The Effectiveness of Macroprudential Policy on Credit Growth at Bank-Level Data in Vietnam

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Abstract

The study investigates the effectiveness of the macroprudential policy on credit growth in Vietnam. The authors use the logic of the transmission mechanism of macroprudential policy on credit growth. Research variables include economic growth, inflation, interest rate, and quarterly bank-level data from 28 commercial banks in Vietnam during 2011–2018. The results reveal that: (i) GDP growth had a positive impact on credit growth of small banks but had no impact on large banks, (ii) Domestic Systemically Important Banks (D-SIBs) and small banks respond differently to macroprudential measures of imposing different credit growth targets for different bank groups, (iii) Restrictions on foreign currency loans are found to be effective in curbing credit growth for the full sample and small banks, (iv) Inflation and economic cycle have significantly impacted credit growth at bank-level in Vietnam and (v) Interestingly, a significant positive relationship between interest rates and credit growth is found for the full sample and D-SIBs in Vietnam. The findings suggest that a stable macroeconomic environment should be good conditions for financial stability, and monetary authority should pay more attention to small banks' behaviors than D-SIBs behavior, toward such "administration" tools since small banks tend to prefer "breaking the rules" to make profits.

Keywords: Macroprudential Policy, Credit Growth, Transmission Mechanism, Bank-Level Data, Vietnam

JEL Classification Code: E58, E61, E65, G28

1. Introduction

Macroprudential policy (MaPP) has been widely used in many countries especially after the global financial crisis 2008–2009. It employs a package of tools to achieve intermediate goals of excess credit growth and then prevents systemic risks (IMF, 2011) as well as its ultimate goals of financial stability (IMF, 2013). The Financial Stability Board

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(FSB), International Monetary Fund (IMF), and Bank for International Settlements (BIS) classified macroprudential tools based on vulnerability of the financial system (e.g financial leverage, liquidity and market risk, financial institutions linkages) and structure of the financial system (e.g. bank and non-bank financial institutions, securities market, financial infrastructure). Unlike FSB, IMF (2011) argued that macroprudential tools could be provisions, countercyclical buffer, loan to value ratio (LTV), debt to income ratio (DTI), and other conventional monetary and fiscal policy. With numerous measures employed, the answer to the effectiveness of MaPP tools has been discussed among policymakers, researchers as well as practitioners (Lim et al., 2011; IMF, 2013; Akinci & Olmstead-Rumsey, 2018). In other words, the contraction of macroprudential measures could prevent excess credit growth in the banking system. Therefore, this paper aims at evaluating the effectiveness of macroprudential tools on credit growth at bank-level data in Vietnam, a bank-based financial system, during 2011Q1–2018Q2.

The main findings of this research are as follows. First, it found interesting evidence that Domestic Systemically

Important Banks (D-SIBs) and small banks in Vietnam respond differently to macroprudential measures of imposing different credit growth targets for different bank groups. In detail, while these measures were found to have negative effects on credit growth at D-SIBs, it was proved to lead to an increase in lending activities at small commercial banks. Another macroprudential tool found to be effective in reducing credit growth was the restriction on foreign currency loans in 28 selected banks and a small bank group. For controls variables, the paper found that inflation and the economic cycle significantly impacted credit growth at the bank level in Vietnam.

The remainder of this paper is structured into 4 sections. The second section will specify the model to evaluate the effectiveness of macroprudential policy at bank-level data in Vietnam. Then, the authors try to analyze findings obtained from panel data regression in section three. The last section presents concluding remarks and policy recommendations for monetary authority in improving the effectiveness of the transmission mechanism of macroprudential policy in a bank-based financial system as well as Vietnam's real economy.

2. Literature Review

There is limited research, especially quantitative research, on the implementation of macroprudential tools before 2010. The lack of models for interaction between the financial system and real economy is due to difficulties in collecting necessary data to conduct empirical research on macroprudential tools. So far, there has been little research on data needed for macroprudential policy. Concerning the United States, Lo (2009) proposed establishing a new independent agency to collect data on market prices of assets (both on and off the balance sheet) and liabilities of financial companies (including shadow banking system) to monitor leverage and liquidity in the US banking system, correlation of asset prices, and sensitivity of enterprises to adapt to changes in the economy. Sibert (2010) proposed setting up an agency in the European area to collect similar data, but he pointed out that data should be used for a limited purpose, as it would measure the symptoms (not the cause) of financial instability, because of difficulties in (i) describing the data, and (ii) measuring interconnection. To support researchers and managers to analyze systemic risk, Brunnermeier et al. (2009) proposed a regular (quarterly) data collection on risk sensitivity (including market risk and idiosyncratic risk) and liquidity sensitivity from financial institutions.

Together with its increasingly important roles, research on the effectiveness of macroprudential policy has been increased in both developed and emerging countries after the global financial crisis. Quantitative studies on the effectiveness of macroprudential policy mostly used IMF survey data in 2011. IMF (2013) concluded that emerging economies used macroprudential tools even more frequently than advanced economies before the financial crisis in 2008. Consistently, Claessens et al. (2013) argued that emerging economies were four times more likely to use macroprudential policy before the crisis and 3.3 times after the crisis compared to developed countries. It could be explained that emerging economies are more affected by external shocks (due to capital flows) and their financial systems are less developed and less liberalized, and thus macroprudential tools should be used more frequently to prevent adverse effects of the market.

Jimenez and Saurina (2006) found empirical evidence on credit standards that tend to be more lenient during the boom period, both in borrower screening and mortgage requirements. With this evidence, they proposed future credit risk provisions in the bank's loan risk portfolio throughout the business cycle as an adjustment tool. Other studies about the effectiveness of the macroprudential policy on financial stability including Lim et al. (2011), Claessens et al. (2013), Akinci and Olmstead-Rumsey (2018), Cerutti et al. (2017), and Corrado and Schuler (2017) found that macroprudential policy could limit credit boom and reduce credit burst. The use of macroprudential tools before the financial crisis may prevent the spread of negative transmission.

Claessens et al. (2013) emphasized that macroprudential tools help control bank system's vulnerability. When the financial crisis in 2008 was triggered by high asset prices and excessive credit growth, there were many studies the evaluating effectiveness of macroprudential tools in curbing the rise and unintended impacts of systemic vulnerabilities. Akinci and Olmstead-Rumsey (2018) analyzed the impact of macroprudential policy on domestic bank credit growth, housing credit growth as well as real estate price inflation, concluding that after the financial crisis, macroprudential tools related to bank credit growth could lower housing credit, tighten inflation, and real estate price inflation. These results were verified by Cerutti et al. (2017), who stated that two years after the implementation of macroprudential tools, bank credit growth decreased by 7.7 basic points compared to the lack of macroprudential tools.

Considering different measures, Akinci and Olmstead-Rumsey (2018) found that loan-to-value (LTV) and debt-to-income (DTI) ratios are effective in reducing credit vis-à-vis real estate credit growth. These results are consistent with the findings of Lim et al. (2011) related to LTV and DTI tools, while the IMF (2013) confirmed results related to LTV and DTI ratios for emerging countries. On the other hand, the reserve requirements did not have a significant effect on credit growth in Akinci and Olmstead-Rumsey (2018), while Lim et al. (2011), IMF (2013), and Claessens et al. (2013) found that reserve requirement

reduce credit growth and asset price inflation. Referring to foreign banks and the impact of spillover effects, macroprudential tools implemented to restrict domestic credit could contribute to financial stability. Avdjilev et al. (2017) studied the impact of LTV and the local reserve requirement on 16 banking systems and 53 countries during 2000–2014. They concluded that tightening both LTV limits and domestic reserve requirements could lead to an increase in foreign loans by banks (with abroad headquarter) in countries that use the corresponding tools. When approved in the home country (the bank headquarter in that country), such tightening is transmitted abroad by international banks in the form of higher growth in lending to borrowers in other countries.

Besides credit growth, there are other measures to evaluate systemic risks such as system liquidity, leverage, and capital flows. To control liquidity risk, Lim et al. (2011) showed that limits related to term imbalances are effective in reducing credit/deposit ratio (LDR). Corrado and Schuler (2017) argued that controlling interbank transactions through tighter liquidity measures (liquidity coverage ratio) reduces the severity of problems in interbank lending. Banks with higher leverage and interbank asset ratios are considered more vulnerable and should hold more capital (Gauthies et al., 2012). Highly leveraged banks also contributed more to systemic risk in a study by Brunnermeier et al. (2012) on the parent companies of US banks. The impact of excessive leverage can be mitigated through restrictions on DTI and foreign currency lending, the ceiling on credit growth, reserve requirements, reciprocal capital requirements, and dynamic provision (Lim et al., 2011). These results were also confirmed by Claessens et al. (2013), as a measure to reduce leverage and asset growth during boom times multiplied by the loan-to-value ratio. With the aforementioned results, both scholars and policymakers proposed that macroprudential policy should be taken over by the central bank (Gauthies et al., 2012).

Another issue is whether liquidity risk in foreign currencies should be limited by using macroprudential tools? Allen and Moessner (2010) discussed the reasons for establishing swap facilities, relate the probability of a country receiving a swap line in a currency to a measure of currency-specific liquidity shortages based on the BIS international banking statistics, and found a significant relationship in the case of the US dollar, the euro, the yen, and the Swiss franc. They also discussed the role and effectiveness of swap lines in relieving currency-specific liquidity shortages, the risks that central banks run in extending swap lines, and the limitations to their utility in relieving liquidity pressures. We conclude that the credit crisis is likely to have a lasting effect on the international liquidity policies of governments and central banks.

Liquidity-related macroprudential tools, mainly reserve requirements, had an opposite effect on credit growth. Some

studies confirmed that an increase in reserve requirements could limit credit growth (Lim et al., 2011), while others showed that such an effect is very small or insignificant (Kuttner and Shim, 2016). Borrower-related instruments (such as limits on LTV and DTI ratios) had been found to improve bank resilience by reducing credit risk on new loans and control loan growth (Lim et al., 2011; Akinci & Olmstead-Rumsey, 2018; Kuttner & Shim, 2016).

Capital-related macroprudential tools could reduce the probability of a crisis by increasing resilience to shocks and reducing credit growth in the short term due to increased credit costs (Noss & Toffano, 2016). This judgment is also verified by empirical studies, which suggested that capital requirements reduce the probability of each bank's default and the probability of systemic crisis by 25% (Gauthies et al., 2012). These results are consistent with Bluhm and Krahnen (2014), who argued that increasing the required capital ratio could reduce a bank's impact on systemic risk. Further, they stated that a bank's optimal capital level to prevent most past crises is 15 to 23 percent of risk-weighted assets, as banks that have better capital may continue to make lending easier during a recession. Analyzing individual bank's data on lending activities, credit risks, and interbank links including OTC derivatives of the Canadian banking system, Gauthies et al. (2010) found that capital allocation mechanisms reduce the likelihood of individual bank failures as well as the possibility of a systemic crisis by about 25%. This finding suggested that capital buffer can significantly improve the stability of the whole financial system.

The paper could contribute to the literature in some novel ways. First, the paper employs quarterly bank-level data in a bank-based financial system like Vietnam to assess the effectiveness of the transmission mechanism of macroprudential policy on credit growth. Therefore, this could add more empirical evidence to literature from an Asian emerging market. Second, unlike previous studies, we classify our sample into Domestic Systemically Important Banks (D-SIB) and small banks to see differences in market behaviors as well as their responses to activation of macroprudential tools in Vietnam. This also helps robustness check between two groups of banks in a bank-based economy.

3. Model Specifications

3.1. Model Description

Lessons from financial crises (e.g. the global financial crisis in 2008) suggested that systemic risk usually originates from a credit boom in the real estate sector. Bank credit transfers the impact of macroprudential tools on the real estate market through expected channels, thereby affecting real estate prices and has indirect effects on the financial

cycle and financial stability. Specifically, reducing the LTV ratio would weaken credit institution's ability to offer loans to real estate. As a result, real estate credit decreases, and real estate price is expected to fall, contributing to financial system stability through the real estate market.

This study focuses on evaluating the effectiveness of macroprudential tools through bank lending channels in Vietnam in the sense that activation of macroprudential tools aims at reducing excess credit growth rate in the whole banking system in general, and in each individual bank in particular. Based on Cerutti et al. (2017), the research builds a model to assess the effectiveness of macroprudential tools on credit growth as follows:

$$
\begin{aligned}
DC_{i,t} = {} & \alpha + \mu_i + \beta_1 GDP_{i,t-1} + \beta_2 CPI_{i,t-1} + \beta_3 IR_{i,t-1} \\
& + \beta_4 EARNINGS_{i,t-1} + \beta_5 ASSETQUALITY_{i,t-1} \\
& + \beta_6 LTA1_{i,t-1} + \beta_7 TA\_L_{i,t-1} + \beta_8 MAPP1_{i,t-1} \\
& + \beta_9 MAPP2_{i,t-1} + \beta_{10} MAPP3_{i,t-1} + \beta_{11} MAPP4_{i,t-1} \\
& + \beta_{12} MAPP5_{i,t-1} + \beta_{13} MAPP6_{i,t-1} + u_i
\end{aligned}
$$

whereas: $i = 1, 2, …, N$; $t = 1, 2, …, T$; μ_i bank's fixed effect.

In which:

- The dependent variable (Domestic credit growth - DC in percent) is seasonally adjusted and calculated by the growth of one quarter of the current year with the corresponding quarter of the preceding year.
- Independent variables consist of a vector of macroprudential tools, three macroeconomic variables, and four bank-specific variables. They are defined as follows:

A vector of macroprudential tools: According to Zhang and Zoli (2016), macroprudential variables could be coded as 1 if it is activated or 0 otherwise. In addition, the MaPP tool could get its values if activated all the time. Therefore, in this study, we also set dummy variables for MaPP tools based on policies implemented by the State Bank of Vietnam (SBV). During 2011–2018, SBV launched a package of macroprudential tools such as (i) ceiling credit growth rates for commercial banks based on their performance - MaPP1; (ii) restrictions on institutional entities that could borrow foreign currency-denominated loans from banks - MaPP2; (iii) limits on loans per total deposit ratio (LDR) - MaPP3; (iv) higher risk weights on loans to securities and housing sectors - MaPP4; (v) applying the minimum capital-asset ratio of 9% - MaPP5; (vi) regulations on limits and restrictions on capital contribution and share purchase - MaPP6.

In addition, we also add macro-economic indicators as control variables in the model such as GDP growth rate (GDP, in percent), inflation rate or consumer price index (CPI, in percent), and lending interest rate (IR, in percent).

- Bank specific variables:
  - EARNING: This variable is measured by the return-to-assets ratio, and it is expected to have a positive impact on
  - ASSETQUALITY: non-performing loans (NPL)
  - TA: bank's total assets
  - LTA: bank's loan to assets ratio

These four variables are normalized so that the average of the sample is zero. However, MaPP5 and MaPP6 are collinear with the remaining variables and should be excluded from the regression model. Therefore, the regression equation should be as follows:

$$
\begin{aligned}
DC_{i,t} = {} & \alpha + \mu_i + \beta_1 GDP_{i,t-1} + \beta_2 CPI_{i,t-1} + \beta_3 IR_{i,t-1} \\
& + \beta_4 EARNINGS_{i,t-1} + \beta_5 ASSETQUALITY_{i,t-1} \\
& + \beta_6 LTA_{i,t-1} + \beta_7 TA\_L_{i,t-1} + \beta_8 MAPP1_{i,t-1} \\
& + \beta_9 MAPP2_{i,t-1} + \beta_{10} MAPP3_{i,t-1} \\
& + \beta_{11} MAPP4_{i,t-1} + u_i
\end{aligned}
$$

3.2. Data Description

The research employs quarterly data of 28 commercial banks in Vietnam during 2011Q1–2018Q4, giving a total of 844 observations. They are collected from (i) Vietnam General Statistics Office, Fred St Louis Database, IMF's International Financial Statistics (for macroeconomic data); (ii) State Bank of Vietnam, National Financial Supervisory Commission in Vietnam as well as banks' audited financial statements (for bank-specific data). To check result robustness, we also divide the sample of 28 commercial banks into 2 groups: (i) domestic systemically important banks (D-SIB) which are classified based on the Decision 06/QD-NHNN dated 10th January 2018 of SBV, and (ii) small banks. A statistical description is summarized in Table 1, and a list of commercial banks is shown in Appendix 1.

As shown in Table 1, the number of observations for variables is 844 observations. Independent variables of the model are explained as follows:

- GDP growth is expected to have a positive impact on credit growth. During the study period, the quarterly GDP growth rate was 5.93% with a standard deviation of 0.78%.

Table 1: Statistical Description

Variables	Expected Sign	Number of obs.	Mean	Standard Deviation	Min	Max
GDP_G	+	844	5.93383	0.7844964	4.136745	7.679047
CPI2	–	844	105.4667	5.882449	99.9	122.42
IR	–	844	9.854945	3.485351	6.96	18.075
ROA	+	843	0.1574538	0.8265702	–8.185477	12.52679
NPL	–	844	1.662116	3.846755	0	39.63446
LTA1	+	843	56.84418	12.73723	15.81888	81.44842
TA_L	+	843	32.06671	1.223782	29.5345	34.75777
MaPP1	–	844	0.2654028	0.4418093	0	1
MaPP2	–	844	0.9620853	0.1911032	0	1
MaPP3	–	844	0.4312796	0.4955487	0	1
MaPP4	–	844	2.033175	0.499194	1.5	2.5

- Inflation is expected to have the opposite effect on credit growth. During the study period, quarterly inflation is 5.46%/year with a standard deviation of 5.88%/year.
- Interest rates are expected to have the opposite effect on credit growth. During the study period, the quarterly interest rate has an average value of 9.85%/year with a standard deviation of 3.48%/year.
- Return on total assets (ROA) is expected to have a positive impact on credit growth. During the study period, quarterly ROA had an average value of 1.57% with a standard deviation of 0.82%.
- Loan to total assets (LTA) is expected to have a positive effect on credit growth. During the study period, quarterly LTA has an average value of 56.8% with a standard deviation of 12.7%.
- Variables of macroprudential policy in the model are expected to have a negative impact on credit growth.

4. Evaluating Effectiveness of Macroprudential Policy in Vietnam

4.1. Empirical Results

The estimation result of panel data from 28 commercial banks in the period of 2011Q1–2018Q2 is shown in Tables 2, 3, and 4. Independent variables have a lag of 1 period compared to the dependent variable, implying that a change of independent variables in the current period should have impacts on the dependent variable in the next adjacent period.

Table 2: Estimation Results of the Effectiveness of Macroprudential Tools in Vietnam (Model with Macroeconomic Variables Only)

	Full Sample	D-SIB Group	Small Bank Group
L.GDP_G	2.357	–2.805	6.745**
	(2.398)	(4.066)	(2.759)
L.CPI2	–2.215***	–3.395**	–1.193
	(0.846)	(1.424)	(0.980)
L.IR	3.858**	5.984*	2.015
	(1.847)	(3.107)	(2.139)
L.MaPP1	1.321	–13.93*	14.478***
	(4.710)	(7.392)	(5.450)
L.MaPP2	–15.11	–3.553	–24.701**
	(9.240)	(15.758)	(10.583)
L.MaPP3	6.894	9.947	4.265
	(8.554)	(14.392)	(9.906)
L.MaPP4	2.228	5.373	–0.517
	(8.732)	(14.692)	(10.112)
Constant	211.3***	331.8***	107
	(72.446)	(121.853)	(83.933)
Number of obs.	813	377	436

Note: ***, ** and * indicates significant at 1%, 5% and 10% level of significant based on *t*-statistics. The number in parentheses (…) indicates the value of standard error.

Table 3: Estimation Results of the Effectiveness of Macroprudential Tools in Vietnam (Model with Bank-Specific Variables Only)

	Full Sample	D-SIB Group	Small Bank Group
L.ROA	3.656*	–4.585	3.321**
	(1.877)	(9.707)	(1.657)
L.NPL	0.159	2.064	–0.0763
	(0.455)	(1.519)	(0.428)
L.LTA1	0.183	–0.029	0.339*
	(0.147)	(0.267)	(0.176)
L.TA_1	–0.609	–0.88	2.939
	(1.633)	(2.654)	(2.703)
L.MaPP1	4.592	–6.842	12.89***
	(4.203)	(7.145)	(4.884)
L.MaPP2	–19.99**	–13.53	–26.03***
	(8.230)	(14.301)	(9.339)
L.MaPP3	–0.449	–1.632	1.215
	(8.117)	(13.71)	(9.333)
L.MaPP4	–1.137	–1.751	–2.649
	(8.391)	(14.39)	(9.622)
Constant	51.85	72.17	–62.98
	(55.457)	(87.462)	(89.803)
N	812	376	436

Note: ***, ** and * indicates significant at 1%, 5% and 10% level of significant based on *t*-statistics. Number in parentheses (…) indicates the value of standard error.

The Hausman tests show that the random effects regression model should be the optimal model for the full sample, D-SIB sample, and small banks sample. All diagnosis tests (such as the autocorrelation test, heteroscedasticity test) show that models are suitable to evaluate the effectiveness of the macroprudential policy on credit growth in Vietnam.

4.2. Main Findings

The panel regression applied for bank-level data during 2011–2018 shows that there were only two macroprudential measures that could be effective in Vietnam, as follows.

First, commercial bank classification with varied credit growth targets (MaPP1) caused a significantly different impact on credit growth in D-SIBs and small banks in Vietnam during 2011–2018. While this MaPP tool was found to have negative effects on credit growth at D-SIBs, it was proved to lead to an increase in lending activities at small commercial banks.

Table 4: Estimation Results of the Effectiveness of Macroprudential Tools in Vietnam (Model with all Variables)

	Full Sample	D-SIB Group	Small Bank Group
L.GDP_G	2.063	–2.45	6.376**
	(2.427)	(4.116)	(2.778)
L.CPI2	–2.211**	–3.183**	–1.248
	(0.857)	(1.445)	(0.984)
L.IR	3.864**	4.912	2.504
	(1.895)	(3.24)	(2.179)
L.ROA	3.742**	–1.345	3.187*
	(1.888)	(9.979)	(1.662)
L.NPL	0.148	2.536	–0.0865
	(0.46)	(1.63)	(0.43)
L.LTA1	0.143	–0.0809	0.294
	(0.153)	(0.276)	(0.186)
L.TA_1	–0.494	–0.752	3.433
	(1.634)	(2.651)	(2.716)
L.MaPP1	0.939	–16.81**	14.75***
	(4.874)	(8.283)	(5.626)
L.MaPP2	–14.19	–4.676	–23.06**
	(9.339)	(15.984)	(10.608)
L.MaPP3	6.673	9.484	4.243
	(8.633)	(14.551)	(9.915)
L.MaPP4	2.088	3.798	–1.243
	(8.814)	(14.871)	(10.125)
Constant	219.1**	349.4**	–14.24
	(88.646)	(145.047)	(120.626)
N	812	376	436

Note: ***, ** and * indicates significant at 1%, 5% and 10% level of significant based on *t*-statistics. Number in parentheses (…) indicates the value of standard error.

This finding could be explained by the different behavior of different groups of banks to SBV macroprudential regulations. During 2012–2013, to curb inflation, SBV classified commercial banks into four groups to assign credit growth targets. Accordingly, Group 1 enjoyed a credit growth rate of 17%, and this rate for Group 2, Group 3, and Group 4 was 15%, 8%, and 0% respectively. Large banks or D-SIBs seemed to comply with SBV's regulations in credit activities and as a result, the credit growth of this group decreased about 16% compared to the absence of SBV's regulations. In addition, the period of 2012–2013 was the toughest time for the whole banking system in Vietnam because of high

non-performing loans, so D-SIBs wanted to tighten credit growth to improve credit quality and restructure their balance sheet. A negative impact of macroprudential policy on credit growth was also found in Claessens et al. (2013), Cerutti et al. (2017), and Akinci and Olmstead-Rumsey (2018).

However, it was likely that small banks did not strictly comply with the SBV macroprudential tool, reflected in the credit growth of this group, which increased by 13% to 15% in the three models. This could be explained by the fact that customers who cannot borrow money from large banks (with strict lending conditions) switched to small banks, and small banks (because of profit targets) did not comply with credit growth regulations and/or small banks usually asked the SBV for more credit limits at the end of each year, reducing the effectiveness of this tool. The above results are also consistent with the research of Pham (2019).

Second, among macroprudential tools implemented in Vietnam during 2011–2018, the paper found that restriction on foreign currency loans (MaPP2) affects significantly small banks and 28 selected banks while it did not impact D-SIB banks. The same result has also been verified in Pham (2019). This finding could be explained as follows. In Vietnam, there was a large spread between USD and Dong denominated interest rates. Therefore, enterprises tended to borrow in foreign currencies, leading to a "bubble" in foreign currency-denominated loans. For example, in 2010, lending rates in VND were quite high (14–18%) while lending interest rates in USD were relatively low (6–7.5%) so that enterprises turned to loans in USD because of lower interest rates and stable exchange rates (Pham, 2019). With large interest rate differentials, in the first quarter of 2010, credit in VND increased by only 0.57% while credit in foreign currency climbed to 14.07% compared to 2009. In this case, excess demand for foreign currency as well as

loans in foreign currency led to high volatility in the foreign exchange market. Therefore, SBV imposed restrictions on loans in foreign currency.

However, activation of this macroprudential tool did not significantly influence D-SIBs in Vietnam during 2011–2018. This finding could be explained as follows. First, D-SIBs with high competitiveness might change their business strategy from loans in foreign currency to loans in domestic currency easier than small banks. Therefore, an increase in loans in the domestic currency could upset a loan in foreign currency, as such, it could not be harmful to the total outstanding loans of D-SIBs. Second, D-SIBs were not willing to provide loans in foreign currency because of the potential risk for bank's currency mismatch. In fact, loans in foreign currency accounted for only 5–6 percent of total loans in D-SIBs (Banking Supervisory Agency's internal quarterly reports). On the other hand, empirical results found that other macroprudential tools such as loan-to-deposit ratio and higher risk weights on real estate loans were not effective in curbing domestic credit in Vietnam during 2011–2018.

For control variables, the model showed that inflation had a significantly negative impact on credit growth of the whole banking system as well as of D-SIBs banks during 2011–2018. In other words, a higher inflation rate would lead to lower credit growth in the banking system. This finding is consistent with theory and empirical evidence. Theoretically, during the high inflation period, the central bank is expected to follow a contractional monetary policy, equivalent to a high interest rate and lower credit growth, to curb inflation. Studies by Huybens and Smith (1998, 1999) and Boyd et al. (2001) confirmed that inflation has an opposite effect on long-term credit.

Figure 1 indicates a significant reverse relationship between inflation and credit growth in Vietnam, especially
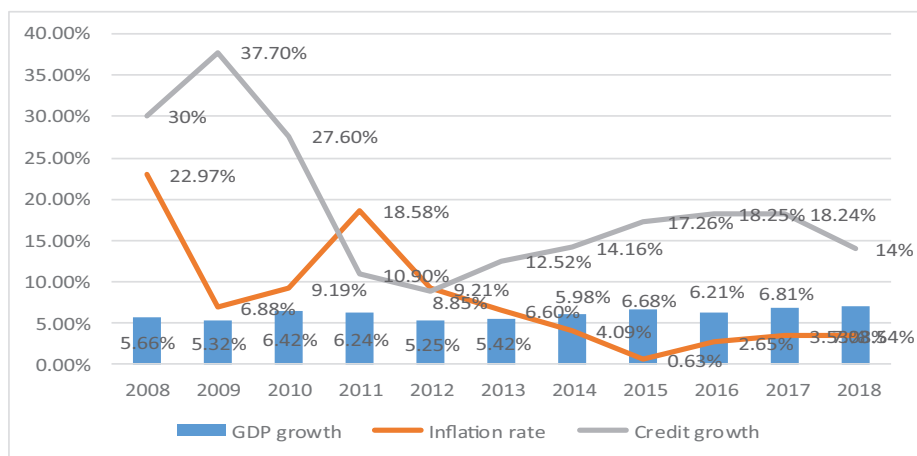

Figure 1: GDP Growth, Inflation Rate and Credit Growth in Vietnam, During 2008–2018

Source: General Statistics Office, State Bank of Vietnam

for large banks during 20011–2018, implying that when inflation decreases, the credit growth of large banks will increase and vice versa. This is consistent with theory and empirical research because if inflation increases, SBV will apply tight monetary policy and limit credit growth to curb inflation.

Interestingly, the paper finds a significant positive relationship between interest rates and credit growth for the full sample and D-SIB sample in Vietnam during 2011–2018. It means that the higher the interest rate, the higher the credit growth. However, in theory, interest rates and bank credit growth were proved to have a negative relationship, which implies that an increase in interest rate increase will lead to a decrease in credit growth due to increased borrowing costs. This relationship has been mentioned by Beutler et al. (2020).

The finding could be explained by the economic cycle as well as the behavior of market participants in the Vietnam economy. During the economic downtrend (period 2012–2015), the SBV lowered the policy interest rate leading to a lower lending rate in the market. However, domestic credit could not increase (or even decrease) because there were not many profitable investment opportunities for enterprises during the recession. In addition, banks tend to tighten lending requirements to restructure their balance sheet and improve loan quality. On the other hand, during the economic uptrend (2016–2018), enterprises tried to raise capital, expand production even when interest rates rose.

The paper provides empirical evidence that GDP growth had a positive impact on the credit growth of small banks but had no impact on large banks. This finding is consistent with those of Shijaku and Kalluci (2014) and Guo and Stepanyan (2011). In terms of bank-specific data, we find that bank profitability (proxy by return on asset ratio) might be considered as the most important determinant of credit growth at commercial banks in Vietnam during 2011–2018. The high profitability implies banks are in good conditions so that both SBV and banks' board of directors agreed to expand banks.

5. Conclusion

The paper employs quarterly bank-level data in Vietnam's bank-based financial system to assess the effectiveness of the transmission mechanism of macroprudential policy on credit growth during 2011–2018. The paper found interesting evidence that D-SIBs and small banks respond differently to a macroprudential measure of commercial bank classification with varied credit growth targets (MaPP1) during 2011–2018. While this measure was found to have negative effects on credit growth at D-SIBs, it was proved to

lead to an increase in lending activities at small commercial banks. This finding implies that small banks tend to prefer "breaking the rules" to make profits than D-SIBs. Therefore, the monetary authority should pay more attention to the small bank behaviors to such "administration" tools like this.

Another macroprudential tool found to be effective in reducing credit growth was the restriction on foreign currency loans in the whole Vietnam banking system and a small bank group during 2011–2018. Imposing this tool, SBV did not only curb high credit growth but also reduced dollarization status, and stabilized the foreign exchange market (Pham, 2019). It implies that in a dollarized economy and bank-based financial system, the monetary authority should impose the restrictions on foreign currency loans to achieve financial stability in the financial system in general, and in the banking system in particular.

For controls variables, the paper found that inflation, the economic cycle had significantly impacted credit growth at the bank level in Vietnam. These findings imply that a stable macroeconomic environment should be good conditions for financial stability.

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Appendix 1: List of Commercial Banks

No	Banks
Domestic Systemically Important Banks (D-SIB)	
1	Vietnam Joint Stock Commercial Bank for Industry and Trade
2	Joint Stock Commercial Bank for Investment and Development of Vietnam
3	Joint Stock Commercial Bank for Foreign Trade of Vietnam
4	Vietnam Bank for Agriculture and Rural Development or Agribank
5	Vietnam Prosperity Joint Stock Commercial Bank
6	Vietnam Technology and Commercial Joint Stock Bank
7	Military Commercial Joint Stock Bank
8	Southeast Asia Commercial Joint Stock Bank
9	Vietnam International Commercial Joint Stock Bank
10	Sai Gon Joint Stock Commercial Bank
11	Sai Gon Thuong Tin Commercial Joint Stock Bank
12	Asia Commercial Joint Stock Bank
13	Ho Chi Minh City Development Joint Stock Commercial Bank
Small Banks	
14	Vietnam Maritime Commercial Stock Bank
15	Tien Phong Commercial Joint Stock Bank
16	Petrolimex Group Commercial Joint Stock Bank
17	Bao Viet Joint Stock Commercial Bank
18	North Asia Commercial Joint Stock Bank
19	Dong-A Commercial Joint Stock Bank
20	Vietnam Export Import Commercial Joint Stock Bank
21	Nam A Commercial Joint Stock Bank
22	Saigon Bank For Industry And Trade
23	An Binh Commercial Joint Stock Bank
24	Vietcapital Commercial Joint Stock Bank
25	Orient Commercial Joint Stock Bank
26	Vietnam Thuong Tin Commercial Joint Stock Bank
27	Kien Long Commercial Joint Stock Bank
28	Global Petro Commercial Joint Stock Bank