THE ECONOMIC AND BANK SPECIFIC FACTOR ON THE BANK CREDIT RISK: EVIDENCE FROM MALAYSIA

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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.

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LIST OF ABBREVIATIONS

GDP	Gross Domestic Products
NPL	Non Performing Loan
LA	Loan and Advances
LLP	Loan Loss Provision
TD	Total Deposit
CL	Classified Loans
CPI	Consumer Price Index
ROA	Return on Asset
ROE	Return on Equity
NIM	Net Interest Margin
BNM	Bank Negara Malaysia
E- Views	Econometric View
UTAR	Universiti Tunku Abdul Rahman
RESET	Regression Equation Specification Error Test
LM	Lagrange Multiplier
ARCH	Autoregressive Conditional Heteroskedasticity
JB	JarqueBera
OLS	Ordinary Least Square
GLS	Generalized Least Squares
VIF	Variance Inflation Factor
TOL	Tolerance
BLUE	Best Linear Unbiased Estimator

PREFACE

This research project is Final Year Project (FYP) submitted in partially fulfillment of the requirements for Bachelor of Business Administration (Hons) Banking and Finance that work done from June 2014 to March 2015. The development of the subject is supervised by Puan Siti Nur Amira Binti Othman. This research is based on the previous research and other reliable sources as quoted in the references. Most of the data and information are able to get in internet while we get the data of regression analysis from Bank Negara Malaysia and World Data Bank.

There are a lot of researches and studies are related to commercial bank but we try to examine different independent variables affect to bank credit risk in local commercial bank and foreign commercial bank. We are interest to know that effect of economics factor and bank-specific factors to commercial bank's credit risk in Malaysia during year 1988 to year 2013.The reason we examine the effects of commercial bank credit risk is also because the loan is the main profitability and sources of bank. Throughout this study, people will know how to manage bank credit risk more efficiently. Therefore we choose this title for our research paper. This research has to accomplish from June 2014 to March 2015.

ABSTRACT

The main purpose of this study is to examine the economic and bank specific factors on bank credit risk in Malaysia that covering of year 1988 to year 2013. This study is used Ordinary Least Square Model to investigate the relationship between dependent variables, which is bank credit risk and independent variables. There are total of 5 independent variables that encompass economic (external) and bank-specific (internal) factors affect the bank credit risk. The economic factors include inflation, interest rate and gross domestic product (GDP) while the bank-specific factors include bank performance and reserve requirement.

The empirical results in this study show that inflation, gross domestic product (GDP), bank performance and required reserve have significant impact on bank credit risk while interest rate has insignificant impact on bank credit risk. Furthermore, inflation, interest rate, gross domestic product (GDP) and bank performance have positive relationship with bank credit risk while required reserve has negative relationship with bank credit risk.

CHAPTER 1: RESEARCH OVERVIEW

1.0   Introduction

Banks play an important role in developing economic of a country. They are the financial intermediaries which provide variety of financial services to the customers. Historically, the functions of commercial banks are accepting deposit and making business loan (Saini and Sindhu, 2014). Commercial banks have grown stronger and provide variety of investment products services such as saving accounts, deposit accounts, and fixed deposit accounts.

The purpose of a commercial bank is to channel funds from those who has surplus of funds (surplus spending unit) to those who shortage of funds (deficit spending unit). In other words, commercial banks are using the funds deposited by depositors to make loans to borrowers and loan. Basically, loans can be divided into three categories which are short, medium and long term. Short term loan usually has a maturity up to one year; medium term loan is one to three years, and long term loan has a maturity of three to ten years. By making loans to borrowers, banks can earn profit from charging customers interests and services fees. However, this service leads the banks expose to credit risk which borrowers might not pay back the loan as promised.

Thus, this paper is to examine how the economics factors as well as bank-specific factors affect the bank credit risk. In this chapter, background of the study, problem statement, research objectives, research question, hypothesis of the study, significance of the study and chapter layout will be covered as well as a brief conclusion of this chapter.

1.1   Research Background

Over the past two decades, Asian financial crisis in year 1997 and subprime crisis in year 2008 have significantly affected the banking industry. In Malaysia, there are 22 local commercial banks operating as financial intermediaries before Asian financial crisis in year 1997 happened. The number of local commercial banks in Malaysia started to decreases after the financial crisis. On 29 July 1999, restructuring plan of merger and acquisitions has imposed by Bank Negara Malaysia (BNM) to consolidate the 54 local deposit taking financial institutions into 6 institutions (Ahmad, Ariff, and Skully, 2008). Consequently, there are only left 8 local commercial banks in Malaysia. According to Amel, Barnes, Panetta and Salleo (2004), mergers and acquisitions can improve the efficiency of a bank. Besides, it can also be gained access to cost-saving technology and make improvement in managerial efficiency. Therefore, banks have make improvement in making decisions and evaluating the decisions made in rapidly growing financial markets nowadays. Risk is has the most significant effect on bank in making loan for consumers. Risk is the chance which the actual return of an investment might different from what investor are expected, which also means that risk is the probability of getting losses from investment.

There are many types of financial and non-financial risk faced by a bank such as credit risk, liquidity risk, interest rate risk, foreign exchange risk, market risk, legal risk, reputation risk and operation risk. There are highly interdependent among these risks. For an example, when a bank is exposed to credit risk it will reduce the liquidity and reputation of a bank. This is because the confident level of the customers toward the bank decrease and withdrawn a large amount of deposits from the bank which cause a bank become illiquid. Past researchers have found that the decrease in liquidity is the driving force behind the failure of the banks. According to Moore (2009), on average, liquidity of the banks might decrease by 7 percentage points during financial crisis. From the view of a bank, risk illustrates failure instead of achieving success (Yurdakul, 2013). Therefore, successfully managed risk becomes a crucial instrument in increasing profitability of a bank. Thus, banks should understand the risks and those factors that influence the risks.

Credit risk is one of the significant risks among all risks that most of the banks exposed to which the loans not pay back. Credit risk is the probability of losses for a bank due to loan debtors unable to fulfill on time or completely their obligations as stated in the agreement with bank (Yurdakul, 2013). There are two components in credit risk which are systematic and unsystematic credit risk (Raghavan, 2003). A systematic credit risk is the volatility of economic, social and political that affects financial market and securities traded in the markets. On the other hand, unsystematic credit risk occurred due to the internal factors of the firm such as inefficiency management, technology innovation and changes in customers preferences. Credit risk can be measured in both quantitatively or non-quantitatively. There is a credit scoring model for loan officer to assign points to the customers based on the characteristics of the borrowers. While in the judgment procedures, the loan officer will evaluate the information of the borrowers according to the lending guidelines. Information such as character, capacity, capital, collateral and condition (5Cs) is needed for evaluating loan request.

Credit risk has been widely studied in lending decisions. Despite there are advanced measurement techniques in credit and diversification of portfolio, it is still difficult to offset. Indeed, credit risk management is a very difficult and complex task for a bank. The Basel Committee on Banking Supervision (Basel II) has proposed a more flexible revised capital adequacy framework "International Convergence of Capital Measurement and Capital Standards" in order to make improvement on risk assessment capability (Angelini, Tollo and Roli, 2008). Indeed, credit risk management is a very difficult and complex task for risk manager in banking industry. This is because there are many unpredictable natures of economic factors that influence the others relevance risks in banking industry or specific to a particular bank (Garr, 2013).

This study will examine the effect of inflation rate, interest rate, gross domestic products (GDP), reserve requirement and bank performance toward commercial bank credit risk. Reinhart and Rogoff (2010) have proposed that Non-Performing Loans (NPLs) can be used to mark the onset of a banking crisis. Therefore, this study uses

NPLs as the indicator of credit risk. Besides, this study will use Ordinary Least Square (OLS) model to examine the time series data set from all commercial banks in Malaysia that covering 26 years period of time (1988-2013).

1.2 Problem Statement

Financial intermediaries is an entity that acts as the middle person between two parties like banker and customer in a financial transaction, it includes financial institutions such as commercial bank, investment banks, broker-dealers, mutual funds, insurance companies and pension funds. It channel funds from lender who have excess funds to borrower who do not have enough funds which have improves social welfare and improves economic efficiency by allocating the resources to the most productive uses. Financial institutions are very important to the overall economy that apparently during the market booms and market downturn. During economic expansion, financial institutions will provide financing which will drives the growth of the economic, and during economic downturn, banks will reduce the lending to the borrower, where it show the fact that the economies are heavily dependent on the financial sector.

The main functions of commercial bank are accepting deposit and granting loans and advances that perform their important role of channeling funds from people who have surplus income to people who have deficit income. The interest rate spread is the main source of a bank's income which is the difference between the interest rate pay on deposits and the interest rate charged on the loans. Therefore, loan is the most profitable service that provide by the bank but it is also the most risky service because of the credit risk, which involves loan that borrower might not paid back as they promised. According to Castro (2013), when banks start to struggle with the problem of liquidity and/or insolvency that caused by the increasing of bad or non-performing loans in their balance sheets, this is the moment that banking crisis may arise. When borrower did not or might not pay back the loan as they promised, the loan will be considered as bad or non-performing loan which is the loss for the bank. In this case,

the bank will not have enough money in their hands, if any emergency cases happen to the bank, it will directly affect the bank's liquidity and cause the bank become insolvency. When bank become illiquid and insolvent, they cannot meet their legal obligation, then the bank will be consider fail and will be close down. Therefore, credit risk is the most important risk that must be aware, in order to avoid illiquidity and insolvency problem that will cause the bank near to the bankruptcy.

On September 15, 2008, Lehman Brothers, the fourth-largest U.S. investment bank has filed for bankruptcy because of the subprime mortgage crisis. During the subprime mortgage crisis, many borrower defaults on their loans (credit risk) and lead to a significant loss to the bank which directly affect their liquidity that they have no enough cash on hand to resist the crisis cause the Lehman Brothers collapse in the crisis. The collapse of Lehman Brothers has make the depositors very panic and loss the confidence towards the bank, therefore the depositor withdraw out all of their savings and checking account (Amadeo). The bank panic has indirectly cause the Washington Mutual faced bankruptcy because depositor withdraw all of their saving which make the bank has insufficient funds to carry on their daily business. Blythe (2010) said that the consequences of Lehman's fall for the world economy were extreme because it makes the public loss confidence to other banks, a worldwide financial crisis and a deep economic depression in many other countries since Lehman Brothers conduct their business all over the world. Therefore, bank credit risk has to be manage effectively then the bank only can prevent the liquidity problem occur which will directly cause the bank bankruptcy and will affect the economic as a whole.

However, credit risk management is indeed a very difficult and complex task in the financial industry because of the unpredictable nature of the macroeconomic factors coupled with the various microeconomic variables which are peculiar to the banking industry or specific to a particular bank (Garr, 2013). Therefore, before the bank manage the credit risk, they should understand further of the factors that cause the credit risk in order to manage credit risk more effectively. If a bank manages the credit risk without knowing well the factors of credit risk, the bank will not

effectively reduce credit risk in the risk management. Besides, it will become a task that is costly and time-consuming which rather is a burden than is a solution to the bank. Summarizing Ratnovski (2013), risk management is costly because it requires many effort from bank managers (include administrative cost) for the maintenance and it cannot be compensated by a low return on highly liquid assets. Credit risk management require time and people to manage, monitor, control, supervise, maintain and always need to come out a contingency plan when the credit risk is suspect to increase, where all of this need a very big amount of money to continues the management. Therefore, if the bank construct a credit risk management without knowing the factors of credit risk, the bank not only will suffer a significant of loss that due to the credit risk problem, they also need to bear the costly risk management task that did not reduce the credit risk effectively and wasting their time which is also a term of cost in using this management. Consequently, it has led to an interesting question that what are the factors that affect the bank credit risk, so that the bank can understand further of these factors of bank credit risk before construct an effective credit risk management to reduce the possibility of loss.

Thus, this study aims to investigate the determinants of the bank credit risk of commercial bank in Malaysia. The determinants of bank credit risk consist of bank specific factors and economic factors. It uses, reserve requirements and bank performance as bank specific factors, and uses inflation rate, interest rate, and gross domestic product (GDP) as economic factors. This study will be conduct during the time period of year 1988 until year 2013 in all commercial banks in Malaysia.

1.3   Research Objectives

The main objective of this study is to examine the relationship between economic and bank specific factors on bank credit risk in Malaysia for the period of year 1988 to year 2013.

1.3.1 General Objectives

To examine the economic and bank specific factors on bank credit risk of all commercial banks in Malaysia that covering 26 years period of time (1988 – 2013).

1.3.2 Specific Objectives

- To examine whether there is a significant relationship between gross domestic products (GDP) and bank credit risk.

- To examine whether there is a significant relationship between inflation rate and bank credit risk.

- To examine whether there is a significant relationship between interest rate and bank credit risk.

- To examine whether there is a significant relationship between bank performance and bank credit risk.

- To examine whether there is a significant relationship between reserve requirement and bank credit risk.

1.4   Research Question

- Is there a significant relationship between gross domestic product (GDP) and bank credit risk?
- Is there a significant relationship between inflation rate and bank credit risk?
- Is there a significant relationship between interest rate and bank credit risk?
- Is there a significant relationship between bank performance and bank credit risk?
- Is there a significant relationship between reserve requirement and bank credit risk?

1.5   Hypothesis of the study

Our study included 5 independent variables to examine the effects of economic and bank specific factor on the bank credit risk in Malaysia. The hypotheses are as below:

1.5.1 Gross Domestic Product (GDP)

We test the relationship between gross domestic product (GDP) and bank credit risk.

Ho: Gross Domestic Product does not have significant effect on bank credit risk

H_1: Gross Domestic Product has significant effect on bank credit risk.

1.5.2 Inflation Rate

We test the relationship between inflation rate and bank credit risk.

Ho: Inflation rate does not have significant effect on bank credit risk

H_1: Inflation rate has significant effect on bank credit risk.

1.5.3 Interest Rate

We test the relationship between interest rate and bank credit risk.

Ho: Interest rate does not have significant effect on bank credit risk

H1: Interest rate has significant effect on bank credit risk.

1.5.4 Bank Performance

We test the relationship between bank performance and bank credit risk.

Ho: Bank performance does not have significant effect on bank credit risk

H1: Bank performance has significant effect on bank credit risk.

1.5.5 Reserve Requirement

We test the relationship between reserve requirement and bank credit risk.

Ho: Reserve requirement does not have significant effect on bank credit risk

H1: Reserve requirement has significant effect on bank credit risk.

1.6   Significance of the Study

The main intention of this study is to examine the effect of gross domestic product (GDP), inflation rate, interest rate, bank performance and reserve requirement toward the bank credit risk in Malaysia. Credit risk is the most important risk that the banks have exposed. Hence, the result of this study can be useful for the country, depositor or investor, bank management and public.

This research is aim to provide general knowledge for the country by discovering the variable that cause the bank credit risk and also to evaluate the performance of the local bank. According to Demirguç-Kunt and Detragiache(1998), adverse economic condition where there is high inflation rate ,high level of unemployment and high interest rate tend to cause bank credit risk to be increase and favorable to banking crises. Therefore, in this study people will intend to understand the linking between the economic developments and the credit risk in the country. Besides, other foreigner investor or depositor can easily how the local banks operates and how our country economic condition.

On the other hand, this study can also give knowledge and information for the investor and depositor for their banking activities. If a bank credit risk is high, they will not engage themselves to invest with that particular bank. This is because according to Yurdakul (2013), credit risk refers to the probability of losses for a bank due to loan debtors unable to fulfill on time or completely their obligations as stated in the agreement with bank and risk tends illustrates failure instead of achieving success in bank. Thus, the higher the risk profile, the lesser the capital base, the greater is the chance that depositor and investor will lose their fund when the bank become not liquidated and the market value of its net worth drops to zero (Kaufman, 1998).This study will be able to let investor and depositor know how the stability and soundness of the bank performance via knowing the economic and bank specific factors. As consequences, investor and depositor will conscious on their choice of investment and capable to make more exact decision to avoid bad investment.

The result can provide better information for the bank management by knowing the variable that will cause the increases in bank credit risk. According to Berger and DeYoung (1997) if a bank manager does not exercise sufficient loan monitoring process, the bank will have a very high numbers of nonperforming loans and will stimulate the bank towards high credit risk. Therefore, the result of study will give them better understanding on what economic and bank specific factors that will affect the bank credit risk. Hence, they can use the information such as by reveal the inflation rate, and interest rate. This research provides bank the capability of monitoring, evaluating, and controlling risk exposures in a more precise way. Consequently, the bank management team can implement better credit risk management and measurement which can lead to more effective and efficient capital allocation in bank. Thus, bank needs certain criteria to make things convenient for making and evaluating the decision made in order to enhance their performance and profitability of bank (Yurdakul, 2013).

As for the public, they also can benefit themselves from this research too. The public will also be able to have a better decision making in their choices of investment correspondingly. The bank which has weak performances and higher credit risk will eventually be eliminated from the choice of investment. Furthermore, the public can notice the economic condition of the country and they will be able to focus and start to create strategies and new plans to overcome the problems and strengthen the economic condition of the country and reduce the bank credit risk.

1.7   Chapter Layout

This research paper is organized as follows:

Chapter 1 provides a general idea of the study context and overall concept of the research paper which cover introduction, research background, problem statement, research objectives, research questions, hypotheses of the study, significant of study, chapter layout and conclusion of this chapter.

Chapter 2 consists of the literature review of the previous studies that about the economic factors and bank specific factors on the bank credit risk. It includes the review of the literature, review of relevant theoretical models, proposed theoretical/conceptual framework, hypotheses development and end this chapter with a conclusion.

Chapter 3 is an overview of the research methodology which describes the research design, data collection methods, sampling design, research instrument, constructs management, data processing, data analysis and a summary of this chapter.

Chapter 4 analyses the result that found in chapter 3 which are linked to the research questions and hypotheses of the research paper by descriptive analysis, scale measurement and inferential analyses. It will show the relationship of the economic factors and bank specific factors with the bank credit risk.

Chapter 5 is the final summary of the entire research paper and the discussions of the major finding, then it follow by the implication and limitation of this research paper and some recommendation for future research.

1.8   Conclusion

Credit risk is one of the significant risks that faced by most of the banks. It will reduce the liquidity of the bank that it will lack of ready cash to resist any emergency which will make the depositor panic and indirectly affect the reputation of the bank. Hence, the objective of this study is to examine the economic and bank specific factors on bank credit risk in Malaysia for the period of year 1988 to year 2013. This chapter outlines an overview of study context, which the research background, problem statement, research objectives, research question, hypothesis of the study, significant of the study and chapter layout has been clearly stated. The literature review will be presented in the next chapter.

CHAPTER 2: LITERATURE REVIEW

2.0   Introduction

This chapter provides a literature survey of the relevant finding of previous researches that related to this study which is the determinant of bank credit risk. There are total of 5 variables that encompass economic (external) and bank-specific (internal) factors will affect the bank credit risk which has been stated in the previous chapter. The economic (external) factors include inflation, interest rate and gross domestic product (GDP), while the bank-specific (internal) factors consist of bank performance and reserve requirement. In addition, the following parts of this chapter will discuss the relevant theoretical models, proposed theoretical/ conceptual framework by using the diagram to show the relationship of the determinant and bank credit risk, hypothesis development and conclusion for this study.

2.1 Review of Relevant Theoretical Models

Figure 2.1: Determines of Credit risk
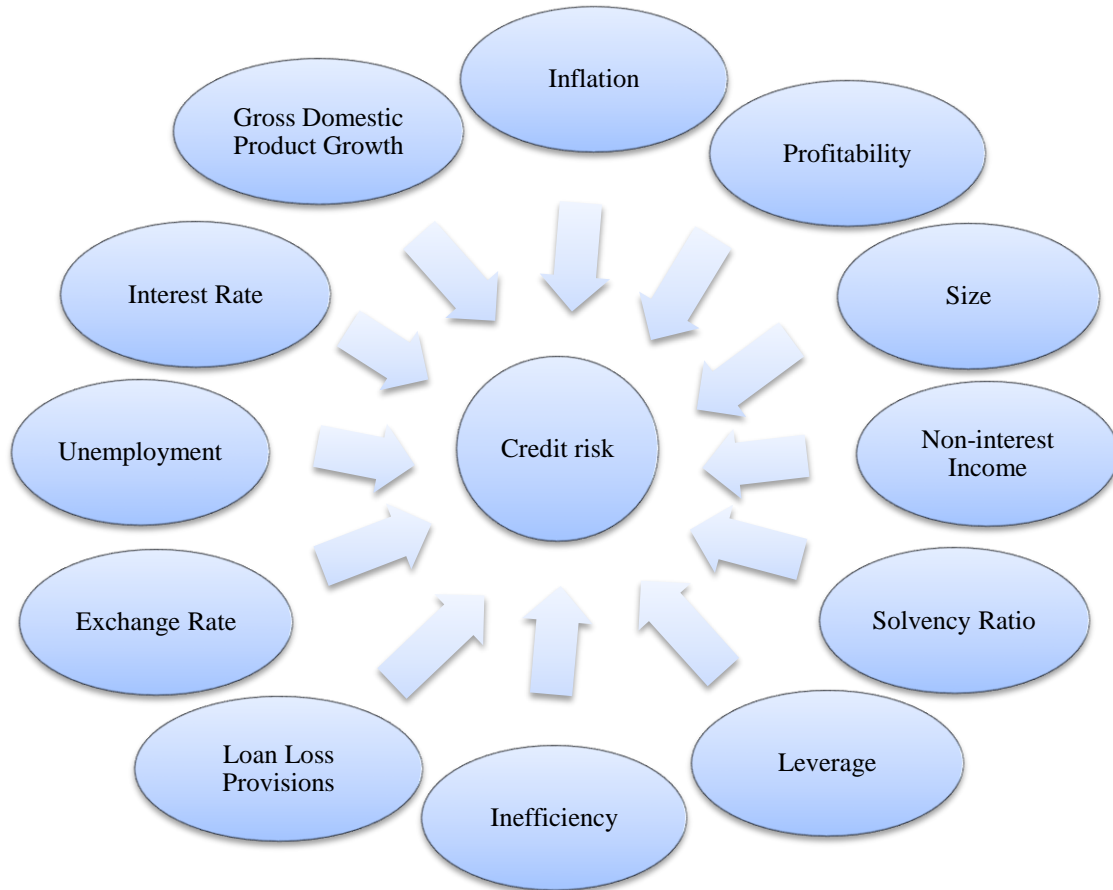
Adapted from: Chaibi, H. & Ftiti, Z. (2014).Credit risk determinants: Evidence from a cross-country study. *Research in International Business and Finance, 33, 1-16.*

Chaibi and Ftiti (2014) have conducted a cross country study to examine the factors affecting the commercial banks credit risk in a market-based economy, represented by France, compared with a bank-based economy, represented by Germany, for the period of 2005 to 2011. According to their research, credit risk is affected by banks' specific and macroeconomic variables, which are inflation, gross domestic product growth, interest rate, unemployment, exchange rate, loan loss provisions, inefficiency, leverage, solvency ratio, non-interest income, size and profitability.

According to Chaibi and Ftiti (2014), the relationship between inflation and credit risk can be positive or negative. Inflation and credit risk are negatively correlated because debt servicing can be easier during high inflation period. Moreover, high inflation can reduce the real value of total outstanding loan and high inflation also associated with lower unemployment which suggest by Phillips Curve Model. Phillips Curve is an economic concept stating the inverse relationship between inflation and unemployment, which means inflation was high, unemployment was low (Huang, 2013). In other hand, Chaibi and Ftiti (2014) also claim that inflation and credit risk are positively correlated as high inflation reduces the capacity of borrower to service their debt. The condition continue worsen when policymaker apply monetary policy to increase interest rate in order to maintain the lender's real returns.

They include Gross Domestic Product (GDP) for macroeconomics cycle, high GDP growth represent economic expansion while low GDP growth represent economic recession. They claim that GDP is negatively correlated with bank credit risk. During the period of economic expansion, consumers can generate enough income or cash flow as economy is good, thus they have enough funds to pay back their debt during economic expansion period. While economic recession lowered household and individual income, thus consumer's capacity to service the debt has decline. Consequently, bank credit risk will increase.

For interest rate, they claim that there is a positive relationship between interest rate and credit risk. An increase in interest rate will increase the cost of servicing debt, and hence reduce the borrower capacity to service their existing loan, thus it lead to higher credit risk in banking services.

Besides, they expect a positive relationship between unemployment rate and credit risk. Increase in unemployment rate can cause credit risk increase because it reduces the borrower ability to generate enough income to pay back their existing debt. Moreover, high unemployment rate also can reduce the consumption of products and services because consumers purchasing power have reduce as they real income reduce, consequently it reduce the production company profit and cash flow, so the

production company have a weak liquidity position, therefore the company has low capacity to service debt. Hence, bank credit risk will increase.

Furthermore, they found that an increase in the exchange rate can have mixed repercussions where this variable to control for external competitiveness. The exchange rate shows positive relationship with NPLs in France because a real appreciation of local currency make the local products become expensive, which weakens the competitiveness of firms that mainly do export business and makes them unable to repay their debt. However, it shows negative relationship with NPLs in German due to the appreciation of exchange rate improve the ability of those Germans who borrowing foreign currency to repay their debts. Therefore, the sign of the relationship between the exchange rate and NPLs can be positive or negative.

Loan loss provisions are a way to control the anticipated loan losses, and to detect and cover the high levels of credit loss for banks' loans. Their findings show that the high loan loss provisions ratio indicates a potentially high credit risk which means that the banks need to make greater provisions when loans tend to be potentially impaired. Thus, high loan loss provisions indicate high NPLs.

There have either positive or negative relationship between bank efficiency and credit risk. For the negative relationship aspects, if bank is inefficient will increase amount of credit risk because they might have problem in monitoring the internal cost of bank, lead to the result become not reliability when evaluate borrower's credit risk rating and hence increase in nonperforming loan. Next, Chaibi and Ftiti stated that if there have some unexpected event happened and out of bank's control, bank need to spend extra money to solve the problem, it will create low cost efficiency. If the bank decide not to spend enough resources to ensure high loan quality, the bank will become efficient. However the nonperforming loan might become higher. So, the relationship between bank efficiency and credit risk can be either positive or negative.

They confirm that there is a positive relationship between a bank credit risk and leverage due to the highly leveraged capital will leads to a higher risk-taking which need to use lower capital to produce higher return. This also means that when the

liabilities that relative to total assets is big, the probability of impaired loans will be high as well.

For the solvency ratio, they said that the banks with less capital will generally take more risky loans to earn more profit, which could lead to higher NPLs. Besides, non-interest income is act as a proxy for diversification opportunities because banks will invest in other business to earn income other than to earn interest income from the loan. They found a negative relationship between NPLs and non-interest income because they believe that bank will not always manage their non-traditional income successfully whey they lack of experience, thus banks are likely to increase risk.

For the bank size, the researchers indicate that there has either positive or negative relationship between bank size and credit risk of Malaysia. For the positive aspect, they proved that larger bank willing to take excessive risk compare to smaller bank due to government will not let larger bank to fail and bankrupt. They will be protected by government since if they fail will lead to several banking crisis. So, they intend to approve more loans to borrower with bad credit risk rating and lead to increase in nonperforming loan amount. In terms of negative relationship between bank size and credit risk, Chaibi and Ftiti claimed that large size bank is expected to more diversify since they have more ability and skill in terms of risk management. They also more effective to deal with bad borrower to collect back the bad loan. Hence, larger bank size will reduce credit risk.

Last bank-specific factor is bank performance. Bank performance has negative relationship with credit risk of Malaysia. Chaibi and Ftiti explained that bank have good performance and hence lead to less amount of nonperforming loan. Besides, historical performance plays an important role to reflect quality of management. Good quality of performance leads to low credit risk, vice versa. Hence, they have negative relationship between bank profitability and credit risk.

2.2 Review of the Literature

Dependent Variable

2.2.1 Bank Credit Risk

According to Broll, Pausch and Welzel (2002), one of the earliest and the most important forms of risk faced by banks is credit risk, which are the risk that borrower default on interest and /or principal, it carries the potential of wiping out enough of a bank's capital and force it into bankruptcy. Catherine (2009) defines credit risk as the prospective that a borrower from a bank will fail to meet its obligation in agreement with agreed term and conditions. The risk of monetary losses due to debt issuers who do not honor contractual debt payments is commonly referred to as credit risk (Lindset, Lund and Persson, 2013). Funso, Kolade and Ojo (2012) found that when bank expose more to credit risk will make the bank have high tendency to experience the financial crisis and vice-versa.

There are many indicators of credit risk like the ratio of non-performing assets to total loans and leases, the ratio of total loan and leases to total deposits, the ratio of the annual provision for loan losses to total loans, the ratio of net charge-off of loan to total loans and leases, and leases or to equity capital and the ratio of non-performing assets to equity (Garuba, 2010). Vogiazas and Nikolaidou (2011) defined credit risk as the ratio of loss and doubtful loans to total loans (LLP ratio) in their research. Funso, Kolade and Ojo (2012) used the ratio of Non-performing loan to loan & Advances (NPL/LA), ratio of Total loan & Advances to Total deposit (LA/TD) and the ratio of loan loss provision to classified loans (LLP/CL) as the measurement of credit risk. And, Garr (2013) indicate the ratio of loan loss provision to total asset and the net interest income to total asset as credit risk.

However, the most common indicator of credit risk is non-performing loans (NPLs) which is the ratio of non-performing loan to total loans, because non-performing loans (NPL) is directly affect the bank's financial performance which is the contributing factor to the credit risk in the banking system (Thiagarajan, 2013). A large number of credit defaults will be suspect in a high probability when NPL increase in the bank (Thiagarajan, 2013). NPLs as the indicator of credit risk in banking sector had been widely uses in the past research in different country such as Fainstein and Novikov (2011) in Baltic States, Yurdakul (2014) in Turkey, Charles and Kenneth (2013), Abiola and Olausi (2014) in Nigeria, Ranjan and Dhal (2003) in Indian, Louzis, Vouldis and Metaxas (2011) in Greece and Mileris (2012) in European Union (EU) countries.

According to Somoye (2010), non-performing loans (NPLs) reduces the liquidity of banks because increase credit will decelerate the growth on the bank performance when bank is in default and will affect the whole economy. Espinoza and Prasad (2010) also found that the NPL ratio worsens when economic growth becomes lower, therefore large banks and banks that spend less would have lower NPLs, but high NPLs in the future might cause by the high credit growth in the past. Besides, Karim, Chan and Hassan (2010) indicate that higher non-performing loan reduces cost efficiency which means will make the bank efficiency drop, in other words, lower cost efficiency of the bank increases non-performing loans. As a result, credit risk that represent by non-performing loans not only affect by the economic condition and economic factors, it also affect by the internal factors which will affect the bank efficiency at the same time.

Independent Variables

Economic Factors:

Economic Variables

Existing literature identifies macroeconomic variables as important variables in explaining the bank credit risk. According to Jimenez & Saurina (2006), inflation plays an important role in explaining bank credit risk. In upturns, borrowers are confident about their ability to pay back their loans, corresponding fees and interest rate. While during recessions, banks are have more non-performing loans and specific provisions, hence increase the bank credit risk. Gunsel (2012), Poudel (2013), Badar & Javid (2013), Zribi & Boujelbene (2011), Vogiazas & Nikolaidou (2011), Clementina & Isu (2014) and Garr (2013) also use inflation variables in conducting their research of factors affecting bank credit risk. Carlos &Javier (2011), Piergiorgio (2009) use interest rate, Castro (2013) and Zribi & Boujelbène (2011) uses Gross Domestic Product in explaining bank credit risk.

2.2.2 Gross Domestic Product (GDP)

Gross Domestic Product (GDP) can be defined as the economic activities such as import and export or an output generated in particular country. These activities may have directly impact on every sector as well as the banking sector in terms of bank risk and profit. According to Jakubik (2007) indicate that gross domestic product (GDP) is a measurement of the cyclical position of the economy. The researcher point out that when there are decreases or low growth in GDP, it will affect the bank credit risk. This is because when GDP growth is low, it will affect the corporate earnings, wage growth, unemployment which consecutively cause the loan portfolio quality change to

worse. Therefore, when GDP growth is higher it will lead to lower credit risk of bank.

Louzis et al. (2012) found out that the non-performing loan will be increase when there is a downturn in economic growth for all loan types. During the economic gain period, the household and firm borrowers will have sufficient and enough funds to repay their loan but when it comes to the recession, their ability to repay the loan will tends to be lower compare during the economic expansion. This shows that the ability of repay of loan depend on the phase of the economic cycle. Hence, when there is a slowdown in economic growth or lower GDP growth, non-performing loan will increase. Louzis et al. (2012) observed that when there is an economic slowdown NPL ratio is negatively affected for all loan types.

Moreover, according to Castro (2013), when GDP growth decreases, bank credit risk will increase. The movement of the bank credit risk can be explained by looking on the economic environment. For instance, the bank will have low non-performing loan rate when the economy expansion. This is due to the consumer and firm has enough income and fund to repay their loan. Conversely, when the economy is in recession phrase, the non-performing loan will increase.

Furthermore, Chaibia and Ftiti (2015) show that GDP growth variable is significant and negatively related with the bank credit risk. It shows the same findings with Louzis et al. (2012). The overall effect of the GDP growth rate whether it is high or low is relatively dependence of the ability of loan repayment on the phases of economy. Non-performing loan is negatively influenced by the higher or lower of the GDP growth rate.

Zribi and Boujelbène (2011) also indicate that gross domestic product will affect the bank credit risk. The overall effect of GDP growth should consider as the macroeconomic variable in order to determine the bank credit risk. They provide an analysis for Tunisia which determines a panel model which

examine the ten commercial banks that cover the period from year 1995 to year 2008. They found that there is a negative relationship between GDP growth and bank credit risk.

Nevertheless, Messai and Jouini (2013) indicate that minimum amount of non-performing loan is an essential condition to improve the economic growth in the country. The higher level of GDP growth causes a higher level of income. Due to that, it will improve the ability of the borrower to pay their debts which will contribute to lower down the non-performing loan and bad debts in the bank. The researcher also said that improvement of GDP leads to greater cash flow from the household and this will raise the profitability of the bank. When there is economy downturn, the level of non-performing loan will be increase. Borrower tends to have less flow of income when the economy downturn, therefore their ability of repaying the loan will be lower which caused the non-performing loan increased. Their results show that GDP growth is negatively related to the NPL.

Moreover, according to Farhan et.al (2012) examines that debt servicing capacity of the borrowers will favorable when growth in the economy increased. A higher level of GDP growth or improved economy will increase the income and repayment ability of individuals and firms. The researchers had given the view point of Pakistani bankers about the economic factors cause the non-performing loan to be increased and leads to bank credit risk. GDP is one of the factors which have been examined. This result shows that there is significant negative relationship between GDP growth and non-performing loan in Pakistani banking sector.

On the other hand, there are some researcher found out that there is a positive relationship between GDP and bank credit risk. According to Poudel (2013), there is no significant relationship between GDP and non-performing loan which can lead to bank credit risk. The study is to examine the macroeconomic determinants of bank credit risk in the Nepalese banking sector. According to the researcher, during economy downturn or when GDP

growth is low, bank tends to be more careful on selecting the loan borrower and qualifying them based on their creditworthiness and credit condition. Therefore, the volume of credit during low economic growth tends to be reduced. Besides, bank will also strict in categorized their client and debtor during the economy downturn so that the bank can control the amount of non-performing loan which can contribute to bank credit risk. The same result also found by the research of Aver (2008) which examine the credit risk in Slovenian banks. The result shows that there is positive reaction between GDP and bank credit risk because banks are well prepared when unfavorable economy and market situation.

2.2.3 Inflation Rate

Inflation is a continued increase in the price level of consumer goods and services in an economy until a certain extent when a unit of currency purchases smaller quantity of consumer goods and services as inflation decrease the value of money. Inflation is commonly measured by Consumer price index (CPI) which defines as a change in the price level of a basket of consumer goods and services bought by household (Badar & Javid, 2013).

Several studies have found inflation is significantly affecting the banks credit risk. According to Gunsel (2012), inflation will increase the banks credit risk because banks are hard to evaluate the credit risk of borrowers during a inflation period, hence increase in lower quality loan increase the non-performing loan, resulting in higher banks credit risk. Furthermore, Badar & Javid (2013) had conducted a research to evaluate the impact of macroeconomic forces on non-performing loans of 36 Pakistani commercial banks during the period 2002 to 2011. They state that inflation is significantly affecting the bank credit risk because it affects the profitability of commercial banks. Their research result suggests the positive relationship between

inflation and bank credit risk. They claim that inflation will increase the bank credit risk because increase in Consumer price index (CPI) will force monetary regulators to conduct contractionary fiscal policy to increase the interest rates in order to control inflation, and the action of increase in interest rate will lead to an increase in the cost of borrowing, thus will decrease the borrower's ability to repay the loan by reducing their real income, causes non-performing loans increase, and consequently decrease the profitability of bank, at the end banks credit risk will increase. Similarly in a very recent study by Clementina & Isu (2014) stated that inflation is significantly affecting banks credit risk. His study proves that inflation affect credit risks because during high inflation period, borrowers are difficult to pay back their existing loans due to the rising cost of capital.

Poudel (2013) has studied the determinants of credit risk in Nepalese banking during the period 2001 to 2011 with the hypothesis of positive relation of inflation and credit risk because inflation is correlated with interest rate. High inflation leads to high loan interest rate (Berument, 1999). Poudel (2013) claims that high loan interest rate will increases the cost of borrowing, at the end credit risk increase. However, result of his studies shown a negative sign of the inflation coefficient, which mean there is a negative relationship between inflation and credit risk. He claims that during a high inflation period, the bank will choose to lend in assured sectors in the economy instead of giving out long term loan, thus decrease the loan volume. Moreover, banks will more concern in selecting quality borrowers as banks prefer to lend out higher quality loans during inflation period, therefore it decrease the bank credit risk. Similarly, Demirgiic, Kunt & Huizinga (1999) study also indicates negative relationship between inflation and banks credit risk. They argue that banks can earn higher income from bank float and banks income increase more than banks costs during inflation period. Similarly in a very recent study by Washington (2014), he study the effect of inflation on credit risk in Kenyan commercial banks and his findings shown that inflation were negative and

significant to credit risk. He claims that during inflation period, business people will choose to pass on the burden of inflation to the consumers, so that they will be able to pay back their existing loans. The results are consistent with Zribi & Boujelbene (2011), Vogiazas & Nikolaidou (2011) Al-Smadi & Ahmed (as cited in Garr, 2004), and Shingjergji (2013) studies, which also conclude negative relationship between inflation and bank credit risk.

However, several researchers argue that inflation has no relationship with banks credit risk. Abdelaziz, Hichem & Wafa (2012) and Garr (2013) argue that increase or decrease in inflation will not affect the banks credit risk.

2.2.4 Interest-Rate

Interest rate is included in the model in order to investigate the degree of correlation between the interest rate and credit risk.

According to the researcher Kaplin (2009), he determines that there has relationship between interest rate and credit risk. From the research, he found to use the change in short term interest rate, interest rate term structure's slope, short term interest rates expected change interest rate and shock as interest rate variables. He further explained that the reason to include change in short rate, it is because change in short rate is one of the primary variables since Federal Reserve will control interest rate to affect the money supply in the market. Therefore if there have a significant relationship between interest rate and credit risk, speculation of change in short term interest rate would be most sensitive variable to reflect it.

However, there have difference opinions towards interest rate variable. From the previous research (Castro, 2013), researchers used long term interest rate as benchmark of their analysis. It is because normally the loan is borrowed as long term loan. From the research done by Castro, he point out that interest

rate has significant relationship with credit risk. From the result obtained, nonperforming loan of long term interest rate increases by 0.07 percentage point if increase in 1 percentage point in long term interest rate, holding other variables constant. After that, they replaced long term interest rate by real interest rate and by spread between the long and short term interest rate to run the test again. Based on the result, the coefficients of these 3 types of variables are remaining positive. Even the result is almost in same direction, but long term rate is more appropriate used to measure the effect on credit risk as most of the loan is agreed for long term period and economic agents tends to look at long term interest rate when they take their decisions. Based on the result generated by Castro (2013), it shows that higher interest rate will lead to higher credit for corporate borrower and individual, vice versa. It is important to reinforce the economic environment as it will significantly influence credit risk. Long term interest rate is important to include in the model to measure the effect of credit risk when interest is either higher or lower.

The researchers González and Suárez (2011) show that there have significant relationship between interest rate and credit risk. Shifts in interest rate either interest rate rises or interest rate cuts will affect the corporate leverage and default rate in short run.

For long run effect of mature firm, higher interest rate will lead to lower default rate. It is because they tend to lower target leverage across all firms (González & Suárez, 2011). While lower interest rate will deteriorate the lending standard and hence lead to higher credit risk. For short run effect of firm that has higher leverage, there will be higher credit risk because they need to spend more time to adjust the new leverage target. They found evidence support that increase in interest rate will increase the credit risk in short run because it will increase the burden of debt (González & Suárez, 2011).

While for the younger firm, increase in interest rate might increase the credit risk since it tends to be further away from target leverage. However, researchers González and Suárez indicate that there have same effect regardless mature firms or younger firms when interest rate is decrease since lower interest rate allow the firm to speed up convergence to target leverage. The researchers González and Suárez found that increase and decrease in interest rate have asymmetric effects on credit risk due to the underlying financial frictions either in short run and in long run.

Next, PiergiorgioAlessandri(2009) point out that interest rate and credit risk has significant relationship between each other. Interest rate is act as an important determinant to credit risk. It is because interest rate risk will bring impacts to net interest income and influence the profitability of company. It also will lead to higher credit risk if there have an increase in interest rate while credit risk will lower when decrease in interest rate.

The researcher, Arewa (2013) proved that interest rate volatility will give negative effect to default rate of bank. However, he found that interest rate is insignificant to the credit risk. They realize that this happened because of they use insignificant evidence to support the study. However, another researcher, Fofack (2005) found that there has positive relationship between interest rate and non-performing loan ratio. It is because higher interest rate indicated that they need to pay higher cost to obtain loan, lead to cost of borrowing increase. Hence, the default rate will increase respectively. Researcher, Aver (2008) also proved that interest rate will affect non-performing loan rate. Interest rate are negatively affect non-performing loan. From the result, it shows that interest rate take a large part in influencing the default risk in banking sector which consists of 58.8% in total.

Bank-Specific Factors:

Banks specific Variables

Apart from macroeconomic variables, banks specific variables also plays important roles in explaining bank credit risk. Several researchers have conducted research about the determinants of bank credit risk. They take bank specific variables such as bank performance and reserve requirement into account. Lelissa (2014), Said and Tumin (2011), Jeon and Miller (2004), Demirguc-Kunt and Detragiache (1999) uses bank performance in their research while Kugiel (2009), Kolar, Zivkov and Momčilović (2011), Carrera and Vega (2012) and Glocker and Towbin (2012) include reserve requirement in explaining bank credit risk.

2.2.5 Bank Performance

Bank performance is one of the important bank-specific determinants of bank credit risk. There are some past researches has proved that financial crisis will influence the performance of the bank. According to Jeon and Miller (2004), performance of nationwide banks in Korea was decline sharply after the financial crisis in 1997. Besides, Said and Tumin (2011) indicates that both economics and bank-specific factors also would affect the profitability of bank performance. Internal factors are included liquidity risk, credit risk, capital and size of the bank whereas the external factors are included inflation, GDP growth and interest rates. Demirguc-Kunt and Detragiache (1999) have proposed that bank performance is one of the predictors of financial crisis. Thus, research on the factors that affecting bank performance is one of the issues that could assist the banks identify and understand their recent situation in the banking industry. Hence, they can make improvement in making decisions and creating new policies for their banks.

According to Cooper, Jackson III and Patterson (2003), they proved that the variations in credit risk may reflect the variations in the health of a bank's loan portfolio and indirectly affect the bank's performance. Besides, Lelissa (2014) also proposed that performance is an indicator of the capability on controlling their credit risk, overhead expenses as well as diversifying their income sources. Profit is the ultimate goal of a commercial bank, therefore, profitability is a key determinant of the bank performance. Ongore and Kusa (2013) suggested that there are variety of ratios can be used to measure the profitability of a bank such as return on asset (ROA), return on equity (ROE), and net interest margin (NIM). In addition, Ally (2013) also proposed that return on equity (ROE), return on asset (ROA), net interest margin (NIM), capital asset ratio, growth rate of total revenue, cost/income ratio are also can be used in evaluating the bank performance based on the analysis of these financial ratios.

Furthermore, financial crisis will bring a lot of problems such as the borrowers unable to make repayment to the bank which turn their loan into default (Said and Tumin, 2011).In this case, the bank will face serious credit risk due to most of their creditors turn default and cause them suffer from serious losses. Besides, Jeon &Miller (2004) suggested that the financial crisis dramatically influence the ROA and ROE of a bank. Furthermore, they also mentioned that ROA or ROE can be used to measure the bank performance. In addition, according to Funso, Kolade and Ojo (2012), it stated that bank performance is an internal factor of bank credit risk. The more a bank exposed to credit risk, the higher chance for a bank to experience financial crisis.

NIM is a key determinant of a financial institution's profitability. Therefore, this study used net interest margin (NIM) to determinant the bank performance in this study. NIM is a ratio to measure the difference between the interest income generated and the interest paid out to the depositors which relative to the amount of the interest earning assets (Ally, 2013). Generally, it is expressed as a percentage of what the bank generated from loans in a

specific time period and other assets minus the interest paid on loans divided by the average amount of the assets on which its income in that time period (the average earning assets). According to Gul, Faiza and Khalid (2011), NIM is calculated as the net interest income divided by the total earning assets.

Besides, Ongore and Kusa(2013) have proposed that NIM is used to measure the gap between interest income that generate from loans and securities and the interest expenses on borrowed funds. Besides, they also show that NIM reflects the cost of intermediation services that provided by bank. In addition, they concluded that a higher net interest margin leads to a higher profit to the bank and makes the bank more stable. In short, it is an important key determinant of bank performance. Nevertheless, according to Khrawish (2011), it stated that a higher net interest margin means that it shows riskier lending practices of the bank which associated with high credit risk.

2.2.6 Reserve Requirement

Keister and McAndrews (2009) explained that reserve is the amount of fund that held by a bank to fulfill the bank's legal reserve requirement, where it form either as balances on deposit at the Federal Reserve or as cash in the bank's vault or ATMs. The research of Tandelilin (2007) and Bawumia (2010) (as cited in Garr, 2013) found that the required reserves are an enforcement of regulations uses to limits the ability of bank managers to issue excessive debt or transfer assets into high-risk ventures. Therefore, increase in required reserve will decrease the availability of loan and thus reduce the bank credit risk. This can be prove by the following researcher such as Navneet, Boopen, Sawkut, Shalini and Binesh (2009), Kugiel (2009), Kolar, Zivkov and Momčilović (2011), Carrera and Vega (2012) and Glocker and Towbin (2012). Kugiel (2009) indicated that commercial banks are responsible to hold a reserve ratio which acts as a monetary policy's tool by central bank. He also said that increase the reserve ratio will reduce the lending by banks because

the funds cannot be generate as loans, and thus reduces the money supply. Navneetet. al. (2009) also found that increase in reserve requirements result in a widening of banking spread as banks will reduced the liquidity. When bank's liquidity reduced, it will also reduce the amount of loan available in the bank to protect the available funds in hands. Kolar, Zivkov and Momčilović (2011) also confirm that the level of required reserve increase will reduce the availability of the loan. They means that a high level of reserve requirements and a high level of capital adequacy with the conservative measurement of the credit risks and the formation adequate reserves is to protect the bank for resulting a huge loss in bad loans. Carrera and Vega (2012) and Glocker and Towbin (2012) also support that loanable funds of financial intermediaries will reduces and credit condition will become tight as per increase in reserve requirement.

However, according to Valentine (1990) (as cited in Hashim and Halim, 2014) examine that the rate charge on an asset which is the cost of fund will fluctuate based on the situation such as increase in required reserve will increases the loan rate and the return paid on the required reserve will falls. He explained that if the rate earned on required reserves does not have any penalty (i.e.it is equal to the cost of funds), the rate charged on assets will have no impact from the reserve requirement. His study found that a high reserve requirement forces the institution to earn a correspondingly high return on its assets because the penalty imposed by the reserve requirement is passed onto customer to an extend that depends on the elasticity of demand in the market. This will cause the customer feel burden to the interest rate and fail to repay the loan at the end and thus increase the credit risk. Besides, Poudel (2013) also prove that the required reserve rate will fall and reduces the discount rate if the central bank decides to implement the expansionary monitory policy. This will increase the money supply and indirectly increase productivity and profitability and thus increase the income at the end. But, increasing money supply will cause interest rate fall and the opportunity of public to have cheaper fund will increase. Therefore, these conditions will

increase the ability of borrowers to pay back their repayment in reducing the banks' exposure to credit risk (Ahmad and Ariff 2007).

2.3   Proposed Theoretical / Conceptual Framework

Figure 2.3: Economic and Bank Specific Factor on the Bank Credit Risk
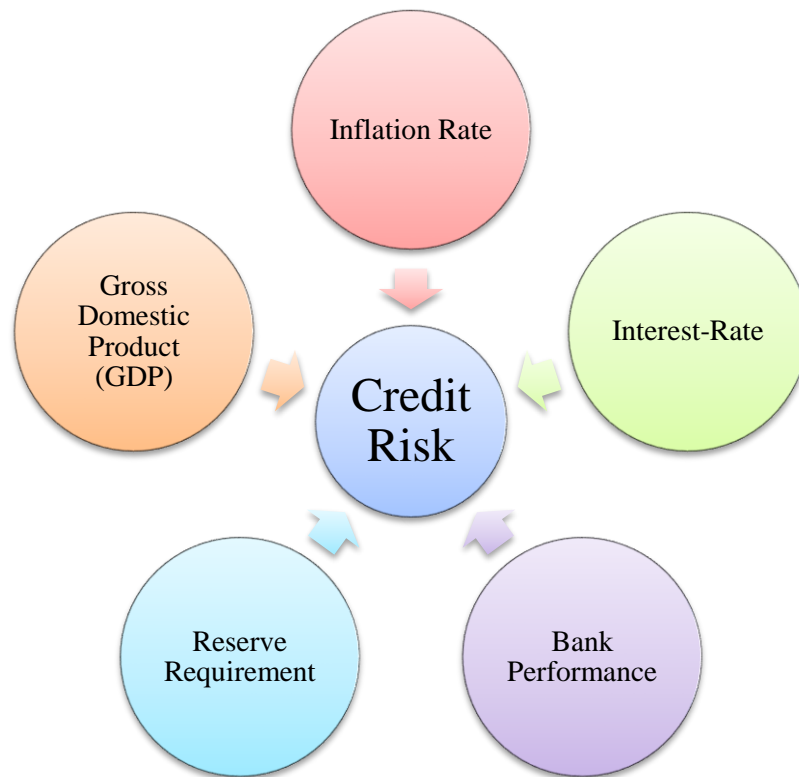
Source: Developed for the research.

Dependent Variable

2.3.1 Bank Credit Risk

This study is using the ratio of non-performing loans (NPLs) to total loans as the indicator of credit risk. A rising NPL ratio in banking assets could indicate the bank management become weak or growth of government-imposed policy

lending (Lu, Thangavelu and Hu, 2005). Besides, Shingjergji (2013) explained that the macroeconomic variables have a significant effect on the non-performing loans. Moreover, Messai and Jouini (2013) also confirmed that macroeconomic conditions affect credit risk, but the shocks to the financial system which NPLs are likely to harm the economic growth can arise from factors specific to the company (idiosyncratic shocks) or macroeconomic imbalances (systemic shocks).

Independent Variables

Economic Factors:

2.3.2 Gross Domestic Products (GDP)

The GDP growth variable is highly significant and negatively correlated with the NPL ratio in both economies whether it is recession as well as expansion. This also means that there is negative relationship between GDP and bank credit risk. Annual GDP growth rate is uses to measure GDP throughout the study. According to Poudel (2013), annual GDP growth rate have a significance effect on the level of non-performing loan. Castro (2013) indicates there is negative relation between GDP and bank credit risk. This is because when there is economy expansion , consumer and firm tends to have enough income and cash flow to repay for their loan whereas when there is a recession or lower GDP growth non-performing loan tend to be increased, which in turn of increase in bank credit risk. Besides, Chaibia and Ftiti (2015), Jakubik (2007) and Louzis et al. (2012) also point out that lower GDP growth will leads to lower credit risk. Non-performing loan will be affected by the slowdown and expansion of the economic growth which continuously affected the bank credit risk. In contrast, there is researcher which found out that there is positive relationship between GDP and bank credit risk. According to Aver (2008), there are positive reactions between GDP and bank credit risk. When

the economy downturn, bank tends to be more careful on selecting the loan borrower and qualifying them based on their creditworthiness and credit condition. Besides, bank will also categorize their client or debtor so that bank can control the amount of non-performing loan which can lead to bank credit risk. The finding is consistent with the study of Poudel (2013) which also shows that there is positive relationship between GDP and bank credit risk.

2.3.3 Inflation Rate

A lot of research has shown that inflation will significantly affect bank credit risk. According to Gunsel (2012) and Badar & Javid (2013), inflation was found to be positive and significantly affecting bank credit risk. Gunsel (2012) said that inflation will increase the credit risk because banks are hard to evaluate the borrower's credit risk during the inflation period, hence nonperforming loan increase. In other hand, Poudel (2013) studies has shown that inflation is negatively correlated with bank credit risk because banks will chose to lend in assured sectors in the economy rather than giving out long term loan during inflation period. Moreover, Zribi & Boujelbene (2011), Vogiazas & Nikolaidou (2011) and Al-Smadi & Ahmed (as cited in Garr, 2004) studies also show that inflation will decrease the bank credit risk. The very recent studies by Washington (2014) and Clementina & Isu (2014) also prove that inflation were significant in explaining banks credit risk. Based on the popularity, Inflation rate is included in the model as it is a significant variable in explaining bank credit risk. It is include in model with the purpose to investigate the relationship between the inflation rate and the bank credit risk on 8 commercial banks in Malaysia for the period 2002 to 2012. According to Badar & Javid (2013), inflation is commonly measured by Consumer price index (CPI). Therefore, for this research, Consumer price index is use as an indicator of inflation.

2.3.4 Interest Rate

Interest rate is included in the model in order to investigate the degree of correlation between the interest rate and credit risk. From the previous research (Castro. 2013), researchers used long term interest rate as benchmark of their analysis. After that, they used real interest rate and interest rate spread (long term vs short term) to represent interest rate rather than long term interest rate to run the test again. Based on the result, the coefficients of these 3 types of variables are remaining positive. Even the result is almost in same direction, but long term interest rate is more appropriate used to measure the effect on credit risk as most of the loan is agreed for long term period and economic agents tends to look at long term interest rate when they take their decisions. Based on the result generated by Castro (2013), it shows that higher interest rate will lead to higher credit for corporate borrower and individual, vice versa. It is important to reinforce the economic environment as it will significantly influence credit risk. Long term interest rate is important to include in the model to measure the effect of credit risk when interest is either higher or lower.

Bank-Specific Factor:

2.3.5 Bank Performance

Bank performance is one of the important bank-specific determinants of credit risk. This study uses net interest margin (NIM) to measure the bank performance. According to Brock and Suarez (2000), NIM is used to measure the cost of financial intermediation which is the difference of cost of interest (loans) paid by borrowers to bank and the interest (deposit) from bank that depositors received. Loan is one of the largest assets for a bank. In addition, credit risk is the probability of losses for a bank due to loan debtors unable to fulfill on time or completely their obligations as stated in the agreement with

bank. Therefore, NIM is best suit to measure the bank performance which is profitability of a bank.

Credit risk is a critical risk to the bank performance, therefore, past researchers have examined the effects of credit risk on banks in various dimensions (Funso, et al, 2012). For an example, Kargi (2011) has evaluated the effect of credit risk on the profitability of banks in Nigerian. From the finding, it showed that an effective credit risk management has significantly affect the profitability of the banks. The research concluded that non-performing loans is inversely influence the profitability of the bank and it will expose the banks to a greater illiquidity risk and distress. Besides, Smirlock (1985) also proposed that best performance banks are more likely to have large amount of loan to be issued as they have a lot of liquidity assets in bank and consequently the loan can be diversified.

Saunders and Schumacher (2000) found that credit risk is to be positively and significantly influence the NIM in developed countries. Besides, the researches by Fuentes and Vergara (2003), Hassan (2005) and Srairi (2010) have concluded that there is a significantly positive relationship exists between credit risk and bank performance. Furthermore, Ben-Naceur and Omran (2008) also found that bank credit risk has significant and positive effect on net interest margin (NIM) as well. On the other hand, Brock and Suarez (2000) has been found that the relationship between credit risk is to be significantly but negatively related to NIM in some Latin American countries. However, the positive relationship between the NIM and bank credit risk only can be applied up to certain level. This is because there will be a negative relationship when a bank has a lot of assets due to agency costs, bureaucratic and other cost of management increase (Stiroh & Rumble, 2006; Athanasoglou, Brissimis, & Delis, 2008).

2.3.6 Reserve Requirement

Reserve requirement is using the required reserve of commercial bank in Malaysia which can be found in Bank Negara Malysia (BNM) in this research. Navneetet. al. (2009), Kugiel (2009), Kolar, Zivkov and Momčilović (2011), Carrera and Vega (2012) and Glocker and Towbin (2012) found that there is a negative relationship between bank credit risk and reserve requirement. This is because increase in required reserve will lead to a reduction of the availability of loan to the customers, so it will reduce the bank credit risk it face because less amount has been loan out. Thus, required reserve can protect the bank from suffering the huge loss or totally loss of the funds they lend out when customers default in their repayment which imply a negative relationship on this variable with credit risk.

However, Valentine (1990) (as cited in Hashim and Halim, 2014) and Poudel (2013) argued that there is a positive relationship between bank credit risk and reserve requirement. When required reserve rate increase, bank tend to impose this additional rate to customer when they want to get a loan, this will increase bank profitability but also will increase the bank credit risk because the additional rate will increase customer's burden and will make them fail to make the repayment, therefore at the end it will increase the credit risk as requires reserve increase.

2.4   Hypothesis Development

Our study included 5 independent variables to examine the effects of economic and bank specific factor on the bank credit risk in Malaysia. The hypotheses are as below:

2.4.1 Gross Domestic Product (GDP)

We test the relationship between gross domestic product (GDP) and credit risk.

H_0: Gross Domestic Product does not have significant effect on bank credit risk

H_1: Gross Domestic Product has significant effect on bank credit risk

GDP is included as one of variables because it is indicate that the cyclical position and healthy of the economy of country. It is because higher GDP indicates that they have higher purchasing power and hence higher ability to pay their loan (David, 2013). Petr (2007) shows that decrease in gross domestic product (GDP) will increase the probability of credit risk since it will lead to decrease in company's profitability, unemployment and value of company's asset. According to the journal (Chaibi & Ftiti, 2013), the researchers stated that borrowers of corporate or individual have sufficient fund to pay back their debt during good economic condition while the ability to pay back loan decline during economic downturn. Therefore, GDP and credit risk is negative relationship.

2.4.2 Inflation rate

We test the relationship between inflation rate and credit risk.

H_0: Inflation rate does not have significant effect on bank credit risk

H_1: Inflation rate has significant effect on bank credit risk

Inflation is one of the main factors that will contribute effect to credit risk. There have no fixed sign between relationship of inflation and credit risk. It is because when there have high inflation, it will reduce the real value of outstanding loan. The actual amount need to pay back is become smaller. However, if the inflation rate is high, the real income of corporate borrower and individual will reduce and hence influence the cash flow for them to pay back the loan (Chaibi & Ftiti, 2013). Credit risk of bank will reduce if there have high inflation. Petr (2007), result of credit risk model show that if there have changes in inflation rate will lead to bad loan. Credit risk become more serious when the inflation increase (John, 2000).

2.4.3 Interest rate

We test the relationship between interest rate and credit risk.

H_0: Interest rate does not have significant effect on bank credit risk

H_1: Interest rate has significant effect on bank credit risk

Interest rate is included as the independent variable in this study. There have positive relationship between interest rate and credit risk. When government lower the interest rate will lead to lower treasury rate as well. Interest payment is lower hence reduce the credit risk (David, 2013). Besides, increase in interest rate will contribute to higher credit risk as well. Because it will increase the household and company's cost of financing and decrease the asset's market value (Petr, 2007). According to the journal (Chaibi & Ftiti, 2013), ability of pay back loan will be weaken when there have an increase in interest rate since it will increase the burden of borrowers of corporate or individual.

2.4.4 Bank performance

We test the relationship between bank performance and credit risk.

H_0: Bank performance does not have significant effect on bank credit risk

H_1: Bank performance has significant effect on bank credit risk

According to the Ravi (2012), he maintained that there have significant negative relationship bank performance and credit risk. Bank need to maximize the bank performance to achieve lower credit risk. (Chaibi & Ftiti, 2013), high quality of management can provide good performances of bank and reduce the bad loan problem.

2.4.5 Reserve Requirement

We test the relationship between reserve requirement and credit risk.

H_0: Reserve requirement does not have significant effect on bank credit risk

H_1: Reserve requirement has significant effect on bank credit risk

Kugiel (2009) indicated that commercial banks are responsible to hold a reserve ratio which acts as a monetary policy's tool by central bank. He also said that increase the reserve ratio will reduce the lending by banks because the funds cannot be generate as loans, and thus reduces the money supply. When bank don't have funds to loan out to customer, the bank credit risk will be reduce as well. Therefore, reserve requirement will negatively and significantly affect bank credit risk in this study.

2.5 Conclusion

This chapter has reviewed each of the factors (gross domestic product (GDP), inflation rate, interest rate, bank performance and reserve requirement) that will affect the bank credit risk based on the studies done by previous researchers. Relevant theoretical models and proposed theoretical/ conceptual framework (show in figure 2.1) also included in this chapter. The hypotheses development in this chapter also has be further discussed in this study. Therefore, chapter 3 will be discussing about the methodology that will be uses in this study.

Chapter 3 Methodology

3.0   Introduction

In chapter 3, the Research Design, Data Collection Methods, Sampling Design and Data Analysis will be discussed in details. All the elements in this chapter were constructed based upon the purpose of the research. Secondary data is used for this research. Data are gathered from World Data Bank and Bank Negara Malaysia covering the time period of 1988 to year 2013.

3.1   Research Design

The main objective of this study is to examine the economic and bank specific factors on bank credit risk in Malaysia for the period of year 1988 to year 2013. This study is a quantitative research as it is use secondary data from World Data Bank and Bank Negara Malaysia. This research is to investigate the relationship between bank credit risk with inflation rate, interest rate, gross domestic product (GDP), bank performance and required reserve. This study uses commercial bank because these are the main player in banking industry which provides variety of financial services and investment products to the customers. The regression model of this study is estimated in the following form:

$$CR = \beta_0 + \beta_1 \, GDP + \beta_2 \, INF + \beta_3 \, INT + \beta_4 \, BP + \beta_5 \, RR + \varepsilon$$

Table 3.1: Definition of the variables

Variables			Description
Dependent variable			
Y	CR	Credit risk	Nonperforming loan
Independent variable			
X1	GDP	Gross Domestic Products (GDP)	GDP growth (annual %)
X2	INF	Inflation rate	Consumer Price Index (CPI)
X3	INT	Interest rate	Real interest rate (%)
X4	BP	Bank Performance	Net interest margin
X5	RR	Required Reserve	

Source: Developed for the research

3.2   Data Collection Method

Data collection plays an important role in a research as it is the most essential information for a study. Besides, the accuracy of a result is depends on the precision of the data and this study used the data collected for analyzing purpose. Basically, data can be categorized into two which are primary data and secondary data. Data can be presented in term of words, numbers, figures or diagrams.

Primary data are information that has not been published. In other words, it is the first-hand-data. The methods for collecting primary data are surveying, experiment, testing or observations. Most of the researchers are choose to use primary data instead of secondary data due to it more credibility as it is based on the target population. On the other hand, secondary data are information that has been published or available to public. Secondary data can be collected from books, newspapers, journals, and electronic sources such as website, e-journals and etc. Secondary data are less time

consuming and costly compare to primary data. This is because the information is collected from previous study by other researchers.

3.2.1 Secondary Data

This study is to investigate the economic (external) factors and bank-specific (internal) factors that influencing the bank credit risk. There are total of 5 variables factors will affect the bank credit risk which has been stated in the previous chapter. The economic factors consist of inflation, interest rate, and gross domestic product (GDP), while the bank-specific factors consist of bank performance and required reserve. Secondary data is used in our study in order to determine the factors of bank credit risk among all the commercial banks in Malaysia. The economic variables such as inflation, interest rate and gross domestic product (GDP) were obtained from World Data Bank while the bank-specific variables such as bank performance and required reserve were obtained from Bank Negara Malaysia.

Table 3.2.1: Data Sources

Types of Data	Sources
Economics (External) Factors	
Gross Domestic Products (GDP)	World Data Bank
Inflation rate	World Data Bank
Interest rate	World Data Bank
Bank-Specific (Internal) Factors	
Bank Performance	Bank Negara Malaysia
Required Reserve	Bank Negara Malaysia

Source: Developed for the research

3.3   Sampling Design

3.3.1 Target Population

In this study, the target population is the banking sector in Malaysia and secondary data was used to carry out the empirical test. Hence, the data collected from all commercial banks in Malaysia.

3.3.2 Sampling Size

Sampling size is the number of units in a population that needed to be examined and studied. In order to get more accurate result, this study tends to use a larger sample size so that it can have a high possibility of perceiving a true result. Therefore, this study uses26 years period of time from 1988 to 2013.

3.4   Data Processing

First, this study will collect the needed data from World Data Bank and Bank Negara Malaysia according to the description that set in table. After that, collected data will be rearranged, edited and calculated in order to become complete data that this study needed. These collected data will become useful data for our research paper. Next, these useful data will be analyzed by using E-views. The next step is interpreting the data after run by E-views. The Econometric Views which also known as E-Views were the technique used to conduct this research. This software is used to analyze the data which this study has collected and to examine the relationship between the economic and bank specific factor with the bank credit risk. E- Views are a software

package that used in econometrics as it can help to provide data analysis, regression and act as an anticipating tool for this research. Besides, this study found some journal articles from UTAR online database such as Science Direct to support the statement.

3.5   Data Analyses

3.5.1   Ordinary Least Square

According to Wooldridge (2009), ordinary least squares (OLS) or linear least squares is a method to estimate the slope and intercept in a linear regression model. Previous studies on bank risk, such as Rubi Ahmad, Skully & Mohamed Ariff (2008) and Washington (2014) used ordinary least squares model (OLS) to estimate their equations. According to Washington (2014), ordinary least squares (OLS) are a suitable model to explain non performing loan time series. Hence this study uses an ordinary least squares (OLS) regression to estimate our equations.

According to Wooldridge (2009), the assumptions of ordinary least squares are:
1) Linear in parameter
2) Random sampling
3) Sample variation in the explanatory variable
4) Zero conditional mean

3.5.2 Inferential Analyses

Diagnostic checking is to test whether our sample is consistent with these assumptions:

1) The model is correctly specified.

2) There is no relationship between independent variables (No multicollinearity).

3) There is no relationship among the error term at the period t and the error term at period before t (No autocorrelation problem)

4) The error term is constant across the number of observations (Homoscedasticity)

5) The error term is normally distributed.

Once achieve above assumptions, E-view result will be accurate and reliable.

3.5.2.1 Model Specification

Specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form, so that regression model will be wrong predicted. If the omitted variable is correlated with the included variable, the estimators are biased and inconsistent. If the omitted variable is not correlated with the included variable, the estimators are unbiased and consistent. Ramsey RESET test is used to see whether our model is correctly regressing.

H_0: the model is correctly specified

H_1: the model is not correctly specified

Decision Rule: Reject H_0 if p-value greater than significance level. Otherwise, do not reject H_0.

3.5.2.2 Multicollinearity

Multicollinearity will occur when some or all of the independent variables are highly correlated with one another. If the multicollinearity occurs, the

regression model is unable to tell which independent variables are influencing the dependent variable. The consequences of Multicollinearity are OLS estimators still Best, Linear and Unbiased, large variances and covariance of OLS estimators, wider confidence interval, insignificant t ratio, high R^2 but few significant t ratio, sensitivity of OLS estimators and their standard errors to small changes in data. There do not have one unique method to detect the multicollinearity problem, it only have some rules of thumb, which are high R^2 but few significant t ratio, high pair wise correlation coefficient and Variance Inflation Factor (VIF) or Tolerance (TOL). In this case, this study chooses to use high pair-wise correlation coefficients method because it can see the correlation of independent variables between each other one by one. If the correlation coefficient is higher than 0.8, it is considered as the model consists of serious Multicollinearity problem.

3.5.2.3 Autocorrelation

When the error term for any observation is related to the error term of other observation, it indicate that autocorrelation problem exist in this model. In the case of autocorrelation problem, the estimated parameters can still remain unbiased and consistent, but it is inefficient. The result of T-test, F-test or the confidence interval will become invalid due to the variances of estimators tend to be underestimated or overestimated. Due to the invalid hypothesis testing, it may lead to misleading results on the significance of parameters in the model. Breusch-Godfrey Serial Correlation LM Test is used to detect Autocorrelation problem.

H_0: There is no autocorrelation problem in the model.

H_1: There is autocorrelation problem in the model.
Decision Rule: Reject H_0 if p-value greater than significance level. Otherwise, do not reject H_0.

3.5.2.4 Heteroscedasticity

Heteroscedasticity means that error terms do not have a constant variance. If heteroscedasticity occur, the estimators of the ordinary least square method are inefficient and hypothesis testing is no longer reliable or valid as it will underestimate the variances and standard errors. There are several tests to detect the Heteroscedasticity problem, which are Park Test, Glesjer Test, Breusch-Pagan-Goldfrey Test, White's Test and Autoregressive Conditional Heteroscedasticity (ARCH) test. In this case, this study chooses to use ARCH test to detect Heteroscedasticity.

H_0: There is no Heteroscedascity problem in the model.
H_1: There is Heteroscedascity problem in the model.
Decision Rule: Reject H_0 if p-value greater than significance level. Otherwise, do not reject H_0.

3.5.2.5 Normality

Normality tests are used to determine if a data set is well-modeled by a normal distribution. With the normality assumption, ordinary least square estimation can be easily derived and would be much more valid and straight forward. This study usesJarqueBera Test (JB test) to find out whether the error term is normally distributed or not.

H_0: Error term is normally distributed
H_1: Error term is not normally distributed
Decision Rule: Reject H_0 if p-value of JB test greater than significance level. Otherwise, do not reject H_0.

3.6   Conclusion

Chapter 3 included data and methodology that will be used to perform data analysis in Chapter 4. This study will use quantitative and secondary data and Ordinary least square method to test the relationship between macroeconomics factors and bank specific factors with credit risk in Malaysia. Besides that, diagnostic tests will be conducted to confirm the reliability of the results. Chapter 4 will show out in details regarding the hypothesis testing and diagnostic tests that have been carried out for the data that had been collected.

Chapter 4 Data Analysis

4.0 Introduction

In the previous chapter , the research methodology which the research design, data collection methods, sampling design, data processing and data analysis have been examine. To ensure the reliability of the data, many tests were implemented. Hence, in this chapter will carry out the description of the data and the empirical result, diagnostic checking and the interpretation of the study on commercial bank and foreign bank in Malaysia. From the E-views result, this study managed to carry out the coefficient, t-statistic, probability, standard error of each variable, the R squared, adjusted R-squared and other information.

4.1 Descriptive Analysis

4.1.1 Normality

Normality test is used to determine whether the error term is normally distributed. The purpose of the JarqueBera test is to make sure that the data set is well-modeled by a normal distribution. The hypothesis for the Normality Test is stated as follow:

H_0: Error term is normally distributed

H_1: Error term is not normally distributed

$\alpha = 0.05$

Decision Rule: Reject H_0 if P value of JB less than significant level 0.05. Otherwise, do not reject H_0.

Table 4.1.1: Result of Normality Test

	Probability (P-value)
JarqueBera Test	0.466500

Source: Developed for the research

JB P-value = 0.466500

Decision Making: Do not reject H_0 since the P-value of JB is 0.466500, which is larger than significant level 0.05 (5%).

Conclusion: There is sufficient evidence to conclude that the error term is normally distributed.

4.1.2 Model Specification

Model specification error occurs when omitting a relevant independent variable, including unnecessary variable or choosing the wrong functional form, so that regression model will be wrong predicted. When the omitted variable is correlated with the variable which included, the estimators will be biased and inconsistent and model specification error will tends to occur. If the omitted variable is not correlated with the included variable, the estimators are unbiased and consistent and model specification error will not occur. Therefore, in order to select a correct estimated model, this research had carry out the Ramsey-RESET Test to check on the model specification.

Table 4.1.2: Result from Ramsey-RESET test

	Test statistic value
Ramsey-RESET test	Prob. F test = 0.0775

Source: Developed for the research

H_0: the model specification is correct

H_1: the model specification is incorrect

Significant Level: 0.05 (5%)

Decision Rule: Reject H_0 if p- value < 0.05. Otherwise, do not reject H_0.

From table 4.1.2, it can be concluded that this research do not reject null hypothesis (H_0) since the p value is 0.0775, which is greater than significance level of 0.05. Thus, it can be concluded that the model specification is correct from year 2003 to 2012.

4.1.3 Autocorrelation

There are 2 types of autocorrelation which are pure autocorrelation and impure autocorrelation. Pure autocorrelation is cause by the underlying distribution of the error term whereas impure autocorrelation is cause by specification bias. Therefore, in order to solve autocorrelation problem, first step is find out whether it is pure autocorrelation or not. If it is pure autocorrelation, it can transform the model by some GLS method such as Cochrance-Orcutt procedure to solve the problem. Besides, if the sample is large enough, Newey-West test can be used for OLS estimator to get corrected standard errors (Gujarati & Porter, 2004). In this study, it used Breusch-Godfrey Serial Correlation LM Test to carry out the autocorrelation test. The p-value is obtained to examine whether the autocorrelation problem occurs in the model. If the p-value is more than 5% significant level, it implies that there is no autocorrelation problem in the model.

Table 4.1.3: Result from Breusch-Godfrey Serial Correlation LM Test

	P-Value	**Decision Rule**
Breusch-Godfrey Serial Correlation LM Test	0.8800	Reject the Ho

Source: Developed for the research

H_0 : There is no autocorrelation problem

H_1 : There is autocorrelation problem

Significant level: 0.05 (5%)

Decision Rule:Reject the H_0 if p-value is less than significant level. Otherwise, do not reject the H_0.

Decision: Reject H_0 since the p-value (0.0088) is less than the significant level 0.05(5%).

Conclusion: There is sufficient evidence to conclude that the model consists of autocorrelation problem.

4.1.4 Multicollinearity

According to the Gujarati (2009), he stated that multicollinearity will occurs If some or all of the independent variables are highly correlated with one another. It will causes the regression model has difficulty telling which independent variables are affecting the dependent variable. If multicollinearity problem too serious in model, this study have to take action to add in other important independent variable or drop unimportant independent variables. There have 3 methods to detect multicollinearity whether seriousness in the model which is high R-squared but few significant t ratios, variance inflation factor (VIF) / Tolerance (TOL) and high pair-wise correlation coefficients. This study chooses to use high pair-wise correlation coefficients method because it can see the correlation of independent variables between each other one by one. If

the correlation coefficient is higher than 0.8, it is considered as the model consists of serious multicollinearity problem.

Table 4.1.4: Result from High Pair-Wise Correlation Coefficients

	NPL	GDP	INF	INT	BP	RR
NPL	1	0.301760	0.301760	0.234542	0.613432	-0.662869
GDP	0.301760	1.000000	1.000000	-0.083876	0.053534	0.000698
INF	0.134649	0.031278	0.031278	-0.167071	-0.082038	0.160579
INT	0.234542	-0.083876	-0.083876	1.000000	0.100978	-0.215981
BP	0.613432	0.053534	0.053534	0.100978	1.000000	-0.517786
RR	-0.662869	0.000698	0.000698	-0.215981	-0.517786	1.000000

Source: Developed for the research

Notes: NPL= Nonperforming Loan

GDP= Gross Domestic Product

INF= Inflation Rate

INT= Interest Rate

BP= Bank Performance

RR= Required reserve

Based on the E-view result, it shows that pair wise correlation between independent variables (GDP, inflation rate, interest rate, bank performance, require reserve) and independent variables respectively. From the wise-pair correlation coefficient, it shows that the entire coefficient is lower than 0.80, it is indicated that there have not serious multicollinearity problem between independent variables.

4.1.5 Heteroskedasticity

When the scatter of the errors is different, varying depending on the value of one or more of the independent variables, the error terms are heteroskedastic (Gujarati & Porter, 2009). Autoregressive conditional heteroskedasticity (ARCH) test is used to test the heteroskedasticity problem in this research. This test is very important because if the model consists of heteroskedasticity problem, the OLS estimator no longer BEST and error variances are incorrect, therefore the hypothesis testing, standard error and confident level will be invalid.

<p align="center">Table 4.1.5: Result from ARCH test</p>

	P-Value	Decision Rule
ARCH Test	0.0643	Do not reject Ho.

Source: Developed for the research

H_0: There is no heteroskedasticity problem.

H_1: There is heteroskedasticity problem.

Significant Level: 0.05 (5%)

Decision Rule: Reject the H_0 if p-value is less than significant level. Otherwise, do not reject the H_0.

Decision: Do not reject H_0 since the p-value is 0.0643 which is more than the significant level 0.05 (5%).

Conclusion: There is sufficient evidence to conclude that the model does not consist of hetetoskedasticity problem.

4.2 Inferential Analyses

Table 4.2: Result of Ordinary Least Square (OLS) Model

Independent Variable	Coefficient Value	P-Value	Sign
Gross Domestic Product (GDP)	0.533408	0.0299**	+
Inflation (INF)	1.492120	0.0518*	+
Interest Rate (INT)	0.324494	0.2200	+
Bank Performance (BP)	2.746671	0.0245**	+
Required Reserve (RR)	-10.59304	0.0034***	−

Source: Developed for the research

R-squared = 0.698578, Adjusted R-squared = 0.623223

F-statistic = 9.270453, Prob (F-statistic) = 0.000109

Notes: ***   significant at 1%

  **   significant at 5%

  *   significant at 10%

The model after tested by Ordinary Least Square (OLS) model:

NPL_t= 98.93246 + 0.533408 GDP + 1.492120 INF + 0.324494 INT + 2.746671 BP

   – 10.59304 RR

The table above shows the empirical result which tested by Ordinary Least Square (OLS) from E-views software. This R-squared of this model is 0.698578, which means that 69.86% of the total variation of credit risk is explained by the total variation of gross domestic product, inflation, interest rate, bank performance and

required reserve. Whereas, the adjusted R-squared is 0.623223, which means that 62.32% of the total variation of credit risk is explained by the total variation of gross domestic product, inflation, interest rate, bank performance and required reserve, by taking into account the number of independent variables and sample size. Besides, F-test is used to test the significance of the whole model at the significant level. From the result shows above, the p-value of F-test is 0.000109 which less than the significant level at 0.05, therefore, it has sufficient evidence to conclude that this model is significant.

4.2.1 Gross Domestic Product

Hypothesis testing of the relationship between gross domestic product (GDP) and bank credit risk:

H_0: Gross Domestic Product does not have significant effect on bank credit risk

H_1: Gross Domestic Product has significant effect on bank credit risk

Conclusion: Reject H_0 since they have positive relationship between gross domestic product (GDP) and credit risk.

Based on the E-view result, it suggests that the coefficient of gross domestic product (GDP) is positive. The expected sign is inconsistent with Jakubik (2007), Louzis et al. (2012), Zribi and Boujelbène (2011), Castro (2013) and Chaibia and Ftiti (2015) which indicates that GDP is negatively significant affect the bank credit risk. However, Poudel (2013) can prove that the result of GDP shows the coefficient estimate is positive. The researcher suggested that there is no any significant relationship between GDP growth and non-performing loan which caused the bank credit risk. The regression result of GDP from Poudel (2013) also show the coefficient estimate is positive. These result also consistent with the research of Aver (2008). According to Poudel

(2013) and Aver (2008) it can be explained that during the economy downturn the bank tends to be more careful and alert in selecting the loan borrower by qualifying them based on their credit condition. In conjunction, the bank will reduce the volume of credit when they found out that the economic growth in low. Besides, the banks will strict in categorized their client and debtor during the economy downturn in order to control the non-performing loan to be increased. The borrower will have to insured by pledge their asset as collateral (Aver, 2008). Therefore, it can say that when GDP growth is low, bank tend to control their non-performing loan in order to ensure that the bank will not expose to the credit risk.

4.2.2 Inflation rate

Hypothesis testing of the relationship between inflation rate and credit risk:

H_0: Inflation rate does not have significant effect on bank credit risk

H_1: Inflation rate has significant effect on bank credit risk

Conclusion: Reject H_0 since they have positive relationship between inflation rate and credit risk.

E-view result suggests that inflation have significant positive relationship with non-performing loan, where significant at level of significant of 0.1 (10%). If inflation increases by 1%, on average, non-performing loan will increase by1.49%, holding other variables constant. This result is consistent with the research of Gunsel (2012), Badar & Javid (2013) and Clementina & Isu (2014) which prove that inflation is significantly and positively affecting the bank credit risk. Gunsel (2012) claims that inflation increase low quality lending because banks are difficult to evaluate the credit risk of borrowers during inflation period, consequently the non-performing loan increase. Badar & Javid (2013) state that increase in Consumer price index (CPI) will force monetary regulators to conduct contractionary monetary policy. Central bank

will raise interest rate to control inflation, however this action will lead to an increase in the cost of borrowing thus will decrease the borrower's ability to repay the loan. Furthermore, a very recent study by Clementina & Isu (2014) state that the borrowers are difficult to repay their existing loans because of the rising cost of capital during inflation period.

4.2.3 Interest rate

Hypothesis testing of the relationship between interest rate and credit risk:

H_0: Interest rate does not have significant effect on bank credit risk

H_1: Interest rate has significant effect on bank credit risk

Conclusion: Do not reject H_0 since they have no relationship between interest rate and credit risk.

From the E-views result, the coefficient of interest rate is positive. It is shows that there has positive relationship between this two variables. According to the researchers, Jacobson, Linde, and Roszbach (2011), they argue that higher short-term interest rates tend to increase the default rates among Swedish firms especially in short run. Landier et al. (2011) stated that increase in interest rate during 2004 could have forced investor to make more risky loans and lead the credit risk increase. Study from Carlos and Javier (2012) indicated that real interest rate will bring positive effect to credit risk.

Moreover, Angeloni and Fala (2009) examines that reduction in interest rate will lower down the bank's funding cost and hence the creditor have more ability to repay the loan. So it proved that there has positive relationship between interest rate and nonperforming loan. Furthermore, the researchers proved that expected sign of interest rate is positive to nonperforming loan due to decrease in interest rate tend to lighten the burden of borrower and lead to decrease in credit risk (Aver, 2008; Louzis, et al. 2011; Nkusu, 2011). Study of researcher, Quagliariello (2007) discovers that the relationship

between interest rate and nonperforming loan is positive. According to the study in Greece, Ireland, Portugal, Spain and Italy (GIPSI) from year 1997 to year 2011, it show the long term interest rate is positively affect the nonperforming loan due to higher the interest rate will increase the obligation of borrower (Castro,2012).

Besides, this result shows that the interest rate is insignificant to the credit risk. However, most of the researchers is support that interest rate is significantly bring effect to the credit risk. It might because of this study uses less sample size to determine the effects of interest rate to the credit risk in commercial bank. According to the Douglas (1999), he stated that if sample size too small, it is possible to cause null hypothesis do not reject even the actual result supposed to be reject null hypotheses. It is because small sample sizes do not enough to determine the differences between the variables. As the study increase the sample size, the standard error will be decrease due to degree of freedom is bigger. It is means that larger sample size support more accurate result (John). Researcher, Arewa (2013) examine that interest rate is negatively bring effect to non-performing loan. However, the result is insignificant for interest rate. She found that she added some insignificant information in to the study so that causes result is insignificant.

4.2.4 Bank Performance

Hypothesis testing of the relationship between bank performance and credit risk:

H_0: Bank performance does not have significant effect on bank credit risk

H_1: Bank performance has significant effect on bank credit risk

Conclusion: Reject H_0 since they have positive relationship between bank performance and credit risk.

From the E-view result, the positive sign shows that there is positive relationship between credit risk and bank performance which is net interest margin (NIM). This result is constant with few researches has been carried out. For an example, Saunders and Schumacher (2000) found that credit risk is to be significantly and positively related to NIM in developed countries. Besides, the researches by Fuentes and Vergara (2003), Hassan (2005) and Srairi (2010) have concluded that there is a significantly positive relationship exists between credit risk and bank performance. Furthermore, Ben-Naceur and Omran (2008) also proved that bank credit risk has significant and positive effect on NIM as well.

Besides, the result which Al-Khouri (2011) has examined the bank's risk characteristics on the bank performance of commercial banks proved that credit risk will influence the bank profitability. Moreover, the study of Boahene, Dasah and Agyei (2012) which examine the connection between credit risk and profitability showed that there is a significantly positive relationship between credit risk and bank profitability. In addition, Kurawa and Garba (2014) also provide additional proves that there is a significant and positive relationship between bank credit risk and profitability of banks in Nigerian.

According to Bektas (2014), it stated that bank spreads and net interest margin have positive and significant effect on the credit risk. In addition, Angbazo (1997), Maudos and Fernandez de Guevara (2004) have stated that there is positive and significant effect between credit risk and net interest margin. Study from Abiola and Olausi (2014) also showed that there is a strong positive relationship between non–performing loans (credit risk) and commercial banks performance (NIM).

4.2.5 Reserve Requirement

Hypothesis testing of the relationship between reserve requirement and credit risk:

H_0: Reserve requirement does not have significant effect on bank credit risk

H_1: Reserve requirement has significant effect on bank credit risk

Conclusion: Reject H_0 since they have negative relationship between reserve requirement and credit risk.

Based on the E-views result, this study found that there is a negative relationship between bank credit risk that represent by non-performing loan and reserve requirement that represent by required reserve in this model. The P-value of reserve requirement is 0.0034 which is significant at the significant level of 0.01 (1%). If required reserve increases by 1%, on average, non-performing loan will reduce by 10.59%, holding other variables constant. The result that this study found show consistent with the result of the following researcher: Navneetet. al. (2009), Kugiel (2009), Kolar, Zivkov and Momčilović (2011), Carrera and Vega (2012) and Glocker and Towbin (2012). Those researchers also prove that there is a negatively significant relationship between bank credit risk and required reserve which indicated that increase in reserve requirement will reduce the availability of funds to loan out to customer and thus reduce the credit risk. Besides, required reserve will limit the choice of manager to invest in any risky investment because lack of funds in the funds, this will also reduces the risk that the bank may face if the investment fails in the future (Tandelilin, 2007 and Bawumia, 2010) (as cited in Garr, 2013).

Besides, this result is found to be contrast with the result from Valentine (1990) (as cited in Hashim and Halim, 2014) and Poudel (2013). They found a positive relationship between bank credit risk and reserve requirement because they believe that bank tend to impose extra interest on the loan and

try to loan out as much as they can to customer when the required reserve increase by the government, so that they can earn more profit when customer repay but it also will increase the credit risk. However, this study believe that Bank Negara Malaysia (BNM) will restrict the bank for impose a high lending rate on the loan to the customer which is to protect customer from being unfairly treat because need to pay more interest. This study also believe that customer will compare the lending rate of each of the bank before they decide to borrow the loan, so if the bank have high lending rate, customer will not borrow from the bank and the bank will have no chance to loan out their fund which eventually reduces the credit risk.

4.3   Conclusion

In conclusion, in this chapter the results of the data analysis on the determinants of the bank credit risk of commercial bank in Malaysia. The result have been reported and conducted in details including the diagnostic checking to ensure the result is consistent. This chapter provides evidence on the significance relationship of the determinants of bank credit risk consist of bank specific factors and economic factors that would have positive or negative effect on the bank credit risk. Conversely, the result also showed some inconsistencies as compared to the researches done by previous researchers. Several reasons will be discussed in Chapter 5. Besides, the Chapter 5 will summarize the major finding, implication, limitations and recommendations for the future research.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0   Introduction

This chapter will discuss and summarize about statistical analysis that was presented in previous chapter. It also included major findings to validate the research objectives and hypothesis in this chapter. It continues with the policy implication, limitation of this study and recommendations for future research based on limitation. Lastly, conclusion of this research project will be provided in this chapter.

5.1   Summary of Statistical Analyses

The objective of this study is to examine the economic and bank specific factors on bank credit risk in Malaysia for the period of year 1988 to year 2013. This study used the Ordinary Least Square Model to investigate the relationship between dependent variables, which is bank credit risk and independent variables. The independent variables consist of economic variables and bank-specific variables. The economic variables are inflation, interest rate and gross domestic product (GDP) while the bank-specific variables are bank performance and required reserve. The empirical results in this study show that inflation, gross domestic product (GDP), bank performance and required reserve have significant impact on bank credit risk except interest rate. Inflation, interest rate, gross domestic product (GDP) and bank performance have positive relationship with bank credit risk while required reserve have negative relationship with bank credit risk. The obtained result of the R-squared indicates 69.86 % of the variation of bank credit risk can be explained by the

variation of gross domestic product (GDP), inflation, interest rate, bank performance and required reserve. The results of diagnostic checking as following:

Table 5.1: Result of Diagnostic Checking

Diagnostic Checking	Test	Decision	Result
Normality of error term	Normality Test	Do not reject H_0	No problem
Heteroskedasticity	ARCH Test	Do not reject H_0	No problem
Autocorrelation	Breusch-Godfrey Serial Correlation LM Test	Reject H_0	Autocorrelation problem
Model Specification	Ramsey RESET Test	Do not reject H_0	No problem
Multicollinearity	High pair-wise correlation	Do not reject H_0	No problem

Source: Developed for the research

5.2 Major Finding

Table 5.2: Summary of Regression Model

	Sign	Significant	Not Significant
(i) There is a significant relationship between bank credit risk and gross domestic product	+	✓	
(ii) There is a significant relationship between bank credit risk and inflation.	+	✓	
(iii) There is a significant relationship between bank credit risk and interest rate	+		✓
(iv) There is a significant relationship between bank credit risk and bank performance	+	✓	
(v) There is a significant relationship between bank credit risk and reserve requirement	−	✓	

Source: Developed for the research

The table above shows that there is a significant relationship between bank credit risk and inflation, bank performance and reserve requirement with the expected sign that consistent with past researcher that discuss in chapter 4.Inflation is positively affect the credit risk because inflation increases low quality lending because banks are difficult to evaluate the credit risk of borrowers during inflation period, consequently the non performing loan increase. Besides, bank performance is positively and significantly affect bank credit risk because when bank generate more profit, they will tend to loan out more funds to customer in order to gain more and more profit which is a objective of every business to gain as much profit as they can, therefore as the amount of funds that loaned out to customer increase, bank will increasingly face credit risk because the probability of customer that fail to repay the loan amount will increase as well. Moreover, the required reserve set by government increase, bank

need to hold more fund from deposit fund which decrease the money supply of the bank and reduce the availability of loan, therefore the bank credit risk will fall. This shows that reserve requirements negatively affect the bank credit risk.

Moreover, this study found that there is a positive and significant relationship between gross domestic product and bank credit risk which is contrast with the past researcher. This is because during the economy downturn the bank tends to be more careful and alert in selecting the loan borrower by qualifying them based on their credit condition, therefore, bank will reduce the volume of credit when they found out that the economic growth in low (Poudel, 2013 and Aver, 2008).

However, this study found that interest rate do not have a significant relationship with bank credit risk although it show that there is a positive relationship, this result contrast with all the past researcher's result that prove that interest rate will affect bank credit risk. According to Douglas (1999), this is because small sample sizes do not enough to determine the differences between the variables and the time period of year 1988 until year 2013 is not enough long to capture the effect of the interest rate towards the bank credit risk in Malaysia.

5.3   Implication of Study

Credit risk has been widely studied in lending decisions. Despite there are advanced measurement techniques in credit and diversification of portfolio, it is still difficult to offset. Indeed, credit risk management is a very difficult and complex task for a bank. Credit risk management plays an important role in banking industry in order to prevent or to minimize the adverse effect. According to Funso, Kolade and Ojo (2012), credit risk management framework is critical for banks to reduce minimize the credit risk of a bank and increase the profitability of the bank as loans are the main source of income of a bank. Besides, they also have proposed the key principle in credit risk management process which is clear structure establishment,

responsibility allocation, and priority of the process. Therefore, strategies for hedging credit risk are needed to prevent or lower the unfavorable effect of credit risk.

Shao and Yeager (2007) suggested that bank can implement credit derivatives which provide a conduit for them that do not have to adjust the loan portfolio. Besides, it also stated that credit derivative is a new source of fee income that helps bank to generate more profit and it offers an opportunity to bank to lower the regulatory capital. Credit default swap is the most common type of credit derivative which is the protection buyer agrees to receive the credit risk from the seller. According to Marsh (2008), it advises bank to lend out as more as they could to riskier borrowers at a lower rate. This is because innovation of credit derivative recently has make improvement of the ability of lender on maintaining the relationship with the borrowers and transfers the credit risk to other institutions.

Second, banks must compliance to Basel Accord which is an international principles and regulations that provides guidelines on the operation of the bank in order to ensure the soundness and stability of the bank structure. By compliance with the Accord, it can enable the bank to recognize, generate, track and record the data of related risk in a manner form, more transparent and auditable, and it creates an opportunity to bank to enhance the risk management processes of banks. Furthermore, responsibilities and obligations of bank have been provided in The New Basel Capital Accord to assists the bank in adopting sound credit risk management practices and evaluate the capital adequacy requirement set by regulators (Chen and Pan, 2012).

According to Kurawa (2014), it stated that application of risk evaluation technique is a fundamental for banks to control the credit risk, improve the efficiency in analyzing credit and for loan officer to secure their assets and minimize the high incidence of non-performing loans. Moreover, adoption of a sound lending policy is one of the important credit risk management strategy for bank. The lending policy is a guideline for a bank when granting a loan to customers. Lending policy is the easiest and cost-efficiency way to bank for managing the credit risk. Besides, lending policy of the bank mostly will be in line with the particular bank overall strategy. In addition, factors that needed take into account when creating a good lending policy are existing

credit policy, industry criterion, economic condition of the country and others (Kithinji, 2010).

Last but not least, bank can communicate and build a good relationship with credit bureau. Credit bureau is an institutions that collects and manages personal information, then sells the information to banks as bank have to evaluate the creditworthiness of the borrower before granting loan to them. Information needed for evaluating the characteristics of the borrower are character, capacity, capital, collateral and condition (5Cs). Besides, there is a credit scoring model for loan officer to assign points to the customers based on the characteristics of the borrowers. While in the judgment procedures, the loan officer will evaluate the information of the borrowers based on the lending guidelines.

5.4   Limitation of study

There are some limitations throughout this study. Firstly, there are limited resources in finding the articles and journal. In chapter 2, it is responsible to find as many journals as possible so that this study can do some literature review from the past researcher. But some journal and articles need to be purchased with cash which limiting the flow of searching the journal in order to support this research paper. There are many journals which are suitable for this study but most of them need to purchase it with cash. This becomes a problem for us in finding information for literature review.

Moreover, bank credit risk can be affected by many determinants such as unemployment rate, management efficiency and financial crisis. This study wish to include financial crisis in this research paper but due to resource constraint this study does not included financial crisis in this research paper. This is because there is not enough annual report of most of the bank for the year before 2000 so it might lead to inaccurate result when it comes to data analysis. Therefore, this study decided not to include too much variable to avoid inaccurate result.

Besides, data constraint also reason which make the Eviews result insufficient and inadequate. This study wishes to increase the sample size in order to get a better result. But the period of study mostly can be determined limited to 26 years which is from 1988 to 2013. This is due to some of the sample bank only release their most recent year annual report. Due to that, the result will less precise and less accurate compared having longer period.

5.5 Recommendation for Future Research

This study is focus on commercial bank of local bank and foreign bank in Malaysia. However, this study is only useful to be used in Malaysia or other country with similar characteristic. Future researchers are suggested to include foreign countries in the study. Hence, it will provide a better comparison of credit risk with Malaysia's commercial bank and foreign commercial banks.

Since this study does not take financial crisis as one of variables in the model, this study suggest that future researchers can consider including Asian financial crisis during 1997 and 2008 as dummy variable for further study. Financial crisis are considered one of the important factor that will bring effect to the credit risk. It is because this study believes that financial crisis will significantly influence the credit risk.

Besides, this study tests the determinants of credit risk in Malaysia during year 1988 to 2013 (26 years) with 5 dependent variables. The sample size of this study is 20 (26-5-1) in total. In fact, the sample size is small and not enough for us to obtain an accurate and precise result as this study use annual data instead of quarterly data or monthly data. In order to increase sample size, future researchers may extend the period of study by use monthly data or quarterly data for future study. As the sample size becomes larger, the result that this study obtains will become more accurate and precise, because increase in degrees of freedom enables them to get more reliable and comprehensive result.

Lastly, this study would like to recommend useful quantitative data analysis software, Stata for future researcher to run regression analysis and diagnostic checking test. Stata is user friendly software and it is very easy, fast and accurate to run the result. It provides everything in one package. It provides broad suite of statistical features since it consists of 100 statistical tools in software. This software can give u 100% control on all types of data since it have a strong data-management features.

5.6 Conclusion

This main objective of this study is to carry out the macroeconomics factors and bank specific factors will affect the credit risk in commercial bank in Malaysia regardless local bank or foreign bank. The predictor variables of macroeconomics factors include GDP, interest rate and inflation while predictor variables of bank specific factors include required reserve and bank performances. OLS (Ordinary Least Square) method is the method that this study uses to analysis the time-series data in the study while E-views is the main software that this research used to run the result. Furthermore, this study uses annually data to test the effects on credit risk in Malaysia during year 1988 to year 2013. The sample size is 20 in total.

This chapter discussed summary of statistical analysis and major findings of this study. Besides, practical implication for policy makers, limitation of this study faced when carrying out this study and come along with recommendation for further study also included in this chapter. In short, this study has achieved its main objective to finding the determinants of credit risk in Malaysia regardless local bank and foreign bank during year 1988 to 2013. This study can act as reference for future researchers to further study about determinants of credit risk.

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APPENDICES

Appendix 1.1

Ordinary Least Square Regression

Dependent Variable: NPL
Method: Least Squares
Date: 02/12/15   Time: 23:02
Sample: 1988 2013
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.533408	0.228092	2.338565	0.0299
INFLATION	1.492120	0.721465	2.068180	0.0518
INTEREST_RATE	0.324494	0.256299	1.266075	0.2200
BANK_PERFORMANCE	2.746671	1.128649	2.433593	0.0245
REQUIRED_RESERVE	-10.59304	3.189296	-3.321434	0.0034
C	98.93246	34.47106	2.870015	0.0095

R-squared	0.698578	Mean dependent var	8.523077
Adjusted R-squared	0.623223	S.D. dependent var	7.313402
S.E. of regression	4.489124	Akaike info criterion	6.040366
Sum squared resid	403.0446	Schwarz criterion	6.330696
Log likelihood	-72.52476	Hannan-Quinn criter.	6.123971
F-statistic	9.270453	Durbin-Watson stat	0.798198
Prob(F-statistic)	0.000109		

Appendix 1.2

Histogram- Normality Test

Series: Residuals	
Sample 1988 2013	
Observations 26	
Mean	-8.54e-16
Median	1.206977
Maximum	6.711619
Minimum	-8.092615
Std. Dev.	4.015194
Skewness	-0.455176
Kurtosis	2.239113
Jarque-Bera	1.524996
Probability	0.466500

Appendix 1.3

Ramsey RESET Test

Ramsey RESET Test:

F-statistic	3.484435	Prob. F(1,19)	0.0775
Log likelihood ratio	4.377993	Prob. Chi-Square(1)	0.0364

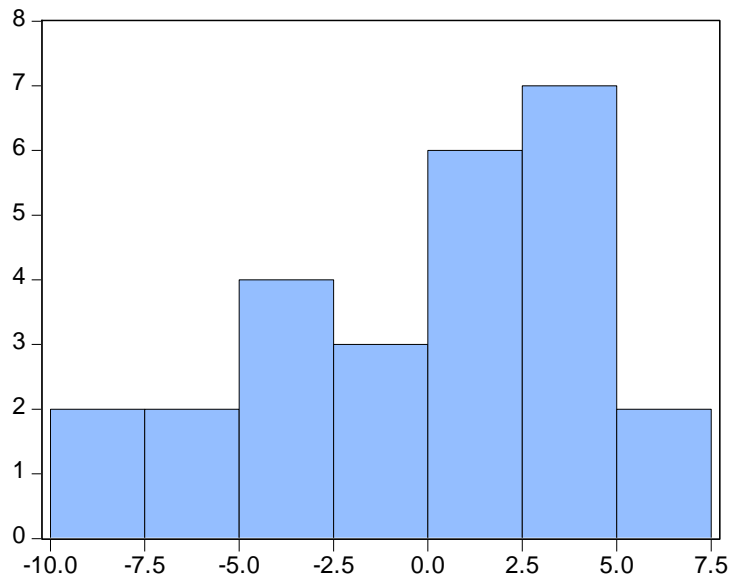Test Equation:
Dependent Variable: NPL
Method: Least Squares
Date: 02/12/15   Time: 23:27
Sample: 1988 2013
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.207194	0.277160	0.747562	0.4639
INFLATION	0.880578	0.755200	1.166019	0.2580
INTEREST_RATE	0.159548	0.257369	0.619918	0.5427
BANK_PERFORMANCE	0.891023	1.456477	0.611766	0.5479
REQUIRED_RESERVE	-5.119710	4.200613	-1.218801	0.2378
C	50.62485	41.55340	1.218308	0.2380
FITTED^2	0.026141	0.014004	1.866664	0.0775

R-squared	0.745290	Mean dependent var	8.523077
Adjusted R-squared	0.664855	S.D. dependent var	7.313402
S.E. of regression	4.233851	Akaike info criterion	5.948905
Sum squared resid	340.5844	Schwarz criterion	6.287623
Log likelihood	-70.33577	Hannan-Quinn criter.	6.046444
F-statistic	9.265777	Durbin-Watson stat	0.835551
Prob(F-statistic)	0.000081		

Appendix 1.4

Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	6.236843	Prob. F(2,18)	0.0088
Obs*R-squared	10.64249	Prob. Chi-Square(2)	0.0049

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 02/12/15   Time: 23:26
Sample: 1988 2013
Included observations: 26
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-0.017294	0.199547	-0.086665	0.9319
INFLATION	-0.361890	0.598962	-0.604196	0.5533
INTEREST_RATE	-0.143447	0.211677	-0.677668	0.5066
BANK_PERFORMANCE	0.058322	0.914511	0.063774	0.9499
REQUIRED_RESERVE	0.249953	2.667459	0.093705	0.9264
C	-1.021198	28.56003	-0.035756	0.9719
RESID(-1)	0.780883	0.231574	3.372062	0.0034
RESID(-2)	-0.252941	0.252214	-1.002883	0.3292

R-squared	0.409326	Mean dependent var	-8.54E-16
Adjusted R-squared	0.179620	S.D. dependent var	4.015194
S.E. of regression	3.636755	Akaike info criterion	5.667721
Sum squared resid	238.0678	Schwarz criterion	6.054827
Log likelihood	-65.68037	Hannan-Quinn criter.	5.779193
F-statistic	1.781955	Durbin-Watson stat	1.965997
Prob(F-statistic)	0.152856		

Appendix 1.5

High Pair-Wise Correlation Coefficients

	NPL	GDP	INFLATION	INTEREST_RATE	BANK_PERFORMANCE	REQUIRED_RESERVE
NPL	1.000000	0.301760	0.134649	0.234542	0.613432	-0.662869
GDP	0.301760	1.000000	0.031278	-0.083876	0.053534	0.000698
INFLATION	0.134649	0.031278	1.000000	-0.167071	-0.082038	0.160579
INTEREST_RATE	0.234542	-0.083876	-0.167071	1.000000	0.100978	-0.215981
BANK_PERFORMANCE	0.613432	0.053534	-0.082038	0.100978	1.000000	-0.517786
REQUIRED_RESERVE	-0.662869	0.000698	0.160579	-0.215981	-0.517786	1.000000

Appendix 1.6

Heteroskedasticity Test- ARCH Test

Heteroskedasticity Test: ARCH

F-statistic	3.776976	Prob. F(1,23)	0.0643
Obs*R-squared	3.526328	Prob. Chi-Square(1)	0.0604

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/12/15   Time: 23:26
Sample (adjusted): 1989 2013
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.923401	4.541394	2.185100	0.0393
RESID^2(-1)	0.374692	0.192798	1.943444	0.0643

R-squared	0.141053	Mean dependent var	15.80092
Adjusted R-squared	0.103708	S.D. dependent var	17.89279
S.E. of regression	16.93959	Akaike info criterion	8.573802
Sum squared resid	6599.841	Schwarz criterion	8.671312
Log likelihood	-105.1725	Hannan-Quinn criter.	8.600847
F-statistic	3.776976	Durbin-Watson stat	1.637221
Prob(F-statistic)	0.064298		