	Non Performing Loan	Conventional Bank	Bank Indonesia
<i>LDR</i>	Loan to deposit Ratio	Conventional Bank	Bank Indonesia
<i>NPF</i>	Non Performing Financing	Islamic Bank	Bank Indonesia
<i>FDR</i>	Financing to Deposit Ratio	Islamic Bank	Bank Indonesia

In this study, we use two macroprudential instruments toward credit growth in Indonesia, namely GWM ratio (*Giro wajib minimum*) and Buffer which was calculated from the Capital

Adequacy Ratio, CAR (actual) – CAR (target). Apart from that, we also employ macroeconomic variables and micro-banking variables to see their impact on credit growth in Indonesia.

3.2. Estimation Method

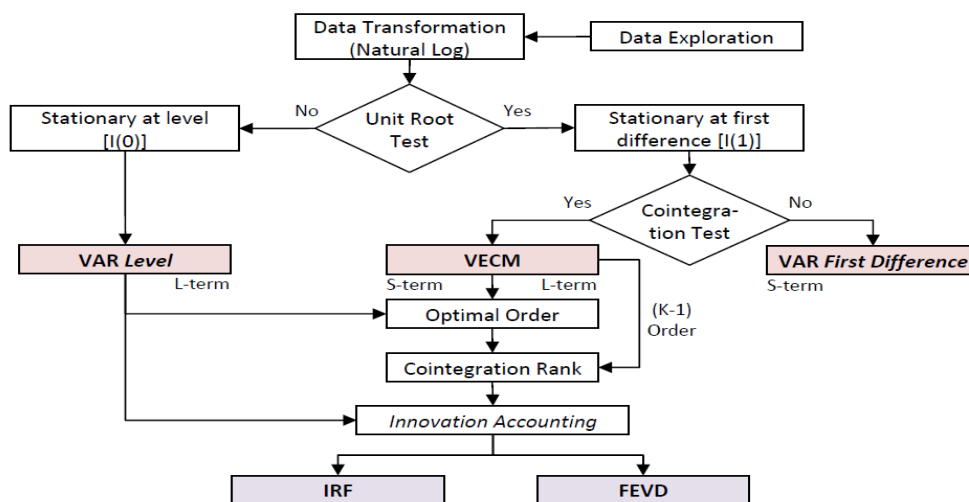
Vector Error Correction Model (VECM) is restricted VAR designed and used for non-stationary variables known to be cointegrated. VECM specification restricts the long-run behavior of endogenous variables to converge to their cointegrating relationship whilst allowing for short-run adjustment dynamics. Through the ECT, VECM allows the discovery of Granger causality relation. In addition, VECM method allows the differentiation of short-term and long-term relationships. Error term with lagged parameter measuring the short term dispersal from long term equilibrium. In short-run, the variable might be dispersed from one another which will cause system unequilibrium. Thus, the statistical significance of the coefficient associated with ECT (-1) provides us with evidence for an error correction mechanism that drives the variable back to the long-term relationship. The Vector Error Correction Model (VECM) can be expressed as equation below.

$$\Delta x_t = \mu_t + \Pi x_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta x_{t-i} + \varepsilon_t$$

Where .

X_t is k selected endogenous variables, specified for each model
 ε_t is disturbance error term

Figure 3.1. VAR / VECM Procedure



Source: Ascarya (2009)

Proxies for endogenous variables (both conventional and Islamic banks) can be depicted in table below.

Table 3.2. Proxies of Endogenous Variable

Bank	Dependent	Macroprudential Instrument	Macroeconomic variables	Micro-banking variables
Conventional	Credit (LCREDIT)	<i>RGWM</i> <i>Buffer</i>	- <i>LGDP</i>	- <i>NPL</i>
Islamic	Financing (LFIN)		- <i>BI RATE</i>	- <i>LDR</i>
			- <i>LCPI</i>	- <i>NPF</i>
				- <i>FDR</i>

The disaggregation between Conventional and Islamic banks will be in the light of dependent variables (Credit for conventional, financing for Islamic bank); and micro-banking specific variables (i.e. NPL – conventional, NPF – Islamic). We use two macroprudential instruments that were practiced in Indonesia, namely ratio of demand deposit / ratio *giro wajib minimum* (RGWM) and Buffer.

3.3. Model Specification

In this study, we follow the model from Furlong (1992) and Lin et al (2011). The model can be depicted as follows.

$$Y_{i,t} = \alpha_1 I_{i,t} + c_1 \Delta Y_{i,t-1} + d_1 X_{i,t} + d_2 Z_{i,t-1} + \varepsilon_{i,t}$$

Where:

X is macroeconomic factors, i.e. GDP and interest rate

Y is credit growth

Z is micro-banking variables

I is macroprudential instruments

Specifically, to study the impact of macroprudential instrument on credit growth, our model specification can be depicted below:

For Conventional Banks

Model 1. RGWM Instrument

$$LCREDIT_t = \beta_0 + \beta_1 RGWM_t + \beta_2 LGDP_t + \beta_3 NPL_t + \beta_4 LDR + \varepsilon_t$$

Model 2. Buffer Instrument

$$LCREDIT_t = \beta_0 + \beta_1 Buffer_t + \beta_2 LDPK_T + \beta_3 BIRATE_t + \beta_4 NPL_t + \beta_5 LCPI_t + \epsilon_t$$

For Islamic Banks

Model 1. RGWM Instrument

$$LFIN_t = \beta_0 + \beta_1 RGWM_t + \beta_2 LGDP_t + \beta_3 NPF_t + \beta_4 FDR + \epsilon_t$$

Model 2. Buffer Instrument

$$LFIN_t = \beta_0 + \beta_1 Buffer_t + \beta_2 LDPK_T + \beta_3 BIRATE_t + \beta_4 NPF_t + \beta_5 LCPI_t + \epsilon_t$$

Where:

LCREDIT	= Total Credit
LFIN	= Total Financing iB
BUFFER	= CAR (Actual) – CAR (Target)
RGWM	= Ratio Demand Deposit / Third Party Fund
LDPK	= Total Third Party Funds
LGDP	= Gross Domestic Product
LCPI	= Consumer Price Index
BIRATE	= Bank Indonesia Interest Rate
NPL	= Non Performing Loan
LDR	= Loan to deposit Ratio
NPF	= Non Performing Financing
FDR	= Financing to Deposit Ratio
ϵ_t	= Error term

The equation of VECM model in matrix for RWGM instrument can be written as follows:

$$\begin{bmatrix} \Delta LCREDIT_t \\ \Delta RGWM_t \\ \Delta LGDP_t \\ \Delta NPF_t \\ \Delta FDR_t \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} \end{bmatrix} \begin{bmatrix} \Delta LCREDIT_{t-1} \\ \Delta RWGM_{t-1} \\ \Delta LGDP_{t-1} \\ \Delta NPF_{t-1} \\ \Delta FDR_{t-1} \end{bmatrix} + \begin{bmatrix} \epsilon_{1t} \\ \epsilon_{2t} \\ \epsilon_{3t} \\ \epsilon_{4t} \\ \epsilon_{5t} \end{bmatrix}$$

The equation of VECM model in matrix for Buffer instrument can be written as follows:

$$\begin{bmatrix} \Delta LCREDIT_t \\ \Delta Buffer_t \\ \Delta LDPK_t \\ \Delta BIRATE_t \\ \Delta NPF_t \\ \Delta CPI_t \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \\ \beta_{60} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} & \beta_{36} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} & \beta_{46} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} & \beta_{56} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & \beta_{66} \end{bmatrix} \begin{bmatrix} \Delta LCREDIT_{t-1} \\ \Delta Buffer_{t-1} \\ \Delta LDPK_{t-1} \\ \Delta BIRATE_{t-1} \\ \Delta NPF_{t-1} \\ \Delta CPI_{t-1} \end{bmatrix} + \begin{bmatrix} \epsilon_{1t} \\ \epsilon_{2t} \\ \epsilon_{3t} \\ \epsilon_{4t} \\ \epsilon_{5t} \\ \epsilon_{6t} \end{bmatrix}$$

4. CHAPTER FOUR: EMPIRICAL FINDINGS

To begin with, several steps of data testing should be performed as a normal procedure for using VAR/VECM approach, such as unit root test, optimal lag test, and cointegration test (see figure above).

4.1. Unit Root Test

We investigate the stationarity status of the variables using both the augmented Dickey-Fuller (ADF) and the Philips-Perron (PP) tests for unit roots. The null hypothesis tested is that the variable under investigation has a unit root against the alternative that it does not. In terms of lag length, we choose the Akaike Information Criteria (AIC) to determine the optimal lags after testing for first and higher order serial correlation in the residuals.

Table 4.1 . Unit Root Tests (ADF and PP Unit Root Tests)

Panel A. Conventional Bank

Variables	Level		First Difference	
	ADF	PP	ADF	PP
LCREDIT	-0.9241	-0.4466	-3.0586***	-8.7172***
RGWM	-0.6399	-0.6597	-2.6915**	-7.4050***
LDPK	0.3415	2.4853	-2.5072**	-12.1033***
LGDP	0.4989	0.8084	-2.7845**	-6.7438***
LCPI	-2.8802	-3.3365	-8.1488***	-12.1815***
BIRATE	-3.2102	-3.1918	-3.9410***	-5.1007***
NPL	-1.8658	-2.8467	-1.9275**	-2.6891**
LDR	-1.5473	-1.7752	-2.2842**	-11.9505***
BUFFER	-2.9248	-1.6880	-2.8736**	-11.0766***

Note: **, *** denotes significant at 5% and 1% alpha respectively. Criteria: Akaike Information Criteria

Panel B. Islamic Bank

Variables	Level		First Difference	
	ADF	PP	ADF	PP
LFIN	-1.9377	-2.6214	-2.4352**	-5.5775***
RGWM	-1.8307	-2.1532	-3.0860**	-13.7301***
LDPK	-1.9482	-3.5133	-2.1391**	-7.7478***
LGDP	0.4989	0.8084	-2.7845**	-6.7438***
LCPI	-2.8802	-3.3365	-8.1488***	-12.1815***
BIRATE	-3.2102	-3.1918	-3.9410***	-5.1007***
NPF	-2.8457	-1.6616	-1.9339**	-8.6391***
FDR	-1.3684	-1.1446	-3.7077***	-6.6790***
BUFFER	-1.8503	-1.8738	-6.5115***	-5.409***

Note: **, *** denotes significant at 5% and 1% alpha respectively. Criteria: Akaike Information Criteria

Table above shows the results of testing for unit roots in the level as well as in first difference. In the level form, the null hypothesis for all variables in panel A and panel B have a unit root cannot be rejected by both tests. However, after applying the first difference, both tests reject the null hypothesis. In that, all variables are not stationary in level, but all variables are stationary in first difference. Therefore, maintain the null hypothesis that each variable is integrated of order one.

4.2 Selection of Optimal Lag

The purpose of optimal lag selection is to resolve the issue of autocorrelation (Ascarya, 2009). The lag determination is far more important because lag variables will be used as exogenous variables in the system (Enders, 1995). The lag selection, in this study, will be based on the shortest lag of Akaike Information Criteria (AIC) and Schwarz Information Criterion (SIC). Table below shows the optimal lag selection in this study.

Table 4.2. Selection of Optimal Lag

Panel A. Conventional Bank

Lag	AIC	SC
0	-34.3313	-33.7247
1	-42.6668*	-40.4292*
2	-41.8075	-37.9194
3	-41.2093	-35.6505
4	-40.4529	-33.2031

Panel B. Islamic Bank

Lag	AIC	SC
0	-32.3092	-31.4412
1	-37.5431	-34.3313
2	-44.4652*	-38.8666*
3	-49.7655	-41.7357
4	-56.2776	-45.7709

Panel A shows the lag selection for conventional banks. According to the AIC and SC, lag order selected with refer to criterion for macroprudential model is 1. Panel B shows the lag selection for Islamic banks. In contrast, based on AIC and SC criterion, lag order for Islamic bank for macroprudential model is 2.

4.3. Cointegration Test

Having concluded that each of the series is stationary, and then we go further to assess whether there exists a long-run equilibrium between variables for both models. Table below provides the results of the Johansen cointegration test, with the trace and maximum eigenvalue statistic. We set the lag length equal to 1 for conventional (panel A) and lag 2 for Islamic (panel B) based on Akaike Information Criterion (AIC) whereas we found sufficient to render the error term serially uncorrelated in conducting the test. In that, an overview of the overall result is shown in table below.

Table 4.3. Johansen Juselius Cointegration Tests - *Conventional Bank*

Panel A. Model 1 (RWGM instrument)

Null Hypothesis	Test Statistics		Critical Values (5%)	
	Trace	Max Eigen	Trace	Max Eigen
None*	90.70845	45.38907	69.81889	33.87687
At most 1	45.31938	21.50093	47.85613	27.58434
At most 2	23.81845	17.27291	29.79707	21.13162
At most 3	6.545541	6.536149	15.49471	14.26460
At most 4	0.009391	0.009391	3.841466	3.841466

*denote significant at α 5%. The results indicate 1 cointegrating equation at 5% alpha.

Panel B. Model 2 (Buffer instrument)

Null Hypothesis	Test Statistics		Critical Values (5%)	
	Trace	Max Eigen	Trace	Max Eigen
None*	106.2216	36.4390	95.7536	40.0775
At most 1	69.7825	27.9623	69.8188	33.8768
At most 2	41.8202	17.6046	47.8561	27.5843
At most 3	24.2156	14.0030	29.7970	21.1316
At most 4	10.2125	10.1109	15.4947	14.2646

denote significant at α 5%. The results indicate 1 cointegrating equation at 5% alpha.

According to above cointegration results, for conventional banks, we find enough evidence that all variables are co-integrated at 5% significance level for both RGWM model and buffer model. The trace statistic indicates the presence of one cointegrating vectors. While maximum eigenvalue statistics also indicates similar facts whereby there is one cointegrating vectors. From these results, we conclude that there is a unique cointegrating vector governing the long run association among variables. In other words, there is one cointegrating relationship among credit and macroprudential instruments having tested by Johansen-Juselius tests. These variables are tied together in the long run and their deviations from the

long run equilibrium path will be corrected. The presence of cointegration also rules out non-causality among the variables.

Table 4.4 . Johansen Juselius Cointegration Tests - *Islamic Bank*

Panel A. Model 1 (RWGM instrument)

Null Hypothesis	Test Statistics		Critical Values (5%)	
	Trace	Max Eigen	Trace	Max Eigen
None*	131.9871	75.7838	9.8188	33.8768
At most 1*	56.2032	39.0849	47.8561	27.5843
At most 2	17.1183	11.3787	29.7970	21.1316
At most 3	5.7395	4.3135	15.4947	14.2646
At most 4	1.4259	1.4259	3.8414	3.8414

**denote significant at α 5%. The results indicate 2 cointegrating equation at 5% alpha.*

Panel B. Model 2 (Buffer instrument)

Null Hypothesis	Test Statistics		Critical Values (5%)	
	Trace	Max Eigen	Trace	Max Eigen
None*	327.9514	192.5837	95.7536	40.0775
At most 1*	135.3677	69.0455	69.818	33.8768
At most 2	66.3222	38.6557	47.8561	27.5843
At most 3	27.6664	17.9885	29.7970	21.1316
At most 4	9.6778	9.2710	15.4947	14.2646

**denote significant at α 5%. The results indicate 2 cointegrating equation at 5% alpha.*

Meanwhile, for Islamic banks, we also find evidence that all variables are co-integrated at 5% alpha on RGWM model and buffer model. The trace statistic shows the presence of two cointegrating vectors. While maximum eigenvalue statistics also shows similar facts. From these, we conclude that there is a unique cointegrating vector governing the long run association between financing and macroprudential instruments. In that, there is two cointegrating relationship among credit and macroprudential instruments having tested by Johansen-Juselius tests. These variables are tied together in the long run and their deviations from the long run equilibrium path will be corrected.

4.4. Long-Run Model

The model below depicts the long run relationship between the credit growth and independent variables for both RWGM and buffer model. It can be seen that all independent variables significantly affect the credit growth of conventional banks in the long run (parentheses are t-stat).

Long run Equation for Conventional Bank

Panel A. Model 1 (RWGM instrument)

$$LCREDIT_t = -23.5257 + 0.0572 RGWM_t + 2.8460 LGDP_t - 0.0009 NPL_t + 0.0101 LDR_t$$

[1.4832] [-13.0507] [-0.1349] [-3.4101]

Panel B. Model 2 (Buffer instrument)

$$LCREDIT_t = 1.4947 + 0.0359 BUFFER_t + 0.8683 LDPK_t - 0.0234 BIRATE_t - 0.1251 NPL_t$$

[-2.2061] [-7.8722] [-2.5279] [6.3219]

$$- 0.07743 LCPI$$

[1.1333]

In the long run, the credit growth of conventional bank is positively affected by LGDP and negatively affected by interest rate (BI Rate) and inflation (LCPI). Our results supported the study of Utari et al (2012) who found that the credit growth has negative correlation with interest rate and inflation in Indonesia.

Subsequently, macroprudential policy based on GWM instrument (see panel A) is significantly influence the credit growth in the long run. The positive sign of GWM coefficient shows that when the GWM ratio increase by 1%, then the credit growth will be increase by 0.057%. Our findings is differ with Utari et al (2012) who found the fact of negative sign on GWM ratio toward credit growth. The reason is because the third party funds will be decreased since the bank has less capacity to offer credit due to the placement on demand deposit (GWM). While other variables shows the similar findings with prior studies, for instance GDP variable has positive relationship with credit growth. Aside from that, credit also affected by NPL ratio. When NPL increase by 1 percent, it will trigger the decreasing number of credit growth by 0.0009%.

From panel B, another macroprudential instrument is capital buffer (BUFFER). The positive sign of buffer indicates that capital buffer of conventional bank has positively affected the credit expansion in Indonesia. Our findings is differ with prior study (Utari et al, 2012) who found that buffer has negative relationship with credit growth. Based on model with buffer instrument, we also find that credit growth has negative correlation with interest rate and

inflation in Indonesia, while third party funds has positive association with credit growth.

Long run Equation for Islamic Bank

Panel A. Model 1 (RWGM instrument)

$$LFIN_t = -11.8204 + 0.3770 RGWM_t + 1.4339 LGDP_t - 0.0676 NPF_t + 0.053 FDR_t$$

$$[-8.4436] \quad [-7.0414] \quad [3.7029] \quad [-8.8062]$$

Panel B. Model 2 (Buffer instrument)

$$LFIN_t = 2.8960 - 0.0328 BUFFER_t + 0.8686 LDPK_t - 0.0138 BIRATE_t - 0.0340 NPF_t -$$

$$[23.8891] \quad [-93.4458] \quad [6.2539] \quad [7.9554]$$

$$- 0.1601 LCPI$$

$$[5.4409]$$

For Islamic bank, similar with conventional, the financing growth in the long run is positively affected by LGDP and negatively affected by interest rate (BI Rate) and inflation (LCPI). Macroprudential policy according to GWM instrument (see panel A) is significantly influence the financing growth. The negative sign of GWM coefficient shows that when the GWM ratio increase by 1%, then the financing growth will be decrease by 0.37%. The reason perhaps in harmony with conventional banks because the third party funds will be decreased since the bank has less capacity to offer credit due to the placement on demand deposit (GWM). Other variables also shows the similar findings with conventional banks, for instance GDP variable has positive relationship with financing growth. Aside from that, credit also affected by NPF ratio. When NPF increase by 1 percent, it will trigger the decreasing number of financing growth by 0.676%.

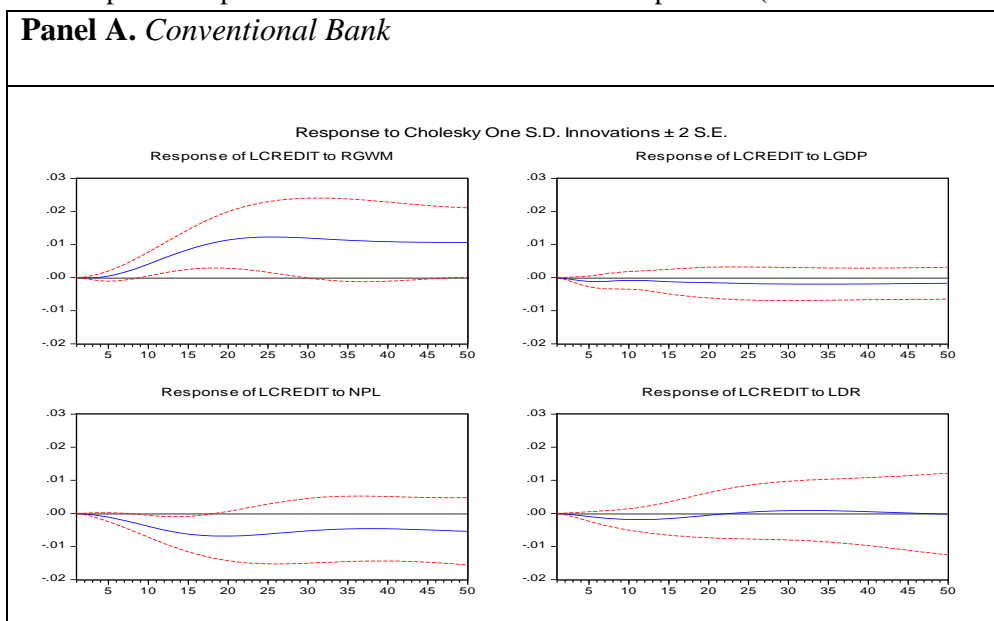
Another macroprudential instrument is capital buffer (BUFFER). The negative sign of buffer indicates that capital buffer of Islamic bank has negatively affected the financing expansion in Indonesia. Our findings is in line with prior study (Utari et al, 2012) who found that buffer has negative relationship with credit growth. Moreover, according to the buffer instrument model, we also find that financing growth has negative correlation with interest rate and inflation in Indonesia, while third party funds has positive association with credit growth.

4.5. Impulse Response Function (IRF) and Variance Decomposition

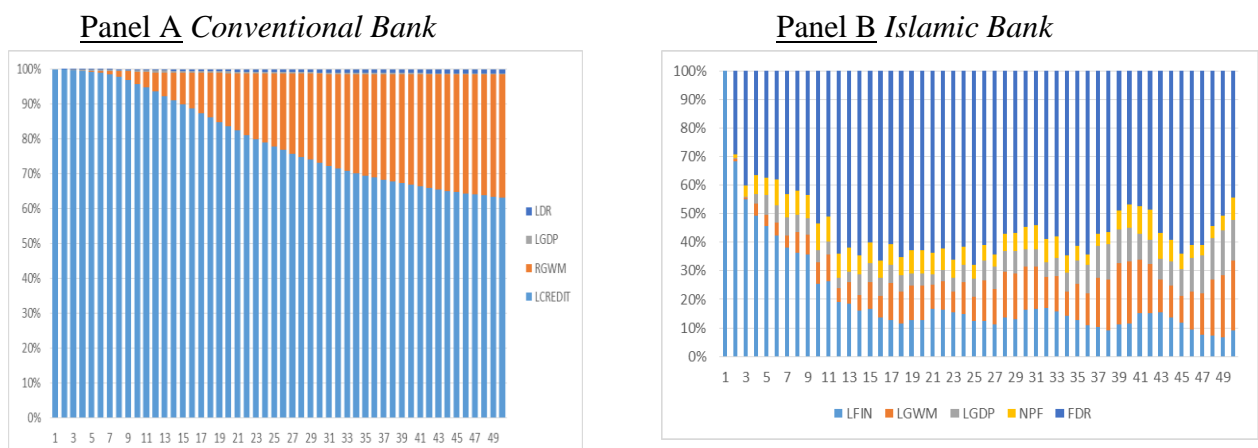
The impulse response function (IRF) conducted in to order to illustrate the dynamic patterns of credit growth and financing growth. Here, the IRF provided over 50-month time horizon. The initial shock in a variable is set to be equal to one standard error of innovation; the vertical axis in figures indicate the approximate percentage change in other variables in response to one percentage shock in credit growth for conventional banks, and financing growth for Islamic bank.

Figure below give us clearly picture that *credit* respond positively to the shocks in GWM ratio. The influences of these variables on credit growth are further reaffirmed by the variance decomposition. In contrast, for Islamic bank the responses of *financing* to shocks in GWM ratio for the same period is negative respond and return to the long run,

Figure 5.1 . Impulse Response Function and Variance Decomposition (some selected variables)



Variance Decomposition of GWM instrument



5. CHAPTER FIVE: CONCLUSION

This paper attempted to analyse the impact of macroprudential instruments, macroeconomic variables, and microbanking factors toward credit growth for conventional and Islamic banks in Indonesia. By using time series data, the findings suggest that there is cointegration exists over the observation. The study found that macroprudential policy based on GWM instrument significantly influence the credit growth in the long run. The negative sign of GWM coefficient for Islamic banks shows that when the GWM ratio increase then the financing growth will be decrease because the third party funds will be decreased since the bank has less capacity to offer credit due to the placement on demand deposit (GWM). This study suggests that the policy of reserve requirement (RR) seems not effective since the credit growth still increase albeit the banks place the demand deposit (GWM) on Bank Indonesia. From macroeconomic factors, the variables shows the similar findings with prior studies, such as GDP has positive relationship with credit growth. In addition, credit also affected by NPL ratio.

Another macroprudential instrument is capital buffer (BUFFER). Interestingly, there is a different impact of capital buffer instrument in credit growth between conventional and Islamic banks. The positive sign of buffer indicates that capital buffer of conventional bank has positively affected the credit expansion in Indonesia. According to buffer instrument, credit growth has negative relationship with interest rate and inflation in Indonesia, while third party funds has positive association with credit expansion. Meanwhile, capital buffer instrument has negatively affected the financing growth of Islamic banks in Indonesia.

For Islamic bank, similar with conventional, the financing growth in the long run is positively affected by macroeconomic factors, i.e GDP and negatively affected by interest rate (BI Rate) and inflation (LCPI). Macroprudential policy based on GWM model is significantly influence the financing growth of Islamic banks.

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