

The Determinant of Loan Portfolio Shifting: Empirical Study of Banks in ASEAN Country

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Abstract

In offering a loan, banks have several considerations. This is because Standard Basel has regulations and requirements for banks to offer loans. This relates to the bank's minimum capital and liquidity requirements. This factor includes external and internal factors. This is important to be noted because external and internal factors contain risks inherent in financial instruments. Risk management is one of the things that the executive is most concerned about in taking a policy. Risks faced by the bank include interest rate risk and credit risk. In this case, we study interest rate and credit risk in the bank's loan offering management role. We study banks in ASEAN Countries. The results show that interest rate is one of the considerations of banks for providing the loan. But, no evidence of credit risk. We also add analysis using a profitability ratio that captures the bank's loan offering management. In this case, profitability strengthens the model relationship tested.

Keywords: Interest Rate; Credit Rate; Profitability; Loan Portfolio Shifting; Loan Policy

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Introduction

Bank is a financial institution that has the main function as an intermediary, between people who have a surplus of funds to those have lack funds. In carrying out its function, the bank collects funds from the public and is subsequently used to carry out operational and non-operational activities. Lending is one of the bank's main activities. Malede (2014) stated that loans are assets and the main source of operating income of the bank. In addition, bank loans have an important role in the economic system, especially in business financing (Ivashina & Scharfstein, 2010; Levine, 2004). Bank providing business through lending, bank support investment, home purchases, education, and other economic activities. Caglayan & Xu (2016) explained that funds owned by the bank are quite limited. Liquid assets turn into illiquid assets when making loans (Diamond & Rajan, 2001). From various sources of funds collected by the bank, it is proper for the

bank to manage the loan portfolio. By carrying out a careful credit analysis and managing the portfolio carefully, bank can maintain the stability and prevent large losses.

Even though the bank is currently developing many business activities in non-operational activities, it is seen that the proportion of funds allocated to operational activities, especially lending, is very large (Malede, 2014). The loan to deposit ratio (LDR) is the proportion of deposits used by the bank for lending activities. Table 1 is the LDR data of banks in ASEAN countries during the period 2016-2020, which are several countries; such as Indonesia (IND), Malaysia (MAL), Singapore (SNG), Thailand (THAI), and the Philippines (PHI).

Table 1. Debt to Assets Ratio in LDR of banks in ASEAN Country

Country	2016	2017	2018	2019	2020
Indonesia	0,802	0,852	0,893	0,865	0,877
Malaysia	0,876	0,876	0,891	0,914	0,930
Singapore	0,877	0,878	0,897	0,878	0,876
Thailand	1,849	1,400	1,243	1,251	1,264
Philippines	0,573	0,656	0,621	0,675	0,717

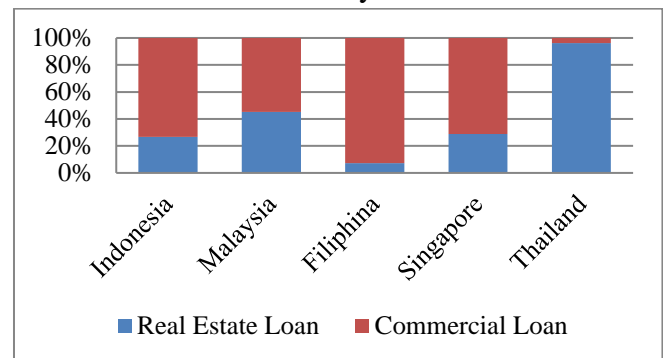
Source: Osiris Database (2020)

Standard Basel have regulations and requirements for banks on offering the loans. This relates to bank's minimum capital and liquidity requirements. Loan portfolio management is carried out by taking into account the concentration of loans in certain segments or groups.

Bank has a loan portfolio allocated to several types of loans. The portfolio includes a wide variety of loans made to individuals, business, and other institutions. The portfolio that banks make is based on different maturity. Besides of different maturity, it is also important to note that commercial and real estate loans differ in term of risk, that use and the type of collateral required. Commercial loans focus more on financing operations and business activities, while real estate loans relate to property ownership and development.

The proportion of commercial loans and real estate loans can be used to find out how bank carries out portfolio management on different types of loans. Data on the average proportion of bank loans during the period 2016-2020 in ASEAN countries are presented in Figure 1 as follows:

Figure 1. Average Proportion of Bank Loans in ASEAN Country 2016-2020



Source: Osiris Database (2020)

We capture the average proportion of bank loans during the period of 2016-2020 in several ASEAN Country in Figure 1. It also shows that types of loans vary greatly. So, we need to make sure about the indicators that affect the provision of commercial loans and real estate loans.

Several factors need to be considered by banks in managing loan portfolios, including external and internal factors (Olusanya, et al., 2012). This is important to be noted because external and internal factors contain risks inherent in financial instruments. Froot, Schafstein, & Stein (1993) stated that risk management is one of the things that the executive is most concerned about in taking a policy. Saunders & Cornett (2011) explained that risks faced by the bank include interest rate risk and credit risk. In addition, Orzechowski (2017) presented the important role of bank profitability in loan portfolio management. Bank aim to diversify their loan exposure across various sectors, industries, and borrower profiles to manage risks effectively. Profitability can guide banks in determining the optimal mix of loan types to maximize profitability while controlling risk. From some previous research literature, there are several influential factors in loan portfolio management, including interest rate, credit risk, and bank profitability (İskenderoğlu & Tomak, 2013; Kashyap & Stein, 2000; Orzechowski, 2017).

Banks can't avoid external factors because

the bank doesn't have control. Bank faces challenges over economic conditions and monetary policies in lending activities to the public. The parties involved in banking activities provide responses that will lead to changes in the loan portfolios. Bank often responds to changes in the interest rate of loans with several related reasons regarding the capital adequacy ratio and hedging (Orzechowski, 2017).

Some previous studies, such as research conducted by Ferri, Kalmi, & Kerola (2014) and Ivashina & Scharfstein (2010), stated that interest rate policies often lead to reduced loan demand by borrowers. Disyatat (2011) stated that through Bank Lending Channel (BLC) is the role of bank as intermediary institution. It shows that interest rate policy and impact on overall economic activity in financial system. The scope activity is close to bank deposits and bank loans. Whereas the research conducted by Kashyap & Stein (2000) stated the opposite that there is a positive result of interest rate on bank's lending activity.

In addition to external factors, interest rates, the bank often considers internal factors in managing loan portfolios. Bank considerations relate to conditions that occur in bank operations. Bank considers the aspects of credit risk that are related to providing loans. Malede (2014) explained that bank needs to emphasize credit risk because it can cause the bank to go bankrupt and slow down the bank in disbursing loans. İskenderoğlu & Tomak (2013) stated that loans are very sensitive matters. Berger & Udell (2004) stated that the high level of bank's credit risk explains the reluctance to provide loans.

However, several studies suggest that the existence of external and internal factors can cause the bank to make a policy of loan portfolio shifting. Loan portfolio shifting results in bank loans being transferred from one to another loan. Haan, Sumner, & Yamashiro (2007) stated that interest rate related to loan portfolio shifting. Harimurti, Pandoyo, & Sofyan (2022) stated that

a real estate loans is difficult to restore initial investment when credit risk is high. So, the provision of real estate loans is reduced. Loan portfolio shifting reduces real estate loans and bank loans tend to shift to commercial loans.

Several previous studies focused on bank internal factors, capital, and liquidity, as influential factors in managing bank loan portfolios. Bank reduces loans because of the high level of credit risk and when difficult to access capital (Ivashina & Scharfstein, 2010). Jayaratne & Wolken (1999) stated that banks with larger capital have more ability to conduct loan monitoring and screening efforts, so can provide larger loans. Gambacorta & Mistrulli (2004) mentioned that banks with good capital have more opportunities. Bank free from minimum capital requirements and can flexible to expand the loan portfolio.

However, research conducted by Orzechowski (2017) states that in making loans, the bank need to focus more on bank profitability. This is because the role of bank profitability is more significant compared to bank capital in responding to external and internal factors in conducting bank loan portfolio management. Banks with different levels of profitability will differently manage loan portfolios. This is due to the Bank Capital Channel (BCC) which states that: (1) bank profitability can be used to mitigate asymmetric information and agency problems, (2) bank profitability can be used as a reason for the bank to take a cost of the capital policy, and (3) bank profitability is the main source of bank internal capital.

Literature Review

The modern theory of portfolio states that market imperfections can cause the bank to abandon investment in adverse or slightly profitable assets and switch to other more profitable investments (Froot et al., 1993; Ahamed, 2017). Loan portfolio management manages productive assets that have risks, such as

loans. Bank needs to have practical systems and instruments for managing loan portfolios. Orzechowski (2017) stated that the intent and purpose of the bank's loan portfolio management are as follows:

- In diversifying loans, it is required to pay attention to loan concentration in certain segments or groups, for example, based on different levels of risk.
- To mitigate risks contained in providing loans that are concentrated on a particular type of loan. The risks inherent in loans are caused by several factors including the economic sector, asset quality, market segments, and certain economic activities.
- Bank expects balanced returns and risks for loans provided to archive a maximum loan portfolio. A loan portfolio is also regulated in Basel requirements to achieve objectives.

In addition, the bank adheres to the principle of prudence so that loan portfolio management becomes a reference in the bank taking operational policies. In general, the loan portfolio policy is as follows:

- Portfolios in the economic sector as a whole are an attempt by the bank to look at the structure of the national economy and industry.
- A greater proportion is given to a more profitable economic sector.
- A less favorable or detrimental economic sector is diverted to a better economic sector.
- Application of the maximum risk exposure and portfolio limits in each industry, the economic sector taking into account the ability of the bank, capital adequacy, and risk level.
- Bank has the authority to determine internal limits in allocating distributed loans.

2.1. First Hypotheses

Interest rate is one of the monetary policies of the government that needs to be considered by the bank. Bank often responds to interest rate

policies on lending for several reasons, such as capital adequacy ratio and hedging.

Disyatat (2011) stated that through Bank Lending Chanel (BLC) is the role of bank as intermediary institution. It shows that interest rate policy has an impact on overall economic activity in financial system. This is closely related to bank deposits and loans. Interest rate policy manage the liquidity. If bank faces some problems in issuing uninsured obligations to replace the shortage of loan funds, bank tends to reduces reservable deposits which are the source of loan funds.

Haan et al. (2007) stated that similarly, Bank Lending Channel (BLC) shows the existence of strict interest rate policies that are followed by a decrease in loans given by the bank. The research conducted by Ferri et al. (2014) and Ivashina & Scharfstein (2010) stated that interest rate policies often lead to reduce loan demand by borrowers. The existence of a negative impact of interest rate policies on loan activity is also stated in a study conducted by Kashyap & Stein (2000).

In addition, the bank often anticipates interest rate changes by adjusting loans to protect loans given for interest rate risk. Orzechowski (2017) stated that strict interest rate policies make banks tend to avoid investing in long-run maturity loans because of the need for more frequent adjustments in interest rates changes. This is in accordance with the research conducted by Gambacorta & Marques-ibanez (2010) that bank reacts to interest rate policies by making short-term financing. This has resulted from loan portfolio shifting, so commercial loans will increase when interest rate policies are tight while real estate loans decrease. The first hypotheses of this study are:

H_{1a}: Interest rate has a positive effect on commercial loans.

H_{1b}: Interest rate has a negative effect on real estate loans.

H_{1c}: Interest rate has a negative effect on loan portfolio shifting.

2.2. Second Hypotheses

Credit risk is an important factor a consideration for the bank in providing loans. If NPL is high, bank tend to reduce loan in response to the bank's decline in loan quality (Berger & Udell, 2004). When the non-performing loan (NPL) is higher, banks require to increase the provision for loan losses, which causes a decrease in bank income and reduces new loan (Hou & Dickinson, 2007).

Another study about the effect of credit risk on loan activity is İskenderoğlu & Tomak (2013) research. İskenderoğlu & Tomak (2013) stated that credit risk with non-performing loans (NPL) as the proxy affect loan activity negatively to banks in Turkey. This is because bank loans are sensitive and the provision of low-quality loans can cause problems in the future, so bank reduces lending.

To maintain the stability of loan portfolios, bank transfers loans from greater risk to smaller risk (risk averse) because bank adheres to the precautionary principle. Harimurti, Pandoyo, & Sofyan (2022) stated that a high level of non-performing loan (NPL) in real estate loans causes banks difficulty to recover their initial investment, so real estate loans are reduced when the level of credit risk is high. This is because to provide real estate loans, the bank needs a high cost of capital due to the difficulty of managing real estate loans. It takes longer and more costly to assess the provision of real estate loans. Unlike commercial loans, the bank requires borrowers to provide guarantees to obtain loans from banks. This has resulted from loan portfolio shifting, so commercial loans will increase when there is an increase in credit risk while real estate decrease. The second hypotheses of this study are:

H_{2a} : Credit risk has a positive effect on commercial loans.

H_{2b} : Credit risk has a negative effect on real estate loans.

H_{2c} : Credit risk has a negative effect on loan portfolio shifting.

2.3. Third and Fourth Hypotheses

Credit risk is an important factor a consideration for the bank in providing loans. If NPL is high, bank tend to reduce loan in response to the bank's decline in loan quality (Berger & Udell, 2004). A higher credit risk requires to increase the provision for loan losses, which causes a decrease in bank income and reduces new loan (Hou & Dickinson, 2007).

Bank profitability has an important role for the bank in responding to economic conditions toward lending. Orzechowski (2017) stated that in managing loan portfolios, the bank needs to focus more on profitability. Through the Bank Capital Channel (BCC), it is explained that high-profit banks can increase the ability to accumulate retained earnings. Based on risk-based capital requirements, this can lead to increase lending provided by the bank. VanHoose (2007) stated that a high level of bank profitability makes banks have capital growth by retained earnings and bank have ability to increase loans in future. Bolton & Freixas (2006) also have same opinion. Alencar & Nakane (2006) stated that a bank needs to have very large profits to attract shareholders and depositors to be able to create and maintain bank eligibility.

Banks with good capital can protect loans from interest rate risk and credit risk. Gambacorta & Mistrulli (2004) stated the ease of access to unsecured funding. Banks with low capital experience asymmetrical information problems, so they can't protect loan relationships. Alencar & Nakane (2006) stated that banks with large capital and profit have a competitive advantage which includes: better information asymmetric mitigation, better cost of funds, and faster capital accumulation. The fourth hypotheses of this study are:

H_{3a} : Bank profitability weakens the positive influence of interest rates on commercial loans.

H_{3b} : Bank profitability weakens the negative influence of interest rates on real estate loans.

H_{3c} : Bank profitability weakens the negative influence of interest rates on loan portfolio shifting.

H_{4a} : Bank profitability weakens the positive influence of credit risk in commercial loans.

H_{4b} : Bank profitability weakens the negative influence of credit risk in real estate loans.

H_{4c} : Bank profitability weakens the negative influence of credit risk in loan portfolio shifting.

Methods

We study interest rate and credit risk on the role of bank's loan offering management. We study banks in ASEAN Country. We also add analysis using profitability ratio that capture bank's loan offering management. In this case, profitability strengthens or weakens the model relationship tested. The proportion of commercial and real estate loans use to find out how bank carrying out portfolio management on different type of loan.

We use data that gathered from Osiris Database, such us: credit risk, interest rate, profitability, commercial loan, and real estate loan. We use non-probability sampling technique with several predetermined characteristics for sample selection (Cooper & Schindler, 2003). Characteristics of the sample selection based on the regional ASEAN and availability of the data around 2016 until 2020. The number of banks sample in this study is 72 banks divided by country showed by Table 2 as follow:

Table 2. Distribution of Research Samples in ASEAN Country

Country	Number of Banks
Indonesia	39 banks
Malaysia	10 banks
Singapore	3 banks
Thailand	11 banks
Philippines	9 banks

Source: Osiris Database (2020)

Data needed in this study are commercial loan, real estate loan, NPL, Real Interest Rate, ROA, ROE, and NIM. The indicator used in this study is COMM as presentation of commercial to total loans; REAL as the presentation of real estate to total loans; RECIR as presentation of real estate loans to commercial loans, which is loan portfolio shifting; INTERESTRATE as the real interest rate; NPL as non performing loan which is credit risk; and ROA, ROE, NIM as profitability ratio. This study uses secondary data. The data is the annual banking financial report data accessed from the Osiris Database. While macroeconomic data is interest rate accessed from the Bloomberg Database. Data collection is done by pooling data (cross-section and time series). This study has the characteristics of unbalanced panel data, meaning that the information data held by banks in the sample are not entirely available.

The research model uses Ordinary Least Square (OLS) using pooled data panels. There are three research models: (1) COMM Model: Testing the effect of interest rate and credit risk on commercial loans, (2) REAL Model: Testing the effect of interest rate and credit risk on real estate loans, and (3) RECIR Model: Testing the effect of interest rate and credit risk on loan portfolio shifting. So, the research model formed is as follows:

Model 1:

$$COMM_{i,t} = \alpha + \beta_1 \log_1(RIR)_{i,t} + \beta_2 \log_1(NPL)_{i,t} + \beta_4 AR(\rho^{th}) + \varepsilon_{i,t}$$

Model 2:

$$REAL_{i,t} = \alpha + \beta_1 \log_1(RIR)_{i,t} + \beta_2 \log_1(NPL)_{i,t} + \beta_4 AR(\rho^{th}) + \varepsilon_{i,t}$$

Model 3:

$$RECIR_{i,t} = \alpha + \beta_1 \log_1(RIR)_{i,t} + \beta_2 \log_1(NPL)_{i,t} + \beta_4 AR(\rho^{th}) + \varepsilon_{i,t}$$

Where: COMM = commercial loans, REAL = real estate loans, RECIR = loan portfolio shifting, $\log_1(\text{INTERESTRATE})$ = period lag 1 of

real interest rate (INTERESTRATE), $\log_1(\text{NPL}) =$ period lag 1 of non-performing loan (NPL), $\text{AR} =$

Autoregressive term, $i =$ bank, $t =$ period.

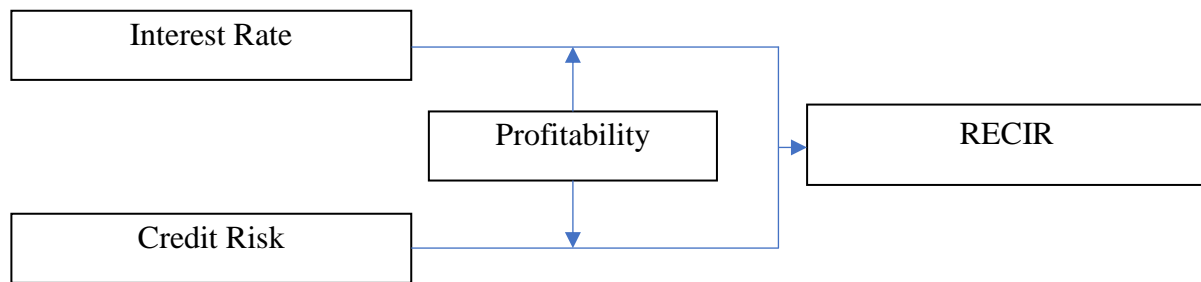


Figure 1. Theoretical Framework

Results

The number of banks sampled in this study is 72 banks divided by country as presented in Table 4.1 as follows:

Table 3 represents the statistics descriptive of the data variables in this study. From these data, it can be seen that the mean of commercial loans is higher than real estate loans for all samples, which are 57,5 percent and 22,1 percent, with 437 and 256

observations. The mean of RECIR for all samples is 74,6 percent with 237 observations. The mean real interest rate (INTERESTRATE) for all samples is 5,22 percent with 504 observations. While the mean of non-performing loans (NPL) for all samples is 3,35 percent with 471 observations. The mean of ROA, ROE, and NIM for all samples are 1,323; 12,146; 4,339 percent with 473, 471, and 473 observations.

Table 3. Descriptive Statistics of All Study Samples

Variables	Obs.	Mean (%)	Std. Dev	Min	Max
Panel A – Dependent Variables					
Commercial Loans	437	57,5	25,6	0,0278	99,75
Real Estate Loans	256	22,1	17,81	0,1706	73,83
RECIR	237	74,6	182,6	0,0348	2507,73
Panel B – Independent Variables					
RIR	504	5,220	2,512	-0,8	9,18
NPL	471	3,35	4,41	0	65,46
Panel C – Moderating Variables					
ROA	473	1,323	1,646	-13,35	5,19
ROE	471	12,146	12,75	-80,94	49,83
NIM	473	4,339	2,11	0,34	13,76

Source: Database Osiris (2020)

This study used profitability ratio such as: ROA, ROE, and NIM to know the effect of interest rate (INTERESTRATE) and credit risk (NPL) on commercial loans (COMM), real estate loans (REAL), and loan portfolio shifting (RECIR) at different levels as moderating variable. So, research samples are divided into two categories, research samples

with profitability below the industry average and research samples with profitability above the industry average. Based on the data obtained, statistics of the proportion of samples in the study are presented in Table 4.

Based on data in Table 4, it presents the proportion of research samples based on the level of profitability. It is greater for banks

that have profitability below the industry average by ROA and ROE ratio for the proxy of profitability. But, when using NIM as a proxy of profitability, the proportion of the research sample is greater for banks that have profitability above the industry average. By using ROA, ROE, and NIM as a proxy, each show that the percentage 43,06; 46,03; and 57,94 percent of banks have profitability below the industry average and 56,94; 53,97; and 42,06 percent of banks have profitability above the industry average.

Table 5 and Table 6 are separate samples based on different levels of profitability. Table 5 for samples that have profitability below the industry average and

Table 6 for samples that have profitability above the industry average.

Table 5 presents the descriptive statistics of the samples with profitability below the industry average. From the data, it can be seen that the mean commercial loans and real estate loans are as large as 64,07 percent and 22,69 percent with the number of each observation being 149 and 85. The mean of RECIR is 99,88 percent with 75 observations. The mean real interest rate (INTERESTRATE) is 6,00 percent with 183 observations. While the mean of non-performing loans (NPL) is 3,47 percent with 163 observations. The mean return on assets (ROA) is 0,29 percent with 165 observations.

Table 4. Proportion of Research Samples

	Frequency	Percentage	Cumulative
Panel A – Return on Assets (ROA) as a Proxy of Profitability			
Below the industry average	2017	43,06 %	43,06 %
Above the industry Average	287	56,94 %	100,00 %
Total	504	100,00 %	
Panel B – Return on Equity (ROE) as a Proxy of Profitability			
Below the industry average	232	46,03 %	46,03 %
Above the industry Average	272	53,97 %	100,00 %
Total	504	100,00 %	
Panel C – Net Interest Margin (NIM) as a Proxy of Profitability			
Below the industry average	292	57,94 %	57,94 %
Above the industry Average	212	42,06 %	100,00 %
Total	504	100,00 %	

Source: Osiris Database (2020)

Table 5. Descriptive Statistics of Research Samples dumROA = 0

Variables	Obs.	Mean (%)	Std. Dev	Min	Max
Panel A – Dependent Variables					
Commercial Loans	149	64,07	25,73	0,032	99,75
Real Estate Loans	85	22,69	16,53	0,170	71,44
RECIR	75	99,88	295,65	0,034	2507,73
Panel B – Independent Variables					
RIR	183	6,00	2,58	-0.8	9,18
NPL	163	3,47	3,40	0,0001	19,58
Panel C – Moderating Variables					
ROA	165	0,29	2,19	-13,35	4,12

Source: Osiris Database (2020)

In the Table 6 shows the descriptive statistics of the samples with profitability above the industry average. From these data, it can be seen that the mean of commercial loans is higher than real estate loans, which are equal to 54,14 percent and 21,95 percent with 234 and 136 observations. The mean RECIR is 65,11 percent with 130 observations. The mean real interest rate (RIR) is 5,25 percent with 249 observations.

In addition of presents descriptive statistics from each measurement, it is necessary to know the correlation value between variables in this study presented in Table 7. Table 7 presents correlation between variables. From these data, it can be seen that real interest rate (INTERESTRATE) has a

significant positive correlation to commercial loans ($r=0,000$; $p<0,05$), real interest rate (INTERESTRATE) has a significant negative correlation to real estate loans ($r=0,011$; $p<0,05$), and real interest rate (INTERESTRATE) has a significant positive correlation to RECIR ($r=0,058$; $p<0,10$). From Table 4.2.5, also can be seen that non-performing loan (NPL) has no significant positive correlation to commercial loans ($r=0,473$; $p>0,10$), non-performing loan (NPL) has a significant negative correlation to real estate loans ($r=0,001$; $p<0,05$), and non-performing loan (NPL) has a negative correlation but not significant to RECIR ($r=0,623$; $p>0,05$).

Table 6. Descriptive Statistics of Research Samples dumROA = 1

Variables	Obs.	Mean (%)	Std. Dev	Min	Max
Panel A – Dependent Variables					
Commercial Loans	234	54,14	25,34	0,027	98,91
Real Estate Loans	136	21,95	18,90	0,214	73,83
RECIR	130	65,11	96,63	0,803	799,23
Panel B – Independent Variables					
RIR	249	5,25	2,26	-0,8	9,18
NPL	249	3,17	4,97	0,006	65,46
Panel C – Moderating Variables					
ROA	249	1,89	0,82	-0,78	5,19

Source: Osiris Database (2020)

The first hypotheses in this study are the effect of interest rates on commercial loans, real estate loans, and RECIR. While the second hypotheses are the effect of credit risk on commercial loans, the effect of credit risk on real estate loans, and the effect of credit risk on RECIR. Table 8 shows the results of testing the first and second hypotheses for three models that have considered the problem of normality test.

Table 8 can be seen the results of testing the first hypotheses. It presents that the real interest rate (INTERESTRATE) in lag 1 has a significant positive effect on commercial loans (t-

statistic= 2,13) and real estate loans (t-statistic=-1,70). Real interest rate (INTERESTRATE) in lag 1 has a significant negative effect on RECIR (t-statistic= -1,76).

Table 4.4.1. also presents the results of testing the second hypothesis. Based on Table 8, can be seen that NPL as the proxy of credit risk has no significant effect on commercial loans (t-statistic= -1,46), real estate loans (t-statistic= -0,24) and RECIR (t-statistic= -0,97).

Table 7. Correlation Test Results between Variables

	Commercial Loans	Real Estate Loans	RECIR	RIR	NPL	ROA
Commercial Loans	1.000					
Real Estate Loans	-0,281*** 0,000	1.000				
RECIR	-0,370*** 0,000	0,239*** 0,000	1.000			
RIR	0,242*** 0,000	-0,158** 0,011	0,123* 0,058	1.000		
NPL	0,0344 0,473	-0,238*** 0,001	-0,078 0,230	0,022 0,623	1.000	
ROA	0,164*** 0,006	0,093 0,135	0,002 0,968	0,164*** 0,003	0,215*** 0,000	1.000 -

Source: Osiris Database (2020)

Table 8. First and Second Hypotheses Testing Results

	Model 1 (Commercial Loans)	Model 2 (Real Estate Loans)	Model 3 (RECIR)
L1(RIR)	0,239** (2,13)	-0,114* (-1,70)	-0,503* (-1,76)
L1(NPL)	-0,128 (-1,46)	-0,005 (-0,24)	-0,088 (-0,97)
AR (1)	1,042*** (15,84)	1,513*** (23,28)	1,728*** (12,64)
AR (2)	-0,0003 (-0,01)	-0,516 (-7,87)	-0,727** (-2,88)
AR (3)	-0,142 (-2,76)	-	-0,191 (-1,64)
AR (4)	0,082*** (2,19)	-	0,180*** (5,77)
Constant	-0,261 (-0,29)	0,925 (2,37)	4,425 (1,84)
Obs.	166	176	94
R-squared	0,9784	0,9904	0,9918

Source: Osiris Database (2020)

The third and fourth hypotheses in this study are the role of profitability on the effect of interest rate and credit risk on commercial loans, real estate loans, and RECIR. Testing the third and fourth hypotheses is done by dividing the sample (split sample) into two groups: samples of the research with profitability (ROA) below the average of the industry and above the average of the industry. Table 9 presents the results of testing the third and fourth hypotheses for three models in this study that have considered the problem of normality test.

Table 9. Third and Fourth Hypotheses Testing Results

	Model 1 (Commercial Loans)		Model 2 (Real Estate Loans)		Model 3 RECIR	
	dROA=0	dROA=1	dROA=0	dROA=1	dROA=0	dROA=1
L1(RIR)	0,113 (0,49)	0,552** (2,59)	0,188 (-1,64)	-0,28 (-0,24)	-0,644** (-2,44)	-0,486 (-1,06)
L1(NPL)	-0,035 (-0,40)	-0,049 (-0,66)	-0,032** (-2,24)	0,072** (2,04)	-0,062 (-0,30)	-0,131 (-0,90)
AR (1)	0,960*** (40,44)	0,617** (2,46)	1,781*** (12,30)	1,340 (6,87)	1,413*** (13,87)	1,969*** (24,08)
AR (2)	-	0,358 (1,39)	0,815*** (-4,96)	-0,274 (-1,06)	-0,174 (-0,89)	-0,796*** (-4,84)
AR (3)	-	-	-	0,051 (-0,62)	-0,348** (-3,82)	-0,268 (-1,27)
AR (4)	-	-	-	-	0,108*** (4,45)	0,065 (0,42)
Constant	2,270 (1,32)	0,973 (-1,05)	1,967 (1,95)	0,017 (0,02)	4,783 (2,92)	4,879 (1,26)
Obs.	135	188	66	81	42	52
R-squared	0,9389	0,9353	0,9911	0,9921	0,9969	0,9905

Source: Osiris Database (2020)

The results of testing the third hypothesis can be seen in Table 9. That is known that real interest rate (INTERESTRATE) in lag 1 has a significant positive effect on commercial loans (t-statistic= 2,59) in the research sample with return on assets (ROA) above industry average and real interest rate (INTERESTRATE) in lag 1 has a significant negative effect on RCIR (t-statistic = -2,44) in the sample with return on assets (ROA) below the industry average. In addition, Table 4.5.2.1 also presents the results of testing the fourth hypothesis that non-performing loan (NPL) in lag 1 has a significant negative effect on real estate loans (t-statistics= -2,24) in the sample with return in assets (ROA) below industry average and a significant positive effect on real estate loans (t-statistic= -2,04) in the sample with ROA above the industry average.

Discussions

The results of the first hypothesis show that the effect of the interest rate on commercial loans is a significant positive, negatively influencing real estate loans and having a significant negative effect on RECIR. This

indicates that the first hypothesis is supported so that interest rate affects the loan portfolio shifting. Providing bank loans tends to shift from real estate loans to commercial loans.

This happens because bank reacts to the interest rate in short-term loans. Commercial loans can more quickly adjust to changes in interest rates. Unlike real estate loans because it is a long-term loan. Haan et al. (2007) stated that the increased interest rate will cause banks to add commercial loans with an additional floating rate. This means that banks can earn higher interest income from loans they provide to companies. As such, banks may be inclined to increase their commercial loan offerings to take an advantage of higher income opportunities. Beside that, banks can have access to more qualitative customers, with better risk profiles. Banks may increase their commercial loan offering to these companies deemed more capable of paying higher interest rate.

The results of testing the second hypothesis indicate that credit risk has no significant effect on commercial loans, real estate

loans, and RECIR. This indicates that hypothesis 2 is not supported so there is no significant effect of credit risk on loan portfolio shifting.

This gives a signal that credit risk is not a determinant that is considered by banks in managing bank loan portfolios. Bank may under pressure to expand their business and increase loan offering and carrying out moral hazard (Abiola & Olausi, 2014). In effort to achieve higher growth, banks may lower their creditworthiness criteria or provide loans with higher level of risk that they otherwise would. This reduction in creditworthiness criteria could mean that banks are more inclined to provide loans to customers who might previously have been perceived as a higher credit risk. This can include companies that have lower credit quality or businesses that are just developing. Some of the factors that can affect the reduction of creditworthiness criteria in the context of bank business expansion in ASEAN can include: market competition, economic growth, business strategy.

The results of testing the third hypothesis show that the effect of interest rate on RECIR is a significant negative if banks have profitability below the industry average and does not show that significant relationship on banks with profitability above the industry average. Although testing hypotheses regarding the role of profitability on the effect of interest rate on commercial loans and real estate loans are not supported, the negative significant effect of interest rate on RECIR disappears on banks with profitability below the industry average. This indicates the role of profitability on the effect of interest rates on loan portfolio shifting.

The results of testing the fourth hypothesis indicate that credit risk has a significant negative effect on real estate loans if banks have profitability below the industry average even though it does not show a significant effect on commercial loans and RECIR. However, a

significant negative effect of interest rate on real interest rate loans reversed and the significance value was reduced for banks with profitability above the industry average. This indicates the role of profitability on the effect of credit risk on bank loans. Banks with profitability below the industry average, tend to reduce real estate loans, but banks with profitability above the industry average can provide loans. So real estate loans are still increasing even though they have large credit risks.

This shows the superiority of banks with certain levels of profitability in response to interest rates and credit risk. Orzechowski (2017) stated that banks with a high level of profitability have an advantage in accumulating profits through Bank Capital Channel (BCC), so they can overcome the problem of asymmetrical information and agency problem, minimizing the cost of capital and maximize the profit.

Robustness Test

A robustness test is conducted to see the consistency of the previous test. In testing the third and fourth hypotheses that have been done by using return on assets (ROA) as a proxy of profitability. Furthermore, this research adds a robustness test by using return on equity (ROE) and net interest margin (NIM) as a proxy of profitability. The test results use ROE as a proxy of profitability in Table 10 and the result using NIM as a proxy of profitability in Table 11. The tests conducted also considered the problem of normality test.

Table 10. Third and Fourth Hypotheses Testing Results with Return on Equity (ROE) as a Proxy

	Model 1 (Commercial Loans)		Model 2 (Real Estate Loans)		Model 3 RECIR	
	dROE=0	dROE=1	dROE=0	dROE=1	dROE=0	dROE=1
L1(RIR)	0,342* (1,70)	0,275 (1,43)	-0,180 (-1,53)	-0,007 (-0,06)	-0,301 (-1,19)	-0,692 (-1,61)
L1(NPL)	0,028 (0,19)	-0,281* (-1,75)	-0,027** (-2,43)	0,062* (1,98)	-0,739 (-0,40)	-0,165 (-1,35)
AR (1)	1,021*** (13,54)	1,036*** (6,70)	1,829*** (14,46)	1,334*** (7,64)	1,431*** (11,64)	1,982*** (24,17)
AR (2)	0,009 (0,14)	0,068 (0,25)	0,870*** (-5,93)	-0,248 (-1,04)	-0,124 (-0,57)	-
AR (3)	-0,057 (-1,11)	-0,184 (-0,34)	-	-0,075 (-0,82)	0,379*** (-4,28)	0,768*** (-4,65)
AR (4)	-	0,020 (0,03)	-	-	0,103*** (3,88)	-0,242 (-1,15)
AR (5)	-	0,062 (0,18)	-	-	-	-
Constant	-0,950 (-0,57)	-0,988 (-0,68)	1,774* (1,74)	0,122 (0,17)	2,090 (1,11)	6,126* (1,79)
Obs.	103	50	59	88	38	56
R-squared	0,9684	0,9851	0,9915	0,9914	0,9953	0,9920

Source: Osiris Database (2020)

Robustness test results of the third hypothesis can be seen in Table 10, it is known that real interest rate (INTERESTRATE) in lag 1 has a significant positive effect on commercial loans (t-statistic= 1,70) in the research samples with return on equity (ROE) below the industry average. Table 10 also shows the robustness test results of the fourth hypothesis that non-performing loan (NPL) in lag 1 has a significant negative effect on commercial loans (t-statistic= -1,75) in the research samples with return on equity (ROE) above the industry average. NPL as the proxy of credit risk has a significant negative effect on real estate loans (t-statistic= -2,43) in samples with return on equity (ROE) below the industry average and a significantly positive effect on real estate loans (t-statistics= 1,98) in samples with return on equity (ROE) above the industry average.

Robustness test results of the third hypothesis can be seen in Table 11. It is known that the real interest rate (INTERESTRATE) in lag 1 has a significant positive effect on

commercial loans (t-statistic= 3,16) in samples with net interest margin (NIM) above the industry average.

Table 11. Third and Fourth Hypotheses Testing Results with Net Interest Margin (NIM) as a Proxy

	Model 1 (Commercial Loans)		Model 2 (Real Estate Loans)		Model 3 RECIR	
	dNIM=0	dNIM=1	dNIM=0	dNIM=1	dNIM=0	dNIM=1
L1(RIR)	-0,099 (-0,29)	0,617** (3,16)	-0,048 (-0,55)	-0,159 (-1,14)	-0,622 (-1,40)	-1,187** (-2,63)
L1(NPL)	-0,023 (-0,49)	-0,038 (-0,22)	-0,002 (-0,21)	0,216 (0,98)	-0,119 (-1,26)	1,123 (1,28)
AR (1)	0,678*** (3,34)	1,146*** (11,68)	1,433*** (19,64)	1,619*** (5,04)	1,819*** (23,76)	1,528*** (3,87)
AR (2)	0,279 (1,41)	-0,0898 (-0,68)	0,427*** (-5,66)	-0,476 (-0,95)	0,966*** (-7,01)	0,196 (0,32)
AR (3)	-	-0,061 (-0,96)	-	-0,121 (-0,43)	0,149 (1,49)	-0,919** (-2,30)
AR (4)	-	-	-	-	-0,016 (-0,27)	0,186 (1,63)
Constant	2,146* (1,82)	0,793** (-2,39)	0,533 (0,97)	0,162 (0,14)	5,063 (1,56)	4,407 (0,89)
Obs.	165	165	145	23	78	16
R-squared	0,951	0,951	0,990	0,998	0,987	0,999

Source: Osiris Database (2020)

Conclusions

This study provides several result conclusions, as follows: the interest rate is one of considerations of banks for offering the loan but not evidence in credit risk and profitability strengthens the model relationship tested. Associated with interest rate, the effect on commercial loans remains positive, but on real estate loans remains negative. It also indicates on loan portfolio shifting. Associated with credit risk, the effect on commercial loans, real estate loans and loan portfolio shifting remains not significant.

In the role of profitability model show that the effect of interest rate on loan portfolio shifting is weakens. So, the effect of interest rate on loan portfolio shifting on banks with the level of profitability below in the industry average is higher. Then, that the effect of credit risk on loan portfolio shifting is strengthens. So, the effect of credit risk on loan portfolio shifting on banks with the level of profitability above in the industry average is higher.

This study contributes to the effect of interest rate and credit risk on commercial loans,

real estate loans, and loan portfolio shifting in banks with different levels of profitability. Credit risk shows an insignificant effect on loan portfolio shifting. Last year's NPL does not make banks reluctant to shift their loan portfolio.

This indicates that credit risk is not a major determinant of loan portfolio shifting that considered by banks in managing loan portfolios. Based on the results of this study, external factors are better able to explain bank portfolio management compared to external factors.

This study attempts to complement previous studies to confirm the effect of interest rate and credit risk on commercial loans, real estate loans, and loan portfolio shifting. However, this study still contains several limitations. This research needs to divide the sample into two groups based on the level of profitability. However, the samples are not too large cause the number of observations is small. It is due to the availability of data. Future researchers need to add a long period of research. This study does not confirm the effect of credit risk on commercial loans, real estate loans, and loan portfolio shifting. This study uses NPL as a proxy for credit risk. Future research may be able

to add another credit risk proxy. No confirmation of credit risk can also be caused by an endogenous

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