DETERMINANTS OF NON-PERFORMING LOAN IN MALAYSIA

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APRIL 2018

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A research project submitted in partial fulfillment of the requirement for the degree of

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(HONS) BANKING AND FINANCE

UNIVERSITI TUNKU ABDUL RAHMAN

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APRIL 2018

DECLARATION

We hereby declare that:

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

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

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

(4) The word count of this research report is 14882 words.

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Date: 11th April 2018 .

ACKNOWLEDGEMENTS

This research project has been successfully completed with the assistant and support from countless parties. We would like to take this opportunity to show great appreciation for lending a helping hand to complete this research project.

First of all, we express appreciation to Universiti Tunku Abdul Rahman (UTAR) for giving us this opportunity to conduct this research. The learning experience in the progress of this research has benefit us in many ways as well as deepens our knowledge on banking sector in Malaysia. Secondly, we would like to express gratitude to our honored supervisor, Encik Ahmad Harith Ashrofie bin Hanafi from the Department of Finance, UTAR. We are extremely grateful for his patience to help us with the questions that arises in the progress of this research. Besides that, he provided clear direction as well as give valuable advice throughout this research project. We are much grateful for the time that Encik Ahmad Harith had taken to help us with this research project.

Next, we would like to thank our coordinator, Cik Nurfadhilah binti Abu Hasan, for giving guidelines and explanation on the research project. On the other hand, we would like to thank our second examiner, Mr Ravindran a/l Raman as well, who had given useful comments on this research paper. Lastly, we also like to thank our parents and friends who gave full support to each of our members throughout the process of completing this research project.

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LIST OF ABBREVIATIONS

ARCH	Autoregressive Conditional Heterscedasticity
BLUE	Best Linear Unbiased Estimator
BNM	Bank Negara Malaysia
CESEE	Central, Eastern and Southeastern Europe
CV	Critical Value
DR	Decision Rule
EViews	Econometric Views
FSA	Financial Services Act
FD	First Difference
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
IFSA	Islamic Financial Services Act
IR	Inflation Rate
JB	Jarque-Bera
LM	Lagrange Multiplier
LR	Lending Rate
NPL	Non Performing Loan
OLS	Ordinary Least Square
RESET	Regression Equation Specification Error
TOL	Tolerance

TS	Test Statistic
UR	Unemployment Rate
VIF	Variance Inflation Factor

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PREFACE

This paper is conducted under the title of "DETERMINANTS OF NON-PERFORMING LOANS IN MALAYSIA". Non-performing loan (NPL) is an ongoing issue that banking institution is concern about. One of the factors that causes cost inefficiency that leads to bank failure and financial crisis is the NPL problem when banking institution did not manage well their NPL level. Next, regulatory authorities and management of banks were advised to reduce NPL rate in individual banks. Banking information context in this paper are able to enhance reader's knowledge on banking industry.

ABSTRACT

This research paper focuses on examining the independent variables affecting Non-Performing Loan (NPL) banks in Malaysia. Lending Rate (LR), Unemployment Rate (UR), Inflation Rate (IR) and Gross Domestic Product (GDP) are the variables that will be used to conduct the research. Data of variables was collected on yearly basis from year 1987 to 2016, consisting sample size of 30 observations for each variable. Data was obtained from Bank Negara Malaysia (BNM) statistics database and The World Bank statistics database. Ordinary Least Square (OLS) regression method will be used for this research and Econometrics View (EViews) program will be used to test the presence of econometrics problem. The results of the research revealed that LR and UR have a significant relationship with NPL, whereas IR and GDP have an insignificant relationship with NPL.

CHAPTER 1: RESEARCH OVERVIEW

1.1 Overview

Commercial bank acts as a bank or institution and it is also known as an essential part to the economic development (Saini & Sindhu, 2014). The daily routine services provided by commercial bank are receiving the customer's deposits, issuing loans which is more typically for business and also some investment products (Saini & Sindhu, 2014). Besides than business sectors, commercial bank also serves other sectors such as individuals and government. Normally, commercial bank will get the profits from deposit when the customers keep or save their money in the bank. Customers save their money into the bank account and earn the interest rates according to the bank they referred (Saini & Sindhu, 2014). When they save more money, they can earn more through the interest rates offered by the bank. At this time, commercial bank will use the money in the bank for some lending activities and earn the profits from the interest rate. Commercial bank will also take the deposits and lend it out to those who request to the bank to borrow money. These customers are known as borrower and the lender will be commercial bank. There are many types of loan, some loans are long term and some are short term. No matter what types of loan that the borrower applies, the loan will be non-performing as long as the borrower is not able to pay off their loan payment.

Sometimes, the borrower may not be able to repay the amount they borrow in the time period given that agreed with the bank, these types of loans are grouped under non-performing loan (NPL). Regarding to International Monetary Fund (IMF), NPL exists when the borrower has an outstanding payment for more than 90 days; or when the interest has been renegotiated, deferred or promoted for

more than 90 days; or on the other hand instalments are under 90 days past due yet are never again foreseen (Chavan & Gambacorta, 2016). It will cause the commercial bank to be in trouble if the cases of NPL are getting more because it affects the performances of the bank if the bank has a lots of NPL cases which means a lots of debtors are unable to pay back the debts. In addition, the bank will have a lower cost efficiency if the bank has serious NPL problems (Karim, Chan & Hassan, 2010). As a results, commercial bank shall reserve a specific amount of the profits for loan loss provision to ensure and defend their different kinds of situations. It will minimize the bank's volatility and reduce the probability of getting bad performances to remain their reputation. This study focus and concentrate on the determinants that may influence NPL and discover the factors that may likely to give impact on bank's NPL in Malaysia. In addition, other parts like research background, problem statement, research questions, objectives, hypothesis of study, significance of this research and chapter layout also included in this chapter too.

1.2 Research Background

Financial Institution is a foundation that handles financial transaction. Investments, deposits and loans are the examples of financial transaction. According to Chinweoke, Onydikachi and Elizabeth (2014), one of the exercises of financial institutions (banks) includes intermediating between the surplus and shortage parts of the economy. The intermediary (Financial Institutions) will become a middleman which collects deposits from the surplus units (savers) and look for a suitable deficit unit (borrower) to lend for it on behalf on the institutions and receive interest payment. Based on the information given by the Bank Negara Malaysia (BNM), Malaysia has twenty-eight licensed Commercial Banks, sixteen licensed Islamic Banks, two International Islamic Banks, eleven Investment Banks and two Financial Institutions which are qualified to provide loans to the public.

NPL is the total of acquired cash whereupon the indebted person did not make his planned instalments in more than 90 days. Normally, a NPL will be in 2 conditions which is in default or being nearly to be default. There were reasons such as debtors were facing bankruptcy caused uncertainty that the debtors will pay in full amount of debt repayment. Once the loan default, the chances of reimbursed in full are still consider to be generously lower. After a loan was known as nonperforming, it should be stayed as nonperforming unless the loan was written off or a subsequent loan were being replaced and paid the interest along with or without the principles (Bloem & Freeman, 2005).

Most of the banks in Malaysia often faced the problems caused by NPL. Some banks may have their own ways to solve the NPL' problems, but majority of the banks will apply for debt collection agencies to recover the debts. Therefore, debt collection turned out to be a profitable business for communities, and a "good business opportunities" mind-set was instilling to the public's mind. In 2009, a solution was proposed from the Finance Minister to protect the banks. The Finance Minister approved the banks action to be legal which they were doing illegally stated under the law. There were many problems and questions occur regarding the Finance Minister's Act.

According to Klein (2013), the NPL were essential since they will influence the financial intermediation function of commercial banks which represents the primary source of the banks' income, and most importantly was the stability of a financial economy. From other perspectives, the aim of this study was to determine the variables which will affect the NPL in Malaysia in order to have more understanding regarding the causes of NPL and helps to improve the economic conditions in Malaysia.

1.3 Problem Statement

Adebola, Yusoff and Dahalan (2011)'s studies had shown that global financial crisis (2007-2009) originate from US, was due to default of borrowers to payoff sub-prime mortgages. However, this issue was not only affecting developed countries as high level of NPL caused a few banking crisis in Sub-Saharan African and East Asia countries. According to Barr, Seiford and Siems (1994), they indicated NPL had increased world wide's intention for thirty to forty years as arising of NPL were the cause of banking industries crisis and failures. NPL was probably going to hamper financial development and decrease the economic efficiency. The shock to the financial system emerge from factors particular to the bank or economic conditions. In general, the researches adopted from the developed economies have confirmed that economic conditions do influence credit risk (Ekanayake & Azeez, 2015).

According to Polodoo, Seetanah, Sannassee, Seetah and Padachi (2015), the financial and economic crisis caused NPL level to increase throughout the worldwide. When the banks faced the economic or financial crisis, they protected themselves through diversifying their markets or product to stay away from the losses, but then it led to a raise of NPL level. Banking industry then became weaker towards both domestic and foreign market resulting in global adverse shocked to the entire global economy (Polodoo et al., 2015). NPL were also linked with the credit risk which will influence the global economy and the ability of banks to provide credit will be disrupted (Ghosh, 2017).

Škarica (2014) stated that NPL growing to high level had turned into a serious issue to be concern. Based on the past financial crisis, it showed a "clean-up" of the financial sector was needed for a lasting recovery. Besides, it was certain about NPL draw in uncertainty and affected the banks' decision and ability to continue loaning to individual and businesses, thus influencing the aggregate demand and investments. Besides, unsettled NPL will overthrow the economic

activity which were now having too much borrowers and keeping the assets in an unproductive situation.

According to Ghosh (2015), a bank's NPL level will lead to a series of liquidity and profitability risk faced by the bank, as NPL linked to bank crisis and bank failures. It does not only affect the bank assets condition, but it also affected the entire banking system and at the same time reduced the economic efficiency. Obviously, the higher the level of NPL, the higher risk exposure will be faced by the banking industry. Guy and Lowe (2011) commented that when the NPL rise, it will cause the unemployment rate to increase but the aggregate demand to decrease and it will further affect the banks' capital adequacy. Moreover, the NPL also affected the political issues, such as increasing government tax rate will lower citizens or businessman's disposable income. It means that the NPL affected the banking industry, individual and businesses in the same way.

Based on the studied of Roy (2014), NPL had turned into a serious concerned matter since the Asian crisis (1997-1998) hit hard the "Asian Tigers" included countries such as Indonesia, Thailand, China and Malaysia. Furthermore, due to poor financial performance and increasing in NPL, most of the banks in Malaysia had restricted their lending policy after the Asian Financial Crisis (1997-1998), therefore it caused a lots of entrepreneurs and organizations unable to get sufficient fund from banks to cover those high expenses business operations. Moreover, the capacity of those local banks with smaller size to survive through the losses caused by NPL and a declining operating profits during the crisis was also a big problem (Khong, Tee, Tan, Low & Lim, 2015).

In the other hand, Karim, Chan and Hassan (2010) stated that the economy growth and innovation of Malaysia and Singapore were constrained by bank because the accumulation of NPL had destroy the bank's capital. In spite of the fact that the NPL ratios of Malaysia have decrease recently but the decreasing of NPL ratio was due to the bank have conducted and transferred a large amount of NPLs to

public asset management companies. However, the researchers carry out there was a improving in NPL in both Malaysia and Singapore. The improving was established by re-categorised the NPL to performing status and recovery including the attempted to achieve good condition of balance sheet through loan write-off.

Malaysia suffered losses from financial crisis and it affects Malaysia's banking institution. Commercial bank, merchant bank and finance company which are the 3 main types of banking institutions have incurred high net NPL ratios that average increase 7.4 percent from 1997 to 1998. The NPL in 1988 is 30.1 percent and it keeps on decreasing until 1996 which is 3.7 percent but it started to rises to 4.1 percent and increase steeply which reached 11.8 percent in 1998. It shows that the huge gap exists from 1997 to 1998 and it contributed the worsening of asset quality of financial institution.

For the serious problems of NPL in Malaysia, government implemented many ways to change the situation. Danaharta which established in 1998 is one of the assets management company to purchase the NPL from the financial institutions and their value will be recovered back (Zakaria, Hussin, Noordin & Sawal, 2010). Moreover, financial institutions recapitalized by Danamodal in the stabilization phase through injected RM64 million into financial institutions in Malaysia to increase capital adequacy ratio (Zakaria, Hussin, Noordin & Sawal, 2010). The established of the Corporate Debt Restructuring Committee (CDRC) also assist companies to restructure and it is not assisted by government (Zakaria, Hussin, Noordin & Sawal, 2010). These are some recover plans that support financial institutions in Malaysia reduced the amount of NPL. As a results, explanatory variables stated in this study such as IR, UR, GDP and LR are considered to examine the relationship with NPL.

1.4 Research Objectives

Research objectives will be achieved upon completion of this study. In the results and interpretation segment will provide a more in-depth and detail information to better understand the purpose of this research. The main purpose of this research was to conduct a detailed and comprehensive analysis of the factors affecting the level of NPL, and providing solutions for this issue.

1.4.1 General Objective

According to the research problem statement, NPL is a continuous issue that raised every country's attention. NPL does not only incur cost from a non-earning asset, it also affected the efficiency and strategy of the banking system when solutions to deal with numbers of underperforming assets was limited. Therefore, this study aimed to examine how factors affected the NPL in Malaysia.

1.4.2 Specific Objective

This research focused on Malaysian credit providing institutions, whether it be conventional and Islamic. The main interest was to examine the relationship between NPL and factors included Lending Rate (LR), Unemployment Rate (UR), Inflation Rate (IR) and Gross Domestic Product (GDP). Objectives are stated as below:

i) To examine the relationship between LR and NPL.

ii) To examine the relationship between UR and NPL.

iii) To examine the relationship between IR and NPL.

iv) To examine the relationship between GDP and NPL.

1.5 Research Questions

Four research questions were formed in order to examine the specified objectives above:

i) Does LR have a significant effect on NPL?

ii) Does UR have a significant effect on NPL?

iii) Does IR have a significant effect on NPL?

iv) Does GDP have a significant effect on NPL?

1.6 Hypotheses of Study

Hypothesis is a supposition of outcome based on limited evidence as a guide for this research. It shows the relationship of two variables. Therefore, both null hypothesis and alternate hypothesis for the factors in this study are presented as below:

1.6.1 Lending Rate

The null hypotheses, $H_{0,}$ for independent variable LR in this research conclude that there is no relationship between LR and NPL. Whereby for the alternate hypotheses, $H_{1,}$ shows the relationship is found between LR and NPL.

H_0 : There is no relationship between LR and NPL.

H_1 : There is a relationship between LR and NPL.

1.6.2 Unemployment Rate

The null hypotheses, $H_{0,}$ for independent variable UR in this research conclude that there is no relationship between UR and NPL. Whereby for the alternate hypotheses, $H_{1,}$ shows the relationship is found between UR and NPL.

H_0 : There is no relationship between UR and NPL.

H_1 : There is a relationship between UR and NPL.

1.6.3 Inflation Rate

The null hypotheses, $H_{0,}$ for independent variable IR in this research conclude that there is no relationship between IR and NPL. Whereby for the alternate hypotheses, $H_{1,}$ shows the relationship is found between IR and NPL.

H_0 : There is no relationship between IR and NPL.

H_1 : There is a relationship between IR and NPL.

1.6.4 Gross Domestic Product

The null hypotheses, $H_{0,}$ for independent variable GDP in this research concluded that there is no relationship between GDP of a country with its NPL. Whereby for the alternate hypotheses, $H_{1,}$ shows that there is a relationship between GDP of a country with its NPL.

H_0 : There is no relationship between GDP and NPL.

H_1 : There is a relationship between GDP and NPL.

1.7 Significance of Study

This research topic had raise different types of questions regarding the significance of this research on the factors of NPL in Malaysia. This study's main focus was to examine the relationship of NPL and the independent variables namely LR, UR, IR and GDP. Results and interpretation of this study was believed to be beneficial to several parties upon completion of this study.

This research was important to clearly explain the nature of NPL. Lower level of NPL resembled a sound banking system and lesser loan losses. On the other hand, high level of NPL within the banking system indicated the instability and insecurity of the banking system. The results and interpretations from this study can provide a detailed information for readers and researchers regarding the issues of NPL in Malaysia and how was it affecting the Malaysian banking system. Future researchers will be able to broaden their studies and knowledge regarding this research topic.

In addition, this topic of research was an important source to let other parties understand the causes of NPL and the problem associated with it. Banks will be able to modify their current strategies based on information provided by this research to overcome any problems that surfaced. Besides that, this information can guide or facilitate banking institutions to make lending decisions based on their customers' creditworthiness and rating, enabling them to reduce the probability of loan losses. This study encouraged banking institutions to deepen their knowledge on the factors on NPL. The accurate and informative interpretation of the results will be beneficial for several parties where this will be further discussed in another chapter of this paper.

Furthermore, generally, the main objective of Bank Negara Malaysia is to promote the monetary stability and sound financial structure. This research will contribute an advantage for BNM the level of NPL in Malaysia currently and it enable for BNM to implement the policies. By implement the policies, BMN are able to manage the level of NPL as well as improve the NPL level.

1.8 Chapter Layout

There were five major chapters in this research paper. This chapter was basically focusing on the general concept and briefly background of the research paper. Furthermore, chapter two consisted of literature reviews of the relevant studies done by previous researchers in this field. The following chapter, chapter three presented the overview of the research methodology which describe the ways to collect the data and the methods used. In chapter four, E-Views will be used to analyse all the empirical testing and interpretation will be made for every results. It involved the investigation on the significant and insignificant relationship between the factors on the NPL. Finally, for chapter five, the research will be completed by concluding the overall research paper from chapter one to four with

summarise of the entire research paper and conclude of major finding. Besides, implications, recommendations and limitation will be proposed for future studies.

1.9 Conclusion

This research's purpose was to find out which factors will affect the Malaysia's NPL. By referring to the last studies done by other researchers, it showed that this topic was still worth for further inquiry since NPL is a major and continuing issue for all countries. In this research, variables such as IR, UR, LR and GDP were used to determine the factors of NPL in Malaysia. Furthermore, some problem caused by NPL towards the economy and financial institution of a country were found and being analysed. Besides, the examination of the reason of NPL in Malaysia is also important since this study would provide significant of this study that contribute and provide advantages to the other researchers, BNM and regulatory authorities as well as the banking industry in particular. The completed literature review of objectives and findings would be show in next chapter.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview

In chapter 2, the aim was to cover all analysis of the studies that were related to this research which have been completed by the researchers before. In this research, there were four factors in total that will be tested for the response of the banks' NPL. The variables were LR, UR, IR and GDP. Thus, to provide a basic understanding about the determinants of a banks' NPL, studies on all relevant journals were clarified and summarized. Furthermore, this chapter will further discuss about the suggestion of theoretical framework through diagram to check the relationship between the determinants and NPL.

2.2 Review of Literature

2.2.1 Non-Performing Loans (NPL)

Nowadays, NPL is a major and continuing issue for all countries and therefore NPL had become a common research topic for the researchers. As a result, there were a lots of researchers had done their research in different countries around the world. There were some past empirical literatures from the researchers that focuses on only a few countries, for example: CESEE countries (Škarica, 2014; Jakubík & Reininger, 2013; Klein, 2013). On the other hand, there were also researchers that focus only one country, such as Malaysia (Adebola, Yusoff &

Dahalan, 2011; Karim, Chan & Hassan, 2010; Murthy, Kamil, Mariadas & Devi, 2017; Asari, Muhamad, Ahmad, Latif, Abdullah & Jusoff, 2011), Nigeria (Akinlo & Emmanuel, 2014; Karim, Ahmad & Muhammad, 2010; Morakinyo & Sibanda, 2017; Adeola & Ikpesu, 2017), Indonesia (Alexandri & Santoso, 2015), Pakistan (Ahmad & Bashir, 2013), Namibia (Sheefeni, 2015) and others.

Furthermore, according to Saba, Kouser and Azeem (2012), NPL also had many researches because it is a significant factor towards the survival of banks. They also stated that financial crisis, bank's earning decrease and extra flexible credit rationing policy are also the impact caused by high rate of NPL. Besides, NPL ratio can be used to measure the performances of a bank, the economy of a country and its financial status. The issue of NPL are getting more attentions from the global as the sub-prime loan borrowers increased rapidly after the financial crisis (Vatansever & Hepsen, 2013). Based on the research done by Kwambai and Wandera (2013), the asset provision will not be able to secure the banks against the default risk if the NPL assets level is high. A high level of NPL will be a factor that cause the economy stability of a country to be unstable. This is due to banking sectors' development and the country's economy expansion are highly correlated.

Moreover, NPL had become a main factor of causing bankruptcy in the banking factors and eventually affecting the whole economy. These may be the reasons the researchers and governments from the global wanted to control the level of NPL. Farhan, Sattar, Chaudhry and Khalil(2012) stated that, the nature and origin causes of NPL in financial industries must be find out to understand in order to control and reduce the level of NPL. Other than that, NPL also decreased the willingness of banks to continue the lending activities as it will cause uncertainty and severe impact to the bank (Škarica, 2014). This may lead to another indirect impact such as economy slowdown and investment decrease. Furthermore, NPL also caused a situation of outreach debtors and stuck a large amount of resources in an unproductive states.

2.2.2 Lending Rate (LR)

Louzis, Vouldis and Metaxas (2012), in their study found that NPL in the Greek banking system can be indicated by the factors which it included the variable interest rate have effect toward the NPL. Besides, the banks which charged higher real interest rate have higher NPL (Bhattarai, 2015). As per Macit (2012), the author explained that banks which have a high equity to total assets ratio and high net interest margin are expected to have a high NPL ratio. Murthy et al. (2017) carried out the correlation analysis of the NPL which showed a moderate correlated relationship with the bank's interest rate. Their result show that these two variables are related to each other.

Badar and Javid (2013) concluded the result of cointegration which long run relationship exists between NPL with money supply and interest rates. This statement can be supported by Sheefeni (2015) which conducted the analysis of co-integration found a long run relationship between NPL and log of gross domestic product, interest rate and inflation rate. The author also carried out the results for Granger causality found unidirectional causality from interest rate to NPL in the long run. In addition, Vardar and Özgüler (2015) carried out the results of Johansen co-integration approach that provided strong evidence for the existence of three long-run co-integrating relationships which it included interest rate.

In the other hand, Saba, Kouser and Azeem (2012) conducted the analysis that carries out the result of interest rate which show high value with negative expected sign, this indicated that interest rate has a negative relationship with the non-performing loan. Based on the study from Ahmad and Bashir (2013), they said that a significant negative relationship existed association between NPL and interest rate. Their study had proven the negative relation between GDP growth, interest rate, inflation rate, exports and industrial production with NPL. According to Baholli, Dika and Xhabija (2015), they found that the real interest rate has

positive effect in increasing the NPL, however, the interest rate has negative impact on the NPL fluctuation because as loans become more expensive, payment capabilities becomes more unlikely.

However, Asari, Muhammad, Ahmad, Latif, Abdullah and Jusoff (2011) analyzed that the interest rate show a significant relationship with NPL in long run. This statement can be supported by the finding of Adebola, Yusoff and Dahalan (2011), their study results suggested that NPL is positively affected by interest rate in long run. When a bank's lending rate is high, NPL in the bank is expected to be high as well, which leads to an increase in the borrowers' default rate. Moreover, from the study of Škarica (2014), the author indicated that higher interest rates may lead to the problem of inflation and decline the economic conditions. The increasing level of NPL is typically closely related to inflation which carry out a positive impact of inflation towards borrowers' debt servicing capacities. Farhan, Sattar, Chaudhry and Khalil (2012) examined factors which causee non-performing loans in Pakistani top 10 banks, according to them the interest rate is the only one from the factors that have significant and positive relationship with NPL. Besides, Messai and Jouini (2013) indicated that the unemployment rate and the real interest rate impact impaired loans positively.

2.2.3 Unemployment Rate (UR)

Unemployment rate (UR) is known as the percentage of unemployed labour force that measure underutilization of labour market. If high unemployment rate exists in a country, it means that many jobless people want to get a job but they are not able to do so in that period, especially during economic recession.

According to Akinlo and Emmanuel (2014), Nigeria suffered non-performing loan starting from 1981. The magnitude of non-performing loan increased from N273 million further to N1,112,423 million in 2011. Non-performing loan kept on increasing and it harmed efficiency and growth of banking sector even endangers development of Nigeria economy (Akinlo and Emmanuel, 2014). The non-performing loan in Nigeria will increase as long as the unemployment rate of Nigeria keep increasing. Regarding to Ahmad and Bashir (2013), the declined in unemployment rate causes non-performing loan decreased. This is because when the unemployment rate decrease, the earning of individual increases which and they have more money to repay loan, results in non-performing loan declines.

For the next researcher, Škarica (2014), the unemployment rate was highly significant. The slowdown of economic will cause high level of non-performing loan, from statistically significant and economically on unemployment rate. According to Messai and Jouini (2013), they stated that the unemployment rate affected impaired loans positively, when the unemployment rate increase, the non-performing loan will increase too. According to Vatansever and Hepsen (2013), Klein (2013), Iuga and Lazea (2012), Adeola and Ikpesu (2017), they have completed their research that an increase in non-performing loan has a significant impact on unemployment rate.

Based on the researcher (Farhan, Sattar & Khalil, 2012) stated the unemployment rate and non-performing loans were showing a positive and significant relationship. The non-performing loan will become large volume especially in the consumer financing caused by unemployment (Farhan, Sattar and Khalil, 2012). Vogiazas and Nikolaidou (2011) stated that unemployment rate influenced the credit quality of the Bulgarian banking system together with the global financial crisis and credit growth. Moreover, Babouček and Jančar (2005) stated that when the non-performing loan rises, it will mitigate growth in unemployment as market cleaning of inefficient domestic capacities will be postponed. The researchers also stated that the GDP growth can help to reduce unemployment supported by Okun's Law (Babouček and Jančar, 2005).

Regarding to Dimitrios, Helen and Mike (2016), they found that the unemployment rate exerts a strong influence in non-performing loan in Euro countries. Based on Louzis, Vouldis and Metaxas (2012), they found out that non-performing loan in Greek banking system showed a result of the unemployment rate and unemployment has a strong effect on the non-performing loan (Vouldis and Metaxas, 2011).

Shingjergji and Shingjergji (2013) stated that the unemployment rate had a relationship with the NPL which when the unemployment rate rises, the NPL also rises. Furthermore, Nkusu (2011) stated that non-performing loan goes downward in which the deterioration in economic activity reinforce each other. According to Vardar and Özgüler (2015), they stated that unemployment rate can predict the value of non-performing loan. It means that the future values of non-performing loan depend on the statistically significant information can be predicted (Vardar and Özgüler, 2015). Based on researcher, Ghosh (2015), he found that non-performing loan was affected by unemployment and it underscoring its countercyclical nature.

2.2.4 Inflation Rate (IR)

According to Greenidge and Grosvenor (2010), with their empirical result that supported the view that stated inflation rate has an impact on the level of NPL. The findings show that as inflation rate increases will eventually increase the level of NPL. This statement was further supported by Farhan et.al. (2012), from their correlation and regression data analysis described that inflation has a significant and positive relationship towards NPL. Besides that, Ahmad and Bashir (2013), through their research too states that CPI inflation has a significant and positive association with NPL.

Saba, Kouser and Azeem (2012) from their study of NPL determinants of banking sector in the United States claimed that NPL and inflation has a positive relationship. Škarica (2014) claimed that real GDP growth is the main factor of the rise of NPL ratio, where this statement shows that when GDP of the economy slows down, inflation rate starts to rise, causing NPL level to rise as well. Furthermore, Škarica (2014) observed that NPL ratio growth will increase followed by a rise on the inflation rate. Bhattarai (2015), in their research that showed the lagged inflation rate has significant positive impact on NPL. This showed that inflation rate and NPL were directly proportional stating that when there was inflation, the level of NPL in the country increased. This statement supported the view of Murthy et.al. (2017) saying that inflation and capital adequacy ratio have a positive insignificant relationship.

Vardar and Ozguler (2015) stated the results of co-integration approach provided evidence of long-run relationship between inflation rate and NPL. Based on findings of Us (2017), it stated that crisis in a country can cause inflation to be positively significant for foreign banks' NPL. Based on Vatansever and Hepsen (2013), they found that there is decrement in ratio of NPL when there is an increment in CPI inflation property price inflation. On the other hand, Alexandri and Santaso (2015) based on their research results, they stated that inflation shows no significant or positive effect on the NPL.

However, Ahmad and Bashir (2013) through their studies, they found out that inflation rate is significantly negative associated with NPL. This statement was supported by Gremi (2013), for long periods of high inflation the real value of the debt begins to decrease, which helps borrowers to pay their debts.

These findings from previous researchers had different results showing different relationship between NPL and inflation rate, Hence, because of this matter, it had increase the interest in this study to further look into and investigate on the relationship between NPL and inflation.

2.2.5 Gross Domestic Product (GDP)

According to Moinescu (2012) and Škarica (2014), both results stated GDP growth as the CEE economies' outstanding explanatory variables for the non-performing loans development. Besides that, Growth in real GDP as one of factors used are being supported by the empirical results that it has a significant relationship with NPL (Greenidge & Grosvenor, 2010, Ahmad & Bashir, 2013, Shingjergji & Shingjergji, 2013). In Pakistani banking sector, it was found that GDP growth has significant relationship with the NPL and they are in negative relationship (Farhan, Sattar, Chaudhry & Khalil, 2012). In the research done by Kjosevski and Petkovski (2017), they found out that the real GDP is the strongest variables among all variables they used. The real GDP per capita has occupy around 68% of the variables that affects the non-performing loans (Saba, Kouser & Azeem, 2012).

Furthermore, GDP was proved that it has a strong effect towards non-performing loans as a macroeconomic variable in Greek banking system (Louzis, Vouldis & Metaxas, 2012). During the past decades, the prime driver of non-performing loan ratios was the GDP growth of the country (Beck, Jakubik & Piloiu, 2013). Baholli, Dika, Xhabija (2015) and Akinlo, Emmanuel (2014) stated that GDP increase will decrease the non-performing loans in the short run and long run. This is because the economic growth indicates the business performance improvement. According to Tanasković, Jandrić (2015) and Messai, Jouini (2013), rises in non-performing loan ratio and increase in GDP has a negative relationship or negative impact on each other. A research stated that log of GDP and non-performing loans have a long run relationship between each other, there are a few macroeconomic explanatory variables in long run but only log of GDP and another factor (exchange rate) are found in short run (Sheefeni, 2015). GDP per capita and another variable (volume of individual loans) shown a negative significant relationship in the research (Vardar & Özgüler, 2015).

However, Adeola and Ikpesu (2017) found that the result outcome shows that the relationship of GDP growth rate and non-performing loan are positive relationship. GDP and factors such as growth of personal income, rates of unemployment, housing price indices and rates of home-ownership are being proved that they are significantly influencing the non-performing loans, stressing the counter-cyclical nature (Ghosh, 2015). Macit (2012) stated that GDP as the macroeconomic factors is affecting the non-performing loans but with a lag compared to others.

Moreover, according to Vatansever and Hepsen (2013), growth of GDP and the Euro Zone's GDP has no significant relationship with NPL on varieties of perspective used. Swamy (2012) and Bhattarai (2015) also found that GDP growth rate does not has any significance effect on the non-performing assets. According to Alexandri and Santoso (2015), they found out that GDP and non-performing loans are in negative relationship but they are no significantly affecting each other. In the overall analysis and before crisis it shows insignificant relationship between GDP and NPL. Us (2017) stated that the real GDP growth is negatively affecting the non-performing loans for Turkey's state banks, but in the overall analysis and before crisis it shows insignificant relationship between GDP and NPL

2.3 Review of Relevant Empirical Models

2.3.1 Generalized Method of Moments (GMM)

According to Jakubík and Reininger (2013) in their study to examine the relationship of NPL and GDP, the authors uses the approach of GMM including the lagged logarithmic difference of NPL in their respective study. Fixed effect and the lagged level of independent variables would be eliminated with the change

of the data to first differences (Klein, 2013). As a result, the problem of autocorrelation will arise affecting the estimator to be inconsistent and biased. Besides, Jakubík and Reininger (2013) obtained the problem of heteroscedasticity happened in the estimator.

According to Polodoo, Seetanah, Sannassee, Seetah and Padachi (2015), in their study that uses GMM in the model, the authors stated that GMM results shows that cross border loans now significant under both differenced and system GMM but credit concentration textiles were insignificant under system GMM only. The result obtained stated that all economic and global factors were significant.

2.3.2 Ordinary Least Square (OLS)

Saba, Kouser, Azeem (2012) and Shingjergji and Shingjergji (2013) in their study that uses OLS as the method to examine the relationship of inflation rate and NPL. The results from the study show there is a positive relationship and significant coefficient of inflation rate. Pearson's correlation analysis is used to further understand the model and investigate the long run relationship.

In the study of Ahmad and Bashir (2013), they examined the factors of NPL in Pakistan by using OLS regression as well. Total 6 variables were selected and the study proved that there was significant negative association inflation rate with NPL.

In addition, Vatansever and Hepsen (2013) shows that there is a high recognition between economic indicators, bank-level factors and NPL ratio. They used Engle-Granger (EG) also known as augmented Engle-Granger (AEG) test, Cointegrating regression Durbin Watson (CRDW) Test and OLS regression in their research to

examined the selected variables. The empirical results provide evidence that factors are major determinants of the rate of NPL.

2.3.3 Simple Regression Model

When came across literature review, there are several journal article that using this model to examine the determinant of NPL. Simple Regression Model can use to illustrate the variation of the non-preforming loans. In addition, when using a simple regression model the connection which exists between these variables can be better understand.

2.3.4 Panel Data Analysis

During the research of Moinescu (2012), he used panel estimation technique to test for the determinants of NPL in Central and Eastern European countries of Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia at the time period of 2003 to 2011. He found out that the GDP growth is the main factor that affect the NPL developments among Central and Eastern European economies. Besides GDP growth, the panel estimation technique also tests for the other variables such as labour market and the monetary conditions.

Škarica (2014), in the study that used panel data to test for the explanatory variables of GDP growth, rate of unemployment, harmonised index of consumer prices (HICP), nominal effective exchange rate (NEER), index of share price and interest rate of 3-month money market. It covers 7 Central and Eastern European

(CEE) countries - Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Romania and Slovakia from year 2007 to 2012. The result shows that GDP, unemployment rate and inflation rate are the main factors of economic slowdown that is causing the high level of non-performing loans.

Moreover, Panel data technique is also implemented in the research of Swamy (2012). It was used to test on the Indian Banking industry. For example, there are nationalized banks, old and new private banks, state bank group and foreign banks. The inputs to determine the variables of non-performing loans are GDP growth rate, inflation rate, index of industrial production, savings growth rate, growth rate in per capital income and market capitalization growth rate for the year 1997 to 2009. However, the lending rate was found that it has no significant relationship with the non-performing loan.

According to Alexandri and Santoso (2015)'s research, the panel data regression analysis includes the 26 banks of Regional Development Bank (BPD) in Indonesia. The time period they used is from 2009 to 2013 and they used the growth of GDP and inflation rate as their explanatory variables. They found out that the GDP has a negative but insignificance relationship with NPL, while inflation show positive but significance relationship.

Based on the studies learned, it showed that the panel data analysis can be used for all the explanatory variables (LR, UR, IR and GDP).

2.3.5 Other methods

One of the method being used was Pearson correlation coefficient, it was used to test the relationship between the non-performing loan and unemployment. According to Iuga and Lazea (2012), the range of Pearson correlation coefficient

is start from -1 to 1 and it reflects the two sets of data's linear relation. Based on the result measured by Pearson correlation coefficient, there are stated that non-performing loan has the strong relationship with unemployment rate and they are positive relationship.

2.4 Proposed Theoretical Framework

Figure 2.1: Framework for the Determinants of NPL

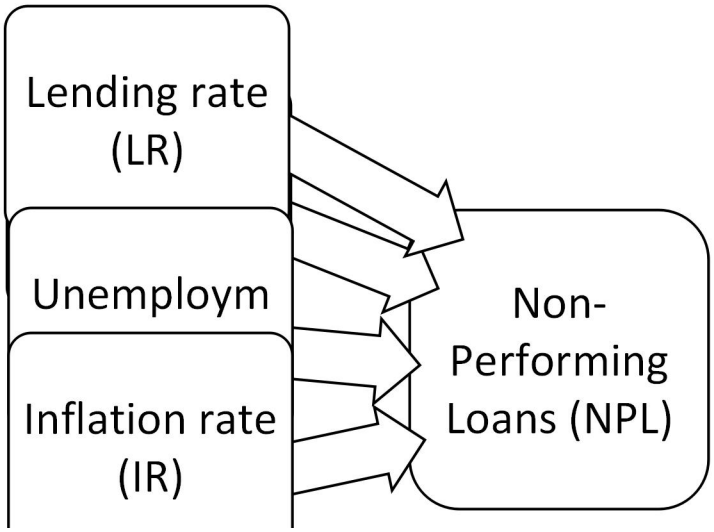


Figure 2.1 shows the independent variables that have the possibilities of affecting the dependent variable. This study focuses in examining how LR, UR, IR and GDP affects level NPL in Malaysia.

Throughout all the research done by the researchers, a brief vision had been captured that these four variables (LR, UR, IR and GDP) are affecting the non-

performing loans. Most of the research says that the LR normally have positive relationship with NPL. LR is an important determinant that affect the NPL as the increase of LR will lower the capacity of borrower to repay the loan and hence it will lead to bad debt. UR is positive related NPL as the people will have a fixed income to repay debt when the employment rate increase. However, if UR is high the income will decline which may cause inability of borrower to repay loans and the NPL will increase.

On the other hand, researchers claim that increasing IR are causing the NPL to decrease as IR makes the borrower becomes much easier to pay off the debt. Furthermore, most of the researches show that the higher the GDP of the respective country, the lower the non-performing loans in that country. This is due to higher GDP indicated better economic performance hence the NPL will be lesser in those high GDP countries.

2.5 Conclusion

In conclusion, there are various researchers who have been working on this examination of non-performing loan (NPL). Although different researchers have been utilizing different independent variables in their research, their results show that LR, UR, IR and GDP greatly influence the NPL level. Several methods have been adopted to run this research on finding out the determinants of NPL, namely, the general method of moments (GMM), ordinary least square (OLS), simple regression model, panel data analysis and some other related methods. OLS, panel data analysis and simple regression model tends to be the most used methodology by previous researchers. However, results from previous researchers tends to differ from one another from time to time depending on various affecting factors. Hence, actual methodology that are used for this research will be further explained and discussed in the following chapters.

CHAPTER 3: METHODOLOGY

3.1 Overview

In this chapter, it carried out the study of all methodology in this research. The research is performed through collecting all the needed data for empirical testing along with some applicable methodology in order to produce a satisfactory result.

3.2 Data Collection Method

The purpose of this research is to study about the determinants (LR, UR, IR, and GDP) of NPLs in Malaysia. To analyse the effect of the economic variables, this paper uses LR, UR, IR, and GDP as the explanatory variables. To find out the relationship between these explanatory variables and NPL in Malaysia, hypothesis testing and several test will be carry out to achieve the result.

Qualitative research is primarily exploratory research. Unlike quantitative research, it does not need to collect all data through face-to-face interview, online poll or survey from the public. It only needs to collect through the research or case study done by the researchers from Malaysia or other countries. In other words, all the data can be collected indirectly through the online media or books.

Furthermore, this research targets all the licensed financial institutions in Malaysia. To grant loans in Malaysia, banks need be licensed under FSA for commercial bank and IFSA for Islamic bank. Otherwise, it will be illegal if the institutions are granting loans without the license in Malaysia. Anti-money laundering, prudential limits and standards, capital adequacy and financial reporting are all the guidelines issued by Bank Negara Malaysia (BNM). Malaysia currently has total of 27 commercial banks and 16 Islamic banks are listed under licensed financial institutions, which means only these banks are allowed or being approved by the government to grant loans to the authorities in Malaysia. Therefore, this research is collecting the data based on these financial institutions only.

The table below shows the sources and unit measurement for the secondary data variables used in this research.

Table 3.1: Sources of Data

Variables	Data Sources
NPLs (in percentage)	Bank Negara Malaysia (BNM) statistics database
LR (in percentage)	The World Bank statistics database
UR (in percentage)	The World Bank statistics database
IR (in percentage)	The World Bank statistics database
GDP (in percentage)	The World Bank statistics database

The sampling period of this research covers 30 years' length starting from year 1987 to 2016. A total of 30 observations are being retrieve for each variable. All the data used for the variables in this research was collected from Bank Negara

Malaysia (BNM) statistics database and The World Bank statistics database. After collecting the data, the raw data is rearranged in Microsoft Excel file so that the data can be used for running the test in this research.

3.3 Methodology

OLS regression will be the choice of research instrument used in the study of this paper. According to Moutinho and Hutcheson (2011), he described Ordinary least-square (OLS) regression as a generalized technique for linear modelling that is used to model response variable that is recorded on interval scale. Moutinho and Hutcheson (2011) add on that this technique can be used for single or multiple variables.

Adeola and Ikpesu (2017) used OLS regression analysis in their research of determining economics determinants of NPL in Nigeria. Adeola and Ikpesu (2017) shows that their results of study are relevant and shows a positive relationship between independent variable and dependent variable indicating an accurate result that shows a good fit of models in the OLS regression analysis.

There are a few OLS necessary assumptions, which is important in the process derivation of OLS estimators in regression models. The first assumption is the assumption of the regression model being linear in the parameters. It is also assumed that there is no multicollinearity where there is indication of unexpected results for the regression coefficient. Assumption of normality of error terms where abnormal standard error will render OLS unreliable. It is also assumed that there is no autocorrelation where correlation between error terms is zero and this autocorrelation normally appear in most time series data and it is important to

results of the research. Homoscedasticity assumption where heteroscedastic error indicates a too wide or too narrow confidence intervals, representing equal variance in the error term. These assumptions are important and must be fulfilled to achieve BLUE (Best Linear Unbiased Estimator). OLS regression analysis is applicable in this research to study the relationship between NPL as dependent variable and explanatory variables such as LR, UR, IF, and GDP in Malaysia banks.

Model 3.1

$$\mathbf{NPL_t = \beta_0 + \beta_1 \beta\, LR_t + \beta_2\, UR_t + \beta_3\, UR_t + \beta_4\, GDP_t + \varepsilon_t}$$

Definitions of Variables:

NPL = Non Performing Loan (in percentage)

β_0 = Constant coefficient

β_1 = Coefficient of Lending Rate

LR = Lending Rate (in percentage)

β_2 = Coefficient of Unemployment Rate

UR = Unemployment Rate (in percentage)

β_3 = Coefficient of Inflation Rate

IR = Inflation Rate (in percentage)

β_4 = Coefficient of Gross Domestic Product

GDP = Gross Domestic Product (in percentage)

ε_t = Error term

Econometric View (EViews) program will be used for the time series data to study the relationship of dependent variable and independent variable. EViews will be used to run tests to identify if there is multicollinearity problem, heteroscedasticity problem, autocorrelation problem, and bias of specification.

3.3.1 Hypothesis Testing

T-test is a hypothesis testing method to test how significant each individual independent variable (LR, UR, IR, GDP) would affect the dependent variable (NPL). Null hypothesis for each T-test is there is no significant relationship between NPL and each independent variable, at significance level of 0.05. Reject null hypothesis if test statistics of p-value is lower than significance level of 0.05, otherwise do not reject null hypothesis.

F-test will be used to test how significant the overall independent variable (LR, UR, IR, GDP) would affect dependent variable (NPL). Null hypothesis for this F-test will assumes all independent variable are not important, alternative hypothesis suggests there is at least one independent variable that is important in explaining the dependent variable, at significance level of 0.05. Reject null hypothesis is test statistics of p-value is lower than significance level of 0.05, otherwise do not reject null hypothesis.

Goodness of fit test is used to find out how the value observed from test statistics is significantly different from the expected value. Chi-square goodness of fit test compares observed sample distribution with expected probability distribution. Null hypothesis assumes there is no significant variation between observed and

expected value, alternative hypothesis suggests there is significant variation between observed and expected value, taking into account the degree of freedom.

3.3.2 Multicollinearity

Multicollinearity is the common problem exists in the most of the model. If the Multicollinearity problem occurred, it shows that the independent variable is relevant or highly correlated with one or even more than one of the independent variables. Each of the independent variables should be irrelevant with the others independent variables to prove that different types of independent variable have different actual effect to the dependent variable. Correlated between the independent variables causes the regression model not reliable or not accurate and face the problem when estimates the β and result interpretation.

There are three main detections of the multicollinearity problems. The first one is the regression model had high R-squared but few significant t-ratio. When the R-squared is high value which is exceed 0.80 but at the same time t-ratio is low significant, it leads to regression model has high probability of suffered the Multicollinearity problem. Moreover, even though the regression model shows that all of the independent is irrelevant with each other, as long as the R-squared is high and exceed 0.80, it will be suspected to the Multicollinearity problem. It can be founded in the regression model test through the EViews.

The next detection is whether there are high pair wise correlation among the regression. If the both of the variables' pair wise as zero order correlation coefficients exceed 0.10, the multicollinearity problem will be concerned. Other than that, Variance Inflation Factor (VIF) or Tolerance (TOL) also one of the effective detection. VIF's formula is stated as below:

$$\text{VIF} = \frac{1}{1 - R^2_{X1X2}}$$

Test the regression model using the VIF formula and it will have a serious Multicollinearity problem if the calculation results exceed 10. Tolerance's formula is stated as below:

$$TOL_j = \frac{1}{VIF_j} = (1 - R^2{}_j)$$

Regarding to the Tolerance, there are serious Multicollinearity problem if the result is near to zero. The closer the result to zero, the higher correlated between the explanatory variables.

3.3.3 Normality of Error Terms

Normality tests in statistics are usually being used to find out whether the data set is an efficient model by the normal distribution. It helps to conclude the possibility of a random variable to be normal distributed in the data set. To confirm the normality, Jarque-Bera test is one of the test that being used broadly by all researchers. The Jarque-Bera test is used to test the skewness and kurtosis of a sample data to find out if it matches a normal distribution. The data can be in many forms such as time series data, errors in a regression model and data in a vector. In a normal distribution data, Jarque-Bera test will asymptotically have a chi-square distribution and two degree of freedoms. The hypothesis of the excess kurtosis and skewness being zero are joint together to be the null hypothesis of Jarque-Bera test. To test the normality, Jarque-Bera test are being carried out as below:

Assume that:

H_0 = Errors terms are normally distributed.

H_1 = Errors terms are not normally distributed.

The test statistic of Jarque-Bera is defined as below:

$$JB = \frac{n}{6}\left(S^2 + \frac{1}{4}(K-3)^2 \right)$$

Where,

n = Number of observations

S = Sample of Skewness

K = Sample of Kurtosis

Therefore, the null hypothesis is rejected if the p-value is less than the significant level 0.05, otherwise do not reject null hypothesis if the p-value is more than or equal to the significant level 0.05. The error term in the model will be not normally distributed if the null hypothesis is false.

3.3.4 Model Specification

The correctly specified regression model is measured and detected by the model specification test. Incorrectly specified model exists while omission of important variables or containing non-relevant variable into the test statistics. Problems encounter during the test such as heteroscedasticity and autocorrelation problem might appear when the model is not correctly specified, so this model specification test is important for making sure test statistics are unbiased and consistent. The Ramsey RESET test will be applied in this model specification

test. The Ramsey RESET test is designed for detection of any neglected nonlinearities in the model. The Ramsey RESET will be conducted as below:

Assume that:

H_0: Model is correctly specified

H_1: Model is incorrectly specified

The null hypothesis will be rejected when the p-value is less than significance level of 0.05, otherwise do not reject the null hypothesis.

Estimation of the restricted model, $Y = \beta_0 + \beta_1 X + e$

Estimation of unrestricted model, $Y = \beta_0 + \beta_1 X + \beta_2 X^2 + \beta_3 X^3 + e$

Critical Value of Ramsey RESET test can be obtained from the F table:

$F(a, 2, n - 3)$

Where:

a = Significance level

n = Number of observations

If the p-value obtained from test statistics is smaller than the significance level of 0.05, null hypothesis will be rejected.

3.3.5 Autocorrelation

Autocorrelation refers to the characteristic of data whereby the correlation between the values of the similar variables depends on related objects. It assumed that the error term or disturbance are identically and independently distributed. That is to say, an independently distributed error term for a certain period is not

related to the error term of previous period, without concern about the size of error term. However, the assumption of independence of error term is violated because most of the autocorrelation problem will occur in time series data. The problem of autocorrelation occur is due to when in time-series data error in a particular period is related to another period that will lead to a violation of Classical linear regression model.

Besides, autocorrelation can be divide into two categories which is Impure Serial Correlation and Pure Serial Correlation. Classical Assumption IV leads to Pure Serial Correlation occurs whereby assumes error term which are uncorrelated observation are disobeyed. That is to say, if the error term between any two of observations of simple regression are not equal to zero, mean that these error term are serially correlated. In the other hand, impure serial correlation is due to specification error, omitted variable or a problem with functional form.

In order to detect the presence of autocorrelation, there is a common and popular test which is Durbin Watson Test. Durbin-Watson test is carry out as shown:

Let assume:

H_0 : ρ = 0 (There is no autocorrelation between error terms)

H_1 : ρ ≠ 0 (There is autocorrelation between error terms)

The test statistic of Durbin-Watson is defined as shown:

$$\hat{p} = \frac{\sum (\mu_t - \mu_{t-1})}{\sum \hat{\mu}_t^2}$$

Where,

$\hat{p}$ = Estimated serial correlation coefficient

μ_t = Error term

$\hat{\mu}_t$ = Estimated error term

When the p-value is less than the significant level of 0.05, the null hypothesis is rejected. In other say, there is a problem of autocorrelation occur in the regression model. However, if there is autocorrelation problem, it shows that this regression model is categorized as pure serial correlation. In order to identify the type of serial correlation, Durbin-Watson statistic can provide the result to refer. The test statistic is as below:

$d = \frac{\sum (\mu_t - \mu_{t-1})^2}{\sum \hat{\mu}_t^2}$, $d = 2(1 - \hat{p})$

Where,

d = d test statistic

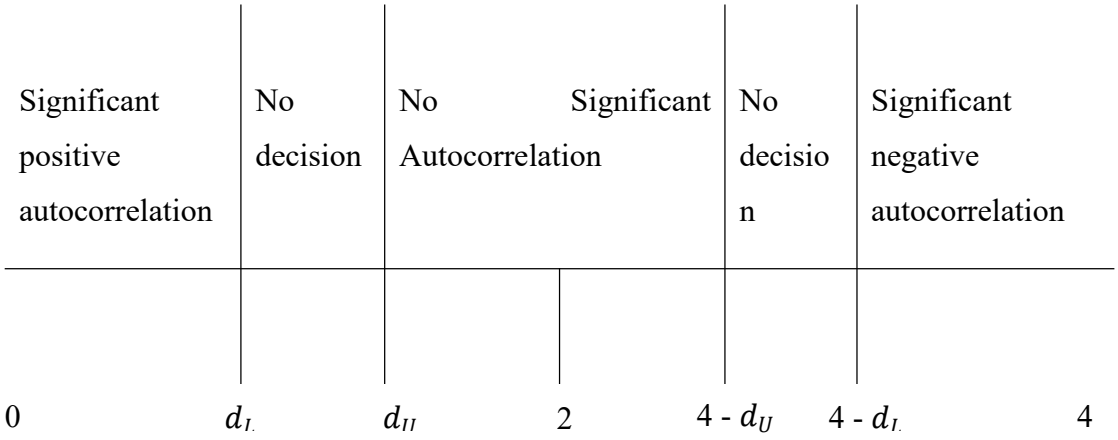
μ_t = Error term

$\hat{\mu}_t$ = Estimated error term

$\hat{p}$ = Estimated serial correlation coefficient

The figure below shows the type of serial correlation in relation to Durbin-Watson test statistic:

Figure 3.1 : Regions of the Durbin-Watson test



Where,

d_L = Lower d critical value

d_U = Upper d critical value

There are few term to identified such as k, number of explanatory variables exclude intercept; n, number of observations; and significant level, 0.05. The null hypothesis is rejected if d test statistic is less than d_L or more than 4 - d_L . Or else, null hypothesis is accepted if d test statistic is falls between d_U and 4 - d_U , otherwise inconclusive.

On the other hand, Durbin-Watson test is difficult to detect higher order autoregressive model of dependent variable and error due to the error term of time series data for a certain period may affected by the error of previous periods. The results shown are inclusive from Durbin-Watson test. Thus, Breusch-Godfrey LM test is using for detailed diagnostic check. The test is shown below:

Let assume:

H_0 : There is no Autocorrelation Problem

H_1 : There is Autocorrelation Problem

The Critical Value of Breusch-Godfrey LM shows as below:

$$X_u^2 = X^2{}_{\alpha,\, p}$$

X^2 = Chi-squared

α = Level of significance

p = Fitted lagged lane

The test statistic of Breusch-Godfrey LM is show as below:

$$\text{Test statistic} = (N - p)\, R^2$$

Where,

N = Number of observations

P = Fitted lagged lane

R^2 = R squared

In Breusch-Godfrey LM test, the observed R-squared value and probability is used to decide whether to accept or reject the null hypothesis of existence of serial correlation in the residual. If the P-Value is less than 0.05, null hypothesis will be rejected which mean that there is no Serial Correlation in the residual.

3.3.6 Heteroscedasticity

When the variance of error terms is not the same and unequal scatter, Heteroscedasticity exists. This will be a serious problem due to it is abnormal. Regarding to Ordinary Least Squares (OLS) which assumes that all residuals or error terms should be have constant variance which is Homoscedasticity. Other than that, Heteroscedasticity problem occurred when scatter of errors is not the same and depending on the value of at least one of the explanatory variables. The model suffered Heteroscedasticity makes estimators of the OLS method inefficient.

Regarding to the Homoscedasticity, residuals is normally distributed with zero mean and variance which is stated as below:

$\text{Var}(\mu_t) = \sigma^2$

On the other side, Heteroscedasticity's residuals have not constant variance which is stated as below:

$\text{Var}(\mu_t) = \sigma_t{}^2$

There are slightly difference between both of the equation. Heteroscedasticity has the different observations in the sample, t is equal to 1,2,3,4…..,,n.

Variance of residuals may be variable due to many factors. For the examples, when people's income rises and they have more additional money, thus they can spend their money for different motives or keep it as savings. This causes the variance rises with the income. Regarding to the people have more money to saving so that the regression of savings on income will be increasing as well.

Ordinary Least Square estimators still unbiased and consistent when the model suffered Heteroscedasticity. The reason is the independent variables are not correlated with the disturbance term. Heteroscedasticity makes Ordinary Least Square estimators inefficient due to the variances of coefficient estimates increasing but it is not detected by the Ordinary Least Square. This condition results in p-values becomes very small and it is not ordinary. Furthermore, Heteroscedasticity ruin the t-values and F-values which depend on variance, it affects the precise of the results of whether significant with the model.

There are many ways to detecting Heteroscedasticity problems. The most appropriate way is Autoregressive Conditional Heteroscedasticity (ARCH) test. ARCH test is a statistical model for time series data and it is appropriate when

Autoregressive model is followed by error variance. The process of ARCH test is stated as below:

H_0 : There is no Heteroscedasticity problem. (Homoscedasticity)

H_1 : There is Heteroscedasticity problem. (Heteroscedasticity)

$\alpha\ (Critical\ Value) : X_u^2 = X^{\ 2}{}_{\alpha,\ k}$

Where,

X^2 = Chi-squared

α = Level of significance

k = Number of independent variables

TS (Test Statistic) = nR^2

Where,

n = Number of observations

R^2 = R-Squared

DR (Decision Rule) = Reject H_0 if TS > CV, otherwise do not reject H_0. The study reject H_0 if the test statistic is bigger than critical value after calculation or p-value is less than 5% significant level. There is enough evidence to conclude that there is Heteroscedasticity problem at 5% significant level.

3.4 Conclusion

All significant statistical tests and measurements are determined in this chapter. Data are obtained from two main sources, BNM official website and The World Bank website. 30 observations are gathered from the period of 1987 to 2016 in Malaysia. The sample size of 30 is sufficient and appropriate. Ordinary Least Squares (OLS) is carried out to analyse this data. In order for the empirical testing and diagnostic checking OLS regression model is formed. The model will be conducted according to the methodologies discussed earlier. Last but not least, all data analysis and major finding which generated by EViews will be discussed in the next chapter.

CHAPTER 4: RESULTS AND INTERPRETATION

4.1 Overview

In this chapter, all of the database was obtained from Bank Negara Malaysia (BNM) statistics database and The World Bank statistics database. It contains database for 30 years started from 1987 to 2016. EViews software satisfy fulfil the interpretation and analysis of the empirical results through a series of diagnostic testing.

4.2 Description of the Empirical Models and Interpretation

This study focuses on using the econometric model to evaluate and explain the NPL's relationship with LR, UR, IR and GDP. The empirical testing model is shown below:

Model 4.1

$$NPL_t = \beta_0 + \beta_1 \beta\, IR_t + \beta_2\, UR_t + \beta_3\, IR_t + \beta_4\, GDP_t + \varepsilon_t$$

Definitions of Variables:

NPL = Non-Performing Loan (in percentage)

β_0 = Constant coefficient

β_1 = Coefficient of Lending Rate

LR = Lending Rate (in percentage)

β_2 = Coefficient of Unemployment Rate

UR = Unemployment Rate (in percentage)

β_3 = Coefficient of Inflation Rate

IR = Inflation Rate (in percentage)

β_4 = Coefficient of Gross Domestic Product

GDP = Gross Domestic Product (in percentage)

ε_t = Error term

Model 4.1 shows that the factors which are LR, UR, IR and GDP affects NPL. All of these independent variables are measured in percentage (%).

Model 4.2

Table 4.1 Empirical Result of OLS Regression Model

Dependent Variable: NPL
Method: Least Squares
Date: 01/27/18 Time: 04:22
Sample: 1987 2016
Included observations: 30

Variables	Coefficient	Std. Error	t-Statistics	Prob.
C	-15.83958	3.416587	-4.636083	0.0001
LR	1.810094	0.406848	4.449067	0.0002
UR	4.478142	0.711581	6.293228	0.0000
IR	-0.797523	0.696660	-1.144781	0.2631

GDP	-0.175134	0.196664	-0.890522	0.3817
R-squared	0.806282	Mean dependent var		10.89306
Adjusted R-squared	0.775287	S.D. dependent var		8.468968
S.E. of regression	4.014633	Akaike info criterion		5.768780
Sum squared resid	402.9319	Schwarz criterion		6.002313
Log likelihood	-81.53171	Hannan-Quinn criter.		5.843490
F-statistics	26.01335	Durbin-Watson stat		0.611896
Prob(F-statistics)	0.000000			

$$NPL_t = -15.8396 + 1.8101LR_t + 4.4781\ UR_t - 0.7975IR_t - 0.1751GDP_t$$

Regarding to the Model 4.2, the estimated parameters can be explained in an efficient way. For the estimated parameters, it shows that LR and UR have positive relationship with the NPL. On the other hand, NPL has negative relationship with both of the independent variables which are IR and GDP. First, NPL will be equal to -15.8396 when all of the independent variables equal to zero. For every 1% rises in LR with holding other independent variables remain unchanged will results the NPL rises 1.81%. Furthermore, when the UR decline 1% and all the other variables remained same amount, the NPL will decreases 4.48% on average. NPL will reduce 0.80% when the IR has one percentage increases with holding other variables constant. By the way, NPL also affected by GDP, it will decrease 0.18% during the GDP has risen 1% with other explanation variables remain unchanged.

The NPL is estimated to have an increment of 4.4781% for every increment of 1% in Malaysia's UR while other variables are remained constant. However, NPLs and IR was found to have a negative relationship between them. On average, Malaysian NPLs will decrease by 0.80% when there is an increment of 1% in IR, while other variables are kept constant. For every increment of 1% in GDP, the

NPL in Malaysia will decrease by 0.1751% on average, holding other variables constant.

Based on the result shown above, the expected signs of the independent variables can be interpreted, showing a consistency with the theories and findings done by past researchers.

LR is referred to the rate set by bank that satisfy the short and medium-term need of financing in the private sector. This rate differentiates according to borrower's credit score and their purpose of obtaining finances. According to the research done by Adebola, Yusoff and Dahalan (2011), NPL are responsive to the changes in LR, thus coefficients for LR must be positive with NPL. When there is an increase in LR, it is expected that NPL will increase, which causes increasing the default rate of the borrowers. Thus, this study has obtained the consistent result as previous researchers.

UR is referred to the group of people in the labour force who is currently without a job but is available and currently seeking for employment. According to Ahmad and Bashir (2013), the coefficients for the UR must be positive with NPL, as the decline in UR causes the earning of individual increases which and they have more money to repay loan, results in NPL declines. Another research done by Vatansever and Hepsen (2013), Klein (2013), Iuga and Lazea (2012), Adelo and Ikpesu (2017) has indicated that an increase in NPL has a significant impact on UR. Thus, this study has obtained the consistent result as previous researchers.

IR uses consumer price index as unit of measurement that represents percentage change annually in the cost bear by average consumer in obtaining a basket of goods and services where the basket might be fixed or altered at specified intervals. According to Ahmad and Bashir (2013) through their studies, inflation has an effect of decreasing the real value of debt and this usually urges borrowers to pay off their debt faster in the period of inflation, therefore level of NPLs will be reduce when there is inflation. Furthermore, other researchers such as

Vatansever and Hepsen (2013), Alexandri and Santaso (2015) also found similar result that inflation reduces the proportion of impaired loans. Thus, this study has consistent result with the findings.

GDP is referred to the sum of gross value by all the people and companies in the country in addition of any product taxes and deduct subsidies that is not included in the production value of the goods. According to Farhan, Sattar, Chaudhry and Khalil (2012), they found out that GDP and NPL has a negative relationship. This statement is further supported by Baholli, Dika and Xhabija (2015) and Akinlo and Emmanuel (2014), where they stated that increment of GDP will decrease the NPL in the short and long run. This is because economic growth indicates the business performance improvement. In addition, the viewpoint is further support by Tanasković and Jandrić (2015) and Messai and Jouini (2013), rises in NPL ratio and increase in GDP has a negative relationship or negative impact on each other. Thus, the empirical result has consistent with the findings.

4.3 Hypothesis Testing

Hypothesis testing is used to test how significant the independent variables affecting the NPL. This study has conducted few hypotheses testing based on the results obtained from EViews.

4.3.1 T-TEST

T-test is used to test how significant the independent variables individually affecting NPL.

Table 4.2 Empirical Result of T-test

Independent Variables	**P-value**	**α**	**Decision**	**Conclusion**
LR	0.0002	0.05	Reject Ho	Significant Relationship
UR	0.0000	0.05	Reject Ho	Significant Relationship
IR	0.2631	0.05	Do not reject Ho	Insignificant Relationship
GDP	0.3817	0.05	Do not reject Ho	Insignificant Relationship

Table 4.2 shows the p-value, decision and conclusion for each independent variables at significance level of 0.05. The null hypothesis in T-test is there is no significant relationship between NPL and independent variable. The decision is made after comparing the p-value with significance level of 0.05. Thus, analysis states that study should not reject the null hypothesis if the p-value is more than 0.05. Based on the result, it is clear that LR and UR are significant to explain NPL in Malaysia meanwhile IR and GDP are insignificant to explain NPL.

4.3.2 F-TEST

Table 4.3 Empirical Result of F-test

F-statistic	26.01335
P-value	0.0000

F-test is used to examine how significant the overall independent variables affecting NPL in Malaysia. The null hypothesis assumes that all independent variables are not important while alternative hypothesis indicates there is at least one independent variable that is important in explaining the dependent variables. Based on Table 4.3, null hypothesis is rejected because p-value of 0.0000 is less than 0.05. Thus, there is enough evidence concluding that there at least one independent variable is significant in explaining NPLs in Malaysia.

4.3.3 Goodness of Fit

Table 4.4 Empirical Result of Goodness of Fit

R-squared	0.806282
Adjusted R-squared	0.775287

Based on Table 4.4, R^2 of the model is 0.806282 which means the overall independent variables affects 80.63% of the total variation in NPLs. Next, the adjusted R^2 of the model is 0.775287 which means after taking into account of the degree of freedom, the overall independent variables affect about 77.53% of the total variation in the NPLs. Based on the results from Table 4.4, there is enough evidence concluding that this model is a good fit model.

4.4 Diagnostic Checking

A total of five diagnostic checking will be conducted using the regression model. Following are the results obtained from EViews program.

4.4.1 Testing of Multicollinearity

This research has done a series of diagnostic checking which to test and know whether the independent variable have correlation problem. Generally, if R^2 is high but only few significant T-ratio, the multicollinearity problem is expected in the regression model. The result is shown as below:

Table 4.5 Empirical Result of OLS Regression Model

R^2	0.806282
Independent Variables	**T-ratio**
LR	4.449067
UR	6.293228

IR	-1.144781
GDP	-0.8905z22

Table 4.5 above shows the empirical result of OLs regression model after the data run. According the results of the table, the value of R^2 is 0.8063 which is high and indicate that the NPL can be well explained by the independent variables it uses. Hence, the high R^2 but few significant T-ratio indicate that multicollinearity problem exist in the regression model.

Table 4.6 Empirical Result of VIF Test

To test the seriousness of multicollinearity among these variables, it is decided to conduct Variance Inflation Factors (VIF) test. The multicollinearity problem is serious if VIF is greater than 10.

Independent Variables	**VIF**
LR	1.485735
UR	1.334063
IR	1.429867
GDP	1.032715

From the empirical result of VIF test, all of the calculated VIF are less than 10, which explains that there is no serious problem of multicollinearity in this model. So it indicates that there is enough evidence to conclude that no serious problem of multicollinearity exist in the model.

4.4.2 Testing of Normality of Error Terms

This research had conducted normality test in order to test the normality of the error terms. Thus, Jarque-Bera Test is conducted.

Table 4.7 Empirical Result of Jarque-Bera test

Skewness	0.115629
P-value	0.721093

Skewness indicates symmetrical of the distribution. From table 4.7, skewness of 0.1156 have carry out the distribution is approximately symmetric due to the value falls between -0.5 and 0.5. It shows that error terms of the model are normally distributed.

Besides, from the results of hypothesis testing, this study rejects null hypothesis if p-value is less than 0.05. From graph, the p-value is 0.721093, which is greater than significance level of 0.05. Null hypothesis will not be rejected. Hence, there is enough evidence to conclude that the error terms in this regression model are normally distributed.

4.4.3 Model Specification Testing

Table 4.8 Ramsey RESET Test Empirical Result

P-value	0.0855

In order to select a correct estimated model, model specification testing is used to examine the model and choose the one with correctly specified. Some problems occur may cause the model to become incorrect specified. Lack of significant variables, irrelevant or insignificant variables are included in the model and a wrong functional form are the reasons of the model to become incorrect specified. Therefore, Ramsey RESET test was used to examine the specification of the model.

Null hypothesis will be rejected whenever the p-value of the empirical result from Ramsey RESET test is lower to the 0.05 significance level, or else do not reject when empirical result p-value is greater than the significance level of 0.05. According to the empirical result from Ramsey RESET test, its p-value of 0.0855 is greater than the significance level of 0.05. Therefore, there are enough information to conclude that this regression model is specified correctly at the 0.05 significance level.

4.4.4 Testing of Autocorrelation

A few tests have been done to test the regression model's error terms. This is to check which error terms are independently and identically distributed in the model.

To check for autocorrelation problem, Durbin-Watson test was carried out for this testing. It also helps to find out the problems are in which category.

The steps of Durbin-Watson test are as following: First of all, with 30 observations (n), 4 variables (k) and significance level of 0.05, it has identified the lower critical value (d_L) is 0.941 and upper critical value (d_U) is 1.51. Then, the figure below shows the categories of autocorrelation:

Figure 4.1 Categories of Autocorrelation

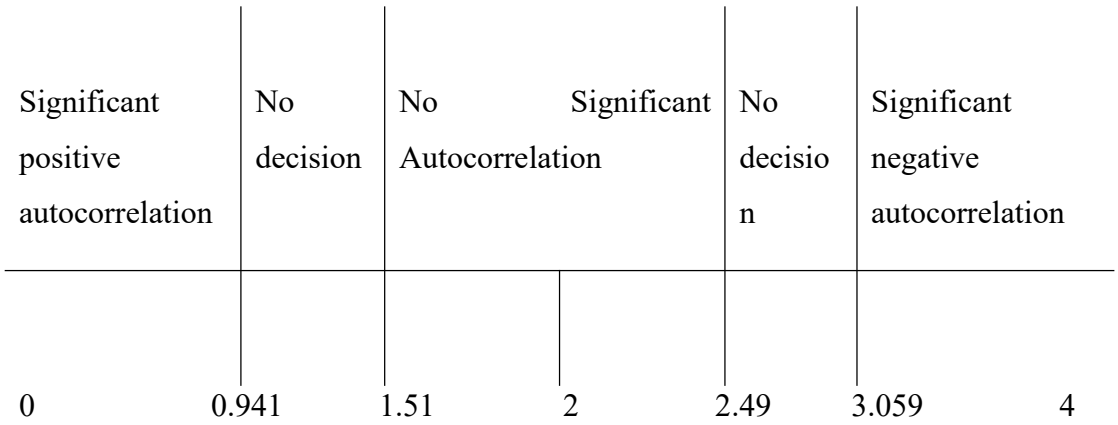


Figure 4.1 shows the types of autocorrelation based on the critical values. To identify autocorrelation problem is under which category, it is necessary to compare it with the OLS regression result.

Table 4.9 Empirical Result of OLS Regression Model

Durbin-Watson Stat.	0.611896

Based on the result, the problem of autocorrelation does exist in this model. It is clear to identify that the positive autocorrelation is present in the model because the test statistic of 0.6119 falls under the range between 0 and 0.941 (d_L). In order

to double-check the result generated, another diagnostic checking called Breusch-Godfrey Serial Correlation LM test is being used to examine its effect.

Table 4.10 Empirical Result of Breusch-Godfrey Serial Correlation LM test

P-value	0.0005

According to the result generated, null hypothesis will be rejected since the empirical result shows a p-value of 0.0005 which is lower than 0.05 significance level. Thus, there is enough information to conclude that there is positive autocorrelation problem does exist in the regression model.

Since the problem of autocorrelation is undesirable in any model, this study intends to solve it using following procedures. First of all, it estimates and restructures the regression model in the EViews program as below manner:

Model 4.3 New Estimation of Regression Model

$$D(NPL) = c + D(LR) + D(UR) + D(IR) + D(GDP)$$

Definitions of Variables:

D(NPL) = First difference of NPL

c = Intercept

D(LR) = First difference of lending rate

D(UR) = First difference of unemployment rate

D(IR) = First difference of inflation rate

D(GDP) = First difference of GDP

The above model shows the restructured regression model of this study. All variables had been employed to first difference level, regardless independent variable or dependent variable, i.e. D(IR) indicates first difference of inflation rate.

Then, the test was run again on the new regression model and the new result of Breusch-Godfrey Serial Correlation LM test was achieved.

Table 4.11 New Empirical Result of Breusch-Godfrey Serial Correlation LM test

P-value	0.1574

Based on result generated, it shows that the empirical result p-value has risen from 0.0005 to 0.1574 after restructuring the regression model. Thus, the null hypothesis in this study will not be rejected since the empirical result p-value is higher than the 0.05 significance level. Therefore, it can be concluded that there is enough information to prove that the regression model has no autocorrelation problem.

4.4.5 Testing of Heteroscedasticity

To detect the heteroscedasticity problem, ARCH test was practiced. The p-value result is as table 4.9 below:

Table 4.12 Empirical Result of ARCH test

P-value	0.0511

Based on the result generated, the null hypothesis is rejected if p-value is less than 0.05. P-value of 0.0511 is greater than the significance level of 0.05. Thus, there is enough evidence to conclude that there is no heteroscedasticity problem in the model.

4.5 Conclusion

In conclusion, all of the EViews testing and empirical results contained and completed in this chapter. Based on the result generated from EViews program. It is found that there are two variables show significant relationship with the NPL which are LR and UR. Whereas, there are two of the independent variables show insignificant relationship with the NPLs which are IR and GDP. Furthermore, the sign of coefficient for all independent variables in the result are consistent with the expected sign that are discussed in earlier chapter. After a series of the diagnostic checking, Heteroscedasticity and Autocorrelation problems detected in this regression model after running through different types of tests. These problems are solved by using different solutions. The next chapter will discuss about the results, implication of the study, limitation and recommendations for future research.

CHAPTER 5: DISCUSSION, CONCLUSION AND POLICY IMPLICATIONS

5.1 Overview

In this chapter, all empirical results from the various tests in chapter four were concluded and some other findings found when carrying out this research will be discussed too. In addition, policy implication, limitation of study and recommendation for future research will be discussed in the following session. Policy implication of study includes how the policy affects the dependent variables and what action of policy should be done to improve the dependent variables. While the limitation of study showed the problems and challenges faced in the process of carrying out this research. Besides, recommendation for future research focus about the advice for improvement and other method that can be used to have a better result in this research. Last but not least, the conclusion part which summarize the overall research was included in the last part of this chapter.

5.2 Summary of Statistical Analysis

The purpose of this study was meant to found out whether LR, UR, IR and GDP were playing an important role in affecting NPL in Malaysia. OLS model was used in this study in order to investigate the relationship between NPL and independent variables. The data collection in this study were secondary data. The two main data sources were from World Bank official website and BNM official

website. The data range is 30 years which the data was collected starting from year 1987 until year 2016. As the data collected is on yearly basis, 30 observations were tested in this research. EViews software was used to conduct tests. Positive relationship exists between lending rate and unemployment rate with NPLs while negative relationship exists between inflation rate and GDP with NPLs. The results of diagnostic checking as following:

Table 5.1 Result of Diagnostic Checking

Diagnostic Checking	Test	Decision	Result	Solution
Multicollinearity	VIF test	$1 < VIF < 10$	No serious multicollinearity problem	-
Normality	Jacque-Bera test	Do not reject H_0	No problem	-
Model Specification	Ramsey RESET test	Do not reject H_0	No problem	-
Autocorrelation	Breusch-Godfrey Serial Correlation LM test	Reject H_0	Consist autocorrelation problem	Restructure the regression model by employ all the variables into first difference level.
Heteroscedasticity	ARCH test	Do not reject H_0	No problem	-

5.3 Discussion of Major Finding

Table 5.2: Summary of Regression Model

	Sign	Significant	Not Significant
(i) The relationship between NPLs and LR.	+	✔	
(ii) The relationship between NPLs and UR.	+	✔	
(iii) The relationship between NPLs and IR.	_		✔
(iv) The relationship between NPLs and GDP.	_		✔

From the table 5.2, EViews had proven that the two variables which is LR and UR have significantly relationship with NPL but the remaining two variables are insignificant relationship with NPL. Not only this, the expected signs of variables that discussed in Chapter two were similar with the actual sign for each independent variable.

Firstly, as for LR, it is significant at 0.05 significant level. LR positively affects NPLs because NPL are easily affected by the variation of LR, high LR will rise the debt burden of borrowers, hence there is a high probability that borrowers unable to service on their debt and cause an increase in the rate of default (Adebola, Yusoff & Dahalan, 2011).

Secondly, as for UR, it is significant at 0.05 significant level, the empirical result shows a direct relationship between NPL and UR. According to Messai and Jouini (2013), when UR increases, the NPL will increases and vice versa. The reason was the borrower will lose the ability to earn income after losing their job and it will affect their capability to repay the debts.

Thirdly, as for IR, it is not significant at 0.05 significant level. According to Ahmad and Bashir (2013) through their studies, they found out that inflation rate is significantly negative associated with NPL. However, the research by Alexandri and Santaso (2015) suggested otherwise, they stated that inflation shows no significant or positive effect on the NPL. When inflation increases, the central bank usually will respond through monetary policy instrument to give moral appeal or moral persuasion to bank credit providers to be cautious in issuing credit in order to prevent the enlargement potential NPL level.

Last but not least, as for GDP, it is not significant too at 0.05 significant level. According to Espinoza and Prasad (2010), when GDP decreases, the NPL will increases and vice versa, this was because the economic growth indicates the business performance improvement, so better business performance will strengthen borrower's capability to repay their debt faster. However, according to Alexandri and Santaso (2015) found that GDP does not have any significance effect on the NPL because the portion of the calculation of GDP in Malaysia is mainly dominated by the agricultural sector. Somehow, lending done by banks in Malaysia dominated for the construction and property sector that has a low portion in the calculation of GDP. So, the low portion of the construction and property sector in GDP calculations are not so influential on the NPL. This is the reason why the GDP has no significant effect on the NPL.

5.4 Policy Implications of Study

This research is to examine the determinants of Non-performing loans (NPL) in Malaysia's banks. The four determinants that causes NPL in banks used in this study are LR, UR, IR, and GDP of the country. The implications of this study is for other parties to further understand the causes of NPL where these four important determinants of NPL will affect decisions and views of banks and future

researchers. However, various unpredictable factors could also affect the level of NPL in Malaysia's financial system. In this case, unpredictable factors consist of government policies, credit scores, and management of the bank itself.

The importance of this research is to clearly explain the nature of NPL. Increase in NPL indicates that bank may be unstable and insecure, which will then reduce bank's profitability and liquidity. When the level of NPL in banks increases, it will cause a reduction of funds available for the bank to make new lending. This occurrence drastically affects the profitability level of the bank with its reduction of new loan approval. At the same moment, banks need to provision for NPL which leads to lower returns. This causes the capital allocation of the bank to change due to NPL provision. Having a high NPL level reduces credit supply for lending and affects credit allocation of the bank. Banks often find it hard to overcome the NPL problem when it arises, and rely on economic growth to bring back its NPL level to satisfactory. In this case, reducing the level of NPL in banks is important to free up banks liquidity.

Information from this research can guide banks in their lending decisions. In the banking industry, Bank Negara Malaysia (BNM) is responsible for the making and implementation of policies to control NPL levels of banks. BNM's responsibility is to ensure the banking system is sound. Therefore, BNM is required to continuously revise and improve existing or new policies. Revisiting existing policies as guideline to improve it or make new policies is a crucial part of BNM in ensuring efficiency of banking system. BNM's loan margin policy is a good example of loan controlling policy where decision of loan approval or rejection based on Central Credit Information Report (CCRIS) of the borrower. A deeper understanding and implication of this policy could reduce the rate of NPL as banks could predict the borrower's ability to pay back a loan more accurately.

However, some forms of government intervention in the financial system of Malaysia causes financial repression that could discourages savings and

investment. Therefore, having sufficient information is important in the process or revising and improving policy implication.

5.5 Limitation of study

There were limitations encountered during preparation of this research project. This study focused solely on Malaysia. It was very difficult to receive the sufficient journals published by Malaysia. However, some information was obtained from foreign country's articles or journal which are suitable to make up the lack of information in Malaysia studies. Moreover, some problems were faced during the collection of the data, there are insufficient platform to obtain the details of data sources listed by bank in Malaysia. One of the reasons is NPL mostly related with the banks, there are many regulations and restrictions that must be followed by the bank such as bank is required to keep customer information confidentiality. As a results, some of the data released by bank are inconsistency and imperfectly completed. Data was collected and combined from different data resources which are BNM (Bank Negara Malaysia) and World Bank Data. Sample size was decided to collect for 30 years from 1987 to 2006. Regarding to test results, some of the test showed negative and insignificant. Negative sign and insignificant made the results are not precisely and reliable. It was resolved after using first- difference (FD) estimator which approach used to resolve the problems of omitted variables in statistic.

5.6 Recommendation

In order to extend and enrich this study, several recommendations will be put forward for future study. First, this study highlighted the factors in NPL, hence the future studies can be done on the specific internal variable from bank such as credit analysis, loan management, lending policy and lending behaviour. These variable are considered as major factors to cause the NPL. Beside, this study found that the impact of the NPL was related to the bank operation. Bank should have adequate and reliable information to their customer in order to conduct appropriate credit appraisal and thus provide a good credit policy. Hence, the future researchers may study deeply how the credit policy or credit analysis can cause the NPL.

Second, the scope of study can include other external or microeconomic factor as well as government action that are main factor to cause the NPL. This is because the government play a key role in enhancing the NPL sector. As a result, NPL will decrease bank's profitability, capital and caused stagnation of financial asset, for example, labour and capital, in sector of lower productivity and decline confidence in financial system. Thus, the future researchers can study on how government can overcome the NPL problem by invest in growth-enhancing sectors of the economy market.

Third, the future researcher may lengthen the period of study. In this study, yearly data from 1987 until 2016 were used. Due to the time constraint, only yearly data were obtained for research testing. So, the results of test will be more accurate if weekly or daily data was used in this research. On the other hand, this study only focused on one country which is Malaysia, in the future studies more country may involve to compare the level of NPL with other country such as the level of NPL in Asian or Islamic Country.

5.7 Conclusion

The purpose of this research had been achieved, which was to investigate the effects of the factors such as LR, UR, IR and GDP towards the non-performing loans in Malaysia. The data obtained from Bank Negara Malaysia (BNM) statistics database and The World Bank statistics database were analysed using the OLS regression. All the data was based on the licensed financial institutions for commercial bank and Islamic bank which can grant loans legally in Malaysia. The data was taken from year 1987 to 2016 on yearly basis so this research took 30 observations of sample size to process the empirical result.

In this research, Eviews program helped a lot in processing the data and running all the test to analyse for hypothesis testing and diagnostic checking of the whole research. It also helped to check if the data had any problem so that action can be taken as soon as possible to solve the problem. Every researcher will have at least one or more limitation during their research. Therefore, researchers have to avoid the same mistake or steps so the same limitation will not happen again. Moreover, other than the limitations, the recommendations found through this research also can be taken to improve the future research.

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APPENDICES

Appendix 4.1 Empirical Result of OLS Regression Model

Dependent Variable: NPL
Method: Least Squares
Date: 01/27/18 Time: 04:22
Sample: 1987 2016
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.83958	3.416587	-4.636083	0.0001
LR	1.810094	0.406848	4.449067	0.0002
UR	4.478142	0.711581	6.293228	0.0000
IR	-0.797523	0.696660	-1.144781	0.2631
GDP	-0.175134	0.196664	-0.890522	0.3817

R-squared	0.806282	Mean dependent var	10.89306
Adjusted R-squared	0.775287	S.D. dependent var	8.468988
S.E. of regression	4.014633	Akaike info criterion	5.768780
Sum squared resid	402.9319	Schwarz criterion	6.002313
Log likelihood	-81.53171	Hannan-Quinn criter.	5.843490
F-statistic	26.01335	Durbin-Watson stat	0.611896
Prob(F-statistic)	0.000000		

Appendix 4.2 Empirical Result of T-test

Dependent Variable: NPL
Method: Least Squares
Date: 01/27/18 Time: 04:22
Sample: 1987 2016
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.83958	3.416587	-4.636083	0.0001
LR	1.810094	0.406848	4.449067	0.0002
UR	4.478142	0.711581	6.293228	0.0000
IR	-0.797523	0.696660	-1.144781	0.2631
GDP	-0.175134	0.196664	-0.890522	0.3817

R-squared	0.806282	Mean dependent var	10.89306
Adjusted R-squared	0.775287	S.D. dependent var	8.468988
S.E. of regression	4.014633	Akaike info criterion	5.768780
Sum squared resid	402.9319	Schwarz criterion	6.002313
Log likelihood	-81.53171	Hannan-Quinn criter.	5.843490
F-statistic	26.01335	Durbin-Watson stat	0.611896
Prob(F-statistic)	0.000000		

Appendix 4.3 Empirical Result of F-test

Dependent Variable: NPL
Method: Least Squares
Date: 01/27/18 Time: 04:22
Sample: 1987 2016
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.83958	3.416587	-4.636083	0.0001
LR	1.810094	0.406848	4.449067	0.0002
UR	4.478142	0.711581	6.293228	0.0000
IR	-0.797523	0.696660	-1.144781	0.2631
GDP	-0.175134	0.196664	-0.890522	0.3817

R-squared	0.806282	Mean dependent var	10.89306
Adjusted R-squared	0.775287	S.D. dependent var	8.468988
S.E. of regression	4.014633	Akaike info criterion	5.768780
Sum squared resid	402.9319	Schwarz criterion	6.002313
Log likelihood	-81.53171	Hannan-Quinn criter.	5.843490
F-statistic	26.01335	Durbin-Watson stat	0.611896
Prob(F-statistic)	0.000000		

Appendix 4.4 Empirical Result of Goodness of Fit

Dependent Variable: NPL
Method: Least Squares
Date: 01/27/18 Time: 04:22
Sample: 1987 2016
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.83958	3.416587	-4.636083	0.0001
LR	1.810094	0.406848	4.449067	0.0002
UR	4.478142	0.711581	6.293228	0.0000
IR	-0.797523	0.696660	-1.144781	0.2631
GDP	-0.175134	0.196664	-0.890522	0.3817

R-squared	0.806282	Mean dependent var	10.89306
Adjusted R-squared	0.775287	S.D. dependent var	8.468988
S.E. of regression	4.014633	Akaike info criterion	5.768780
Sum squared resid	402.9319	Schwarz criterion	6.002313
Log likelihood	-81.53171	Hannan-Quinn criter.	5.843490
F-statistic	26.01335	Durbin-Watson stat	0.611896
Prob(F-statistic)	0.000000		

Appendix 4.5 Empirical Result of OLS Regression Model

Dependent Variable: NPL
Method: Least Squares
Date: 01/27/18 Time: 04:22
Sample: 1987 2016
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.83958	3.416587	-4.636083	0.0001
LR	1.810094	0.406848	4.449067	0.0002
UR	4.478142	0.711581	6.293228	0.0000
IR	-0.797523	0.696660	-1.144781	0.2631
GDP	-0.175134	0.196664	-0.890522	0.3817

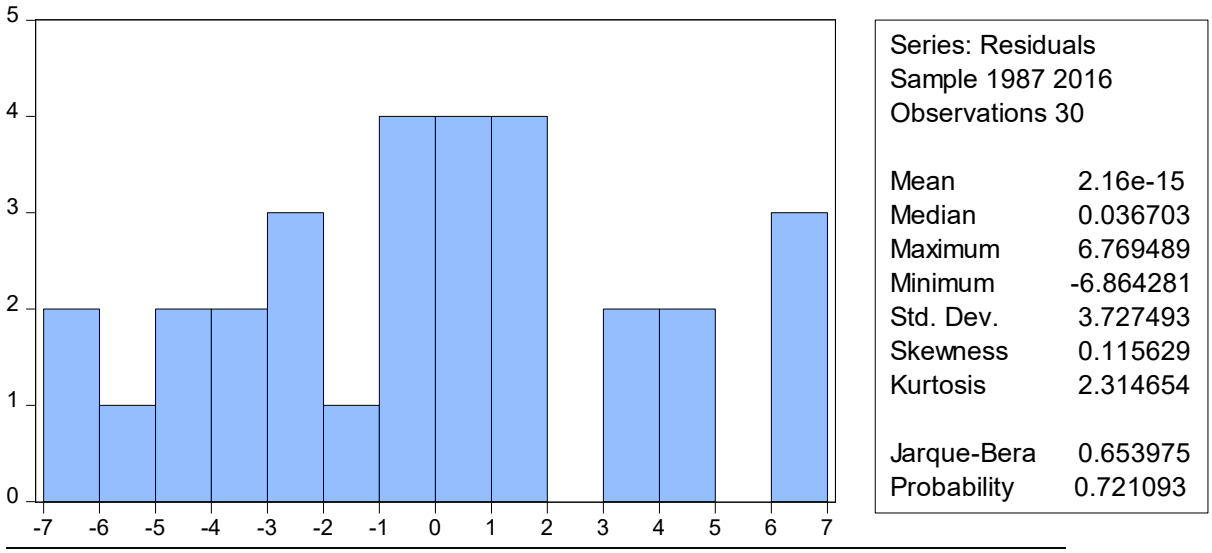
R-squared	0.806282	Mean dependent var	10.89306
Adjusted R-squared	0.775287	S.D. dependent var	8.468988
S.E. of regression	4.014633	Akaike info criterion	5.768780
Sum squared resid	402.9319	Schwarz criterion	6.002313
Log likelihood	-81.53171	Hannan-Quinn criter.	5.843490
F-statistic	26.01335	Durbin-Watson stat	0.611896
Prob(F-statistic)	0.000000		

Appendix 4.6 Empirical Result of VIF Test

Variance Inflation Factors
Date: 01/27/18 Time: 04:23
Sample: 1987 2016
Included observations: 30

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	11.67307	21.72775	NA
LR	0.165525	18.41277	1.485735
UR	0.506348	14.15556	1.334063
IR	0.485335	7.887965	1.429867
GDP	0.038677	3.712662	1.032715

Appendix 4.7 Empirical Result of Normality Graph of Jarque-Bera test



Appendix 4.8 Empirical Result of Ramsey RESET test

Ramsey RESET Test
Equation: UNTITLED
Specification: NPL C LR UR IR GDP
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.793276	24	0.0855
F-statistic	3.215839	(1, 24)	0.0855
Likelihood ratio	3.772358	1	0.0521

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	47.61065	1	47.61065
Restricted SSR	402.9319	25	16.11727
Unrestricted SSR	355.3212	24	14.80505

LR test summary:

	Value	df
Restricted LogL	-81.53171	25
Unrestricted LogL	-79.64553	24

Unrestricted Test Equation:
Dependent Variable: NPL
Method: Least Squares
Date: 01/27/18 Time: 04:24
Sample: 1987 2016
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-31.32674	9.236196	-3.391736	0.0024
LR	2.728782	0.643814	4.238467	0.0003
UR	8.490156	2.338895	3.629987	0.0013
IR	-1.356161	0.736793	-1.840627	0.0781
GDP	-0.298196	0.200592	-1.486581	0.1501
FITTED^2	-0.022201	0.012380	-1.793276	0.0855

R-squared	0.829172	Mean dependent var	10.89306
Adjusted R-squared	0.793582	S.D. dependent var	8.468988
S.E. of regression	3.847733	Akaike info criterion	5.709702
Sum squared resid	355.3212	Schwarz criterion	5.989941
Log likelihood	-79.64553	Hannan-Quinn criter.	5.799353
F-statistic	23.29837	Durbin-Watson stat	0.999723
Prob(F-statistic)	0.000000		

Appendix 4.9 Empirical Result of OLS Regression Model

Dependent Variable: NPL
Method: Least Squares
Date: 01/27/18 Time: 04:22
Sample: 1987 2016
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.83958	3.416587	-4.636083	0.0001
LR	1.810094	0.406848	4.449067	0.0002
UR	4.478142	0.711581	6.293228	0.0000
IR	-0.797523	0.696660	-1.144781	0.2631
GDP	-0.175134	0.196664	-0.890522	0.3817

R-squared	0.806282	Mean dependent var	10.89306
Adjusted R-squared	0.775287	S.D. dependent var	8.468988
S.E. of regression	4.014633	Akaike info criterion	5.768780
Sum squared resid	402.9319	Schwarz criterion	6.002313
Log likelihood	-81.53171	Hannan-Quinn criter.	5.843490
F-statistic	26.01335	Durbin-Watson stat	0.611896
Prob(F-statistic)	0.000000		

Appendix 4.10 Empirical Result of Breusch-Godfrey Serial Correlation LM test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	11.70550	Prob. F(2,23)	0.0003
Obs*R-squared	15.13284	Prob. Chi-Square(2)	0.0005

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/27/18 Time: 04:25
Sample: 1987 2016
Included observations: 30
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.910156	2.546067	-0.750238	0.4607
LR	0.082137	0.300246	0.273566	0.7869
UR	0.068082	0.522471	0.130308	0.8975
IR	0.577298	0.525665	1.098224	0.2835
GDP	-0.095697	0.146173	-0.654681	0.5192
RESID(-1)	0.759105	0.203408	3.731936	0.0011
RESID(-2)	0.002045	0.204408	0.010004	0.9921

R-squared	0.504428	Mean dependent var	6.48E-15
Adjusted R-squared	0.375148	S.D. dependent var	3.727493
S.E. of regression	2.946492	Akaike info criterion	5.200071
Sum squared resid	199.6818	Schwarz criterion	5.527017
Log likelihood	-71.00107	Hannan-Quinn criter.	5.304664
F-statistic	3.901834	Durbin-Watson stat	1.864866
Prob(F-statistic)	0.007820		

Appendix 4.11 New Empirical Result of Breusch-Godfrey Serial Correlation LM test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.607845	Prob. F(2,22)	0.2230
Obs*R-squared	3.698292	Prob. Chi-Square(2)	0.1574

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/27/18 Time: 04:27
Sample: 1988 2016
Included observations: 29
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.108683	0.530659	0.204808	0.8396
D(LR)	0.702763	0.831973	0.844694	0.4074
D(UR)	-0.171227	1.026697	-0.166774	0.8691
D(IR)	-0.053704	0.329875	-0.162799	0.8722
D(GDP)	0.012201	0.136922	0.089107	0.9298
RESID(-1)	0.348436	0.256027	1.360935	0.1873
RESID(-2)	0.191884	0.223801	0.857388	0.4005

R-squared	0.127527	Mean dependent var	4.52E-16
Adjusted R-squared	-0.110420	S.D. dependent var	2.385076
S.E. of regression	2.513309	Akaike info criterion	4.887582
Sum squared resid	138.9678	Schwarz criterion	5.217619
Log likelihood	-63.86995	Hannan-Quinn criter.	4.990946
F-statistic	0.535948	Durbin-Watson stat	2.008672
Prob(F-statistic)	0.775125		

Appendix 4.12 Empirical Result of ARCH test

Heteroskedasticity Test: ARCH

F-statistic	4.078750	Prob. F(1,27)	0.0535
Obs*R-squared	3.805937	Prob. Chi-Square(1)	0.0511

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/27/18 Time: 03:12
Sample (adjusted): 1988 2016
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.605389	3.703586	2.323529	0.0279
RESID^2(-1)	0.362231	0.179359	2.019592	0.0535

R-squared	0.131239	Mean dependent var	13.47965
Adjusted R-squared	0.099063	S.D. dependent var	15.93804
S.E. of regression	15.12803	Akaike info criterion	8.337447
Sum squared resid	6179.143	Schwarz criterion	8.431743
Log likelihood	-118.8930	Hannan-Quinn criter.	8.366980
F-statistic	4.078750	Durbin-Watson stat	2.030371
Prob(F-statistic)	0.053453		