

## The Concept and Practices of Macroprudential Policy in Indonesia: Islamic and Conventional

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**Abstract.** *This study aims to examine reserve ratio (GWM), and capital buffer toward credit growth; the impact of macroeconomic variables and micro-banking specific factors toward credit growth in Islamic and Conventional Bank. This research using Vector Error Correction Model (VECM). This research finds that macroprudential policy based on GWM instrument positively influence the credit growth of conventional and Islamic banks. From macroeconomic, the credit growth is positively affected by GDP and negatively affected by BI Rate and inflation. Also, credit also affected by deposit funds and default rate ratio. Interestingly, there is a different impact of capital buffer instrument toward credit growth. Capital buffer instrument has negatively affected the financing growth of Islamic banks in Indonesia.*

**Keywords:** *macroprudential, macroeconomic, Islamic banks*

**Abstrak.** *Tujuan dari penelitian ini adalah untuk menguji rasio Giro Wajib Minimum (GWM), dan capital buffer terhadap pertumbuhan kredit; dampak variabel makroekonomi dan faktor spesifik perbankan terhadap pertumbuhan kredit di Bank Syariah dan Konvensional. Penelitian ini menggunakan Vector Error Correction Model (VECM). penelitian ini menemukan bahwa kebijakan makroprudensial berdasarkan instrumen GWM berpengaruh positif terhadap pertumbuhan kredit bank konvensional dan syariah. Dari sisi makroekonomi, pertumbuhan kredit dipengaruhi secara positif oleh PDB dan dipengaruhi secara negatif oleh BI Rate dan inflasi. Selain itu, kredit juga dipengaruhi oleh rasio dana pihak ketiga (LDPK) dan NPL. Menariknya, ada pengaruh yang berbeda dari instrumen capital buffer terhadap pertumbuhan kredit. Instrumen capital buffer berdampak negatif terhadap pertumbuhan pembiayaan bank syariah di Indonesia.*

**Kata kunci:** *macroprudential, makroekonomi, bank syariah*

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## 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 crises, 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. Despite this success, as part of the financial institution, we still face some challenges ahead that are triggered by the specific case mainly banking liquidation in Indonesia. In the future, with some shocks faced by financial institutions, it may affect and spread out quickly due to the interconnectedness, and it will lead to systemic risk. This condition worsened by the pro-cyclical behavior of those institutions in the economy. Thus, the Islamic banking system has an internal 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 behavior that amplifies the economic cycle fluctuations (Utari & Arimurti, 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 behavior in the financial system (Utari & Arimurti, 2010). This policy must be taken based on the past evidence, whereby, financial imbalances are the critical factor for the high depression 1929/1930, Japan financial crisis 1990, and Asian financial crisis 1997. Therefore, controlling financial market as a whole system is very vital in managing economic condition as a prerequisite for economic development.

Currently, in Indonesia, there is dual model of banking system, namely conventional and Islamic banking system. The Islamic financial industry (IFIs), with its general 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 phenomenon 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 established in 1992. Until 1998, BMI is still the only Islamic bank in Indonesia. In 2005, the number of Islamic banks had reached 20 units with 3 Islamic Full-fledge banks (BUS) and 17 Islamic business unit (Karim, 2013). As of today, in Indonesia, there are 12 Islamic Full-fledge banks and 22 Islamic business unit (UUS) (Otoritas Jasa Keuangan, 2015).

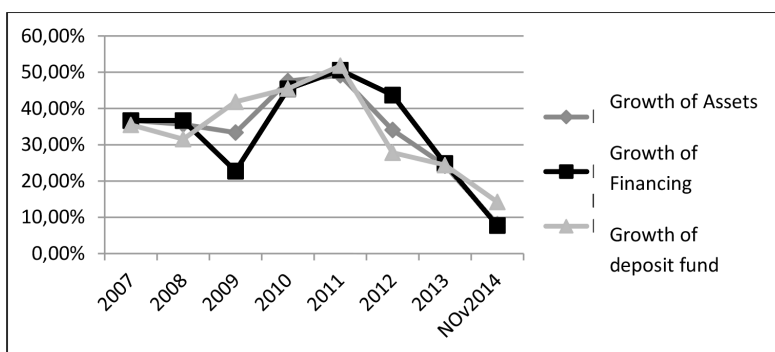
Although the growth of Islamic banking industry is very rapid, the market

share of Islamic banking is still stagnant at the rate of 5%. Also, when viewed from the growth of assets, the amount of financing, and the amount of deposit fund (DPK) BUS and UUS during the last three years (see Figure 1), the trend was decline significantly.

According to the Islamic Financial Services Board (IFSB) 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 significant growth and market share of the Islamic bank, the position of Islamic bank in the whole Indonesian economy is more vulnerable. Thus, Islamic banking as an entire financial system has to address in the macro prudential policy.

The issue in this research is how to define and develop the macro-prudential policy in Indonesia in the paradigm of the dual banking system (conventional and Islamic) is still under debate. Moreover, even in the monetary policy literature, according to Tomuleasa (2013) research on macro prudential policy is always in its infancy and appears far from being able to provide a sound analytical underpinning for policy frameworks. This phenomenon may be due to two main reasons (Utari and Arimurti, 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.

Figure 1. The Growth of Asset, Financing, and Deposit Fund



Source: Otoritas Jasa Keuangan, 2014

According to International Monetary Fund (2012), the macroprudential policy aims to maintain the stability of a whole financial system through the restriction of systemic risk. Also, Bank International Settlement defines macroprudential policy as

a set of policy intended in restricting the systemic risk and its cost. Moreover, Isarescu (2011) argues that macroprudential policies are required 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 the case of Indonesia, Bank of Indonesia (2013) defines macroprudential policy as policy set by Central Bank, to improve the resilience of the financial system and to reduce the systemic risk that can interfere monetary stability.

Another study conducted by Borio (2003) shows that a successful macroprudential policy will lead to the final objective of the microprudential policy, so the microprudential policy 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, Claessens, & Laeven (2015), the macroprudential policy distinguishes from other economic policies. Its policy 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 significant distinction between the macroprudential policy and the microprudential one, regarding objectives, mechanism and tools for transmission.

Although several studies have investigated on the issue of macroprudential policy from the conventional perspective, 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. Besides, this research focus on how to develop macroprudential especially for Islamic financial system. This study focused on the effect of the macroprudential instrument, macroeconomic factors, and micro-banking factors toward credit growth. We try to address the question whether the 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 micro-banking factors on credit growth behavior (or financing growth) since experimental works on this topic are relatively scarce. The macroprudential instruments 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 developing a sustained macroprudential policy in Indonesia.

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

## Literature Review

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

As mentioned by Flannery and Sorescu (1996), macroprudential policies are becoming an essential tool in ensuring the health of country financial is in an excellent position. Macroprudential implementation will make sure the achievement of micro-prudential specific purpose; being so the micro-prudential policy will be part of coordinating tool with the macro policy to achieve better financial system. The recent crisis such as US Subprime crisis in 2009 and Greece debt crisis in 2010 have highlighted the management of systemic risk need to be carefully designed and should not ignore. Those entire financial and economic crises have led to the recognition of policy in managing systemic risk such as macroprudential policy in maintaining healthier financial position.

Specifically, the notion idea of macro prudential policy is to limit the spread of systemic risk, that is, 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, and the 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 the proper management of systemic risk.

To realize the outcome of macro prudential policy, this policy must be structured correctly in the way of proper supervision and enforcement. These actions do by using an appropriate fiscal and monetary policy. According to Utari & Arimurti (2012), there are three primary goals to be achieved by implementing macroprudential policy. (i) Overcoming imbalances of financial position; (ii) reducing systemic risk exists in the market to minimize the market volatility; (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. There are namely: 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; and Systemic liquidity risk.

### **Difference between Microprudential and Macroprudential Policies**

As depicted by Borio and Drehman (2009), the goal of the 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 distinguishing both micro and macroprudential, as suggested by Borio (2003) where both of these policies can be discussed from different characterization as mentioned in Table 1. 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 the tools have been used to achieve specific economic benefits and maintained the healthier financial system. Since the macroprudential policy can help in various ways in enhancing the economy system, hence the policymaker will try their best to implement it by coordinating new organization 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.

Table 1. Differences between Macro and Microprudential Policies.

<b>Details</b>	<b>Macroprudential</b>	<b>Microprudential</b>
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 regarding of system-wide risk	Follow bottom-up approach in dealing with risks of individual institution

Source: Galati & Moessner (2013)

The CGFS has divided macroprudential policy into five broad categories. (i) credit markets; (ii) measurement of balance sheet strength of the 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.

Previous literature has depicted the basic ideas of financial stability and systemic risk. Most of the studies based on empirical justification on macroprudential assessment and its role in enhancing financial stability. The analysis part in quantifies 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) modeling and finally macro stress tests. In the study by Carson and Ingves (2003) and Bordo et al. (2000), the market indicators that used to measure Financial Soundness based on equity and credit-default-swap and other financial engineering instruments. Also, balance sheet variables also used in measuring financial distress such as a 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 taking into account banks' probability of 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 differ by 50 percent from realized capital levels. The result also given similar outcome where all the risk allocation mechanism provide benefits in the sense that improving financial stability.

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

Maino et al. (2013) by using the robust time- series analysis, 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 growing 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.

Table 2. Examples of Macroprudential Tools Used in the Context of Indonesia

<b>Macroeconomic objectives</b>	<b>Macroeconomic prudential tools implemented</b>	<b>Key Objectives to be achieved from implementation</b>
Credit market i) Credit policy	Prohibition of excessive lending rupiah to non-residents  Implement minimum rate of statutory requirements.	To stabilize volatility of Indonesian rupiah (IDR)  To maintain statutory requirement within the range of 78 –LDR-100 To control lending activity.
<b>Measurement balance sheet strength of bank and other lending institutions</b>		
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.	To reduce liquidity risk in the banking system.
<b>Capital flow volatility</b>	Implement minimum holding period for Bank Indonesia bills, 1 month holding period and 6 month holding period.  Change of Bank Indonesia bills from 1 month bill to 9 or 12 months.  Increase Forex reserve from 1 percent to 8 percent.	To control short – term and long-term speculation activity.  To limits the supply of Bank Indonesia bill in the market.  To control liquidity management of Forex market. Allow more banks to involve in the Forex activity.
<b>Tools used by authorities in assessing the macroprudential policy</b>	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.
<b>Inputs to macroprudential</b>	Household survey Credit information  Financial stability  Macro stress test	N/A  To maintain good financial health  To measure shock of economic problem to maintain bank resilience.

Source: Utari and Arimurti (2012)



Cerutti et al. (2015), stated that the use of macroprudential policy has been a success and used widely by 119 countries. Emerging country is the one that prefers to use macroprudential policy especially the one related to foreign exchange. A noble to point to note that the effects of the macroprudential policy are weak in the financially developed country and open based economies. Interestingly, the more significant use can 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), period spanned from 2000 to 2013 covering 119 countries.

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 a 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 the economy system even though the policy 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 and Arimurti (2012) performed Contingent Claim Approach (CCA), to disputes the relationship between default risk of the probability of major banks with the selected macroeconomic variables and micro characteristics of bank-specific factors. The findings indicate that there is the substantial association of macro and micro-specific factors towards banks probability of default. Also, the negative relationship between GDP and probability is found to have the inverse relationship, and interestingly the relationship between the stock market index and probability to default has the positive relationship. This paper also highlights the importance to have the better macroprudential policy in enhancing the 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 useful flexibility, well informed and high level of transparency and lower costs of implementation. This study conducted by reviewing previous literature.

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 the 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 the long-run association between credit risk ratio with the selected macroeconomic variables. A negative relationship can found among exchange rate, supply side-inflation and growth with credit risk whereas money supply and interbank money market have a positive relationship with credit risk rate. Even though this paper illustrated the critical relationship between macroeconomic variables and credit risk rate but it seems that this article does not utilize the specific factors of banks in assessing the credit risk such as loan to deposit ratio, deposit fund, financing to deposit ratio which may have a direct impact on credit buffer. These information are absence from this paper and is subject to criticism.

In contrast, Imadduddin (2007) concludes that the performance of Islamic banking in Indonesia relatively low compared to the 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 modeling. This research probably subject to specific condemnation because the time horizon used is less than the previous study. There will be the possibility where it can be 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) is 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 primary determinant of non – performing financing rate movement where it has the positive relationship with NPF. This study appears 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 apparently subject to criticism.

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

In conclusion for literature review, it can explicitly note that only a few studies have explicitly covered on macroprudential policy in the context of Indonesia including both conventional and Islamic banking. Since the Indonesia is one of the large countries within the South East Asian region and worldwide, being so there must be much attention given to this aspect to maintain the better financial system, to improve transparency. The government needs to focus on this matter as it will affect the investment activities from institutional investors and MNCs. Also, the previous studies focus 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 mainly concentrates on both conventional and Islamic banking.

## Method

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. In addition, in this study, we use two macroprudential instruments toward credit growth in Indonesia, namely GWM ratio (*reserve ratio*) 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.

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 that will cause system un-equilibrium. 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

$\varepsilon_t$  is disturbance error term

Proxies for endogenous variables (both conventional and Islamic banks) can be depicted in Table 3.

Table 3. Proxies of Endogenous Variable

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

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 practiced in Indonesia, namely ratio of demand deposit/ratio giro wajib minimum (RGWM) and Buffer.

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

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

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**

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

**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

BUFFER = CAR (actual) – CAR (target)

RGWM = ratio demand deposit

LDPK = Total deposit funds

LGDP = log natural of gross domestic product

LCPI = log natural of consumer price index

BIRATE = Bank Indonesia interest rate

NPL = default rate/non-performing loan

LDR = loan to deposit ratio

NPF = default rate/non-performing financing

FDR = financing to deposit ratio

**Result and Discussion**

To begin the research, there are several steps of data testing should performed as a regular procedure for using VAR/VECM approach, such as unit root test, optimal lag test, and cointegration test (see figure above). 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. Regarding 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. 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 4 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 integrated of order one.

The purpose of optimal lag selection is to resolve the issue of autocorrelation (Ascarya, 2009). The lag determination is far more critical because lag variables will use 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 5 shows the optimal lag selection in this study.

Table 5. Selection of Optimal Lag

Panel A. *Conventional Bank*

Lag	AIC	SC
0	-34.3313	-33.7247
<b>1</b>	<b>-42.6668*</b>	<b>-40.4292*</b>
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
<b>2</b>	<b>-44.4652*</b>	<b>-38.8666*</b>
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 the criterion for the 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 the macroprudential model is 2.

Table 6 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  $\alpha$  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  $\alpha$  5%. The results indicate 1 cointegrating equation at 5% alpha.

We can conclude 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 7 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 resulted is shown in Table 7.

Table 7 . 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  $\alpha$  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	69.8188	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  $\alpha$  5%. The results indicate 2 cointegrating equation at 5% alpha.



According to above co-integration 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 vector. While maximum eigenvalue statistics also shows similar facts whereby there is one cointegrating vector. 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 between 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 would be corrected. The presence of cointegration also rules out non-causality among the variables.

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 indicates 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.

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 and Arimurti (2012) who found that the credit growth has a negative correlation with interest rate and inflation in Indonesia. Subsequently, macroprudential policy based on GWM instrument (see panel A)

significantly influences the credit growth in the long run. The positive sign of GWM coefficient shows that when 0.057% will increase the GWM ratio increase by 1%, then the credit growth. Our findings differ with Utari et al. (2012) who found the fact of negative sign on GWM ratio toward credit growth. The reason is that the deposit funds will decrease since the bank has less capacity to offer credit due to the placement of demand deposit (GWM). While other variables show the similar findings with prior studies, for instance, GDP variable has the 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 the capital buffer (BUFFER). The positive sign of buffer indicates that capital buffer of the conventional bank has positively affected the credit expansion in Indonesia. Our findings differ from the prior study (Utari et al., 2012) who found that buffer has a negative relationship with credit growth. Based on the model with buffer instrument, we also see that credit growth has the negative correlation with interest rate and inflation in Indonesia, while deposit funds have the 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]                      [-7.0414]                      [3.7029]                      [-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]                      [-93.4458]                      [6.2539]                      [7.9554]

$$- 0.1601 LCPI$$

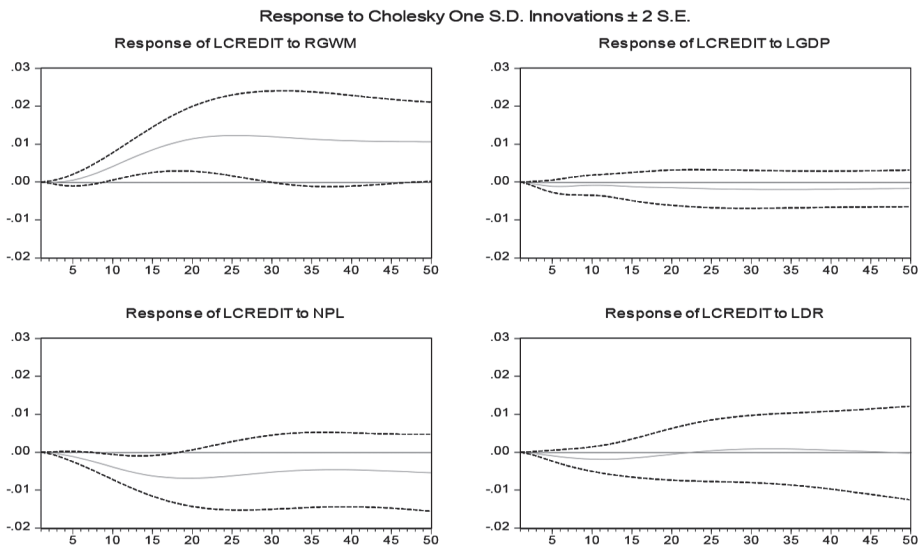
[5.4409]

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) significantly influences the financing growth. The negative sign of GWM coefficient shows that when the GWM ratio increase by 1%, then 0.37% would decrease the financing growth. The reason perhaps in harmony with conventional banks because the deposit funds would reduced since the bank has less capacity to offer credit due to the placement of demand deposit (GWM). Other variables also show the similar findings with conventional banks, for instance, GDP variable has the 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 the 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 are in line with the prior study (Utari et al., 2012) who found that buffer has the negative relationship with credit growth. Moreover, according to the buffer instrument model, we also see that financing growth has the negative correlation with interest rate and inflation in Indonesia, while deposit funds have positive association with credit growth.

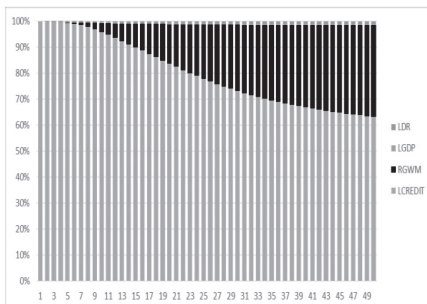
Figure 2 . Impulse Response Function and Variance Decomposition (some selected variables)

Panel A. Conventional Bank

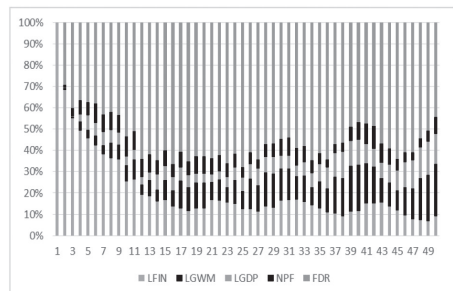


Variance Decomposition of GWM instrument

Panel A Conventional Bank



Panel B Islamic Bank



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 the 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 the Islamic bank. Figure 2 gives us the clear picture that credit responds positively to the shocks in GWM ratio. The variance decomposition further reaffirms the influences of these variables on credit growth. 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.

## Conclusion

This paper attempted to analyze the impact of macroprudential instruments, macroeconomic variables, and micro-banking 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 decrease because the deposit funds will decrease 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 show the similar findings with prior studies, such as GDP has the positive relationship with credit growth. Also, credit also affected by NPL ratio.

Another macroprudential instrument is the 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 the conventional bank has positively affected the credit expansion in Indonesia. According to buffer instrument, credit growth has the negative relationship between interest rate and inflation in Indonesia, while deposit funds have 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 significantly influences the financing growth of Islamic banks.

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