

Effect of Macroprudential Policy on Banks' Profitability in ASEAN Before and During Covid-19

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Abstract

Regulators introduced macroprudential policies to ensure financial stability, but during the Covid-19 pandemic, many countries relaxed these policies to boost credit growth and the economy. This research examines the impact of these policies on bank profitability in six ASEAN countries from 2018 to 2021 using panel data regression. Before the pandemic, tightening policies like capital buffers, taxes, liquidity requirements, and foreign exchange limits reduced bank profitability. During the pandemic, loosening loan loss provisions and loan-to-value ratios increased profitability, while relaxing reserve requirements decreased it.

Keywords : ASEAN, Banking, Macroprudential policy, Profitability.

JEL Classification : E58, G21, G28

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1. Introduction

The banking sector has faced various global crises, including those in 1997/1998 and 2008, prompting the use of macroprudential policies to maintain stability. Empirical studies show these policies' varied effects: emerging countries use them more frequently (Cerutti et al., 2017), some policies negatively impact bank profitability (Davis et al., 2022), they can lower bank funding costs (Ćehajić & Košak, 2021 ; Gharaibeh & Farooq, 2022; Zamfirache et al., 2023) and their use increased after global financial crises (Akinci & Olmstead-Rumsey, 2018).

In ASEAN countries, macroprudential policies, categorized as either tightening or loosening, have been actively implemented. The Covid-19 pandemic disrupted global trade, tourism, and production, significantly impacting the economy. ASEAN countries, with high stringency index scores (Hale et al., 2021), experienced a decline in economic growth in 2020, contrasting their higher growth rates from 2016-2019.

ASEAN governments responded with various monetary, fiscal, and macroprudential policies to stimulate economic growth through increased bank lending (Hahm et al., 2012; Mohd Yaziz Mohd Isa et al., 2016; Rizvi et al., 2021; Utami, 2022). Examples include Indonesia's removal of the capital conservation buffer and reduction of reserve requirements, Malaysia's relaxation of lending limits and LCR, and Singapore's reduction of required stable funding factors. These measures aimed to boost bank lending and economic growth, with an expected increase in bank profitability.

This research aims to analyze the impact of macroprudential policies on bank profitability in six ASEAN countries before and during the Covid-19 pandemic (2018-2021) using panel data regression. The study addresses a research gap by investigating variations in the impacts of these policies across ASEAN countries. It provides insights for banks to develop strategies to leverage these policies and for regulators to understand their economic effects. The study covers a four-year period, with data from banks listed on stock exchanges in Indonesia, Malaysia, Singapore, the Philippines, Thailand, and Vietnam. The data includes annual bank data, annual macroeconomic data, and monthly macroprudential policy data converted to annual data.

2. Hypotheses Development

There Empirical studies have demonstrated the efficacy of macroprudential policies across various economies, focusing on their impact on bank credit, risk, and the housing market. Cerutti et al. (2017) found that emerging economies frequently employ these policies, particularly targeting foreign exchange activities, whereas advanced economies prefer borrower-based policies. These measures effectively moderate credit growth, especially in household credit. The impact of macroprudential policies on bank profitability, finding that certain measures detrimentally affect profitability, particularly in smaller, highly capitalized banks (Gaganis et al., 2021; Davis et al. 2022; Dhiva & Gunawan, 2023; Radovanov et al., 2023). Some policies reduce lending without significantly impacting profitability, while others negatively affect both.

Akinci and Olmstead-Rumsey (2018) studied the post-global financial crisis use of macroprudential policies, noting their effectiveness in reducing bank credit growth, housing credit growth, and house price appreciation, especially in advanced economies. These policies are often implemented alongside bank reserve requirements and capital flow restrictions. González (2022) observed that stricter macroprudential policies can enhance bank competition and stability, with varying impacts depending on the specific measures and countries.

According to Chan et al., (2023) and Geng et al., (2023) Stricter macroprudential policies have the potential to enhance both bank competition and financial stability. However, the effects of these policies can vary significantly depending on the specific measures implemented and the economic context of each country. For instance, policies related to loan supply and liquidity tend to promote greater competition among banks, whereas those related to capital requirements and taxation generally exert a dampening effect on competition. Moreover, the overall impact of macroprudential policies is also influenced by the regulatory environment, with stringent legal restrictions on entry and operational activities potentially diminishing their positive effects or amplifying their negative consequences. This nuanced understanding underscores the importance for policymakers to consider the specific economic and regulatory conditions of their countries when designing and implementing macroprudential measures.

Policies related to loan supply and liquidity promote competition, while those related to capital and taxation tend to dampen it. Several studi from Alam et al., (2019); Araujo et al., (2020); Duca et al., (2021); Eller et al., (2020; Forbes, (2020); Laufer & Tzur-Ilan, (2021) confirmed that household credit-limiting policies significantly affect credit, with a milder impact on consumption. The impact of loan-to-value (LTV) limits is nonlinear, depending on the initial LTV level. Based on these studies, this research hypothesizes that macroprudential policies negatively impact bank profitability in ASEAN countries before and during the Covid-19 pandemic.

Additional determinants of bank profitability include bank size, which positively impacts net interest income (Dang & Nguyen, 2022; Adelopo et al., 2018) but has a negative relationship with ROAA and ROAE (Davis et al., 2022). The solvency ratio shows mixed effects on profitability (Le & Ngo, 2020; Adelopo et al., 2018). Credit risk and the ratio of operating expenses to operating income negatively impact profitability (Adelopo et al., 2018; Bolarinwa et al., 2019; Buallay et al., 2020; ; Amare, 2021; Davis et al., 2022; Abdelaziz et al., 2022; Hunjra et al., 2022). Economic growth positively affects profitability (Davis et al., 2022; Dang & Nguyen, 2022). Cristian et al. (2020) found that cost and revenue efficiency do not significantly impact performance, while credit risk negatively affects ROA and insolvency risk negatively affects NIM, with no significant impact from liquidity risk in

Indonesia. Hypothesis 1, macroprudential policies negatively impact bank profitability in ASEAN countries both before and during the Covid-19 pandemic. Hypothesis 2, determinant factors such as bank size, solvency ratio, credit risk, operating expenses to operating income ratio, and economic growth have varying impacts on bank profitability in ASEAN countries.

3. Method, Data and Analysis

This research model is based on Davis et al. (2022) and aims to analyze the impact of macroprudential policy on bank profitability in ASEAN countries before and during the Covid-19 pandemic. The initial model is:

$$Y_{it} = a + \beta \text{Internal}_{ijt-1} + r \text{Makro}_{jt} + d \text{Macroprudential}_{jt-1} + e_{it}$$

Where, (i) denotes each bank, (j) the country, and (t) the time. The dependent variable (Y_{it}) represents bank profitability measured by ROA and ROE. Control variables are divided into internal and macroeconomic groups. Internal variables (from the previous period to avoid endogeneity and reverse causality) include bank size, solvency ratio, credit risk, liquidity risk, management efficiency, and diversification. Macroeconomic variables include economic growth and inflation.

Each macroprudential policy is tested individually in the model before and during the Covid-19 pandemic. The macroprudential data is sourced from the iMaPP database and the IMF's Macroprudential Policy Survey, with variables taken from the previous period to account for endogeneity and adjustment time. The variables selected for this study are based on their relevance to bank profitability, supported by empirical evidence from previous studies. Bank size, solvency ratio, credit risk, liquidity risk, management efficiency, and diversification are critical indicators of a bank's internal health and operational performance. Macroeconomic variables such as economic growth and inflation are included to capture the broader economic environment's influence on bank profitability. The choice of the 2018-2021 period allows for a comprehensive analysis of the effects of macroprudential policies in both stable economic conditions (2018-2019) and during the significant economic disruption caused by the Covid-19 pandemic (2020-2021).

According to iMaPP data, 12 out of 17 macroprudential policies were implemented in the six ASEAN countries during 2018-2021. Each policy tightening is coded as +1, loosening as -1, and no change as 0. This coding quantifies the direction and intensity of policy changes for comprehensive analysis. Data is cumulated and annualized as per Davis et al. (2022). The study involves 52 research models: 48 models regressing each of the 12 macroprudential policies individually with control variables and dependent variables (ROA and ROE) before and during the pandemic, plus four models examining factors influencing bank profitability before and after Covid-19 using internal and macroeconomic variables.

The research sample consists of 95 banks listed on the stock exchanges of six ASEAN countries: 40 banks in Indonesia, 9 in Malaysia, 3 in Singapore, 9 in Thailand, 10 in the Philippines, and 24 in Vietnam. After filtering and removing outliers, this sample represents 54% to 87% of the total banking assets in each country, adequately reflecting the overall banking sector. The study covers the period from 2018 to 2021, divided into 2018-2019 (pre-Covid-19) and 2020-2021 (during Covid-19). Data includes macroprudential policies from the iMapp database by the International Monetary Fund (IMF). Internal and industry group data are obtained from bank balance sheets accessed through Thomson Reuters and Bloomberg, while economic growth and inflation data are sourced from Thomson Reuters.

4. Results

Based on the table 1, three macroprudential policies—capital, loan restrictions (LoanR), and reserve requirements (RR)—did not experience any tightening or loosening during the 2018-2021 period. This indicates a consistent regulatory stance on these policies across the six ASEAN countries throughout the study period. In contrast, all other macroprudential policies were actively adjusted during the Covid-19 pandemic. This widespread implementation and adjustment of macroprudential

measures during the pandemic highlight the proactive efforts by regulators to mitigate the economic impact of Covid-19 and support financial stability and bank lending. The dynamic nature of these policies during the pandemic underscores their importance in responding to unprecedented economic challenges and adapting to evolving financial conditions.

Table 1. Descriptive Statistics of Macroprudential Policy

Macroprudential Policies	Before Covid-19					During Covid-19				
	Mean	Median	Std. Dev.	Min	Max	Mean	Median	Std. Dev.	Min	Max
<i>Conservation</i>	0,96	1	0,82	0	2	0,72	1	0,82	-1	2
<i>Capital</i>	0	0	0	0	0	0,25	0	0,44	0	1
<i>LVR</i>	0,22	0	0,03	0	1	0,65	1	0,48	0	1
<i>LLP</i>	0,03	0	0,18	0	1	0,15	0	0,29	0	1
<i>LoanR</i>	0	0	0	0	0	-0,09	0	0,27	-1	0
<i>LTV</i>	-0,26	0	0,52	-1,08	1	-1,06	-0,58	1,23	-2,83	1
<i>Tax</i>	0,02	0	0,14	0	1	-0,14	0	0,57	-2	1
<i>Liquidity</i>	2,09	1,88	0,91	1	3,5	2,93	3,83	1,25	0	4
<i>LFX</i>	0,18	0	0,34	0	0,83	0,42	0	0,5	0	1
<i>RR</i>	0	0	0	0	0	-0,64	-0,83	0,78	-3	0
<i>SIFI</i>	0,65	0	0,79	0	2	0,95	1	0,95	0	2
<i>OT</i>	0,54	0,5	0,65	0	1,67	0,92	0	1,07	0	2,33

Note: LVR: leverage requirements, LLP: loan loss provisions, LoanR: loan restrictions, LTV: loan-to-value ratio, LFX: limits on foreign exchange positions, RR: reserve requirements, SIFI: systemically important financial institutions, OT: other macroprudential policy.

The liquidity policy (liquidity requirement) has the highest average and maximum value compared to other policies before and during Covid-19. This policy is implemented by various countries to mitigate liquidity and systemic funding risks. Tightening this policy implies an increase in the minimum requirements for liquidity coverage ratio, liquid asset ratio, stable funding ratio, and core funding. From the table 1, it is also evident that ASEAN countries implemented relaxation measures on several macroprudential policies during the pandemic. The loan restrictions, loan-to-value ratio, tax, and reserve requirements policies have negative average values, indicating the presence of relaxation in these policies.

Below (Table 2) are the descriptive statistics for the dependent and control variables. The dependent variables used in this study are ROA (Return on Assets) and ROE (Return on Equity) for the years 2019-2022. The average value of ROA and ROE is 0.92% and 8.31%, respectively.

Table 2. Descriptive Statistics of Dependent Variables and Control Variables

Variables	Mean (%)	Median (%)	Std. Dev. (%)	Min (%)	Max (%)
<i>ROA</i>	0,920	0,950	1,850	-12,280	10,210
<i>ROE</i>	8,310	8,720	9,960	-49,190	29,890
<i>LNSIZE</i>	14,360	14,013	3,030	8,420	20,460
<i>LEVERAGE</i>	13,710	12,030	7,550	3,920	67,000
<i>CREDITRISK</i>	3,290	2,480	2,990	0,000	25,090
<i>LIQUIDITYRISK</i>	83,100	84,670	10,800	51,300	99,640
<i>EFFICIENCYRATIO</i>	60,550	52,220	36,070	24,200	356,900
<i>DIVERSIFICATION</i>	32,210	31,380	17,010	0,010	86,080
<i>GDPGROWTH</i>	3,170	3,690	4,120	-9,500	8,900
<i>INFLATION</i>	2,870	2,600	2,020	-1,400	8,100

Note: ROA: return on asset, ROE: return on equity, LNSIZE: ln of assets, LEVERAGE: equity/total assets, CREDITRISK: non-performing loans, LIQUIDITYRISK: deposits/total liabilities, EFFICIENCYRATIO: non-interest expense/total revenue, DIVERSIFICATION: non-interest income/gross revenue, GDPGROWTH: economic growth, dan INFLATION: inflation

The internal bank variables used in this study are from the years 2018-2021. The Leverage variable represents the solvency and resilience ratio of the bank. From the table above, the average value of this variable is 13.71%. The average value of the credit risk variable is 3.29%, suggesting that there is a non-performing loan rate of 3.29% of gross loans. The average value of the liquidity risk variable is 83.10%, indicating that 83.10% of the bank's liabilities are funded by customer deposits. The

average value of the efficiency ratio variable is 60.55%, meaning that 60.55% of the bank's income is used to cover operational costs. The average value of the diversification variable is 32.21%, indicating that 32.21% of the total income is derived from non-interest income. The macroeconomic variables used in this study for the years 2019-2022 are economic growth and inflation. The average value of economic growth and inflation are 3.17% and 2.87%, respectively.

Table 3. The Regression Results (Macroprudential Policy)

	Before Covid-19		During Covid-19	
	ROA Coef	ROE Coef	ROA Coef	ROE Coef
CONSERVATION	-0,003**	-0,015	-0,002	-0,038
CAPITAL	-	-	-	-
LVR	0,010*	0,062	-	-
LLP	-	-	-0,026**	-0,127**
LOAN R	-	-	-0,006	-0,186
LTV	0,002	0,004	-0,007**	-0,035**
TAX	-0,004***	-0,052***	-0,002	-0,074
LIQUIDITY	-0,004**	-0,022	0,001	-0,001
LFX	-0,004*	-0,015	-	-
RR	-	-	0,005*	0,023
SIFI	-0,003*	-0,010	-	-
OT	-0,003*	-0,011	-0,019**	-0,084*

Note: LVR: leverage requirements, LLP: loan loss provisions, LoanR: loan restrictions, LTV: loan-to-value ratio, LFX: limits on foreign exchange positions, RR: reserve requirements, SIFI: systemically important financial institutions, OT: other macroprudential policy.

***significant at 1%, **significant at 5%, *significant at 10%

The regression results can be observed from the table 3, which presents the outcomes of a fixed effect model regression with robust standard errors. Before the Covid-19 pandemic, the conservation, tax, liquidity, limit on foreign exchange, SIFI, and other policies had significant negative effects on ROA. While the leverage had a positive effect on ROA. On the other hand, only the tax policy had a significant negative effect on ROE. During the Covid-19 pandemic, the loan loss provisions, loan-to-value, and other policies had significant negative effects on ROA and ROE. While the reserve requirements policy had a positive effect on ROA.

Table 4. The Regression Results of Determinants of Bank's Profitability

	Before Covid-19		During Covid-19	
	ROA Coef	ROE Coef	ROA Coef	ROE Coef
LNSIZE	.008	.106*	.004	.002
LEVERAGE	.050	.495	-.070	-.620
CREDITRISK	.065	.548	-.268	-1,279*
LIQUIDITYRISK	.013	.084	.027	.206
EFFICIENCYRATIO	-.005	-.075	.002	-.008
DIVERSIFICATION	.0162	.108	-.006	-.078
GDPGROWTH	.056***	.455***	.036	.334
INFLATION	-.011	.039	.082*	.393

Note: ROA: return on asset, ROE: return on equity, LNZISE: ln of assets, LEVERAGE: equity/total assets, CREDITRISK: non-performing loans, LIQUIDITYRISK: deposits/total liabilities, EFFICIENCYRATIO: non-interest expense/total revenue, DIVERSIFICATION: non-interest income/gross revenue, GDPGROWTH: economic growth, dan INFLATION: inflation.

***significant at 1%, **significant at 5%, *significant at 10%

Based on table 4, the determining factors of bank profitability that had a significant impact before the occurrence of Covid-19 are the economic growth, which had a significant positive effect on both ROA and ROE. Meanwhile, the determining factors of bank profitability that had an impact during the Covid-19 period are inflation, which had a significant positive effect on ROE, and credit risk, which had a significant negative impact on ROE.

5. Discussion

Before Covid-19 pandemic, the conservation policy had a significant negative effect on ROA. This finding is in line with the hypothesis that tightening this policy, such as increasing capital conservation buffer requirements, will decrease bank profitability. The leverage policy had a significant positive effect on ROA. Tightening this policy by increasing the leverage ratio limit of banks will increase bank profitability. This result is in line with the study by Davis et al. (2022). The tax policy had a significant negative effect on both ROA and ROE. This is in line with the hypothesis that tightening this policy, such as increasing taxes on certain assets and liabilities, will decrease bank profitability. This result is in line with the study by Davis et al. (2022) but differs from the findings of González (2022).

The liquidity policy exhibited a notable adverse impact on ROA, consistent with the hypothesis positing that tightening this policy, such as elevating minimum requirements for liquidity adequacy ratios, NSFR ratios, and liquid asset ratios, would lead to a reduction in bank profitability. Similarly, the limit on foreign exchange position policy demonstrated a significant negative effect on ROA, aligning with the hypothesis suggesting that tightening this policy, such as constraining open foreign exchange positions and exposure to foreign exchange, would diminish profitability. These findings underscore the intricate relationship between macroprudential policies and bank profitability, emphasizing the importance of carefully assessing the effects of policy adjustments on financial performance.

The SIFI policy had a significant negative effect on ROA. This is in line with the hypothesis that tightening this policy, which includes additional capital and liquidity requirements for systemically important financial institutions, will decrease bank profitability. The OT policy had a significant negative effect on ROA. This is in line with the hypothesis that tightening this policy, including stress testing and other policies not included in the other 16 macroprudential policies, will decrease bank profitability. This result is also consistent with the studies by Alam et al. (2019) and Cerutti et al. (2017).

During the Covid-19 pandemic, the loan loss provisions policy had a significant negative effect on ROA and ROE. This is in line with the hypothesis that relaxing the loan loss provision policy will increase bank profitability. During the Covid-19 pandemic, ASEAN countries such as Indonesia and Singapore relaxed the loan loss provision policy to stimulate credit growth, ultimately enhancing profitability. This finding aligns with previous studies by Alam et al. (2019), Cerutti et al. (2017), and Akinci & Olmstead-Rumsey (2018), which also found a significant negative impact of the loan loss policy.

The loan-to-value policy had a significant negative effect on ROA and ROE. This is in line with the hypothesis that relaxing this policy will increase bank profitability. During the Covid-19 pandemic, ASEAN countries such as Indonesia, Malaysia, and Thailand implemented relaxation measures regarding the LTV ratio to boost credit growth and ultimately improve profitability. This result is in line with previous studies by Alam et al. (2019) and Akinci & Olmstead-Rumsey (2018), which also found a significant negative impact of the loan-to-value policy.

The reserve requirement policy had a significant positive effect on ROA. This contradicts the hypothesis that loosening this policy will decrease bank profitability. The same result was found in the study by Akinci & Olmstead-Ramsey (2018). During the Covid-19 pandemic, ASEAN countries such as Indonesia, the Philippines, and Thailand relaxed the minimum reserve requirements to increase available funds for lending and stimulate credit growth. However, based on this study, the relaxation of this policy during Covid-19 actually decreased bank profitability.

During the Covid-19 pandemic, the other macroprudential policy had a significant negative effect on ROA and ROE. This is in line with the hypothesis that relaxing this policy will increase bank profitability. During the Covid-19 pandemic, ASEAN countries such as Indonesia implemented relaxation measures regarding the disincentive parameters for Macroprudential Intermediation Ratio. The Philippines increased the loan limit for borrowers to boost credit growth. These measures were implemented to stimulate credit growth. This result is in line with previous studies by Alam et al.

(2019) and Cerutti et al. (2017), which also found a significant negative impact of the other macroprudential policy.

6. Conclusions, Limitations and Suggestions

Conclusions

The research findings indicate that certain macroprudential policies, such as capital conservation buffers, taxes, liquidity requirement ratios, limit on open foreign exchange positions, additional capital for systemically important financial institutions (SIFI), and other macroprudential policies like stress testing, had a significant negative effect before the Covid-19 pandemic. Tightening these macroprudential policies would decrease bank profitability. On the other hand, during the Covid-19 pandemic, significant influences on bank profitability were observed from policies such as loan loss provisions, loan-to-value ratios, and other macroprudential policies like stress testing, which had a significant negative effect before the pandemic. To loosen these policies during Covid-19 led to increased bank profitability. Another macroprudential policy that had a significant impact during Covid-19 was the minimum reserve requirement, which had a positive effect. Surprisingly, easing the minimum reserve requirement actually decreased bank profitability during Covid-19.

Limitations and Suggestions

The limitation of this study is that the macroprudential policy variables used are annual dummy variables, where policy tightening is represented by +1 and policy relaxation is represented by -1. The implementation of policy changes for each macroprudential policy may have different real values across banks, which is not reflected in this study. A suggestion for future research on macroprudential policies is to incorporate the actual values of policy implementation for each country to assess their impact on bank profitability.

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Appendix

Definition of Macroprudential Policy

Conservation	: Capital Conservation Buffer
Capital	: Requirements for banks's capital
LVR	: Leverage of banks
LLP	: Requirements for setting aside provision for loan losses
LoanR	: Loan Restrictions
LTV	: Restrictions on the loan-to-value ratios
Tax	: Taxation and levies imposed on specified transactions
Liquidity	: Actions implemented, which involve setting minimum thresholds for liquidity
LFX	: Limits on open foreign exchange (FX) positions
RR	: Mandatory reserve requirements
SIFI	: Measures implemented to address risks posed by systemically important financial institutions (SIFIs)
Other	: Other macroprudential policy