Macroprudential Policy, Financial Crisis, and Macroeconomic Policy (Case Study In 5 Asean Countries)

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Abstract
This study will examine two aspects, the first is the impact of macroprudential policy on the potential for a financial crisis, then the link between macroprudential policy and macroeconomic policy (monetary policy, exchange rate regime and capital control). This research will involve 5 (five) ASEAN countries as samples, namely Indonesia, Malaysia, Thailand, Vietnam and Singapore. The data used are annual data starting from 2004 to 2020. The variable used in this study is the loan-to-value (LTV) variable as a variable that describes macroprudential policy, then GDP growth rate, income per capita, inflation rate (consumer price). index), and changes in monetary policy (real interest rate). The analytical tool used in this research is the probit model. The results showed that macroprudential policies had an effect on controlling the financial crisis. Macroprudential policy is considered effective in avoiding a banking crisis by suppressing credit growth. In other words, it is found that a tightening of the LTV ratio is significantly associated with a lower probability of a banking crisis
Keywords: macroprudential policy, monetary policy, exchange rate regime and capital control.
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1. Background
The phenomenon of the financial crisis has occurred in two periods in Indonesia. The first financial crisis that Indonesia experienced in 1997, Vadhera (2015) stated that the crisis that year was called the Asian Financial Crisis. The financial crisis was a period of emergency that affected most of the Asian region starting in July 1997, and caused an infection of the overall monetary crisis also known as the IMF emergency. Furthermore, the second financial crisis occurred in 2008, where the financial crisis began in mid-2006 when there was an increase in default on housing loans in America (Nakatani, 2020).

The phenomenon of the occurrence of the financial crisis so far, cannot be denied, stems from the failure of the current credit system. Nakatani (2020) explained that macroprudential policies have attracted considerable attention for policy makers as one of the macroeconomic policy tools that are able to ensure the sustainability of economic development, especially when the financial crisis occurs. In the context of the current Covid-19 crisis that is spreading in various countries, macroprudential policies have again attracted global attention. The ultimate goal of macroprudential policy is to avoid financial instability, such as a potential banking crisis.

The above opinion is reinforced by many studies that examine the impact of macroprudential on credit growth, including those conducted by Cerutti, Claessens, and Laeven (2017) who studied the effect of macroprudential policy on credit growth and housing prices, while Lombardi and Siklos (2016) analyzed the impact of policy Macroprudential on credit growth, Beirne and Friedrich (2017) through an analysis of the impact of macroprudential policies on cross-border bank flows, Richter, Schularick, and Shim (2019) investigated the effect of the loan-to-value (LTV) ratio on economic growth, while Basto, Gomes, and Lima (2019) explore the effect of the LTV ratio on private lending, and Morgan, Regis, and Salike (2019) analyze the effect of macroprudential on residential mortgage lending. Findings from research conducted by Cronin and McQuinn (2016) also emphasize the strong influence of macroprudential policies, where a decrease in the LTV ratio causes an increase in demand for residential rental accommodation. The same thing was also found by Zhang and Zoli (2016) who also found the LTV ratio and housing tax could hinder the growth of house prices and credit.

In the current global economic crisis caused by the corona virus, macroprudential policy can be one of the most important macroeconomic policy tools to avoid an economic crisis that turns into a financial crisis. During times of crisis, there was a general concern that large capital outflows from emerging markets could lead to liquidity pressures on domestic or foreign currencies in the corporate and banking sectors. This can lead to huge exchange rate depreciation in developing countries. If the Covid-19 crisis drags on, the real estate sector is also likely to be affected, which in turn has the potential to cause asset prices to fall (Nakatani, 2020).

Broadly speaking, this research will conclude two major things related to macroprudential policy. The first is related to the relationship between macroprudential policies and the potential for a banking crisis. So far, there have not been too many studies examining the effect of macroprudential policies on the potential for a banking crisis. One of the reasons for the lack of studies in this regard is that macroprudential policies are different in each country and will be difficult to implement. In addition, macroprudential policies mostly target the housing sector, especially in developed countries (Akinci & Olmstead-umsey, 2018).

Furthermore, the second thing that will be examined in this research is the effectiveness of macroprudential policy in relation to other macroeconomic policies, including monetary policy, exchange rate policy, and capital control. This is quite interesting to study, because as discussed previously, although macroprudential policy is a policy that is considered capable of influencing the potential for a banking crisis, it does not rule out that this policy is contradictory to other policies, such as monetary policy, exchange rate regimes, and restrictions. capital account.

So far, the relationship between macroprudential policy and other macroeconomic policies has only been examined to the extent of the relationship between macroprudential policy and monetary policy. The complexity of the relationship between the two is explained in the research conducted by Agur, 2019; Kim, Kim, & Mehrotra, 2019; Kim & Mehrotra, 2018, where the easing of macroprudential policy can favor monetary policy by reducing the effects of shocks that can have a negative impact on output and credit. The macroprudential relaxation policy was able to remove obstacles to the monetary policy transmission process and increase the ability of monetary policy to support economic activity. When tightening monetary policy is carried out as an effort to limit the inflationary impact of exchange rate depreciation, relaxation of macroprudential policy can help reduce potential pressure from tightening monetary policy.

This research will solve various alleged linkages between macroprudential policies and the potential for a financial crisis, as well as the relationship between macroprudential policies and other macroeconomic policies. As an effort to solve this problem, this study will use the loan-to-value (LTV) variable as a variable that is used as a proxy for macroprudential variables, and the variables of GDP growth rate, per capita income, inflation rate (consumer price index), and changes in policy. monetary (real interest rate) as an independent variable. All variables used will be analyzed in relation to using the probit model which will be applied in 5 (five) ASEAN countries as samples.

In summary, the next section of this research will review the relevant literature related to the banking crisis and macroprudential policy. In the next section, the use of data and analytical tools is presented as a step to estimate the effect of macroprudential policy on the possibility of a banking crisis and the relationship between macroprudential policy and monetary policy, the exchange rate regime and capital control.

2. Theoretical Review
2.1 Macroprudential Policy and the Potential for a Banking Crisis
Babecky et al (2014) stated that the banking crisis was a crisis that caused the biggest loss in terms of overall output when compared to other financial crises. This is reinforced by the findings of Nakatani (2019) which predicts that the banking crisis can reduce production on average by 6-7%. Another finding was also put forward by Fernandez, Gonzalez, and Suarez (2016) that banking stability is closely related to economic stability in terms of value added volatility in the economy. In fact, in countries with more advanced financial and institutional systems, banking stability can reduce economic volatility in industries that are highly dependent on external finance.

Macroprudential policies have been implemented in many countries as an effort to avoid a banking crisis. As Cihak, Demirguc-Kunt, Martinez Peria, and Mohseni-Cheraghlou (2013) have observed that crisis-affected countries show lower actual capital ratios because they tend to be less stringent in the application of loan-related regulations so they are unable to demand banks adjust equity, provisions and have weak incentives for banking supervisors.

Regarding the prediction of the possibility of a banking crisis that will occur, several researchers have conducted studies related to the early warning system regarding the banking crisis. Davis and Karim (2008) built an early warning system to predict banking crises. The study found that credit growth and real GDP are very important for predicting banking crises. Meanwhile, Spelta, Pecora, and Rovira Kaltwasser (2019) use early warning signals from the financial crisis to identify banks that are systemically important. In contrast, Lee, Posenau, and Stebunovs (2020) construct an aggregate vulnerability index to predict banking crises.

2.2 Macroprudential Policy and other Macroeconomic Policies
Studies on the correlation of macroprudential policy with other macroeconomic policies (monetary policy, exchange rate regime and capital control) have been studied by many researchers. Among them by Korinek and Sandri (2016) who found that capital control and macroprudential policies can lead to financial stability by reducing capital inflows. Furthermore, Bruno, Shim and Shin (2017) find that macroprudential policy is more effective if it is complemented by monetary policy. This finding is also reinforced by research conducted by Kim and Mehrotra (2018) which found a similar effect of monetary policy and macroprudential policy on credit growth.

The ability of macroprudential policy to reduce the possibility of a financial crisis has been extensively studied and theoretical models developed. For example, Ma (2020) finds that macroprudential policies reduce the likelihood of crises and impact consumption fluency at the expense of welfare losses caused by slightly lower

economic growth. Flemming, L'Huillier, and Piguillem (2019) found that when the cumulative loan amount is very high, then the application of tax debt will be optimal to make agents revise their decisions. Ghilardi and Peiris (2016) used the Dynamic Stochastic General Equilibrium (DSGE) model and found that macroprudential policy can be effectively implemented in conjunction with monetary policy. Alpanda, Cateau, and Meh (2019) find that loan-to-value (LTV) regulations are the most effective and least expensive policy tool for dealing with household imbalances, followed by bank capital regulations and monetary policy. Next, Mendoza and Rojas (2019) show that the optimal policy is to tax domestic credit or capital inflows, therefore capital control as a separate instrument cannot be justified. In contrast, Schmitt-Grohé and Uribe (2017) find that the optimal macroprudential capital control policy should be tightened when the debt-to-output ratio becomes high after a reduction in interest rates, namely through accommodative monetary policy.

3. Data and Methodology

This study uses the probit model to estimate the probability of a banking crisis. The equation of the regression model that explains the relationship between macroprudential policy and the probability of a banking crisis can be explained as follows:

$$Pr(y_{i,t}=1|x_{i,t}) = \phi(x\_{(i,t)}\,\beta) + \varepsilon_{i,t},$$

Where Pr is the probability; subscript i is the identity of the country, while t is the identity of the time (year); y is a dummy variable that distinguishes the existence of a banking crisis (if it is worth 1) and there is no banking crisis (value is 0); x is the independent variable; is the normal cumulative distribution; is the maximum likelihood estimation vector (maximum likelihood); and is the error term. The range of banking crises is determined by the method developed by Laeven and Valencia (2020). Based on the identification method in the empirical literature, this study eliminates all periods of crisis state except for the first period (start of crisis). Macroprudential data were taken from Alam et al. (2019). Macroprudential policy is explained through the use of the loan to value (LTV) variable because the LTV variable is the only quantitative variable that can describe macroprudential policy. However, the use of the LTV variable in this study does not use data in the form of levels, but multiplies the LTV variable data with the credit variable (credit to GDP ratio). This is because the level of the LTV ratio in each country can be different due to the institutional situation or financial market developments (Nakatani, 2020). While the independent variables in this study were taken from the literature that is commonly used (Cerutti et al., 2017; Claessens, Ghosh, & Mihet, 2013) including GDP growth rate, income per capita, inflation rate (consumer price index), and changes in monetary policy (real interest rate). More fully, the description of the variables used in this study can be seen in the following table:

Table 3.1. Variable Description

No	Variable Name	Description	Data Source
1.	Banking crisis	Banking crisis = 1; absence of banking crisis = 0	Laeven and Valencia (2020)
2.	LTV	Average annual LTV	Alam et al. (2019)
3.	GDP growth	Real GDP growth (%)	World Economic Outlook
4.	Income per capita	GDP per capita	World Economic Outlook
5.	Inflation	Average annual inflation rate (CPI rate, %)	World Economic Outlook
6.	Current account	Balance sheet as a percentage of GDP	World Economic Outlook
7.	Credit	Domestic credit provided by the financial sector divided by GDP	World Bank Development Indicators (WDI)
8.	Monetary policy	Real interest rate (%)	World Bank Development Indicators (WDI)
9.	Inflation targeting regime	Implement an inflation targeting regime = 1; not implementing an inflation targeting regime = 0.	IMF annual report
10.	Exchange rate setting	Floating exchange rate = 1; fixed exchange rate = 0.	IMF annual report
11.	Control over capital	The existence of control over capital = 1; no control over capital = 0.	IMF annual report

All data used in this study were sourced from the IMF database, namely the World Economic Outlook and International Financial Statistics and World Development Indicators (WDI). The data sample in this study covers 5 countries in ASEAN including Indonesia, Malaysia, Thailand, Vietnam and Singapore. While the data used has an annual frequency starting from 2004 to 2020.

4. Findings

4.1. Descriptive Statistics

The summary of descriptive statistics of the data is an initial analysis that is used to see the distribution of the data based on two measurement methods, namely through the size of the concentration and the size of the spread.

This analysis is very necessary in a time series modeling, as an effort to ensure the data distribution is normal. The results of the analysis regarding the summary of the statistical description of the variables for the five countries can be seen in table 4.1 below.

Table 4.1. Summary of variable statistics

Variable	Average	Standard Deviation	Min	Max
Banking crisis	0.058	0.12	0	1
LTV	78.48	11.923	30	90
GDP growth	2.623	2.478	12.234	21.891
Income per capita	21.52	2281	0.654	103.631
Inflation	4.3	6.2	3.8	14.21
Current account	0.312	8.123	26.983	41.212
Credit	1.163	0.761	1.31	3.454
Monetary policy	7.651	6.451	22.753	12.613
Inflation targeting regime	0.012	0.18	0	1
Exchange rate setting	91.615	12.816	41	110
Control over capital	2.123	4.125	11.615	28.111

Note: author's calculation results, 2021.

4.2. Analysis Results
4.2.1 Basic Analysis
In this section, we discuss the basic estimation results based on the probit model. The probit model in column 1 of Table 4.2 shows the results of the univariate probit model that estimates the impact of LTV regulation on the probability of a banking crisis. The results show that the effect of the LTV variable coefficient on the probability of a banking crisis is positive and statistically significant at the one percent level (marginal effects are shown in brackets in all tables). This means that the higher the LTV ratio, the higher the probability of a banking crisis. This result is in line with the previously stated theory, that a higher LTV ratio is considered to loosen macroprudential policies, which can lead to financial instability. In this study, these findings are in line with findings from other studies analyzing the effect of macroprudential policies on the likelihood of crises, as discussed in the introduction and literature review.

Table 4.2. Basic Estimation

Estimation Model	Probit Models (1)	Probit Models (2)
ΔLTV x Credit	0.0425***	0.0452***
	(0.0171)	(0.0212)
GDP growth		-0.1627***
		(0.0232)
Income per capita		-0.0386***
		(0.0045)
Inflation		-0.0158***
		(0.0190)
Current Account		-0.0128
		(0.0111)
ΔMonetary Policy		-0.0213
		(0.0113)
Sample	5 countries	5 countries
Observation	80	80

Note: standard error in brackets
*significant at 10% level
**significant at 5% level
***significant at 1% level

The estimated coefficient on the LTV variable is similar to the previous results in column (1) of the univariate case. In particular, the sign and statistical significance of the coefficients of the LTV variable in column (2) are the same as those in column (1), while the marginal effect of the LTV variable on the second estimate is larger. The positive coefficient on the LTV variable indicates that a tightening of the LTV ratio is associated with a lower probability of a banking crisis through the credit channel. These main results are in agreement with the theory, and this is the first study to estimate this effect on the probability of a banking crisis.

The estimation result of the second independent variable, namely GDP growth, shows that the real GDP growth coefficient is negative and statistically significant at the one percent level. This means that higher economic growth is associated with a lower probability of a banking crisis. This is also in line with economic

theory because if the economy grows faster, creditors can generate higher incomes, making it easier for them to repay debts. In this situation, it is less likely that commercial banks will face default by creditors, therefore higher economic growth will lead to a lower probability of a banking crisis. The estimation result of the third independent variable, namely GDP per capita, shows that the coefficient of GDP per capita is negative and statistically significant at the one percent level. This variable is assumed to capture economic development. Thus, the estimation results show that if the economy approaches a higher GDP per capita, it is less likely to face a banking crisis.

The next fourth control variable is inflation. The estimated coefficient of the inflation variable is statistically significant at the one percent level and is negative. This is also in accordance with economic theory because creditors will benefit from an increase in inflation, because the nominal debt burden of creditors is relatively decreased. Meanwhile, the estimation for the current account variable was found to be insignificant and positive. Although not significant, the sign of the coefficient is consistent with economic theory. A positive current account coefficient means that savings by domestic residents are higher than by foreign creditors. If the economy has sufficient savings, domestic creditors are more likely to default. The negative coefficient on the current account to GDP ratio in the second column probit model strengthens the argument of the theory.

Furthermore, the monetary policy variable is not statistically significant but has the expected sign. The negative coefficient on the monetary policy variable indicates that monetary tightening is associated with a lower probability of a banking crisis. This result makes sense, since loose monetary policy can lead to high credit, which often results in banking crises.

4.2.2 Robustness Check

Robustness check is known as an analysis that is used to test the stability of a model. In testing the stability of the model, this study uses other binary regression models, namely the logit model and the tobit model. The results of the estimation of the tobit and logit models can be seen in table 4.3 below.

Tabel 4.3. Robustness Check

Estimation Model	Logit Models (3)	Tobit Models (4)
ΔLTV x Credit	0.111**	0.2193**
	(0.0342)	(0.0920)
GDP growth	−0.310***	−0.4520***
	(0.0467)	(0.1265)
Income per capita	−0.00852***	−0.0000***
	(0.0128)	(0.0000)
Inflation	0.0452***	−0.2356***
	(0.0212)	(0.0753)
Current Account	-0.1627***	−0.0264
	(0.0232)	(0.0319)
ΔMonetary Policy	−0.0498	−0.0603
	(0.0327)	(0.0415)
Sample	5 countries	5 countries
Observation	80	80

Note: standard error in brackets
*significant at 10% level
**significant at 5% level
***significant at 1% level

Broadly speaking, the estimation results above show that there are similarities between the previous probit model testing and the tobit and logit models in table 4.3.

The LTV variable is now statistically significant at the five percent level, suggesting that a loosening of the LTV ratio is associated with a higher probability of a banking crisis. Another finding shows that the coefficient a of the LTV variable is larger in the logit and tobit models than in the probit model, while the marginal effect is smaller than the estimated results of the probit model. Furthermore, the level of statistical significance of the other independent variables in Table 4.3 is the same as the estimation results of the probit model in Table 4.2. Based on these findings, it can be concluded that the probit model is stable to be used as an analytical tool.

4.2.3 Monetary Policy Framework

The next estimate is an estimate used to investigate the relationship between monetary policy and macroprudential policy. This analysis is very important to do, because the central banks in several countries carry out monetary and macroprudential policies simultaneously. Therefore, in the following estimation, the two variables (monetary policy and macroprudential policy) will be included as independent variables.

Table 4.4. Monetary policy

Estimation Model	Probit Models (5)	Probit Models (6)	Probit Models (7)
ΔLTV x Credit	0.0521***	0.0412***	0.0413
	(0.0215)	(0.0231)	(0.0711)
GDP growth	−0.131***	−0.224***	−0.551***
	(0.0225)	(0.0401)	(0.0253)
Income per capita	−0.0217***	−0.0213***	−0.0041***
	(0.0046)	(0.0063)	(0.0068)
Inflation	−0.0612***	−0.3017***	−0.0612***
	(0.0151)	(0.0501)	(0.0152)
Current Account	−0.0182	−0.0979***	−0.0043
	(0.0131)	(0.0361)	(0.0111)
ΔMonetary policy	−0.0112	0.0022	−0.0196
	(0.0148)	(0.0487)	(0.0161)
Inflation Targeting Regime	−0.9213***		
	(0.1611)		
Sample	5 countries	Indonesia and Thailand	Malaysia, Vietnam and Singapore
Observation	80	32	48

Note: standard error in brackets
*significant at 10% level
**significant at 5% level
***significant at 1% level

For additional information, in column 5 in table 4.4 a dummy variable is added for countries that follow the inflation targeting regime. The coefficient of LTV variable shows consistency even in the probit model in columns 5, 6 and 7. Thus, it can be concluded that the effect of LTV policy on the probability of a banking crisis does not change even if a country implements a targeting regime. Another finding shows that the coefficient on the dummy variable for inflation targeting countries has a negative sign and is statistically significant at the one percent level, implying that inflation targeting countries tend to experience a lower probability of a banking crisis.

4.2.4 Exchange Rate Regime

This section will discuss the effect of macroprudential policy on the probability of a banking crisis in relation to the exchange rate regime. In estimation, this research will use three approaches. In the first approach, an index that captures the flexibility of the exchange rate regime will be used. In the second approach, a dummy variable is used for the floating exchange rate regime. In the third approach, the sample countries will be divided into several groups of different exchange rate regimes.

Table 4.5. Exchange Rate Regime

Estimation Model	Probit Models (8)	Probit Models (9)	Probit Models (10)	Probit Models (11)
ΔLTV x Credit	0.0491***	0.01226***	0.0521***	0.0623***
	(0.0205)	(0.0203)	(0.0215)	(0.0315)
GDP growth	−0.1226***	−0.1293***	−0.131***	−0.1124***
	(0.0226)	(0.0295)	(0.0209)	(0.0215)
Income per capita	−0.035***	−0.080***	−0.0832***	−0.0141***
	(0.0089)	(0.0012)	(0.0069)	(0.0012)
Inflation	−0.0083	−0.0212	−0.0412	−0.139***
	(0.0347)	(0.0128)	(0.0278)	(0.0211)
Current Account	−0.0099	−0.0081	0.0102	−0.0356**
	(0.0224)	(0.0217)	(0.0122)	(0.0217)
ΔMonetary Policy	−0.0126	−0.0242	−0.0860	−0.0241
	(0.0127)	(0.0198)	(0.0410)	(0.0312)
Exchange Rate Regime	−0.1621***			
	(0.0118)			
Floating exchange rate regime		−1.1234***		
		(0.1132)		
Sample	5 countries	5 countries	Indonesia, Malaysia and Singapore	Vietnam and Thailand
Observation	80	80	48	32

Note: standard error in brackets
*significant at 10% level
**significant at 5% level
***significant at 1% level

The results of the application of the effect of the exchange rate regime can be seen in the existing model in columns 8 to 11 in table 4.5. The probit model in column 8 is the result of a regression taking into account the flexibility of the exchange rate built by Ilzetzki, Reinhart, and Rogoff (2019). Next, the probit model in column 9 shows the estimation results including the dummy variable for the floating exchange rate regime. The estimation method in this study follows the Nakatani method (2017b, 2018a).

The estimation of the coefficients on the variables representing exchange rate regulation found negative and statistically significant results at the one percent level in the probit model in column 8. A higher coefficient value of this variable means a more flexible exchange rate regime. countries with more flexible exchange rate regimes tend to experience a lower probability of a banking crisis. This is due to the role of the exchange rate as a shock absorber. As an illustration, in the face of financial or real shocks, the exchange rate can adjust to absorb shocks to achieve stability in the market if the currency is floating (Nakatani, 2018b). The coefficient estimates for the LTV variable in the probit model in column 8 are also very similar to the baseline results in the probit model column 2 in Table 4.2. This finding shows that empirical studies have found that macroprudential policies are very effective in reducing the likelihood of a crisis occurring.

Supporting this finding, the probit model in column 9 shows that the estimated coefficient on the dummy variable for the floating exchange rate regime is also negative and statistically significant at the one percent level. These results indicate that countries with more flexible exchange rate regimes experience a lower probability of a crisis. The coefficients on the LTV variable in the probit model in column 9 of Table 4.5 are also statistically significant, and their magnitudes and signs are almost the same as the results presented in other models.

The findings on the probit model in columns 8 and 9 above are supported by the estimation results based on the subsample (fixed and floating exchange rate regimes) presented in the probit model in columns 10 and. The probit model in column 10 shows that the LTV ratio is no longer statistically significant for countries with fixed exchange rate regimes, while the probit model in column 11 shows that the ratio is positive and statistically significant at the one percent level. These results confirm previous findings that macroprudential policies are only effective for countries with more flexible exchange rate regimes. This finding is consistent with the results by Kim et al. (2019) which finds that the negative effect of macroprudential policy shocks on credit and GDP is more significant in countries with flexible exchange rate regimes.

5. Conclusion

This study seeks to examine the impact of macroprudential policies on the possibility of banking crises by using an annual state panel dataset consisting of 5 countries from 2004 to 2020. This study seeks to prove empirically

that macroprudential policy can be an option in avoiding financial instability that results in a banking crisis.

The results of this study indicate that there are four main findings that provide significant policy implications for the central bank and financial regulatory authorities. First, macroprudential policy is considered effective in avoiding a banking crisis by suppressing credit growth. In other words, it is found that a tightening of the LTV ratio is significantly associated with a lower probability of a banking crisis. This finding is in line with the objectives of macroprudential policy, which aims to reduce the credit boom and avoid instability in the banking system.

Second, this study finds that the monetary policy framework is important for the effectiveness of macroprudential policy. In particular, the estimation results show that macroprudential policies are only effective in countries that follow an inflation targeting regime, namely Indonesia and Thailand. An indication of this is that price increases can be well controlled by monetary policy in countries that have inflation targeting regimes. In such a situation, macroprudential policies can be more effective in achieving banking stability by influencing the volume of credit.

Third, the exchange rate regime also influences the effectiveness of macroprudential policies. Macroprudential policies are more effective in countries with more flexible exchange rate regimes. This may reflect the fact that floating exchange rate regimes are more vulnerable to shocks that trigger financial crises, as found by Nakatani (2018a).

Fourth, macroprudential policies are effective in avoiding banking crises in countries without capital controls but not in countries with capital controls. This is in line with the theoretical model of Mendoza and Rojas (2019). These four findings are new and very important for policy makers, including monetary and financial regulatory authorities.

This study has limitations in the number of samples used, which are only 5 ASEAN countries and have not included the economic crisis caused by the Covid-19 pandemic. In the next study, this research will be developed by including the period of financial crisis caused by health factors. This is very interesting, to examine the impact of the effectiveness of macroprudential policies in overcoming the financial crisis which was specifically caused by other than the instability of macro variable conditions.

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