THE DETERMINANTS OF CREDIT RISK IN FIVE SELECTED SOUTHEAST ASIAN COUNTRIES

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the research project.

(4) The word count of this research report is ___11164___ .

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Lastly, a great applause would be given to our entire group members in contributing their ideas, time and effort in completing our final project.

DEDICATION

First of all, we would like to dedicate this research paper to our final year project supervisor, Mr. Tan Kock Lim because he has provided us guidance and help during the project period.

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PREFACE

After the economic crisis, the global economy was suffered and many sectors be affected and weakened rapidly. This economic crisis had a direct impact on the banking sector which can be seen through the increase in number of bankruptcies of banks. The greatest risks posted to banks by the slowdown of economic growth take the form of credit risk. The failure of banks have drew the intention of conducting this research in order to have a clear understanding on the effect of macroeconomics variables that will affect the credit risk.

Banks in a country plays an important role in determine the performance of economic for a country. Banking efficiency also is important to maintain the stability of the financial markets by channel funds effectively to economically viable activities in a country. The factors that affect the banks' performance have become crucial for banks' success. For this reason, this research is concerned on the finding out the factors that affect credit risk of banks facing in five selected Southeast Asian countries which are Malaysia, Thailand, Singapore, Philippines and Indonesia.

There are definitely a lot of hardships that we had passed through during the progress, but it make us feel worthwhile when we realized that we had learned something new and gain extra mile of knowledge. With no doubt, this kind of extra knowledge will help us in our future career life.

ABSTRACT

The determinants of efficiency of banks in five selected of Southeast Asian countries which consist Malaysia, Thailand, Singapore, Philippines and Indonesia are discussed in this research. There are four macroeconomic variables have been studied to investigate their impacts on credit risk which are real interest rate, inflation rate, exchange rate and money supply (M2). The period of this research has cover from 1999 to 2014 which about 16 years. This study is expected to help improve the institutional, regulatory and supervisory framework of financial institutions in the region by identifying factors that could contribute to their efficiency.

The purpose of this study is to examine the determinants that influence the credit risk in five selected Southeast Asian countries over the 1999 until 2014 periods. The Likelihood Ratio and Hausman Test have been used to test for the Fixed Effects Model (FEM) and Random Effects Model (REM). The results show that all the independent variables in this study contribute significant relationship with the non-performing loans. Furthermore, this research also find out the real interest rate, inflation rate and money supply (M2) have a positive relationship with non-performing loans, whereas exchange rate has a negative relationship with non-performing loans.

CHAPTER 1: INTRODUCTION

1.0 Overview

The aim of conducting this research is to investigate the determinants of credit risk in the five selected Southeast Asian countries which are Malaysia, Thailand, Singapore, Philippines and Indonesia. The four macroeconomic variables (real interest rate, inflation rate, exchange rate and money supply (M2) have been chosen and their impacts on credit risk will be studied. In this research, non-performing loan will be used to represent the data for credit risk. The main ideas of the research which include the research background, problem statement, research objectives, and research question will be enlightened in Chapter 1. Besides, the hypothesis and significance of the research, and chapter layout will also be presented in this chapter.

1.1 Research Background

The global economy from the past had experienced some economic crisis which was when US investment bank Lehman Brothers collapsed in September 2008. A lot of the market players withdrew at the same time from the financial system which cause the credit dried up immediately and finally the world trade collapsed. This crisis affected almost every part of the globalized world because the economic is closely interdependent to each other countries. The global trade was slowing down and cause economic tardy after the financial crisis (Helmut, 2010).

The situation of the economy will bring effect to the banking and financial systems. Bank performance of a country able to reflect how well did a country manage on their country economic. For example, it can be seen in Iceland which most of the major banks were declared bankruptcy due to the financial crisis in October 2008. The Iceland's country economic fall sharply with a 15% of GDP in the particular year (Spruk, 2010). Furthermore, Wall Street had implemented the bank bailouts due to the meltdown of financial market after the economic crisis. However, this action becomes the record of the highest transfer of money wealth and also creating a huge amount of public debt at the same time.

After the economic crisis, a downfall in expenditures on necessary consumer of goods and services resulting from the collapse of employment and disrupted in wages payment. The economic downturns cause the unemployment in countries to increase and reduce the cash in hands of households and consumers. Weakening economy leads to the depreciation of currency and lower down the borrower's repayment ability. A lot of people unable to pay back their loans cause the rising of the non-performing loans. According to IMF (2013), the non-performing loans have been widely increased in Europe countries and banks due to the outbreak of economic crisis in year 2008. A decline in consumer spending will bring negative effect to the entire structure of international commodity trade.

Non-performing loan is the amount of loan that is borrowed but unable to be pay back by debtor at least 90 days after being in default. A high rate of non-performing loan in a bank will bring negative effect to the bank performance by reducing the liquidity of bank. The non-performing loan is considered as the illiquidity assets for bank which do not generate income for bank. The illiquidity assets are known as the main cause that conducts to bank panic (Calomiris and Gorton, 1991). When the bank panic is incurred, depositors will try to withdraw all of their deposits from bank immediately and it cause liquidity problem to bank. If the bank is unable to endure the large amount of withdrawal, then the bank will face the probabilities of bank bankruptcy. Hence, it is important for a bank to measure the non-performing loan in order to take action earlier and prevent any uncertainty happen.

By measuring the non-performing loan ratio, bank is able to determine for the current market situation and evaluate a better decision to resolve the crisis. A higher ratio of non-performing loan represents the difficulty of banks in collecting interest and principal on their credit loans. High non-performing loan ratio will give high pressure to the bank in their financial statement and continues to move opposite with economy recovery. If the situation is no getting improves, then it will not only lower down the profits for the bank but also may lead to the bank closure. From the balance sheet and financial statement of bank, it has stated out the percentage of bad debt among total loans which the bank lend out. Besides that, there are many different determinants that may affect the non-performing loan ratio which also need to be study. The determinants can be differentiating into two types of factors which are external factors and internal factors. External factors are those factors that will affect the whole economic and global market such as unemployment rate, interest rate, and inflation rate. However, internal factors are more specifically focus on particular country or commercial banks such as lending rate and bank size.

Graph 1.1: Rate of Non-Performing Loans in Malaysia
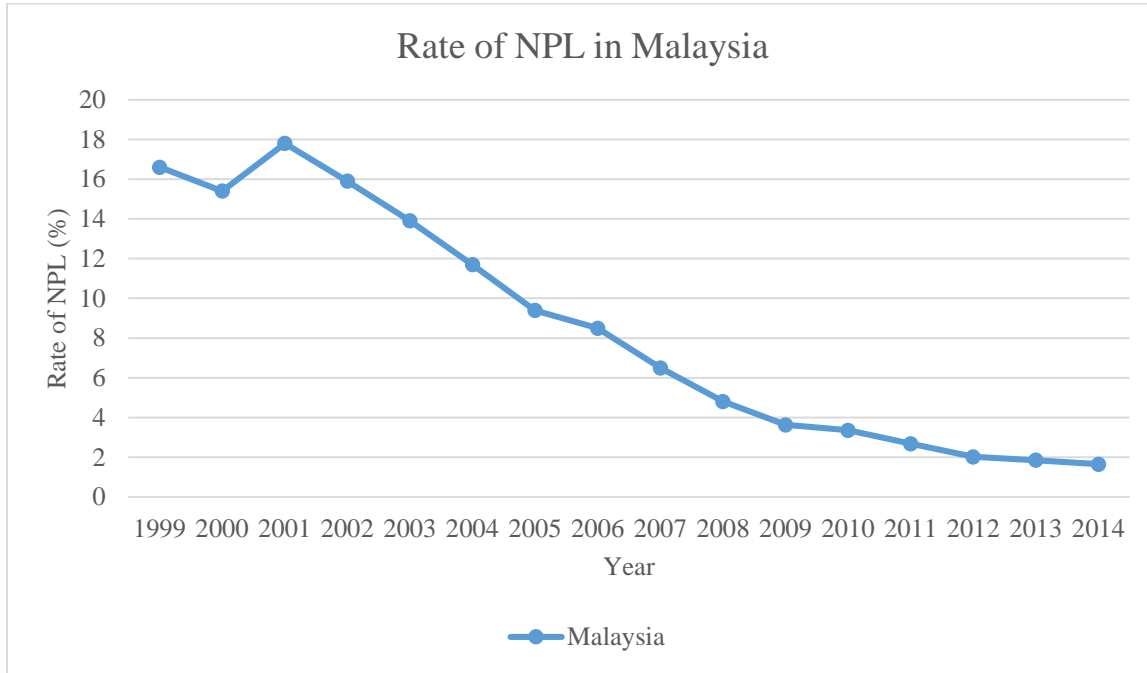
Rate of NPL in Malaysia

The graph above shows the rate of non-performing loans in Malaysia during the period from year 1999-2014. The average value during this period is 8.48% with a maximum of 17.8% in 2001 and minimum of 1.64% in 2014. The rate of non-performing loan in year 1999 is at 16.6% and experience a drop of 1.2% in the following years. In year 2001, it reaches to the highest rate of non-performing loan for these 16 years which is at 17.8%. Although it increased again in 2001, but it continuously decrease in the following 13 years as a result of bank restructuring (Inoguchi, 2012). This improvements in the quality of portfolio financing is mainly brought about by the strengthened of underwriting standards and better practices of credit risk management. As stated in Karim, Chan and Hassan (2010), the reduction in non-performing loans are mostly due to the transfer of non-performing loans from banks to public asset management companies.

Graph 1.2: Rate of Non-Performing Loans in Thailand

Source: World Bank

From graph 1.2 as stated above, it is obviously to know that the rate of non-performing loans achieve highest in the year of 1999 which is about 38.6% due to the Asian financial crisis in 1997. It is experience a dramatic drop of 20.9% in the next year and follow by a continue reduction to 11.5% in year 2001. This is because of the bankruptcy courts start to function at the end of 1999 and success to reorganized 553 large cases which worth US$23 billion (Asami, 2000). However, the rate of non-performing loans in year 2002 is not following the trend to decrease but adversely it increase to 16.5%. In the following 12 years, Thailand has experience a continuous decline in the rate of non-performing loans from year 2003 until year 2014. This is because of the economic growth and price of real estate in Thailand have increased further since 2003 (Inoguchi, 2012).

Graph 1.3: Rate of Non-Performing Loans in Philippines

Source: World Bank

The graph 1.3 above shows the rate of non-performing loans in Philippines during the period from year 1999-2014. Started from year 1999, the rate of non-performing loans in Philippines was continuously increased for two years and reach highest at 27.7% in year 2001. There is a dramatically fall in the following year which about 13.1% reduction from 27.7%. This changes is influenced by the World Bank Financial Sector Assessment Program (FSAP) took place in year 2002 which enable Philippines to assess the stability and remedy weaknesses in their financial sector structure (International Monetary Fund, 2010). From year 2003 to year 2014, the rate of non-performing loans in Philippines is reduce from years to years. Gochoco-Bautista (n.d.) had stated that Bangko Sentral ng Pilipinas (BSP), the central bank of Philippines has extremely encouraged merges and consolidation within the banking sector through increases in the minimum capital requirements.

Graph 1.4: Rate of Non-Performing Loans in Singapore
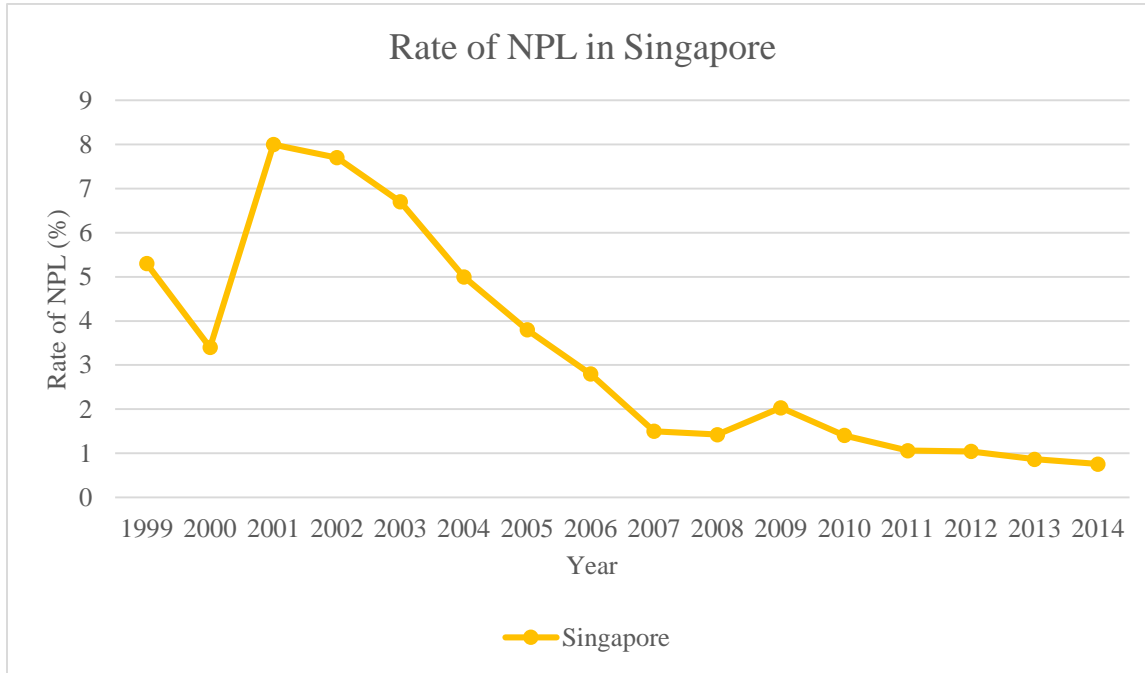
In Singapore, there is about 5.3% of non-performing loans in year 1999 and follow by a 1.9% decrease in the next year. However, the rate of non-performing loans in year 2001 is suddenly boosting up to 8% which is the highest within these 16 years. This has affected the growth and innovation in Singapore. It is restricted by those banks whose capital has been eroded by the non-performing loans (Karim, et. al., 2010). After year 2001, the rate of non-performing loans starts to decrease and maintain at a reasonable rate which is 2.7% on average of the 13 years.

Graph 1.5: Rate of Non-Performing Loans in Indonesia

As shown in the graph 1.5, the rate of non-performing loans in Indonesia is at 32.9% in year 1999. The average value during this period of year 1999-2014 is 10.5% with a maximum of 34.4% in year 2000 and minimum of 1.6% in year 2013. According to Tadahiro Asami (2000), some of the non-performing loans in Indonesia are resulted from business practices based on bribery, connections, and lenient credit screening by banks. Indonesia has experience four years of downward trend from year 2001 until year 2004. Started from year 2006 until year 2014, the rate of non-performing loans in Indonesia is under control and maintain on an average of 2.9% throughout the years.

Graph 1.6: Rate of Non-Performing Loans in Five Selected Southeast Asian Countries
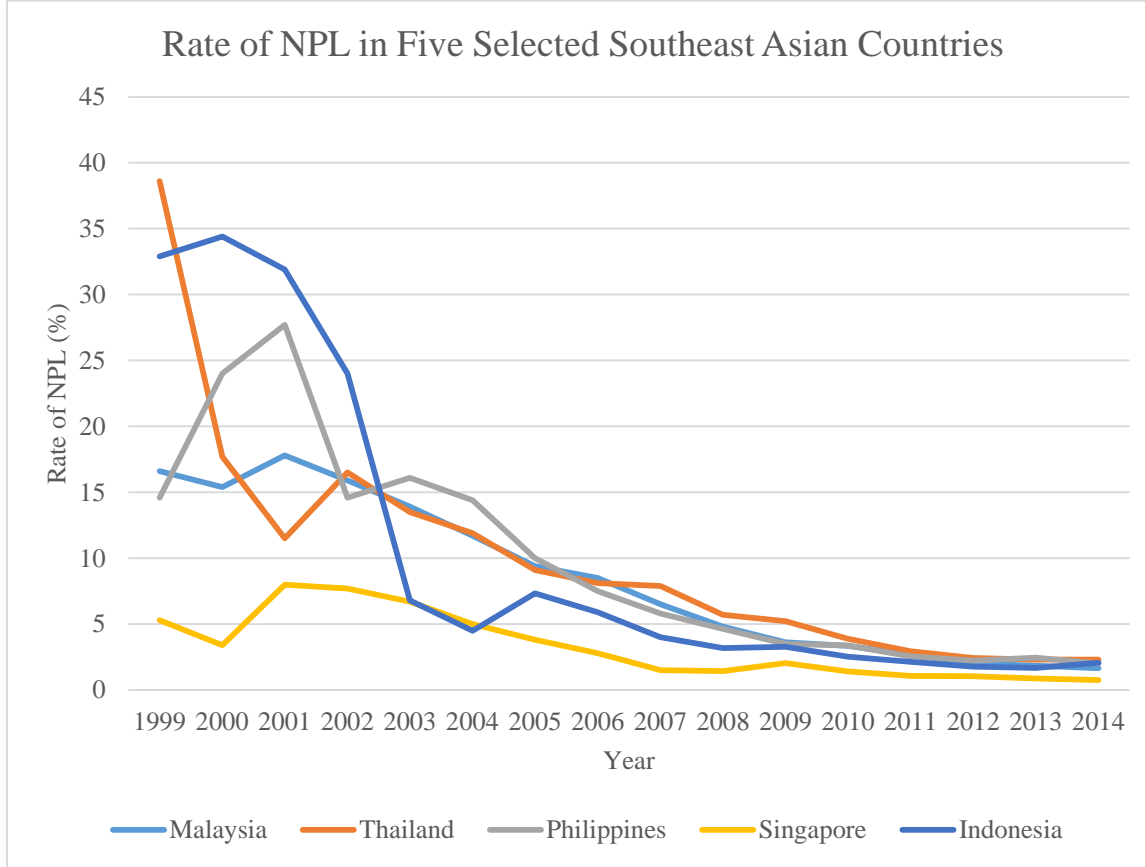
Source: World Bank

From the overall, the rate of non-performing loans for these five selected Southeast Asian countries is high for the first four years. Inoguchi (2012) had stated that some Southeast Asian countries have experienced a large increase in the rate of non-performing loans which wreaked destruction on the banking system after the Asian financial crisis in 1997. After that, the governments of the Southeast Asian countries have contributed to the reduction in rate of non-performing loans by consolidating and restructuring their domestic banks (Inoguchi, 2012). The effort that be made by the countries has successful and effectively in lower down the rate of non-performing loans in following years. It is obvious that the overall rate of non-performing loans is

started to decrease in year 2003 and become stable for last four years. Rebuilt of banking systems have successfully improved the macroeconomic conditions and reduce the rate of non-performing loans in most Southeast Asian countries (Inoguchi, 2012).

Besides, the graph is obviously shown that the rate of non-performing loans in Singapore is the lowest and stable throughout the years compare among the five selected Southeast Asian countries. This is because Singapore indicated a higher average cost efficiency score in commercial banks (Karim, et. al., 2010). From year 1999 until year 2001, Indonesia has the highest rate of non-performing loans among others countries. This is same as the result of Asami (2000) which stated that Indonesia is the most seriously affected by the Asian financial crisis and many of its banks became insolvent at that time.

This research is study about the determinants of non-performing loan in five selected Southeast Asian countries over 16 years. The main reason of conduct this research is to identify the different macroeconomic factors with non-performing loan in the selected countries. The other countries in Southeast Asian are not be selected due to the incomplete data within the 16 years. Different factors will cause different result to a country's non-performing loan. Therefore, there are five determinants of bank non-performing loan have been selected to be study in this research. The research is investigated based on five selected countries in Southeast Asian during the period of 1999 to 2014.

1.2 Problem Statement

Credit risk refers to the probability of loss due to a debtor's default or failure to make payments on debts; it is also called default risk. While non-performing loan is the major factor that create credit risk for the banks. Every bank in this world will face this kind of risk. In recent times, the

non-performing loans in Indonesia, Malaysia, South Korea, and Thailand have rose to 30 percent and above of total assets after the Asian financial crisis (Herring, 1999).Thus, it can be says that serious credit risk may cause a large number of bank failures and bank in distress.

Southeast Asian countries have facing credit risk in their banking industry. One of the determinants that cause them have credit risk is Global Financial Crises (GFC). This has pulled down the demand for exports of the Southeast Asian countries. But GFC was not the major determinant that affects credit risk. The second round effect of the GFC is the global impact of the US policy response. Thus, South Asia countries experienced dissimilar impacts of the GFC. Beside these, there is still existing of some other macroeconomic factors that will affect credit risk in Southeast Asian countries. According to Gulati and Kumar (2016), it has been noted that the banking crisis of the recent decades have been inseparably linked with macroeconomic crises.

Other than that, among several risk in a bank, credit risk is the risk that mainly depends on the bank asset quality and it is the primary causes to cause bank failure. But, macroeconomic factor plays a significant role on this credit risk; it may affect the stability of banking system and to quantify their influence. Hence, it is a must to examine the drivers of credit risk, especially macroeconomic factors. Most of the studies have put their attention on this non-performing loan issue. They have concluded that the macroeconomic situation is the most important cause in the factor of the credit risk (Castro, 2013). For instance, inflation is one of the macroeconomic factors, it affects the capacity of borrower's debt financing through different channel and it gives impacts on non- performing loan, either negative or positive. A higher inflation will reduce the real value of outstanding loan or just because it associated with low unemployment, so a high inflation can make debt servicing more easily, vice versa.

This research is focusing on the macroeconomic factors. Therefore, this research is to examine the macroeconomic factors of credit risk for the five selected Southeast Asian countries which are Malaysia, Thailand, Philippines, Singapore and Indonesia over 1999- 2014 period.

1.3 Research Objectives

1.3.1 General Objective

The main objective of this research is to examine the determinants that influence the credit risk in the five selected Southeast Asian countries over the 1999-2014 periods. In this research, non-performing loan is used to measure credit risk and the determinants selected are included real interest rate, inflation rate, exchange rate and money supply (M2). Thus, the significance, impacts and relationships between the selected determinants and credit risk will be investigated.

1.3.2 Specific Objective

- To determine the significance of real interest rate towards credit risk.
- To determine the significance of inflation rate towards credit risk.
- To determine the significance of exchange rate towards credit risk.
- To determine the significance of money supply (M2) towards credit risk.

1.4 Research Question

- Is real interest rate affecting the credit risk in selected Southeast Asian countries?

- Is inflation rate affecting the credit risk in selected Southeast Asian countries?

- Is exchange rate affecting the credit risk in selected Southeast Asian countries?

- Is money supply (M2) affecting the credit risk in selected Southeast Asian countries?

- Can the non-performing loan of bank be explained by real interest rate, inflation rate, exchange rate and money supply (M2)?

1.5 Hypothesis of the Study

In this research, non-performing loan (NPL) will be the dependent variable because it reflected the credit risk condition of a country. There are four independent variables, which are real interest rate, inflation rate, exchange rate, and money supply (M2) will be included in this research in order to examine the relationship of non-performing loans with each independent variable in the five selected Southeast Asian countries. The hypothesis and definition of each independent variable are stated as below:

1.5.1 Real Interest Rate

Real interest rate is the nominal interest rate adjusted for the effects of inflation. Non-performing loan tends to be increased when there is a rise in interest rate. This will happen because the high interest rate may cause the bank borrowers to face the cash flow problems, they have difficulty to repay their loan and thus forcing them to default their loan repayments and the credit risk will increase simultaneously (Ahmad and Ariff, 2007).

The hypothesis for real interest rate is:

H_0: Real interest rate does not have significant effect on non-performing loan in the five selected Southeast Asian countries.

H_1: Real interest rate has significant effect on non-performing loan in the five selected Southeast Asian countries.

1.5.2 Inflation Rate

Inflation rate refers to the changing prices of goods and services over time. A rise in inflation rate will negatively affect the efficiency of the banking sector (Bucur and Dragomirescu, 2014). Whereas, according to Castro (2013), the relationship between inflation rate and credit risk can be positive because the higher inflation can decrease the ability of borrower to service debt by reducing the real income.

The hypothesis for inflation rate is:

H_0: Inflation rate does not have significant effect on non-performing loan in the five selected Southeast Asian countries.

H_1: Inflation rate has significant effect on non-performing loan in the five selected Southeast Asian countries.

1.5.3 Exchange Rate

Exchange rate is the value of currency of one country expressed in another country's currency. According to Chaibi and Ftiti (2013), an appreciation in local currency will cause the price for local goods and services to become more expensive, but the capacity of those who borrow in

foreign currency to service debt will be increased as well. Thus, the relationship between exchange rate and non-performing loan can be either positive sign or negative sign.

The hypothesis for exchange rate is stated as below:

H_0: Exchange rate does not have significant effect on non-performing loan in the five selected Southeast Asian countries.

H_1: Exchange rate has significant effect on non-performing loan in the five selected Southeast Asian countries.

1.5.4 Money Supply – M2

Money supply, M2, is a measure of money stock which consists of M1 money (currency, checking account balances and travellers' checks), and savings deposits, time deposits and money market mutual funds. According to Yurdakul (2014), large increases in the ratio of M2 money supply to international reserves will cause a greater amount of non-performing loan, resulting the credit risk to be increased as well.

The hypothesis for money supply, M2, is:

H_0: Money supply, M2, does not have significant effect on non-performing loan in the five selected Southeast Asian countries.

H_1: Money supply, M2, has significant effect on non-performing loan in the five selected Southeast Asian countries.

1.6 Significance of the Study

The significance of the study is to provide empirical evidence on which macroeconomic variables that can affect the credit risk in the five selected Southeast Asian countries. In other words, this research will provide a better insight for other researchers on what are the variables that will affect the credit risk. In fact this will help other researchers to use this research as a reference for future research. Besides, this research will aid bank in avoiding the problem of credit risk in future. Furthermore, this will be a guideline to the investors on when and why to invest.

1.7 Page Layout

This research paper had classified into 5 chapters. The layout of the study is as follows:

1.7.1 Chapter 1

This is an introductory chapter that shows the overview of the study with research background, problem statement, research question and objective, the hypothesis will be tested and the significance of the study.

1.7.2 Chapter 2

This chapter depicts about the literature review which has been done by the past researchers about the macroeconomic factors that influence the non-performing loan in five selected

Southeast Asian countries. This chapter also provides the theoretical framework to determine the relationship between variables.

1.7.3 Chapter 3

This chapter explains the methodology that used in the research. It includes the data collection method which is the secondary data, the sampling design, the research instrument used, data processing and analysis of the whole research.

1.7.4 Chapter 4

This chapter shows the findings and results of the research. This research includes the discussion and analysis of major finding about the impact of macroeconomic variables on non-performing loan in five selected Southeast Asian countries.

1.7.5 Chapter 5

This is the last chapter that will comprise the summary of the discussion and analysis of the major finding. Moreover, it also includes the limitations and recommendations on this research for future research.

1.8 Conclusion

In chapter 1, the main idea and purpose of this research is evidently presented and defined, which is to investigate the determinants of credit risk in five selected Southeast Asian countries starting from 1999-2014. The research background, problem statement, research objectives, research questions, hypothesis of the study, significance of the study and chapter layout has been making known to throughout this chapter. In the next chapter, literature review will be presented as well as the results of the overall chapter will be concluded in the following chapter.

CHAPTER 2: LITERATURE REVIEW

2.0 Overview

This part will review the relevant literature of both dependent and independent variables that being examined in this research topic. The dependent variable of this research is non-performing loan while the independent variables are real interest rate, inflation rate, exchange rate and money supply (M2).

2.1 Literature Review for Variables

2.1.1 Non-performing loans

Normally the prime source of commercial banks' earnings is the interest from their lending to customers. It is expected that the loans will be recovered on time with their interest; however the whole process of money cycle is not running smoothly. The customers who supposed to pay back their loan are unable to do so. In the case where when the loan is not performing well, we will define it as non-performing loans.

Non-performing loans means the banks do not receive interest or instalment payments as expected from the financial assets. They are known as non-performing because the loan fails to make income for the bank (Adhikary, n.d.). Meanwhile, as claimed by Idris and Nayan (2016), when non-performing loans have been left unpaid for at least over 90 days, it is considered as impaired loans. According to Woo (2000), non-performing loans will expand the severity of financial crisis and affect macro-economic management. In other words, the confidence of investors in the banking system and the allocation process will be disrupted when there is an increase in non-performing loans (Adhikary, n.d.).

According to Idris and Nayan (2016), the significant participants of financial markets in an external business environment are the banks. Banks have the responsibility to take deposit from deposit customers and make loans to their borrowing customers for consumption or investment purposes. Idris and Nayan claimed that the external business environment factors such as macroeconomic, political and environmental variables will influence the banking activities in form of deposit taking and loans creations. In other words, the non-performing loans positions of banks and other lending financial institutions will be affected by these external business environment factors. Generally, the fact that macroeconomic conditions will affect credit risk has been confirmed by the researches adopted in developed countries (Ekanayake and Azeez, 2015).

The growth in Southeast Asian countries is affected by banks whose capital has been eroded by the aggregation of non-performing loans due to the Asian financial crisis. (Karim, Chan and Hassan, 2010) and (Messai and Jouini, 2013) also considered that the main issues in the banking system and financial crises in developed economies were non-performing loans. They believed that the bank failure generally resulted from huge amount of impaired loans in the banking system will cause the problems of economic stagnation.

Besides that, Cucinelli (2015) found that before the financial crisis, banks had a higher risk appetite and were willing to lend at more risk. Due to financial crisis, banks tend to decrease their risk taking and lending behaviour as non-performing loans started to increase speedily.

Meanwhile, the financial distress of the firms and households during recession will also increase the non-performing loans. So, we can conclude that when the economy is growing, companies tend to demand more loans and are easier to pay off their debts. On the other hand, firms show trouble in repaying debts when the economy slow down.

In order to analyse further on the effect of non-performing loans to economic problem, another deeper study would be needed. This is the major reason why the research topic has been carried out. By investigating the relationship between non-performing loan and macroeconomic variables, we can determine whether a rise in each independent variable will bring a positive or negative effect to non-performing loans.

2.1.2 Real Interest Rate

Real interest rate is the rate of interest that excluded the effect of inflation. Based on the concept of Fisher Effect, real interest rate equals the difference between nominal interest rate and the expected rate of inflation. Hence, if the inflation rate increases, the real interest rate will increase as well, unless the percentage that increased in nominal interest rate is same as the inflation rate. Real interest rate is one of the important indicators to banking sector because the changes in interest rate may affect the purchasing power of individual.

According to Bohachova (2008), increase in market interest rate will increase the return of bank directly, nevertheless it also will cause the credit risk to be increased critically. High interest rate will be an obstacle for borrowers to repay their loan, so that it may make the risk composition of loan applicants to shift toward the bad risks. Besides that, excessive increase in interest rate will become one of the main indicators of financial crisis which will particularly affect the banking sector, causing the amount of non-performing loans increased and the credit risk will be risen simultaneously (Yurdakul, 2014).

In addition, based on the research done by Chaibi and Ftiti (2014), it shows that the relationship between interest rate and non-performing loan is positive. This is because the borrowers' debt burden will be increased when there is a rise in interest rate, and hence weakens the debt servicing capacity of borrowers, resulting to a higher rate of non-performing loan and end up with an increase in credit risk as well.

Furthermore, according to Bucur and Dragomirescu (2014), it states that real interest rate will affect the debt burden of borrowers, which means an increase in interest rate will cause the non-performing loan ratio to be higher. Thus, the effect of real interest rate on the credit risk is positive. Moreover, Castro (2013) also found that the relationship of real interest rate with non-performing loan is positive by referring to the result in case of Portugal, Italy, Ireland, Greece and Spain.

This finding is consistent with Messai and Jouini (2013) who claim that when banks offer loans with high interest rates are expected to obtain higher levels of impaired loans. This author also provides an example by using 80 banks in Golf Cooperation Council (GCC) countries as an example and the years involved are from 1995 until 2008, as an evidence to support this finding. The result shows the ratio of non-performing loan increases when economic growth becomes lower, while the interest risk and risk aversion are increased.

In sum, most of the researchers also found that there is a positive relationship between real interest rate and non-performing loan. This relationship can be explained as the borrowers' ability to meet their obligations will be reduced when interest rate is increased (Messai and Jouini, 2013).

2.1.3 Inflation Rate

What is inflation? Inflation is a kind of rate that measures the basic level of prices for goods and services which increasing and, thus, causing the purchasing power of currency to be lower in a particular country. In other words, inflation indicates that it is the changes in percentage in the value of Wholesale Price Index (WPI) on twelve month basis. So in order to control the stability of economy, Central Bank of that country will attempt to limit inflation, but also to avoid deflation happen in their country.

Inflation is one of the factors that consider as macroeconomic factor. According to Espinoza and Prasad (2010), the recent crisis has emphasis on the importance of relationship between the macroeconomic conditions and the health of the banking system. This is because some of the banks that have higher level of non-performing loan will more sensitive to the macroeconomic shocks. Based on some researches, they found that there is a significant positive relationship between inflation and non-performing loans. Especially, the final results have proof that the non-performing loans level tends to increase when there is a high inflation, exchange rate decline, and an increase of unemployment (Klein, 2013).

In addition, Greenidge and Grosvenor (2010) also have a similar finding in the case of forecasting non-performing loans in Barbados. This is due to a high inflation will increase the rate of interest. This happen will give impacts to the borrowers in bank as they have to pay a higher interest rate for their borrowings. Hence, there will be an upturn in the level of non-performing loan.

However, few numbers of researchers have proof that the relationship between non-performing loan and inflation is negative. According to Vatansever and Hepsen (2013), they found that the non-performing loan ratio will goes up when the nominal interest rates is increase and number of bankruptcies is growing. Nevertheless, higher CPI inflation, economic growth, and property price inflation will cause non-performing loan ratio to goes down.

In conclusion, most of the researchers have specifies that there is a significant positive relationship between inflation and non-performing loan. Yet, few of the researchers have concluded that there is a negative relationship between non-performing loan and inflation.

2.1.4 Exchange Rates

Exchange rate is usually represent the price of one currency (home currency) expressed in terms of another currency (foreign currency). If the value of home currency decreases in terms of a foreign currency, the home currency is depreciated. On the other hand, if the value of home currency increases in terms of a foreign currency, the home currency is appreciated. Beck, Jakubik and Piloiu (2013) stated that exchange rate is one of the variables that significantly affect the non-performing loan (NPL) ratios. The depreciation in home currency will lead to a decrease in non-performing loan. This is because when the home currency decreases, the foreign demands for the country's products and services will increase which cause the export volumes to increase.

On the other hand, Chaibi and Ftiti (2014) stated that the relationship between the exchange rate and non-performing loan may be either positive or negative. This is consistent with the study of Nkusu (2011) who also stated that the changes in the exchange rate can cause mixed implications. First of all, an increase in home currency's value will decrease the competitive advantages of

firms that carry out international trading activities. This is because the price of local products will increase and relatively more expensive when the home currency is appreciated. Consequently, these firms face difficulties in servicing their debts. These statements show that there is a positive relationship between exchange rate and non-performing loan.

In contrast, when the home currency appreciated, it will pull down the number of non-performing loan as the borrowers who borrow in foreign currency are able to service their debts. The debt servicing capacity of borrowers is improved. Currency appreciation causes downturn in the debt servicing costs on local currency terms for borrowers with loans denominated in foreign currency (Beck, Jakubik and Piloiu (2013). However, the demand for loans will increase when the home currency is depreciated in order for the borrowers to support their additional expenditure (Bucur and Dragomirescu, 2014; Ngerebo, 2011). These show that there is a negative relationship between exchange rate and non-performing loan.

In conclusion, exchange rate is found to significantly affect the credit risk and the impacts depend on the situations as the fluctuation of the exchange rate could positively and negatively affect the credit risk. In this research, the relationship among exchange rate and other variables with the credit risk in the five Southeast Asian countries will be investigated and the results will be observed.

2.1.5 Money Supply (M2)

In economics, money supply or called stock of money is known as the total amount of monetary assets circulating in a country's economy as of a particular time period. The circulating money consists of the money in the deposit accounts, stock of currency, and in the form of other liquid instruments. It also can be defined as a group of secure property that hold by households or

businesses to make payments or as a short-term investments. Money supply is a significant element for the economic development in the financial sector (Mukherjee, 2015). This is because money supply is important for improving the development the surface of economic and able to stabilize the price level in the economy. So, economist can conduct analysis on the changes of money supply in order to forecast the possible trends of price level, inflation and business cycle. Money supply can be considered as an important policy tools for controlling inflation and stabilize the price of products by the Federal Reserve which is central bank and government. They can develop policies through controlling the interest rates and amount of money flowing in the economy of a country. For instance are monetary policy, fiscal policy and tariff.

When economy facing shortage of money, government can solve it by printing notes to increase the money supply to the market and maintain the stability of economic situation. However, it will cause inflation to occur when the money supply grows more faster than the real output (Pettinger, 2011). The relationship of money supply and inflation can be clearly showed by the Quantity Theory of money with the formula, as showed below:

$$\textbf{MV = PY}$$

$$\text{Money Suppy} \times \text{Velocity of Money} = \text{Rice level} \times \text{Real GDP}$$

Under the money supply, it consists of several measurements which are M1, M2 and M3.

$$M1 = \text{Currency in Circulation} + \text{Demand Deposits}$$

$$M2 = M1 + \text{Narrow Quasi Money}$$

$$M3 = M2 + \text{Deposits Placed with Other Banking Institutions}$$

M1 is consists of the total of currency which is the most liquid such as demand deposits, traveller's check and currency in circulation that held by publics and transaction deposits at depository institution. M2 is a broader definition on sum of money which is M1 plus with savings accounts, small-denomination time deposits and retail money market mutual fund. Moreover, M3 is M2 plus the total of deposits or interest bearing instruments placed by the non-

bank private sector with merchant banks, discount houses, and finance companies. In our research, we will studied on the relationship of M2 with non-performing loan due to M1 is focusing on too narrow of money supply while M3 is focusing on too broad of money supply.

M2 be selected as one of our variables is because of its significant effect to the credit risk and could be used as a proxy for macroeconomic conditions in the Malaysian economy. From the findings of Vogiazas and Nikolaidou (2011), it indicated that M2 is one of the components which will influence the credit risk of banking system in a country. It can be supported by the result of Akinlo and Emmanuel (2014) which increase in the supply of money will affect the deterioration of banks portfolio and borrowers may tend to have credit risk. Besides that, according to Srairi (2009), there is a positive relationship and significant effect of M2 on the performance of Islamic banks. From all of the studies which stated above, it is to be support that M2 need to be included in our research as an variable due to M2 able to reflect the macroeconomic conditions of a country, which affects the performance of banks through affecting the financial situation of customers.

2.2 Review of Relevant Theoretical Models

2.2.1 Fisher Effect Model

According to Boyd and Jalal (2012), the fisher effect has been widely recognized since Irving Fisher's The Theory of Interest (1930) and is presented as a stylized fact to students of economics and finance. Fisher effect model has been used by most of the researchers to do their research. Fisher effect model is an economic theory that proposed by economist Irving Fisher.

This theory indicates about the connection between inflation and both real and nominal interest rate. Fisher effect can be explained by an equation which is, real interest rate equals to the nominal interest rate minus the expected inflation rate; $i^r = i^n - \pi^e$, where i^r = real interest rate, i^n = nominal interest and π^e = expected inflation rate.

Fisher effect is an important tool in the economy. This is due to the lenders can use this tool to measure whether they are making profit on a granted loan. Lenders will only get their profits when the rate charged is higher and beyond the economy's inflation rate. A strong economic growth will bring a high inflation. If total demand is more than total supply in an economy, a higher inflation rate may be occurring.

However, some researchers proposed that there are difficult to support fisher effect model. Even though there is a wide acceptance for this Fisher effect in theory, but the suggested long-run one-for-one relationship between inflation and nominal interest rates has proven it is very hard to confirm empirically, despite the recent advances in econometric methodology for testing long-run relationships by using co-integration techniques (Westerlund, 2007).

2.2.2 Panel Data Regression Model

Panel data regression model is based on panel data. It will examine on the individual or cross-sectional units over different time periods. In other words, panel data contain of both time series data and cross-sectional data. There are a few advantages of panel data when it is compared to purely cross sectional or purely time series data. Firstly, the sample size can be expanded. Secondly, the researchers can investigate the dynamic transformation in cross-sectional units over time. Besides, panel data regression model allowed the researchers to study on more complex behavioral models.

In previous researches, authors are widely used panel data regression model to examine the relationship between different macroeconomic factors and non-performing loans in different banks or countries. In other words, this model is widely used to understand the performance of a bank. However, panel models carried several evaluation problems, such as heteroscedasticity, autocorrelation, and cross-correlation in cross-sectional units at the same point in time. To deal with one or more of these issues, the fixed effects model (FEM) and the random effects model (REM) are usually used.

2.2.3 Pooled Ordinary Least Squares Model (Pooled OLS)

Pooled OLS Model or sometimes called as Constant Coefficient Model is a type of panel data regression models and it holds two assumptions which include the intercepts and slopes are constant across countries, and there is no time effect (time invariant). Pooled OLS Model can be used when the data has composition of cross-sectional and time series data. To use this model, there are few conditions to follow, where the first condition is the data are of the same characteristics and there is time invariant or no time effect. Next, the independent variables are not coordinated with the error term as the error term is assumed to be normally distributed and all the independent variables do not rely on the values of the error term.

Pooled OLS can help to investigate the impacts of the independent variables on the dependent variable, and also help in determining the main factors of the credit risk or non-performing loans in this research. This model has been used by previous researchers on their studies, for example, Anwar et al. (2011) has used Pooled OLS to examine the significance of assets, equity, loan, and deposits on one of the major profitability indicator return on asset (ROA) in the banks of Pakistan. In the same year, Gul, Irshad and Zaman (2011) also carried out research on factors

affecting bank profitability in Pakistan by using Pooled OLS. Besides, this model also used by Ani et al. (2012) to estimate the coefficients in their research on the determinants of bank profitability in Nigeria. Based on these examples, Pooled OLS model can be determined as one of the important methods for a research with the combination of time series and cross sectional data.

2.2.4 Fixed Effects Model (FEM)

Fixed effects model is a type of statistical model, which normally used in ANOVA and regression which assume the independent variable is fixed. Besides that, fixed effects model examined the observation based on the intercept term, slopes and time variant. There are three situations appropriated for fixed effect model, where the first scenario is included different intercepts, constant slopes and no time effect; second scenario includes different intercepts and constant slopes, but it has time effect; while the third scenario does not have time effect, but it has different intercepts and also different slopes.

Furthermore, fixed effect model is one of the effective methods in determining the factors of credit risks or non-performing loans in certain countries as there are many researches applied this model in their researches. For example, according to Funso, Kolade and Ojo (2012), fixed effect model is conducted to find the major factors that affect the bank performance in Nigeria. Not only like that, Castro (2013) also applied fixed effect model in his research in order to determine the macroeconomic determinants of credit risk in banking system.

2.2.5 Random Effects Model (REM)

Random effects model is another popular statistical models others than fixed effect model. However, it is rarely to be applied by researchers compare with fixed effects model because it is rarely faced with a situation that involved random effects analyses. In this model, the factors has many possible levels and interest is in the variability of the response over the entire population of levels, but only a random sample of levels is included in the data. According to Paul D. Allison (2009), the random effect model will assume unobserved variables are uncorrelated with all the observed variables. According to Kurt Schmidheiny (2016), in the random effects model, the individual-specific effect is a random variable that is uncorrelated with the explanatory variables.

The goal of random effects model is not to estimate one true effect, but is want to estimate the mean of a distribution of effects. The treatment is a random effect when the sample is from a larger population and its effect is unsystematic. The confidence interval of random effects model will be wider and the weights are more similar to each other if compared with the fixed effects model. (Borenstein, Hedges, Higgins & Rothstein, 2010) There are two sources of variation under this random effects model which are included within-study estimation error variance and between-studies variance. The effect of first source of variation will diminish if the sample size is large enough. While, if the between-studies variance is substantial, it must increase the number of studies in order to obtain a good precision of result.

2.3 Proposed of Theoretical / Conceptual Framework

Figure 2.1: Factors affects Non-Performing Loan

Independent Variables

Dependent Variable

Non-performing loans (NPL)

Real Interest Rate (RIR)

Inflation Rate (INF)

Exchange Rate (ER)

Money Supply (M2)
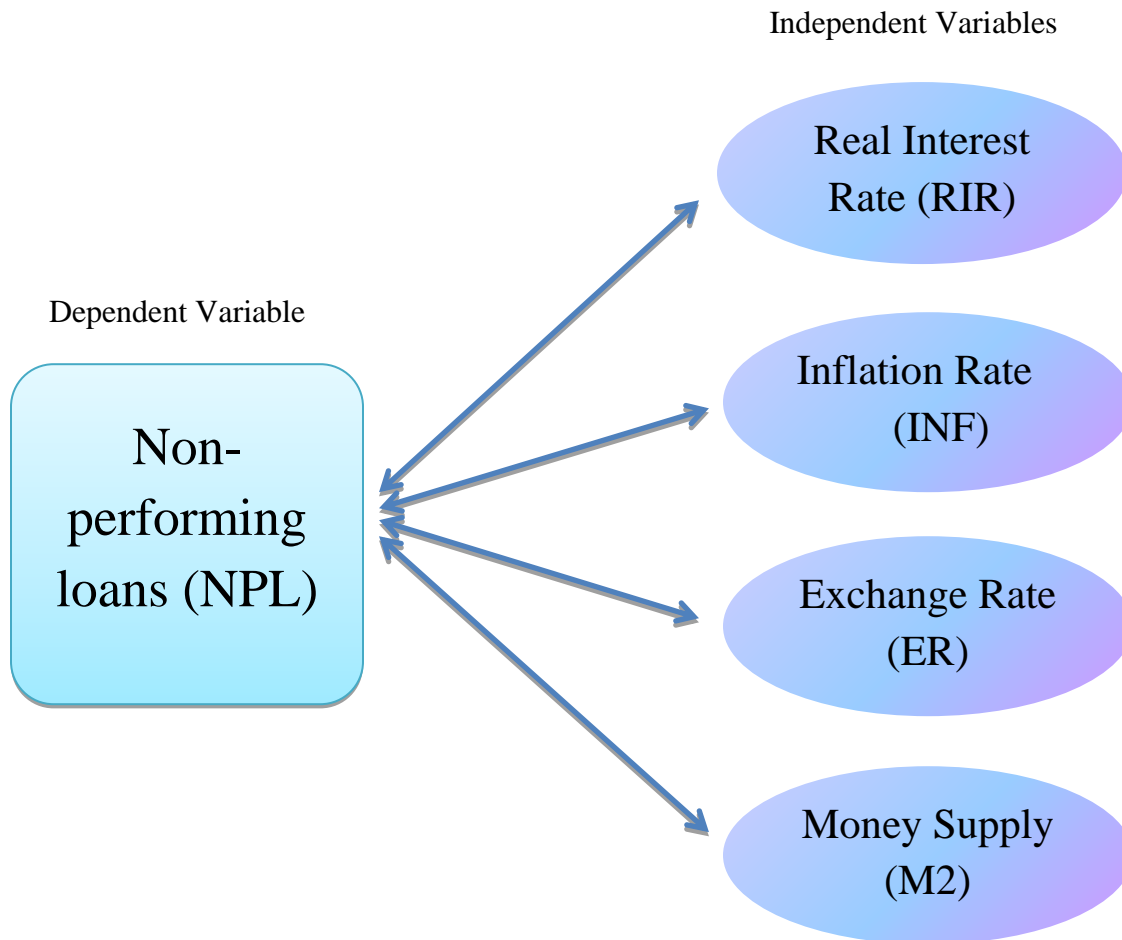
Figure 2.1 shows the relationship between a dependent variable and four independent variables. The conceptual framework of this research project is to examine the determinants of credit risk in five selected Southeast Asian countries which are Malaysia, Thailand, Philippines, Singapore and Indonesia. Based on the figure shown above, non-performing loans (NPL) is the dependent variable in this research project, while there are four independent variables included real interest rate (RIR), inflation rate (IR), exchange rate (ER) and money supply (M2).

2.4 Conclusion

In chapter two, there are most of the researchers are using Panel Data Analysis to examine the relationship between non-performing loans and macroeconomic factors and we have found that panel data analysis, fisher effect model and pooled ordinary least squares model (Pooled OLS) are the most common theoretical models that have been used by the researchers. Next, from the literature review, we have known that real interest rate, exchange rate, inflation rate and money supply (M2) have a significant relationship with non-performing loans. Most of the variables are having positive relationship with non-performing loans.

CHAPTER 3: METHODOLOGY

3.0 Overview

This chapter intends to deliver the methodology of the research by carrying out the empirical test using the data obtained. Various hypotheses are formed to conduct the empirical test and the outcomes are to be analyzed and interpreted in the following chapter. This chapter consists of several parts including the data collection method, the methodology and also the conclusion of the chapter.

3.1 Data Collection Method

This research is to study the determinants of credit risk in the five South Asian countries selected which are Malaysia, Thailand, Singapore, Philippines and Indonesia. There are four macroeconomic variables chosen as the independent variables which include interest rate, exchange rate, money supply and inflation rate, while non-performing loan will be the dependent variable. Hypotheses testing will be carried out in this study to determine the significance, impacts and relationships between the independent and dependent variables.

Secondary data are used to carry out this study because the data will be quantitative data. Therefore, it can provide the significance and establish the relationship between the variables.

Besides, according to Johnston (2014), secondary data is cost effective and convenience. It enable the current researchers to save cost and time in collecting new data as the previous researchers have already collected the data. Secondary data too, enable researchers to make comparative study. For example, there are some similar studies carried out by previous researches on this title "The Determinants of Credit Risk in Southeast Asian Countries". The results of this study might be not same with previous and comparison can be made among these studies.

The sampling period of this study is 16 years, from year 1999 to year 2014. Table 3.1 will show the sources of the data and also the measurement of the data.

Table 3.1: Sources of Data

Variable	Source
Bank nonperforming loans to total gross loans (%)	World Bank Data
Real interest rate (%)	World Bank Data
Inflation, GDP deflator (annual %)	World Bank Data
Official exchange rate (LCU per US$, period average)	World Bank Data
Money and quasi money (M2) as % of GDP	International Monetary Fund

Sources: World Bank and International Monetary Fund (2016)

3.2 Data Analysis

3.2.1 Likelihood Ratio

Likelihood ratio is used to determine either Pooled OLS or Fixed Effects Model is more suitable and appropriate to be applied in the empirical analysis. The hypothesis testing for Likelihood ratio is showed as below:

H_0: There is a common intercept in the five selected Southeast Asian countries.

H_1: There is no common intercept in the five selected Southeast Asian countries.

Furthermore, the test statistic for this hypothesis testing is referred to the restricted F test, and the formula is showed below:

$$F = \frac{\left(R^2_{FEM} - R^2_{Pooled}\right)/\left(k_{FEM} - k_{Pooled}\right)}{\left(1 - R^2_{FEM}\right)/\left[n - \left(k_{FEM} + 1\right)\right]}$$

The decision rule for this hypothesis testing is the null hypothesis (H_0) should be rejected if the test statistic is greater than critical value. While, there is another decision rule can be made without referring to the formula above, which is the null hypothesis (H_0) will be rejected if the p-value is less than the significance level. Otherwise, the null hypothesis (H_0) could not be rejected.

Whereas, the null hypothesis (H_0) indicated that Pooled OLS is preferable, and the alternative hypothesis (H_1) implied that Fixed Effects Model (FEM) is more appropriate to be used in the empirical analysis.

3.2.2 Hausman Test

Hausman test which also called Hausman specification test which is use to detects endogenous regressors in a panel regression model. It is able to test any inconsistency and efficiency of an estimator of the tested models by using hypothesis testing. This test can used to determine which model is more appropriated to be used between fixed and random effect model in the empirical analysis by identifying the endogeneity in the explanatory variables.

Stated below is the hypothesis of Hausman Test:

H_0 : Random effects model is the appropriate model.

H_1 : Fixed effects model is the appropriated model.

Below is the formula used by Hausman statistic:

$$H = (\beta_{FE} - \beta_{RE})[VAR(\beta_{FE}) - VAR(\beta_{RE})]^{-1}(\beta_{FE} - \beta_{RE})$$

The decision rule of this test is to reject the null hypothesis (H_0) when the test statistic is larger than the critical value or the p-value is lower than the significance level. Otherwise, do not reject the null hypothesis (H_0). In other hand, if the decision making is to reject null hypothesis (H_0), it means that fixed effects model is the appropriate model to be used. In a conclusion, the study should use fixed effect model when conducting the empirical analysis.

By using Hausman test, it is able to compare and find out the most efficient model that able to give consistent result. As noted by Sheytanova (2014), fixed effects model is more preferable if there is correlation of the error term with independent variable in random effects model. Fixed effects model estimates are always consistent, but may not the most efficient model to use compared with random effects model estimates.

3.3 Conclusion

This chapter of methodology will be an endeavor to Chapter 4 in performing the data analysis. There are numerous types of hypotheses formed to conduct the empirical test. In other words, number of tests will be conducted in order to determine the reliability of the results. The outcomes are to be analyzed and interpreted in Chapter 4.

CHAPTER 4: DATA ANALYSIS

4.0 Overview

This chapter indicates the empirical analysis results on the determinants of non-performing loans in five selected South Asian countries from 1999 to 2014. All the empirical results are extracted from E-Views Program and tests conducted are included Pooled Ordinary Least Squares Model (POLS), Fixed Effects Model (FEM), Random Effects Model (REM), Likelihood Ratio and Hausman Test.

4.1 Economic Model

The economic model that used to regress all the tests in this study is shown as follow:

$$NPL_{it} = \beta_0 + \beta_1 RIR_{it} + \beta_2 INF_{it} + \beta_3 ER_{it} + \beta_4 M2_{it} + \varepsilon_{it}$$

$$i = 1, 2, 3, 4, 5 \text{ types of countries}$$

$$t = 1999, 2000,\ldots, 2014$$

Where:

β_0 = y-intercept of the equation

NPL_i = Non-performing loan of a $country_i$

RIR_i = Real interest rate of a $country_i$

INF_i = Inflation rate of a $country_i$

ER_i = Exchange rate of a $country_i$

$M2_i$ = Money and quasi money of a $country_i$

ε_i = error term for a $country_i$

i = 1 refer to Malaysia (MYS)

   = 2 refer to Thailand (THA)

   = 3 refer to Philippines (PHL)

   = 4 refer to Singapore (SGP)

   = 5 refer to Indonesia (IND)

t = Annual data which is started from 1999 to 2014

4.2 Panel Data Regression

4.2.1 Significant of Independent Variables

Table 4.1: Significant of Independent Variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.91627	4.140557	-4.568533	0.0000
RIR_?	2.967114	0.307408	9.652055	0.0000
INF_?	2.843996	0.300811	9.454426	0.0000
ER_?	-0.001802	0.000297	-6.061017	0.0000
M2_?	0.067284	0.027480	2.448490	0.0167

Assume significant level is 5%

4.2.1.1 Real Interest Rate (RIR)

$H_0 : \beta_1 = 0$

$H_1 : \beta_1 \neq 0$

Decision Rule: Reject H_0 if the p-value is less than α.

$\alpha : 0.05$

P-value: 0.0000

Decision making: Reject H_0 since the p-value (0.0000) is smaller than α
 (0.05).

Conclusion: We have sufficient evidence to conclude that there is a
significant relationship between real interest rate (RIR) and non-performing loans (NPL) at a
significance level of 5%.

4.2.1.2 Inflation Rate (INF)

$H_0 : \beta_2 = 0$

$H_1 : \beta_2 \neq 0$

Decision Rule: Reject H_0 if the p-value is less than α.

$\alpha : 0.05$

P-value: 0.0000

Decision making: Reject H_0 since the p-value (0.0000) is smaller than α (0.05).

Conclusion: We have sufficient evidence to conclude that there is a significant relationship between inflation rate (INF) and non-performing loans (NPL) at a significance level of 5%.

4.2.1.3 Exchange Rate (ER)

$H_0 : \beta_3 = 0$

$H_1 : \beta_3 \neq 0$

Decision Rule: Reject H_0 if the p-value is less than α.

$\alpha : 0.05$

P-value: 0.0000

Decision making: Reject H_0 since the p-value (0.0000) is smaller than α (0.05).

Conclusion: We have sufficient evidence to conclude that there is significant relationship between exchange rate (ER) and non-performing loans (NPL) at a significance level of 5%.

4.2.1.4 Money Supply (M2)

$H_0 : \beta_4 = 0$

$H_1 : \beta_4 \neq 0$

Decision Rule: Reject H_0 if the p-value is less than α.

$\alpha : 0.05$

P-value: 0.0167

Decision making: Reject H_0 since the p-value (0.0167) is smaller than α (0.05).

Conclusion: We have sufficient evidence to conclude that there is a significant relationship between money supply (M2) and non-performing loans (NPL) at a significance level of 5%.

4.2.2 Consistency with Theory and Expected Signs

Table 4.2: Expected Signs of the Variables

Variables	Coefficients	Sign
Real Interest Rate (RIR)	$\hat{\beta}_1$	Positive
Inflation Rate (INF)	$\hat{\beta}_2$	Positive
Exchange Rate (ER)	$\hat{\beta}_3$	Positive or Negative
Money Supply (M2)	$\hat{\beta}_4$	Positive

Table 4.3: Actual Signs of the Variables Based on Estimation Output

Variables	Coefficients	Sign
Real Interest Rate (RIR)	2.967114	Positive
Inflation Rate (INF)	2.843996	Positive
Exchange Rate (ER)	-0.001802	Negative
Money Supply (M2)	0.067284	Positive

Table 4.2 shows the expected signs of variables that we have expected based on the theories stated in Chapter 2, while Table 4.3 shows the actual signs of the variables based on our estimation output resulted from E-views program. As we observed, all the actual signs of variables are consistent with the expected signs.

4.2.3 Pooled Ordinary Least Squares (POLS)

Table 4.4: POLS generated from E-Views

Dependent Variable: NPL_?

Method: Pooled Least Squares

Date: 02/16/17   Time: 22:08

Sample: 1999 2014

Included observations: 16

Cross-sections included: 5

Total pool (balanced) observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.91627	4.140557	-4.568533	0.0000
RIR_?	2.967114	0.307408	9.652055	0.0000
INF_?	2.843996	0.300811	9.454426	0.0000
ER_?	-0.001802	0.000297	-6.061017	0.0000
M2_?	0.067284	0.027480	2.448490	0.0167

R-squared	0.584374	Mean dependent var	8.398858
Adjusted R-squared	0.562207	S.D. dependent var	8.504362
S.E. of regression	5.626989	Akaike info criterion	6.353487
Sum squared resid	2374.725	Schwarz criterion	6.502364
Log likelihood	-249.1395	Hannan-Quinn criter.	6.413176
F-statistic	26.36267	Durbin-Watson stat	0.764296
Prob(F-statistic)	0.000000		

4.2.4 Fixed Effect Model (FEM)

Table 4.5: FEM generated from E-Views

Dependent Variable: NPL_?

Method: Pooled Least Squares

Date: 02/16/17   Time: 22:09

Sample: 1999 2014

Included observations: 16

Cross-sections included: 5

Total pool (balanced) observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-14.02775	9.723566	-1.442655	0.1535
RIR_?	3.572169	0.347949	10.26636	0.0000
INF_?	3.350924	0.352497	9.506258	0.0000
ER_?	0.001962	0.001588	1.235600	0.2207
M2_?	-0.112593	0.087276	-1.290084	0.2012
Fixed Effects (Cross)				
MYS--C	16.35169			
THA--C	12.78165			
PHL--C	0.589616			
SGP--C	11.31608			
IND--C	-41.03903			

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.661698	Mean dependent var	8.398858
Adjusted R-squared	0.623580	S.D. dependent var	8.504362
S.E. of regression	5.217689	Akaike info criterion	6.247639
Sum squared resid	1932.923	Schwarz criterion	6.515617
Log likelihood	-240.9056	Hannan-Quinn criter.	6.355079
F-statistic	17.35899	Durbin-Watson stat	0.973499
Prob(F-statistic)	0.000000		

4.2.5 Random Effect Model (REM)

Table 4.6: REM generated from E-Views

Dependent Variable: NPL_?

Method: Pooled EGLS (Cross-section random effects)

Date: 02/16/17   Time: 22:58

Sample: 1999 2014

Included observations: 16

Cross-sections included: 5

Total pool (balanced) observations: 80

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.91627	3.839378	-4.926910	0.0000
RIR_?	2.967114	0.285047	10.40921	0.0000
INF_?	2.843996	0.278930	10.19608	0.0000
ER_?	-0.001802	0.000276	-6.536471	0.0000
M2_?	0.067284	0.025481	2.640561	0.0101
Random Effects				
(Cross)				

MYS--C	0.000000	
THA--C	0.000000	
PHL--C	0.000000	
SGP--C	0.000000	
IND--C	0.000000	

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	5.217689	1.0000

Weighted Statistics

R-squared	0.584374	Mean dependent var	8.398858
Adjusted R-squared	0.562207	S.D. dependent var	8.504362
S.E. of regression	5.626989	Sum squared resid	2374.725
F-statistic	26.36267	Durbin-Watson stat	0.764296
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.584374	Mean dependent var	8.398858
Sum squared resid	2374.725	Durbin-Watson stat	0.764296

4.2.6 Likelihood Ratio

Table 4.7: Likelihood Ratio generated from E-Views

Redundant Fixed Effects Tests

Pool: COUNTRY

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.057055	(4,71)	0.0051
Cross-section Chi-square	16.467842	4	0.0025

Assume significant level is 5%

H_0 : There is a common intercept on all countries.

H_1: There is no common intercept on all countries.

Decision Rule: Reject H_0 if the p-value is less than α.

α : 0.05

P-value: 0.0051

Decision making: Reject H_0 since the p-value (0.0051) is smaller than α (0.05).

Conclusion: There is a sufficient evidence to conclude that the Pooled Ordinary Least Squares (POLS) model is not valid. Therefore, we prefer to use Fixed Effects Model (FEM).

4.2.7 Hausman Test

Table 4.8: Hausman Test generated from E-Views

Correlated Random Effects - Hausman Test

Pool: COUNTRY

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	16.228220	4	0.0027

** WARNING: estimated cross-section random effects variance is zero.

Assume significant level is 5%

H_0: Random effects is the appropriate model

H_1: Fixed effects is the appropriated model

Decision Rule: Reject H_0 if the p-value is less than α.

α : 0.05

P-value: 0.0027

Decision making: Reject H_0 since the p-value (0.0027) is smaller than α (0.05).

Conclusion: There is a sufficient evidence to conclude that Fixed Effect Model (FEM) is the appropriate model if compared if Random Effects Model (REM). Therefore, we prefer to use Fixed Effects Model (FEM).

4.3 Conclusion

Through the empirical results, it shows all the independent variables in this study are significant. In other words, these four variables (real interest rate, inflation rate, exchange rate and money supply) will significantly influence the dependent variable (non-performing loans). On the other hand, the result also shows that real interest rate, inflation rate and money supply (M2) have a positive relationship with non-performing loans, whereas exchange rate has a negative relationship with non-performing loans. Furthermore, the results of both Likelihood Ratio and Hausman Test prove that Fixed Effects Model (FEM) is the most appropriate model to be used in this research.

CHAPTER 5: DISCUSSION, CONCLUSION AND POLICY IMPLICATION

5.0 Overview

The purpose of this chapter is to discuss the major findings and summarize the previous chapters which are chapter 1, 2, 3 and 4. Besides, this chapter includes the summary of statistical analyses, policy implication of study, limitation of study and recommendation for future research. Lastly, this chapter concludes with the conclusion section for the overall of this research.

5.1 Summary of Statistical Analysis

Since high non-performing loan ratio will give huge pressure to the bank in their financial statement and cause liquidity problem, it is important for a bank to measure the non-performing loans in order to take action earlier and prevent any uncertainty such as bank bankruptcy from happening.

The main reason to conduct this research is to determine the significance of real interest rate, inflation rate, exchange rate and money supply (M2) against non-performing loans over 16 years (1999-2014) in five selected Southeast Asian countries namely Malaysia, Thailand, Philippines, Singapore and Indonesia. We are able to identify the positive or negative effects between the macroeconomic variables and non-performing loans based on the E-Views result.

Based on Chapter 4, the E-Views result has successfully proved that the four macroeconomic variables which are real interest rate, inflation rate, exchange rate and money supply (M2) have significant relationship with non-performing loans. Not only this, the actual signs of the variables based on estimation output are consistent with the expected signs of variables that discussed in Chapter 2. As we observed, the real interest rate, inflation rate and money supply (M2) have a positive relationship with non-performing loans. It means that when one of these variables stated above increase, non-performing loans will eventually increase and vice versa. On the other hand, there is a negative relationship between exchange rate and non-performing loans. In other words, when exchange rate increases, the non-performing loans will decrease and vice versa. Last but not least, the results of both Likelihood ratio and Hausman Test prove that Fixed Effects Model (FEM) is the most appropriate model to be used in this study.

5.2 Policy Implications of Study

This research is to investigate the determinants of credit risk in the five selected Southeast Asian countries which are Malaysia, Singapore, Thailand, Philippines and Indonesia. From the result of this research, it shows that the four independent variables are significantly influence the credit risk. By having this result, this research hoped that able to provide valuable and supporting information for other major players such as central bank, policy makers, and academicians to have much more understanding on the effect of those variables on credit risk. This research gave a clearer picture in developing suitable implications by those major players in their countries.

The real interest rate, inflation rate, exchange rate and money supply (M2) could potentially bring bad consequences to the performance of banking industry in a country if these factors are not under control. Hence, the policy makers need to take more attention on the changes of those factors in order to enhance the stability of banking industry. The policy makers or government will have to consider on more factors and be more cautious on making related regulations or policies such as fiscal policy. As stated in Aigheyisi and Edore (2014), the government have to

impose restrictions on cross border flow of capital and use relevant macroeconomics management tools to control the inflation fluctuation. Next, policy maker can encourage firm to finance its assets by using retained earnings rather than relied on debt financing.

Other than that, central bank can reduce the rate of non-performing loan by impose some proper policies on interest rate, rate of reserve requirement, and lending rates of banks according to the current market performance. Monetary policy can be conducted by central bank by increasing interest rate to reduce money supply when inflation occurs. Furthermore, market interest rate also will increase if there is higher of discount rate imposed on banks. Higher lending rate will lower down the amount of borrowings made by individuals and firms. Central bank may impose higher regulatory capital on those banks with higher risk in order to make sure there is sufficient capital to absorb high credit risk.

Besides that, actions or decisions of management in a bank will also contribute to the incidence of non-performing loan in banking industry. Berger and DeYoung (1997) have stated that poor management in banking industry is due to the bad quality of loans and escalates the rate of nonperforming loan. Therefore, banks need try to forecast for the inflation rate accurately through revising the inflation reports in order to adjust interest rate accordingly.

Furthermore, banks should have good practice in credit risk analysis to control the level of nonperforming loan at certain reasonable rate. Bank should able to predict loan losses accurately in order to make sure the loan loss reserve is not under or over provided. Accessing value of collateral is indispensable when screening the potential borrowers to ensure the value is sufficient to cover the loss. By this, the banks are able to avoid those excessive lending to unqualified borrowers. According to Messai and Jouini (2013), bad loans will generally result in bank failures. Hence, by reducing the non-performing loan, banks will result in managing and keeping a favourable portfolio and enhance bank's performance.

5.3 Limitation of Study

Throughout these past few months, we have been continuously working and checking on our progress for this research. However, there are still some unavoidable circumstances, leading us to face some obstacles and limitations during this research.

The first limitation is there are insufficient data to do the statistical analysis at the beginning in this study. Some of the data provided from neither International Monetary Fund (IMF) nor World Bank are incomplete and hence, there are problems faced during data collection. This is because some data that needed for some selected countries could not be found from World Bank and IMF, and it leads to a longer time to search for the complete data in all countries. There are omitted variables in this research such as unemployment rate which could also be the important variables that will affect the credit risk. According to Louzis, Vouldis and Metaxas (2012), an increase in unemployment rate causes the households' non- performing loans to rise as they are unable to repay the debts.

Besides, E-views program is unable to run diagnostic test for panel data, which combined both time series and cross sectional data. Therefore, this research faces a limitation in running the data as E-views program only can run diagnostic test for time series data. In addition, diagnostic test still can be run in this research, by testing country to country, with sufficient sample size. However, the sample size needs to be at least 30 observations for each country, while the sample size for every country in this research is only 16 observations. Theoretically, a larger sample size will come out a better result than small sample size, but due to insufficient data, small sample size has been chosen in this research. Therefore, diagnostic test could not run in this research.

Furthermore, the whole empirical analysis in this research only includes quantitative variable such as inflation rate and real interest rate, or it can be said as macroeconomic factors. However, omitted qualitative variables such as gender and age have been omitted. Qualitative variables may also be one of the factors that may affect the bank performance in Southeast Asian countries. Hence, the results in this study are not considered precise as it does not include qualitative factors, and it cannot be define as real determinants of credit risk in Southeast Asian countries.

Last but not least, there are only few researchers targeted their research topic in Southeast Asian countries. Most of them are doing their research in western countries and middle-east countries. Therefore, there are difficulties for current researchers to collect information about Southeast Asian countries and this could be the limitation too.

5.4 Recommendation

Here are some suggestions to future researchers who are willing to conduct similar studies related to the determinants of the credit risk in Southeast Asian countries. First of all, more independent variables could be added in order to improve the effectiveness of the research in determining the determinants of credit risk. With more variables, researchers are able to know which variables affect credit risk the most in the selected countries. Next, future researchers can consider the other Southeast Asian countries in their research such as Myanmar, Cambodia and Brunei as the research for these countries are uncommon.

In addition, future researchers are advice to use the latest data or observation in their research to have the most efficient results. The data used in this research is not the latest because when we

are collecting it, the data for 2015 is still incomplete in the World Bank and International Monetary Fund (IMF). Hence, the data collected for this research is from 1999 to 2014. On the other hand, if future researchers wish to conduct the diagnostic test for each country, the sample size for each country must be at least 30 observations in order to increase the accuracy of their research.

5.5 Conclusion

This chapter has focused on the major findings and discussions on the topic. Through this chapter, we get to know the policy implications for each independent variable on the credit risk (non-performing loan). Besides, limitations on this research have been studied and suitable recommendations are suggested to solve the problems face in this research.

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