

MACRO AND BANK SPECIFIC DETERMINANTS  
THAT AFFECT PROFITABILITY OF COMMERCIAL  
BANK IN MALAYSIA FROM PERIOD 2007 TO 2016

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

BACHELOR OF BUSINESS ADMINISTRATION  
(HONS) BANKING & FINANCE

UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF BUSINESS AND FINANCE  
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APRIL 2019

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Date: 16 March 2019

## ACKNOWLEDGEMENT

We would like to thank University Tunku Abdul Rahman (UTAR) sincerely, as we get the opportunity to partake in the final year project, through this we had gained some benefits which include communication skills, teamwork, interpersonal skills, personal skills and learning. Under the guidance and contribution from various parties, we had completed our final year project successfully. Thus, we grab this opportunity to give our highest gratitude to the parties who gave us the assistance.

First of all, we particular thanks to our FYP supervisor, Mr. Tan Kock Lim, within these two semesters, he provided us the guidance, advice, concern, encouragement, constructive criticisms and information to aid us to done our research project smoothly. We appreciate he willingness sacrificed his time for assists us and lead us to able accomplish our research with the progress schedule in proper.

Secondly, we sincere thanks to our second examiner, Ms. Nabihah Binti Aminaddin , who gave us the valuable advices and patiently explain to us of our problems in certain details, without her pointed out the errors in the research we did, we may overlooked it and will not amend it before submitted the research project. As a result, her willingness to comment on us will improve our research outcome.

Furthermore, we would like to express sincere thanks to our coordinator of final year project, Mr. Ahmad Harith Ashroffie bin Hanafi, during this period, we received his kind advice and support. Once again, we are pleased to have each team members who sacrificed precious time by doing this research; otherwise, the research may not possibly done within the progress schedule. Besides that, we built a strong friendship within these two semesters to each other. Moreover, that was a valuable experience for us.

## Dedication

This research is dedicated to our supervisor, who was helping us to complete our research with given his advices and guidance which was Mr. Tan Kock Lim. Next, we would like to dedicate this research to our parents who have supported us all the way since the beginning of our studies. With their support and encouragement, we are able to fulfill our bachelor's degree with the accomplishment of this research. Last, we would also like to dedicate this research to businessmen and government; since our research was focused on financial of banking sector, so our research may help in policy implication, risk management and others.

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## LIST OF ABBREVIATIONS

ARCH	Autoregressive Conditional Heteroscedasticity
CPI	Consumer Price Index
DW	Durbin-Watson
FEM	Fixed Effect Model
GAAP	General Accepted Accounting Principles
GDP	Gross Domestic Production
GMM	Generalized Method of Moments
INF	Inflation Rate
LGD	Loss Given Default
NIIM	Net Interest Income Margin

NPL	Non-Performing Loans
OLS	Ordinary Least Squares
PD	Probability of Default
POLS	Pooled OLS Model
REM	Random Effect Model
ROA	Return on Assets
ROE	Return on Equity
TOL	Tolerance
UNM	Unemployment Rate
VIF	Variance inflation factor
$\beta_0$	Constant
$\varepsilon$	Error term

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## Preface

UBFZ 3026 Research Project is a compulsory research project that all the final year students should carry out for the purpose of completing our study for Bachelor Degree of Business Administration (Hons) Banking and Finance. The topic of the research project that will be conducted is Macro and bank specific determinants that affect profitability of Commercial bank in Malaysia from period 2007 to 2016. This research project is conducted due to Return on Equity (ROE) was giving great impact at several sector, most concern part for commercial bank was financial analysis problem like profitability and market value.

According to Chen and Lin (2011), ROE is one of the common measurements of the probability of bank and accounting measurements in the banks for valuation of security, but it is not similar with the stock returns. It also represent how effective and efficient of the bank management and performance while gain the profit. Hence, ROE is selected as dependent variable which is one important issue in this study. Although there are more similar research about the bank profitability, however the purpose of this study is to more accurately investigate how ROE is influenced by the economic and banking activities in Malaysia.

In this research project, we outline several macroeconomic and bank specific factors that affect profitability of Commercial bank in Malaysia. Those macroeconomic and bank specific variables that we chose are inflation rate, gross domestic product, unemployment rate, net interest income margin and non-performing loans. Those variables are key factors that give impact on the profitability of Commercial bank in Malaysia.

## **Abstract**

Bank profitability is an important issue to several sectors which including domestic economists, commercial banker, shareholders and government since it is helpful for them. The reasons are not only country profitability was tied up with bank profitability, thus it can also affect the country economy but also help banker in bank business operation like risk management. There are numbers of past literature have conducted to determine the impact on bank profitability by using different macroeconomic and microeconomic factors. In the view of better understanding on bank profitability, this study is being aim to more accurately investigate how the economic and banking activities in Malaysia affect the ROE.

This research involved five macroeconomic and bank specific variables including inflation rate, gross domestic product, unemployment rate, net interest income margin and non-performing loans; thus it is aiming to investigate how each of the variables influences ROE respectively. Moreover, this research contained eight commercial banks in Malaysia including Public bank, Maybank, CIMB bank, Hong Leong bank, RHB bank, AmBank, Alliance bank and Affin bank. We used secondary data to conduct the study by obtaining the macroeconomic variables data from World Bank from period 2007 to 2016 while the microeconomic variables data of 8 commercial banks from the annual report start from year 2007 until 2016. All these analysis are conducted by using E-Views 10 to investigate the relationship of independent variables (Inflation Rate, Gross Domestic Product, Unemployment Rate, Net Interest Income Margin and Non-Performing Loans) and dependent variable (Return on Equity). Based on the finding of study, theoretical and practical implications were presented in the study. In a nutshell, the analysis on the major findings, implications of the research, limitations for the study, and recommendations for future research are discussed in the end of this study.

**Keywords:** Bank Profitability, Return on Equity, Inflation Rate, Gross Domestic Product, Unemployment Rate, Net Interest Income Margin, Non-Performing Loans.



## **CHAPTER 1                      RESEARCH OVERVIEW**

### **1.0 Introduction**

This chapter is studied about research summarization of this research paper. It is included the background of study, problem statement, research objective and question. In addition, there are also included significant of study and summary of all the chapter.

### **1.1 Research Background**

A financial system is a channel for monetary system's transmission, payment system. In addition, this system also has an intermediation function. In 1959, Bank Negara Malaysia was established to create a basic infrastructure for financial system and it has its own roles. In Malaysia banking system, Bank Negara Malaysia acts as a central bank and Malaysia have three type of banks which are Commercial banks, Islamic banks and Investment banks. The function of a Commercial bank is to accept or receive deposits, provide financing, provide treasury and payment services. The main functions of Islamic banks are similar with commercial banks but it was conducted under the Shari'ah Law which means that riba or interests are prohibited and they encourage profit sharing. In addition, the main activities of Investment banks are helping someone to manage the investments.

Recent years, the bank's profitability of Commercial banks in Malaysia are facing declined from period 2007 to 2016. It may due to the declined in the bank

performance. Therefore, bank's profitability has become a concern issue for banks in banking sector in Malaysia. According to the research of Athanasoglou, Brissimis & Delis (2008), there are 2 alternative to determine the bank's profitability, it is Return on Assets (ROA) and Return on Equity (ROE). ROA is usually used to measure the ability of banks to generate revenues from the bank's assets while ROE is used to measure the total net return to shareholders on their equity.

There are a lot of determinants that will give impact to the Return on Equity (ROE). Many researchers such as Aburime (2008), Athanasoglou, Brissimis & Delis (2008), Petria, Capraru & Ihnatov (2015), Osuagwu (2014), Djalilov & Piesse (2016), Duraj & Moci (2015) and Roman & Danuletiu (2013) have studied in this field to find out the determinants and most of them found that credit risk, bank size, capital adequacy, non-interest income margin, financial crisis, liquidity, inflation rate, non-performing loans, gross domestic product and net interest income margin will significantly affect the bank's profitability. Since there are several of factors that will significantly give impact to bank's profitability, we have to find out and examine the determinants that will affect the bank's profitability. Thus, there is a need to carry out this research to find out are there any contradict based on the previous studies.

In our research, we selected Return on Equity (ROE) as our dependent variable since it is the most appropriate variables used to measure the bank's profitability. Moreover, we have decided to choose 3 macroeconomic variables and 2 microeconomic variables as our independent variables which are inflation rate (INF), gross domestic product (GDP), unemployment rate (UNM), net interest income margin (NIIM) and non-performing loans (NPL). We are choosing these 2 microeconomic variables because it is controllable. It can easily adjusted by bank and they are control by the bank. For an example, banks can give more loans to the good customers which have a good attitude and always pay back or make payments on time. Then, banks will have less risk and higher chance to take back

the loans and thus increase the bank's income and reduce the non-performing loans.

In addition, we have chosen 8 commercial banks in Malaysia as our research target which are Public bank, Maybank, CIMB bank, Hong Leong bank, RHB bank, Ambank, Alliance bank and Affin bank to better understanding this research. In this research, we focus on the determinants of these 8 commercial banks of Malaysia that will significantly affect the bank's profitability. We obtain the macroeconomic variables data from World Bank from period 2007 to 2016 while the microeconomic variables data of 8 commercial banks from the annual report start from year 2007 until 2016.

## 1.2 Problem Statement

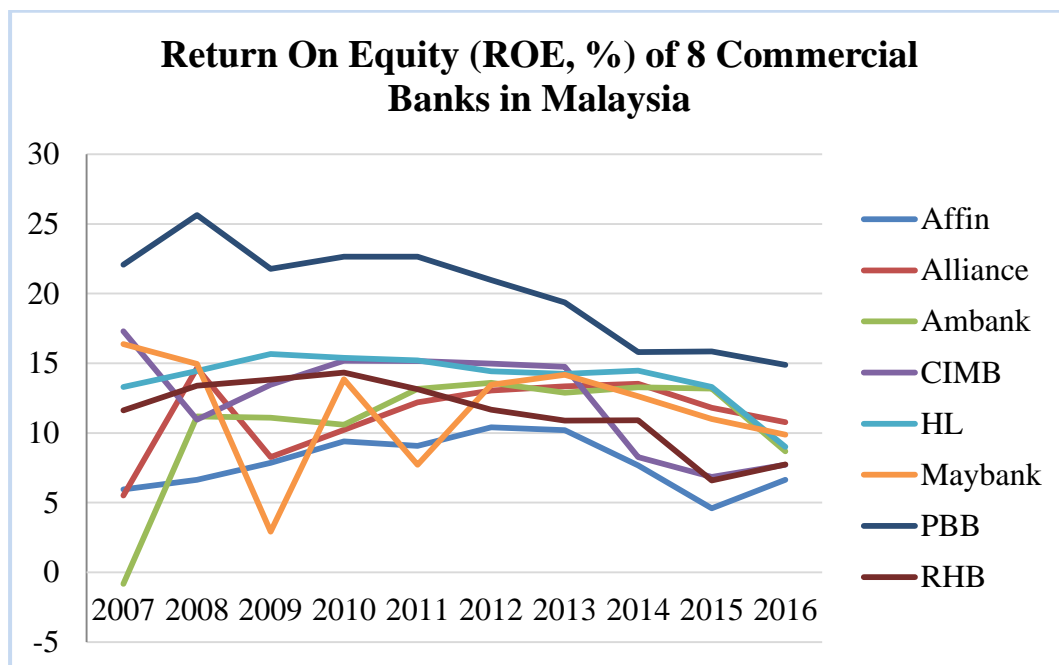


Figure 1: Return on Equity (ROE)

Sources: Annual Report of 8 Commercial banks in Malaysia

According to the graph, it clearly show a fluctuate trend based on the Return on Equity (ROE) of the 8 commercial banks in Malaysia from period 2007 until 2016. Most of the banks have a decline in their bank profitability.

In the research of Roman & Danuletiu (2013), the bank profitability will decrease because of a high level of non-performing loans (NPL). A loan is defined as a principal assets or income of a bank, when the loans increase, the bank profitability will follow to increase (Naceur & Goaid, 2005). However, when there are default payments which mean that the loans are unable to pay back by the borrower, the non-performing loans will increase. In the previous studied of Lekki (2010), there are 11 factors that will affect the non-performing loans. The factors are a poor management of the funds, a poor loan portfolio management, lack of reliable customers information, lack of knowledge on customers side or business failure, changes in country policies, lack of transparency by customers, main person dying, changes in economic conditions, disloyalty of employees, country law that do not support lending businesses or the costs that carry to sell the mortgaged assets are low, businesses which only have an owner. In this case, the bank have to use more provisions expenses to cover the losses when the loans classified as doubtful which also called as non-performing loans (Duraj & Moci, 2015). Therefore, bank income will decrease and thus affect the bank's profitability follow to decrease.

Based on the previous studies of Tan (2016) and Sufian & Habibullah (2010), they found that inflation will significant affect the bank's profitability positively. During Tan (2016) research period, the examined bank managers have managed their expenses well as the bank regulatory authorities and managers have adjusted the interest rates appropriated. Thus, there is an increase in the bank's profitability. However, Duraj & Moci (2015) stated that if there is a poor management of bank, the bank did not adjust the interest rates properly; inflation may cause a negative impact to bank's profitability. For example, if operational costs increases more than the effect of adjusting the interest rate, the bank have use more expenses to cover the operational costs and it will reflect to the bank's profitability. Therefore, the level of bank's profitability will be lower.

In the research of Wasiuzzaman & Tarmizi (2010), the profits made by banks are directly proportional to the Gross Domestic Production (GDP). It is very important for a country to analyze the upcoming GDP. According to Robin, Salim & Bloch (2018), Bouzgarrou, Jouida & Louhichi (2018), a high level in economic growth will increase the ability of borrowers to pay back their debts and lead to a lower level of credit risk. On the other hand, a lower level of economic will also reflect a lower ability of borrowers to pay back their loans and this will lead to an increase in non-performing loans and thus reduce the bank's profitability. For instance, when Malaysia's growth rate decreases, the economy becomes more worse and this will increase the unemployment rate which means that less people are getting a job and their purchasing power will decrease. In this case, the ability of the borrower to pay back their debts will decrease and thus decrease the bank's income and also the bank's profitability. Moreover, when people's purchasing power reduces, they will also reduce their spending on luxury products and focus on necessities products. This will affect the bank getting lesser loans and thus reduce the bank's income and profitability.

According to Lartey, Antwi & Boadi (2013), Net Interest Income Margin (NIIM) is an important factor in determining the bank's profitability. It is expected that the ROE will increase when NIIM is increasing which shows a positive relationship. However, there are a lot of factors that will affect the interest income. When the operational costs of a bank increase, it will lead to a decline in interest income. It will also be affected by the financial repression, competition, market power and inflation rate. For instance, when the inflation rate increases, the operational costs will follow to increase and the income generated by the bank will reduce. Thus, the bank's profitability will face a decline. In addition, when the market power of the bank reduces or the market power of a competitor more than the bank, the interest income of the bank will reduce. For example, Maybank offers lower interest rates on loans, borrowers of Public Bank will decide to go and demand on Maybank loans since they will pay much less compared to Public banks. In this case, the interest income of Public Bank will reduce and thus reflect on the bank's profitability.

The bank's profitability may also be affected by the unemployment rate. In the research of Raulickis & Jureviciene (2018), the unemployment rate will significantly give negative impact to bank's profitability. When the unemployment rate increases, people are difficult in getting a job, their purchasing power will reduce and thus will spend less than normal. People will demand lesser on loans to buy house, car, and land and so on. Hence, incomes of bank will decrease and also the bank's profitability. Moreover, many people will lose their job when economy condition is not good and unemployment rate is high. This will lead to a decrease in the application for loans in bank. Therefore, the bank income will decrease and bring effect to the bank's profitability.

In summary, based on the graph, almost all the banks have a fluctuate trend but 5 of them have a lower return on equity (ROE) in the year end of 2016 compare to themselves at the first year of 2007. These 5 banks are CIMB, Hong Leong, RHB, Maybank and Public bank. It means that, return on equity (ROE) of the banks have a noticeable drop. Since return on equity (ROE) has played an important role in financial system, we would like to examine the determinants which will affect the return on equity (ROE) to better understanding this study.

## 1.3 Research Objective

### 1.3.1 General Objective

To verify the microeconomic with macroeconomic factors that influence commercial bank's profitability in Malaysia from period 2007 to 2016.

### 1.3.2 Specific Objective

#### **Microeconomic Factor**

- I. To verify the impact of non-performing loan on bank profitability in Malaysia.

- II. To verify the impact of net interest income margin on bank profitability in Malaysia.

### **Macroeconomic Factor**

- I. To verify the impact of gross domestic product on bank profitability in Malaysia.
- II. To verify the impact of unemployment on bank profitability in Malaysia.
- III. To verify the impact of inflation on bank profitability in Malaysia.

## 1.4 Research Question

### 1.4.1 General Objective

What are the microeconomic and macroeconomic factors that influence commercial bank's profitability in Malaysia from period 2007 to 2016?

### 1.4.2 Specific Objective

### **Microeconomic Factor**

- I. What is the impact of non-performing loan on bank profitability in Malaysia?
- II. What is the impact of net interest income margin on bank profitability in Malaysia?

### **Macroeconomic Factor**

- I. What is the impact of gross domestic product on bank profitability in Malaysia?

- II. What is the impact of unemployment on bank profitability in Malaysia?
- III. What is the impact of inflation on bank profitability in Malaysia?

## 1.5 Significant of Study

Nowadays, Return on Equity (ROE) was giving great impact at several sector, most concern part for commercial bank was financial analysis problem like profitability and market value. The purpose of this research is how Malaysia's economic and banking activity can affect ROE like unemployment rate, inflation rate and net interest income margin. In other word, it state the relationship between ROE as dependent variable and inflation rate, gross domestic product, unemployment rate, net interest income margin and non-performing loan as independent variables to prove that the real relationship between these variables. The research was based on a panel data of 10 years and 8 Malaysia's commercial bank, which is from year 2007 to year 2016.

This research is important toward country because it may help to study about the reason will affect country economic, since country profitability was tied up with bank profitability; so it will also affect country economic indirectly. On other hand, country gross domestic product is significant related with our research. A relationship of increase in bank profitability will lead to increase of country profitability and result of increase of gross domestic product; this will help a domestic economist have a good study on their research.

Furthermore, this research also important for a commercial bank, it may help banker in bank business operation like risk management. Since Non-Performing loan will increase loss to a bank, so a well risk management can help to meet objective. Our research can help for study as an indicator. On other hand, this research was important at a shareholder viewpoint; although shareholder's



financial health was based on bank profit. Since our research related to bank profitability, when shareholders act as an investor; it can help in investment study. As bank profitability raise, the financial health of shareholders will also raise; as result they will focus on that bank which gains large profit. The following chapter we will discuss about the theory and literature review.

## 1.6 Chapter Layout

The summary of chapter 1 to 5 as stated in below:

Chapter one is provided a simple presentation of overview of this paper. This chapter is included research background and problem statement, objective of this paper. In addition, it also included significant of study and the hypothesis of this research paper.

Chapter two shows the relationship of all selected variable. Other than that, review of literature and theoretical model reviews also be included in this chapter. The reviews are showing the researcher's interest and consideration on the variable of the microeconomic and macroeconomic factors which affect the bank profitability of Malaysia's domestic commercial bank.

Chapter three shows how to collect data and where to collect the data. In additional, it is regard research design and data collection methods. Other than that, it also have included research instrument, sampling target and data analysis.

Chapter four provides findings and analysis the result of this research paper. It presents the relationship of the macroeconomic and microeconomic factors with

the bank's profitability. In this chapter, it majorly includes the description analysis and inferential analysis.

Chapter five shows the conclusion from chapter one until four. In this chapter, it includes the finding of the research paper, implication and limitation of study and the recommendation to future researcher.

## 1.7 Conclusion

To sum up, the first chapter has presented the background of study, problem statement, research objective and question. In additionally has discussed about significant of study, summary of all chapter and conclusion. This research paper's objective is to determine the macroeconomic and microeconomic factors that influence bank profitability in Malaysia from period 2007 to 2016. Lastly, the next chapter will be discussed the literature review which involves relationship between variables and theoretical from others researcher.

## **CHAPTER 2                      LITERATURE REVIEW**

### **2.0 Introduction**

This chapter will describe the review of literature on variable, review of relevant theoretical models and conclusion. The variable of this paper has included return on equity, non-performing loan, net interest income margin, gross domestic product, inflation and unemployment.

### **2.1 Underlying Theories**

#### **2.1.1 Credit Default Theory**

According to Sy (2007), credit risk models have played an important role in the global credit crisis. In his research, the credit risk models have been examined and he has developed a new model which called Credit Default Theory. This theory is development in the year 2007. The purpose of credit default theory is to predict the credit risks. Moreover, the credit risk is unable to evaluate by existing theories because market environment is rapidly changing. Other than that, the effect of default risk is not directly link to the cases by most of the existing theories (Sy, 2007).

This new theory has overcome a lot of limitations of the existing theories. Some existing theories are not strongly dependent on the data. The existing theories face

some difficulty in the statistical estimation. Thus, these models suffer from the historical sampling bias because of the lack of abundant and the qualities of data are high (Sy, 2007). Furthermore, consistency is also an issue of the existing theories. These theories treat these two approaches as 2 estimations, so they separate the loss given default (LGD) and the probability of default (PD) (Sy, 2007).

In the research of Ebba (2016), she also was using this new credit default theory. She found that this theory is useful as it helps in explaining the credit risk systematically. Fundamentally, this theories even robust in measure and manage the credit risk for financial system stability (Sy, 2007).

In Sy (2007) research, he assumes that credit default is caused by delinquency and insolvency. Delinquency was known as a failure to pay back the debt within a given period. It happened when borrower cannot pay back their debt within a given period because of liquidity failures (Sy, 2007). Insolvency will appear when borrowers do not have enough assets to pay back all their debts and thus he or she may enter into bankruptcy. The risk factor only considered relevant when there is a demonstrable causal impact on delinquency and insolvency. By using this new approach in his paper, many issues have been resolved (Sy, 2007). At this moment, only his new approach can be used to evaluate the credit risk in a changing market environment.

Lastly, this theory is related to our study as credit risk which also called non-performing loans will influence the bank's profitability. When non-performing loans increase which means that the bank's profits reduce and bank's liabilities or debts is going up. This will lead to a decrease in bank's profitability.

### 2.1.2 Financial Ratio Analysis

Financial ratio analysis is a tool that are widely used by researchers. The aim is to determine the bank or firm's financial condition and profitability. The financial ratios include liquidity ratio, profitability and debt ratio. Besides, the interest of researcher used this analysis is to develop model in order to exploit the ratio (Rehman et al, 2015).Beside, many researcher have used this analysis for difference purpose. According to Martikainen (1993), he has studied the key factor of stock return by using the financial ratio. Other than that, Fitzpatrick (1932) has used this ratio to analysis the failure of company and most of the analysis is correct. Other than that, using this analysis to measure the bank performance, it will bring some advantages which is it can be identified the strength and weaknesses of a bank and it can present the detail information of bank such as profitability, liquidity and others (Dietrich, 1996).Moreover, this ratio is also important for planning a bank's future, according to Hempel et al (1994), he has suggested that financial ratio provide an opportunity to bank to evaluate the past of bank and it was be a helpful information in planning the bank's future.

Financial ratio analysis is chosen as one of the theories because of there are some calculation for financial ratio which is used in this paper to compute the data and proceed it to do test. For example, return on equity, non-performing loan and net interest margin.

### 2.1.3 Fisher Effect Theory

According to Mishkin (1991), Fisher Effect indicates the relationship between the interest rate and inflation rate in the long run. In additional, it also is a concern issue in the economy. The real interest rate plus inflation rate is calculation of Nominal interest rate. Fisher Effect expected that the change of nominal interest

rate will be same as the movement of expected inflation rate no matter it is increased or decreased. However, the level of real interest rate will remain constant with monetary shock over the long run. Therefore, the relationship between nominal interest rate and expected inflation rate is one-to-one. Other than that, the Fisher Effect will not exist in short run due to the expected inflation. It will not affect the short term interest rate which means it is influenced by the real factors of economy but not market forces (Edirisinghe, Sivarajasingham, & Nigel, 2015).

Fisher Effect is a widely accepted theoretical assumption which has been used in many researches. This is because the policymakers, debtors and creditors are able to implement policy implications from the understanding and information in the effects of monetary policy on interest rate after the observation of the relationship between nominal interest rate and inflation rate (Bayat, Kayhan, & Taşar, 2018). Therefore, it is important for them to carry out the most suitable policy for the country from the existence of Fisher Effect (Edirisinghe, Sivarajasingham, & Nigel, 2015).

High inflation rate will reduce the purchasing power of citizens in return reducing the investments and productions which lead to low economic growth of a country. Chen (2015) stated that the rising of expected inflation rate of a country which will increase the currency deposit rate of a country in the end, since the price of goods and services become expensive. Hence, the higher the currency deposit rate, the higher the bank profitability.

Other than that, Chen (2015) examined the China's unstable economy by conducting an empirical analysis in order to find out the existence of Fisher Effect based on the environment of China in period of 1980-2012. But then, "Fisher Paradox" was found out that it existed in the China economy under the existence of strong controlling features of interest rate market and insensitive interest rate policy.

Lastly, the reason we apply this theory in our study is because it indicates the changes of inflation rate which is related to our dependent variable, return on equity (ROE). For example, ROE decreases as inflation rate increases.

## 2.2 Review of literature

### **Dependent Variable:**

#### 2.2.1 Return on equity (ROE)

Our research looks into the return on equity (ROE) by using both microeconomic and macroeconomic factors. Return on equity (ROE) is one of the common measurements of the probability of bank and accounting measurements in the banks for valuation of security, but it is not similar with the stock returns. ROEs also known as accounting return, it use the formula as net income divided by equity based on General Accepted Accounting Principles (GAAP) to measure the generated profits from the capital (Chen & Lin, 2011).

According to Sufian and Habibullah (2010), the bank profitability can be measured by return on asset (ROA) and return on equity (ROE) in the factors of internal and external determinants. The decision management of bank and the goal of policy will be affected the internal determinants. The industry and macroeconomic factors will embody the operation of financial institution thereby affect the external determinants. Thus, the liquidity level, capital adequacy, management of expenses, bank size and policy of provisioning are determinant the profit. However, the shareholders think over the leverage effect by using ROA to be a trustworthy measurement of shareholder value and the shareholders in investment will used ROE, because ROE is a tool to assess the financial return directly (Lee & Kim, 2013).

While ROA defines as net profit divided by average total assets to measure the performance of bank. But possibility of risk-taking and potential variability of profit in banks, ROA would not justify it, and this is an issue of ROA (Bandt, Camara, Maitre & Pessarossi, 2017). However, through the equity capital in ROE, it represents how effective and efficient of the bank management and performance while gain the profit. Therefore, define ROE can understand more to the underlying drivers in banks, the higher the ROE indicates the greater the profitability of bank, because it use shareholder equity efficiency (Vu, Phan & Le, 2017). The greater the ROE, the more safety of banks (Flannery & Giacomini, 2015). Furthermore, the ROE could control the performance of investor and borrowing firm profitability (Saunders & Song, 2017; Diaz & Huang, 2017).

### **Independent variables:**

#### **Microeconomics Factor**

##### **2.2.2 Net Interest Income Margin (NIIM)**

According to Lartey, Antwi and Boadi (2013), Net Interest Income Margin (NIIM) was significant positively related to bank profitability explain by our dependent variable which is Return on Equity (ROE) ratio. Because of same component as financial categories which is profitability of bank, the correlation between these two financial ratios was strongly positive. At another viewpoint, these two ratios were positively related because of interest rate.

This statement was explained by a relationship which is the lower the interest rate, the lower the NIIM, as result of ROE also will be low and more variation; this relationship can be call as “Low-For-Long” condition (Claessens, Coleman & Donnelly, 2018). On other hand, relationship between NIIM and ROE influence by interest rate also can refer to reformation of financial policy at year 1996;



interest rate was increased and led to increases of NIIM and ROE after the event which is financial policy reformation (Robin, Salim & Bloch, 2018).

Based on Ozili & Uadiale (2017) research, relationship between ROE and NIIM also positively related; this result was proved by internal factor of bank which was bank's ownership. Since the bank's ownership was dispersed and led to sufficient of capital provided by shareholders, large amount of capital will generate great direct return on capital based or interest based, therefore good risk management may better influence bank profitability; so well manage on risk like adjust interest and inflation rate will affect bank profitability in a more healthy way.

### 2.2.3 Non-performing Loan (NPL)

Based on the previous studies of Roman & Danuletiu (2013), a high level of non-performing loans (NPL) will lead to a decrease in bank's profitability. In addition, it also reflect the banks' asset quality. This statement is also supported by Duraj & Moci (2015). In the research of Duraj & Moci (2015), this negative relationship means that bank may need more provisions expenses to cover the losses or debt. Thus, non-performing loans increase will lead to a lower bank's profitability. However, their found that a high level of non-performing may also mean there is a high return. Since the bank loans are the main source of the bank income, it will be expected to have a positive impact on bank profitability. Their results show that the non-performing loans will have an insignificant and negative impact on bank's profitability.

A higher level of bank loans may cause increase in borrower's default which we called credit risk or default risk and thus lead to a higher level of non-performing loans (Naceur & Goaid, 2005). According to research of Osuagwu (2014), Zhao & Murinde (2011) and Kumbakhar et al (2001), non-performing loans are used to

measure the credit risk. The higher the ratio of non-performing loans, the lesser the bank's profitability as it is a measure of the strength of environmental variables on banks' performance. It will reduce the gains, revenues or profits accruing to the bank. Therefore, it is expected to have a negative relationship on the bank's profitability. In Khan, Annuar, Choo & Khan (2011) studies, they also stated the impact of non-performing loans on the bank's profitability is a significant negative impact.

In the paper of Garcia-Herrero, Gavila & Santabarbara (2009), they have used 87 banks from period 1997 to 2004 with a panel data set and their result shows that non-performing loans is an important determinants or a factors of the bank's profitability. In addition, Messai & Jouini (2013) found that increase in non-performing loans will lead to the provisions of banks. Moreover, their found that banks should provide loans by giving interest to reduce their non-performing loans level and thus increase the level of bank's profitability.

According to the studies of Athanasoglou, Brissimis & Delis (2008), there is a negative relationship between the bank's profitability and non-performing loans. They use loan-loss provisions to loans ratio to get the ratio to get the credit risk and they found that decreased in bank's profitability is because of increased exposure to credit risk. There are normally associated with each other's. Hence, when the banks' non-performing loans increase, the bank's profitability is expected to decrease.

### **Macroeconomic Factor**

#### **2.2.4 Inflation (INF)**

Based on the study of Sufian & Habibullah (2010), there are positive relationship between the bank profitability with inflation rate. Where high inflation rate will increase the profit of bank earned. The reason is the interest rate of loan will be

increased with the high inflation rate (Petria, Capraru, & Ihnatov, 2015). However, it depends on the ability of bank managers to forecast the future movement of inflation rate accurately whether it is fully anticipated or not anticipated. For instance, the bank is able to adjust the interest rate to desired level in order to get more profit which in return lead to high bank profitability; while the bank profitability is affected negatively by unanticipated future movement in inflation rate due to it raises the financial costs of bank (Tan, 2016). Besides that, Aydemir & Ovenc (2016) indicated that when a country with high inflation rate and limited competition within bank sector, the bank will be exploited from the endowment effect which helps in increasing more revenue in this condition.

In contrast, Munyambonera (2013) argued that the high inflation rate will reduce the profitability level of bank which means inflation rate is negatively influenced the bank profitability. If the bank make a wrong interest adjustment that the actual inflation rate is higher than the interest rate charged, hence the bank suffers a loss. Furthermore, the high inflation rate gives negative impact to developed countries which affect the bank profitability due to more financial cost of banks than revenues from these countries (Duraj & Moci, 2015).

#### 2.2.5 Gross Domestic Product (GDP)

According to Naceur & Omran (2011), from the financial stability, it can know the conditions of gross domestic production (GDP). For instance, the relationship between GDP and financial stability is positively. In the economy, the negative real or productive sector will cause the unstable of GDP, suppressed broader economic goals and affect distribution and level of risk (Batuo, Mlambo & Asongu, 2017). Therefore, the GDP will affect the demand of interest and non-interest activities, not only the demand and supply for loans and deposits also influence by GDP, hence, the banks try to control the change of profitability (Bouzgarrou, Jouda & Louhichi, 2017).

The GDP contributes to a positive impact on bank profitability. The higher the GDP can lead the bank profitability will also become higher. The economic condition embody at GDP, therefore, the rising in risk of default is lower than in downturns indicates the increase in interest and non-interest activities due to the higher GDP and lead the greater profit (Naceur & Omran, 2011; Bouzgarrou, Jouda & Louhichi, 2017). The banks anticipate the prospective GDP and set up a suitable operational strategy which can gain more profits to them. Since, the relationship between GDP and bank profitability are directly proportional (Wasiuzzaman & Tarmizi, 2010).

Furthermore, Dietrich & Wanzenried (2014) represented the GDP will affect the countries with middle and high income positively, it indicate that the bank profitability of those countries will goes up during the booming economy, which means the GDP rise. This is because the management of bank in these countries can expect future inflation more accurately, and it may achieve higher profits by adjusting the interest rate. Therefore, the debt service capacity of borrowers will be increase as the higher the GDP, at the same time it can lower credit risk, thus the bank profitability will goes up. However, the lower the GDP can strengthen non-performing loan, and lead the profitability of bank decline (Robin, Salim & Bloch, 2018).

Besides, there is an insignificant relationship between GDP and ROE, it represents that the GDP will influence the ROE in insignificant way (Alper & Anbar, 2011; Ongore & Kusa, 2013). Based on the researches Kanwal & Nadeem (2013), GDP and ROE have a negative insignificant relationship, this is due to the customers, every customer have their own way to enhance their profit, some of them will go to invest, saving more money or taking loan instead of spending more on goods and services, furthermore, they are lack of information about the changing of economics, these are the reasons why the relationship became negative and insignificant.

#### 2.2.6 Unemployment (UNM)

According to Rauličkis and Jurevičienė (2018), the change in profitability can be explained by unemployment. Moreover, there is a negative significant relationship between bank profit and unemployment rate. This is because when the inflation rate increases, it will affect the demand of loan and credit risk. Thus, the bank profitability is reduced when unemployment rate increases. Other than that, based on the study of Jureviciene & Doftartaite (2013), the relationship between unemployment rate and ROE is negative. ROE of commercial banks will reflect a higher ratio when unemployment rate is decreasing.

Moreover, according to Mendes and Abreu (2003), they have used the unemployment as a macroeconomic variable to study the determination of bank profitability in European Bank. In the research paper, the unemployment is negative and significant towards the ROE. Besides, in the research of Bordeleau and Graham (2010), they found negative significant relationship between the unemployment and ROE. This is because when the unemployment rate increases, the probability of default on loan increases, thus, it decreases the profitability of bank.

## 2.3 Conceptual Frameworks

### 2.3.1 Previous Conceptual Framework

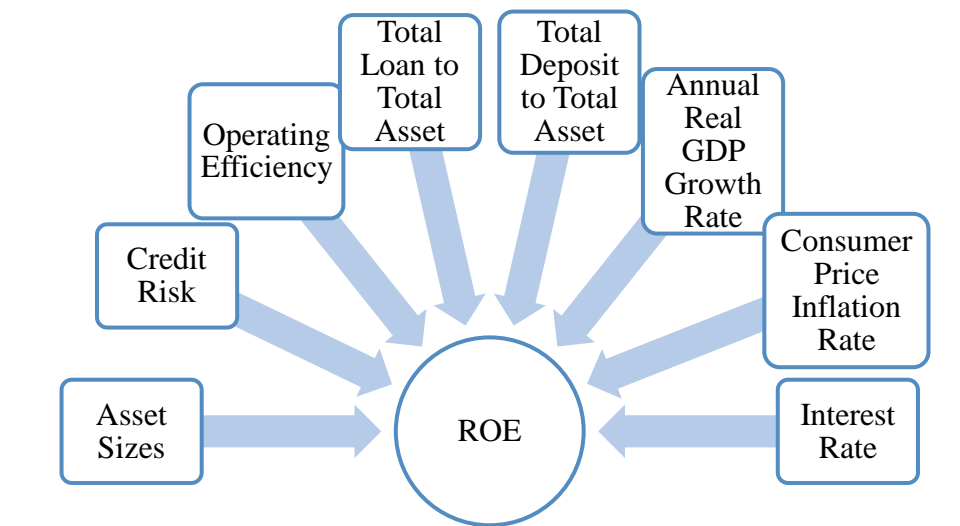


Figure 2.1: The Impact of Bank Specific and Macroeconomic Indicators on the Profitability of Commercial banks in Pakistan, 2006-2010

The figure 2.1 is adapted from “The impact of Bank Specific and Macroeconomic Indicators on the Profitability of Commercial banks in Pakistan from year 2006 until 2010” by Riaz and Mehar (2013). In this research, they used multiple regression analysis technique to test their hypothesis. In addition, they have collected 32 commercial bank’s data in Pakistan and the period was from 2006 to 2010 and the total observation of this study was 141 observation. The variable used in this research is asset sizes, credit risk, total deposit to total asset, and total loan to total asset, interest rate, operating efficiency, annual real GDP growth rate and consumer price index. Besides, there are 7 out of 8 variable was significant and one variable was insignificant. Asset sizes, total deposit to total asset, and total loan to total asset was positive significant. Lastly, credit risk inflation, interest rate and operating efficiency were negative and significant and GDP was insignificant.

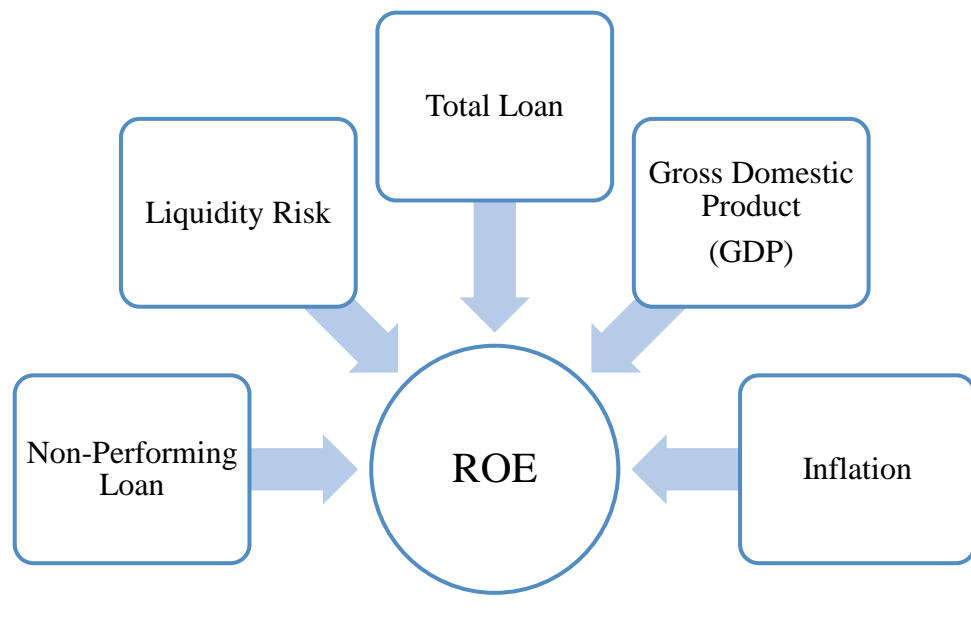


Figure 2.2: Factors Influencing the Bank Profitability - Empirical Evidence from Albania, 1999-2014

The figure 2.2 is adapted from “Factors Influencing the Bank Profitability Empirical Evidence from Albania” by Duraj and Moci (2015). The researchers studied the relationship of internal and external factor with commercial bank profitability in Albania. In this research, they used regression analysis technique to test their hypothesis. In addition, they have collected 16 bank in period was from 1999 to 2014. The variable used in this research is non-performing loan, liquidity risk, total loan, gross domestic product and inflation. Besides, the result of this research for Liquidity ratio and GDP were positive and significant while inflation and total loan were negative and significant. Lastly, only one variable was insignificant relationship which is NPL.

## 2.4 Proposed Theoretical Framework

In this section, Figure 2.3 displays the theoretical framework of this paper. Based on the research objective, we design the framework to examine the relationship between the microeconomic factors (NPL and NIIM) and macroeconomic factors (GDP, UNM and INF) with profitability (ROE) of Malaysia's local commercial bank.

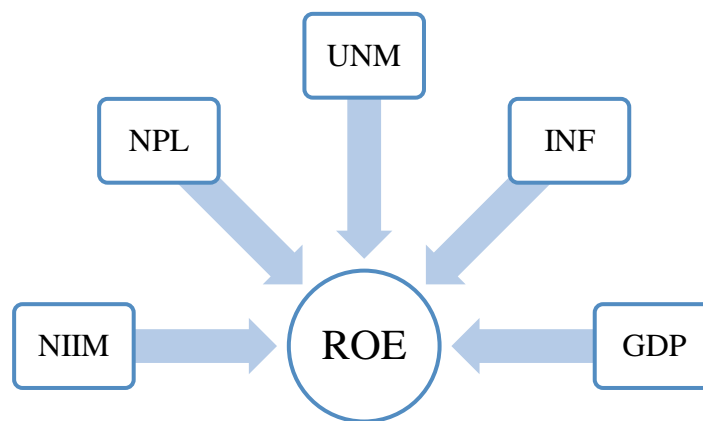


Figure 2.3: Proposed Theoretical Framework

Whereas,

ROE= Return on equity (%)

NPL=Non performing loan (%)

NIIM=Net interest income margin (%)

GDP= GDP growth (annual %)

UNM= Unemployment, total (% of total labor force) (national estimate)

INF= consumer price index (2010 = 100)

$\varepsilon$ = Error term



## 2.5 Hypothesis of Study

### **Microeconomics Factors**

#### 2.5.1 Non-performing Loan (NPL)

*H<sub>0</sub>: There is no significant relationship between nonperforming loan and bank's profitability.*

*H<sub>1</sub>: There is significant relationship between nonperforming loan and bank's profitability.*

#### 2.5.2 Net Interest Income Margin (NIIM)

*H<sub>0</sub>: There is no significant relationship between net interest income margin and bank's profitability.*

*H<sub>1</sub>: There is significant relationship between net interest income margin and bank's profitability.*

### **Macroeconomic Factors**

#### 2.5.3 Gross Domestic Product (GDP)

*H<sub>0</sub>: There is no significant relationship between Gross Domestic Product and bank's profitability.*

*H<sub>1</sub>: There is significant relationship between Domestic Product and bank's profitability.*

#### 2.5.4 Inflation (INF)

*H<sub>0</sub>: There is no significant relationship between inflation and bank's profitability.*

*H<sub>1</sub>: There is significant relationship between inflation and bank's profitability.*

#### 2.5.5 Unemployment (UNM)

*H<sub>0</sub>: There is no significant relationship between unemployment and bank's profitability.*

*H<sub>1</sub>: There is significant relationship between unemployment and bank's profitability.*

### 2.5 Conclusion

In this chapter, it discusses several macroeconomic and microeconomic factors that give impact toward the bank profitability (ROE) of Malaysia's local commercial bank. Moreover, this discussion is about the prior researchers who have same interest in this topic which it be a supply of useful information to current research. Lastly, the next chapter will discuss the methodology.

## CHAPTER 3 METHODOLOGY

### 3.0 Introduction

In this chapter, it will discuss about research methodology. This chapter is introduction of research design, method of this paper. Moreover, it also include data collection method, sampling target, data analysis and conclusion. This research is using secondary data as data collection method and it is retrieved from annual report and World Bank. There are 8 domestic banks involved in this research which are Affin Bank, Alliance Bank, AmBank, CIMB Bank, Hong Leong Bank, Maybank, Public Bank and RHB Bank.

### 3.1 Research Design

In this research, we are using secondary data which obtained from World Bank from period 2007 to 2016 and the data are in annual observations. As most of the previous studies are using at least 30 years to run their model, we decided to obtain a panel data set with 8 commercial banks in Malaysia and 10 years annual data in this research. Hence, we have 80 observations in our study. Since we use more than 30 observations to run our model or to test the result, we are expected to get a more consistent and accurate result in this paper.

In this paper, we decided to take method of quantitative research. This is because quantitative research can give a result to some specific research question. For example, it involves a collection of numerical data. Based on the study of Burdens & Abbott (2014), quantitative theory can be defined as using mathematical formulae to find out the relationship between variables and constants. Moreover, it

can be tested by setting up the specified conditions. Other than that, it can also observing whether the outputs take on the specified values. Our research is to examine the relationship between the dependent and independent variables. We have chosen bank's profitability which is Return on Equity (ROE) as our dependent variable and our independent variables are Non-performing loans (NPL), Net Interest Income Margin (NIIM), Unemployment Rate, Gross domestic product and Inflation.

According to McDaniel & Gates (2010), there are 3 types of research. There are exploratory research, descriptive research and causal research. Exploratory research is used to guide the progress of the hypothesis. This research design can help us to have a better understanding on our problem. Moreover, descriptive research provides a measure of the activity which can explain more on some situations. Next, causal research is normally used to test causality. It uses to find out the activity will or will not cause another activity. This research design is more complex compare to the others.

In this study, we have picked exploratory research to answer the research question which is used to find out the relationship between the dependent variable with independent variables.

## 3.2 Data Collection Method

### 3.2.1 Secondary Data

Secondary data is the research data that have been previously collected and readily available from other sources. Besides, it is also published data that can be accessed by any researchers. Since those data are readily available, it is cost-

efficient and time-saving for lightening the effort of researcher compare to primarily data. For our study, we have collected and analysed the secondary data to carry out the measurement for the bank profitability. The secondary data that we used can be are divided into 2 categories which are microeconomic variables and macroeconomic variables that influence the profitability of bank. For the microeconomic variables aspect, we have obtained the data of 8 commercial banks from their annual reports (2007-2016) from the Bursa Malaysia website respectively, after that those data are calculated into ratios by using each formula. While for macroeconomic variables aspect, the data are collected from World Bank. Specific variables and macroeconomic variables that influence the profitability of bank. For the bank specific variables aspect, the data obtained from the 8 banks annual reports (2007-2016) from the Bursa Malaysia website respectively, after that those data are calculated into ratios by using each formula. While for macroeconomic variables aspect, the data are directly collected from World Bank.

**Econometric Model:**

$$ROE_{it} = \beta_0 + (NPL_{it}) \beta_1 + (NIIM_{it}) \beta_2 + (INF_{it}) \beta_3 + (GDP_{it}) \beta_4 + (UNM_{it}) \beta_5 + \varepsilon_{it}$$

Whereas,

$\beta_0$  =constant

ROE = Return on equity (%)

NPL = Non performing loan (%)

NIIM = Net interest income margin (%)

INF = Inflation (%)

GDP = Gross Domestic Product (%)

UNM = Unemployment (% of total labour forces)

$\varepsilon$  = Error term

**Table 3.1 Description of variables**

Variables		Notation	Source of Data	Formula
Dependent Variable :	Return on Equity	ROE	Banks' Annual reports	Total Net Income / Total Equities
Bank specific Variables :	Non-Performing Loan	NPL	Banks' Annual reports	Non-Performing Loan / Net Loan
	Net Interest Income Margin	NIIM	Banks' Annual reports	Net Interest Income / Total Assets
Macroeconomic Variables :	Gross Domestic Product	GDP	World Bank	Private Consumption + Gross Investment + Government Investment + Government Spending + (Exports – Imports)
	Inflation Rate	INF	World Bank	$[(CPI_2 - CPI_1) / CPI_1] * 100 \%$
	Unemployment Rate	UNM	World Bank	Number of Unemployed Workers / Total Labour Force* 100%

**Table 3.2 Definition of variables**

Variables		Definition
Dependent Variable :	Return on Equity	Return on equity (ROE) is one of the common measurements of the probability of bank and accounting measurements in the banks for valuation of security. However, it was differenced with stock returns. ROEs also known as accounting return, it used the formulae as net income divided by equity. Based on General Accepted Accounting Principles (GAAP), it was a measurement the generated profits from the capital (Chen & Lin, 2011).
Bank specific Variables :	Non-Performing Loan	Non-performing loan (NPL) ratio determined as the NPL to total loans. As there is a default payment of principal and interest which overdue of 90 days or more, the loan will consider as non-performing loan. The higher the NPL, the efficiency of the financial system reduce and it may cause the transmission of monetary policy develop slowly (Pop, Cepoi & Anghel, 2018).
	Net Interest Income Margin	The net interest income divided by total assets is the formula of NIIM. The higher the NIIM, the more efficiency of bank. However, if the banking system is in redistributing resources section, the NIIM is lower,

Macro and Bank Specific Determinants that Affect Profitability of Commercial  
Bank in Malaysia from period 2007 to 2016

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		the bank will be more efficiency. (Saksonova, 2014).
Macroeconomic Variables :	Gross Domestic Product	GDP is a measurement of economic output which means the value of all final goods and services that take into account for the effects of inflation and deflation. Therefore, the higher the GDP, the higher the bank profitability. This is because GDP will affect the demand of interest and non-interest activities. The demand and supply for loans and deposits are influenced by GDP (Combey & Togbenou, 2017).
	Inflation Rate	Inflation can cause the purchasing power of currency decrease due to the prices of goods and services increase. There is significant relationship between inflation rate and bank profitability; as in high inflationary environment, the banks will have higher profitability (Tan, 2016).
	Unemployment Rate	Unemployment rate is used to evaluate percentage of the unemployed workforce of a country. The higher the unemployment, the lower the bank profitability. This is because once non-performing loan increases will cause rise the default rate (Singh & Sharma, 2016).



### 3.3 Sampling Target

#### 3.3.1 Target Population

In our research, secondary data will be used to process our study. Our data was collected from 8 of local commercial bank in Malaysia and with time period of 10 years which was from year 2007 to year 2016. This study was focused on bank profitability of 8 of local commercial bank in Malaysia. Below was the 8 of local commercials bank in Malaysia we targeted in our study:

Table 3.3 Commercial Banks in Malaysia

Local commercial banks in Malaysia
Affin Bank
Alliance Bank
AmBank
CIMB Bank
Hong Leong Bank
Maybank
Public Bank
RHB Bank

#### 3.3.2 Sampling Frame and Sampling Location

In this study, we just examine bank profitability of 8 of local commercial banks in Malaysia we targeted.

### 3.3.3 Analytical Tools (E-view 10)

In this research, E-Views 10 is our main analytical tool. E-Views 10 is an easy-to-use, flexibility and powerful analytics. Moreover, it also because of the ideal or Window-based statistical analysis package by analyst.

### 3.3.4 Sampling Sizes

In our research paper, the 8 commercial bank in Malaysia are chosen with 10 years of time period as our sample to observe. Hence, the total sampling sizes used is 80 observations.

## 3.4 Research Instrument

This study assesses the impacts of non-performing loan, net interest income margin, inflation, gross domestic product and unemployment on bank profitability in the period of 2007–2016 for Malaysia. We are using the panel data from 8 banks in Malaysia and dynamic panel data estimation to determine the relationship between the bank profitability with those microeconomic and macroeconomic variables. Some studies had indicated that non-performing loan, inflation, gross domestic product and unemployment will give negative impact on bank profitability, while net interest income margin have positive impact; however those relationships are not stable and argumentative in some other studies.

From those studies, there are some methods are used to examine their relationships including generalized method of moments (GMM) technique, Sargan test, Hausman test, simple ordinary least squares estimator (OLS) and other diagnostic tests. They can provide a more accurate estimation and used to test the validity of instruments. The panel data of non-performing loan and net interest

income margin for 10 year periods were collected and calculated with the formulas from annual report of each bank respectively. However, for data of inflation, gross domestic product and unemployment were extracted from World Bank. During the progress of project, we will find out the limitations that we need to improve from our project and recommendations will be provided to each banks for the purpose of solving the problems faced by each banks and at the same time also enhancing the stability of bank profitability.

## 3.5 Diagnostic Checking

### 3.5.1 Multicollinearity

Multicollinearity is happened when the independent variable is highly correlated with other independent variable in a model such as correlation more than 80 percent. Moreover, it may bring a difficulty in explaining the dependent variable by independent variable. However, although the multicollinearity problem happens, the OLS estimator still present in BLUE which it is still unbiased, consistent and efficiency. Other than that, it will bring some disadvantage which is wider confident interval result difficulty in rejecting the null hypothesis (Vatcheva et al, 2016), t ratio will be insignificant and there will have high R<sup>2</sup> but few significant in t ratio. By detecting this problem, there do not have formal test but there has some informal way to detect it. For example, if there have high R<sup>2</sup> but less significant of t ratio, it can indicate that multicollinearity problem occurs. Other than that, it also can use the high par-wise correlation coefficients to examine the relationship is strong or weak and Variance inflation factor (VIF)  $VIF=1/(1-R^2)$  or Tolerance (TOL)  $1/VIF$  which provide a more accuracy answer (Gujarati and Porter 2009).

### 3.5.2 Heteroscedasticity

Heteroscedasticity is opposite with Homoscedasticity which is the error term not constant. In addition, when the error term is not constant, the OLS estimator will no longer BLUE which it is still unbiased and constant. However, it will be not efficiency because of the increasing in variance of error term. To detecting this problem, it has several ways to test it, such as Park test, Glesjer test, Breusch-Pagan-Godfrey test, White test and Autoregressive Conditional Heteroscedasticity (ARCH) test (Gujarati and Porter 2009). Moreover, the testing is conducted by using Eview 10. The test statistic will use the P-value to get result. If the P-value is less than critical value (0.05) at 5% significance level, H<sub>0</sub> will be rejected which indicated the error term in the model is not constant and it has heteroscedasticity problem.

Hypothesis for heteroscedasticity:

H<sub>0</sub>: There is no heteroscedasticity problem.

H<sub>1</sub>: There is heteroscedasticity problem.

### 3.5.3 Autocorrelation

Autocorrelation is the auto relationship between the independent variables and error term in a model. This problem will cause the OLS estimator is no longer BLUE, it will be biased, inconsistent and inefficiency. This is because estimate  $\beta$  will be underestimated which is no longer close to true  $\beta$  when autocorrelation occurred in the model. Then, the variance of error term will be increased. Lastly, it may cause the result invalid. By finding this problem, it can use Durbin-Watson (DW) test, Durbin-h test and Breusch-Godfrey LM test to examine the problem. In addition, Breusch-Godfrey LM test is allowed the higher order of serials correlation and lagged on dependent variable which solves the limitation in DW test and Durbin's h test. Moreover, this problem also can be solved by using Cochrane –Orcutt Procedure (Gujarati & Porter 2009).

Hypothesis for autocorrelation

H0: There is no autocorrelation problem.

H1: There is autocorrelation problem.

## 3.6 Data Analysis

### 3.6.1 Fixed Effect Model (FEM)

In FEM model, the intercept of the model is allowed the variable have difference characterise or background. FEM model is allowed for two conditions which is the data of variable is difference characteristic and time variant or invariant and the error term and independent variable are correlated. Besides, it has a disadvantage which is cannot include too many dummy variables. In addition, this is to avoid the intercept absorb the all heterogeneity of the dependent and independent variable (Gujarati and Porter 2009).

### 3.6.2 Random Effect Model (REM)

In this model, it will assume variable's intercept is stochastic drawing from a large population with a constant mean value. The advantage of using this model is to minimize unknown parameter as compared with FEM. Other than that, the chance to have multicollinearity will be reduced since it reduces the independent variable (Gujarati & Porter, 2009).

### 3.6.3 Pooled OLS Model (POLS)

In this model, it not allows the change of time and characteristic. Besides, it is also known as Constant Coefficients Model. The condition of the model is the characteristic of variable's data is constant across the time. Moreover, the other

condition is the error term cannot be correlated with the independent variable (Gujarati & Porter 2009).

### 3.6.4 Panel Data Regression Model

The data analysis of this research paper is using panel data regression model since the data used is panel data which include cross sectional data and time series data. Moreover, it will provide more modifiability and degree of freedom, less collinearity between variable and high efficiency (Baltagi, 2005). Other than that, it needs to conduct some tests to choose the most suitable model for the data which are Poolibility hypothesis testing (POLS vs FEM), Breusehah Pagan test (POLS vs REM) and Hausman Test (FEM vs REM)( Gujarati and Porter 2009).

#### **I. Poolibility hypothesis testing (POLS vs FEM)**

H<sub>0</sub>: Common intercept on all variables. (POLS is preferable)

H<sub>1</sub>: No common intercept on all variables. (FEM is preferable)

#### **II. Breusehah Pagan test (POLS vs REM)**

H<sub>0</sub>: Common intercept on all variables in the model. (POLS is preferable)

H<sub>1</sub>: No Common intercept on all variables in the model.

(REM is preferable)

#### **III. Hausman Test (FEM vs REM).**

H<sub>0</sub>: REM is consistent and efficient. (REM is preferable)

H<sub>1</sub>: REM is not consistent and efficient. (FEM is preferable)

### 3.6 Conclusion

In this chapter, it presents the data collection of researcher and it is used the secondary data as the resource. This chapter has introduced the diagnostic checking and model used in this research paper. Next, Chapter 4 will discuss the result of finding and analysis the result.

## CHAPTER 4 DATA ANALYSIS

### 4.0 Introduction

In chapter 4, it explains about selection of the best suitable panel data model, diagnostic checking and result analysis. We also conducted some test to detect the economic problem such as multicollinearity, heteroscedasticity and autocorrelation. Other than that, the tests will be conducted are Redundant Fixed Effect Test, Breusehah Pagan Test and Hausman Test. The aim of this test is to find out the most suitable model between POLS, FEM and REM model. Lastly, it discussed about the analysis of result.

### 4.1 Scale of Measurement

#### 4.1.1 Redundant Fixed Effect Test (Poolibility test) Test

Table 4.1 Redundant Fixed Effect Test P-value

Test Statistic value
Prob.Chi-Square = 0.0000

Redundant Fixed Effect Testing is used to choose the most suitable model between Pooled OLS model and Fixed Effect Model.

H<sub>0</sub>: Common intercept on all variables. (POLS is preferable)

H<sub>1</sub>: No common intercept on all variables. (FEM is preferable)

Significant Level: 0.05



Decision rule: Reject null hypothesis when the P-value is less than the significant level (0.05). Otherwise, do not reject null hypothesis.

P-value: 0.00

Decision: Null hypothesis is rejected as P-value (0.00) is less than the significant level (0.05).

Conclusion: We have sufficient evidence to conclude that FEM model is more preferable than POLS through this test as P-Value 0.00 is less than significant level (0.05).

#### 4.1.2 Breusehah Pagan Test

Table 4.2 Lagrange Multiplier Test P-value

Test Statistic value
Prob.Chip-Sq = 0.0000

Breusehah Pagan Test is used to choose the most suitable model between POLS model and FEM model.

H<sub>0</sub>: Common intercept on all variables in the model. (POLS is preferable)

H<sub>1</sub>: No Common intercept on all variables in the model. (REM is preferable)

Significant Level: 0.05

Decision rule: Reject null hypothesis when the P-value less than the significant level (0.05). Otherwise, do not reject null hypothesis.

P-Value: 0.00

Decision: Null hypothesis is rejected since P-value (0.00) is less than significant level (0.05).

Conclusion: We have enough evidence to conclude that the FEM model is Preferable.

#### 4.1.3 Hausman Test

Table 4.3 Hausman Test P-value

Test Statistic value
Prob.Chip-Sq = 1.0000

Hausman Test is used to choose the most suitable model between REM model and FEM model.

H<sub>0</sub>: REM is consistent and efficient. (REM is preferable)

H<sub>1</sub>: REM is not consistent and efficient. (FEM is preferable)

Significant Level: 0.05

Decision rule: Reject null hypothesis when the P-value less than the significant level (0.05). Otherwise, we do not reject null hypothesis.

P-Value: 1.00

Decision: Null hypothesis is not rejected since P-value (1.00) is more than significant level (0.05).

Conclusion: We have enough evidence to conclude that the REM model is preferable.

Through the 3 tests above, it shown that the most suitable panel data model is REM model.

#### 4.1.4 Multicollinearity Test

Multicollinearity test was taken to test the relationship between the independent variables in the model.

Table 4.4 Correlation among the Independent Variable

	NPL	NIIM	INF	GDP	UNM
NPL	1.0000	-	-	-	-
NIIM	0.4190	1.0000	-	-	-
INF	-0.4449	-0.5454	1.0000	-	-
GDP	0.2074	-0.1187	-0.0344	1.0000	-
UNM	0.0578	0.3010	-0.3172	-0.6646	1.0000

Based on the result above, it shown that there is no serious multicollinearity exists among the independent and dependent variables. According to rule of them, the correlation of each pair less than 0.8 will consider no multicollinearity happened. Based on the result above, the higher result is -0.6646 which is considered as strong correlative between GDP and UNM

#### 4.1.5 Heteroscedasticity Test

Table 4.5 Result of Breusch –Pagan/Cook-Weisberg Test

Test Statistic Value
0.2788

Breusch-pagan test is a test used to detect heteroscedasticity problem exist or not exist in this model.

$H_0$ : There is homoscedasticity exist in the model.

$H_1$ : There is heteroscedasticity exists in the model.

Critical Value: 0.05

Decision rule: Reject null hypothesis when the P-value is less than critical value of 0.05. Otherwise, null hypothesis do not be rejected.

Test Statistic (P-value):0.2788

Decision: Null hypothesis cannot be rejected since p-value (0.2788) is more than critical value 0.05.

Conclusion: There is insufficient evidence to determine that the heteroscedasticity is existed in the model.

#### 4.1.6 Autocorrelation Test

Table 4.6 Result of Breusch-Godfrey Serial Correlation LM test

Test Statistic Value
0.0716

Breusch-Godfrey Serial Correlation LM test is a test used to detect autocorrelation problem exist or not exist in this model.

$H_0$ : Autocorrelation problem is not existed in the model.

$H_1$ : Autocorrelation problem is existed in the model.

Critical Value: 0.05

Decision rule: Reject null hypothesis when the P-value is less than critical value of 0.05.

Test Statistic (P-value): 0.0716

Decision: Null hypothesis is not be rejected due to p-value (0.0716) is more than critical value 0.05.

Conclusion: There is insufficient evidence to conclude that the autocorrelation is existed in the model.

## 4.2 Inferential Analysis

Table 4.7 Result of the Random Effect Model (REM)

Independent Variables	Coefficient Value	P-Value	Sign
Non-Performing Loan (NPL)	-1.3224***	0.0001	Negative; Significant
Net Interest Income Margin (NIIM)	5.2958***	0.0044	Positive; Significant
Inflation Rate (INF)	-0.1731**	0.0149	Negative; Significant
Gross Domestic Product (GDP)	-0.0773	0.6375	Negative; Insignificant
Unemployment Rate (UNM)	-5.9915***	0.0014	Negative; Significant

\*significant at 10% \*\*significant at 5%;\*\*\*significant at 1%

$$ROE = 43.7066 - 1.3224NPL + 5.2958NIIM - 0.1731INF - 0.0773GDP - 5.9915UNM + \varepsilon$$

Panel Data Regression Model is the model that normally used to bring out on time series data with cross-sectional data which is defined as data that across for different units and time across economic factor. Based on the result in REM, it shown that NPL, NIIM, INF and UNM are significant at 5% which means that they are affect the Return on Equity (ROE) or have effect on bank performance significantly. On other hand, it also mean that the GDP does not affect the ROE or bank performance significantly since it was not significant at 5%.

#### 4.2.1 Microeconomic factors

##### **I. Non-Performing Loan (NPL)**

Based on the result, the coefficient value of NPL is -1.3224 which significant negative relationship with ROE. In addition, it also indicated that when NPL increases, ROE decreases. NPL was weighted by problem loan or can be calculated divide NPL by net loan of bank. In addition, it can direct affect on bank's profitability because the loan was main resources of bank profit. According to Makri, Tsagkanos & Bellas (2014), the strong correlation between NPL and ROE is normally caused by poor bank management and high risk-taking behaviour by bank. Based on research of Osuagwu (2014), the weak economic performance will lead to the rising of bank's credit risk and resulted the reducing in bank profitability. On other hand, according to Tabak, Fazio & Cajueiro (2011), the credit or loan portfolio is affecting ROE. Lastly, Brazil's banks avoided the uncertainty of operate at small amount of capital to maximize bank's profitability, financial crisis caused by Lehman Brothers with minimized the risk of default loan. Hence, this was a great event to explain the negative and significant relationship between NPL and ROE.

##### **II. Net Interest Income Margin (NIIM)**

Accorded to the result, the coefficient value of NIIM is 5.2958 which is positive and significant relationship with ROE. In addition, both of them are under same components which are used to determinants of bank' profitability. Besides, ROE was weighted by 2 formulae which is direct financial return based on capital equities or calculated divide total net income by total equities. However, NIIM was weighted by interest bearing assets of bank or calculated divide net interest income by total assets (Saksonova, 2014). Based on Ozili & Uadiale (2017), it pointed out that dispersion of ownership will result the sufficient of capital provided by shareholders. Then, the large amount of capital can be used to

generate great direct return on capital based or interest based. Thus, as a conclusion when the bank have enough capital, the investment or lending activities increase, the income increases, NIIM increases and then ROE will increase. On other hand, Robin, Salim & Bloch (2018) stated that the increase in interest rate after a financial policy reformation at year 1996 lead to increase in NIIM. Hence, the ROE increases as well.

#### 4.2.2 Macroeconomic factors

##### **I. Inflation Rate (INF)**

As result shown, INF was negatively and significant correlated to ROE which correlation value is -0.1731. Beside, INF is defined as a rate that price of a goods or services rose over time. Besides, it also can be weighted by monetary policies or calculated by Consumer Price Index (CPI) which is used to determine consumer purchasing power (Minella, Freitas, Goldfajn & Muinhos, 2003). Based on research of Duraj & Moci (2015), when inflation occurs it may change the interest rate and operational cost of bank. Hence, it will reduce the bank's profitability which indicated negative and significant relationship. Another consistent result with our estimation was from research of Sayilgan & Yildirim (2009), the paper point out that that, inflation rate was fell after the obstructed economy growth in few years continuously, it will cause the increase in interest rate then the bank's profitability also increase.

##### **II. Gross Domestic Product (GDP)**

According to the result shown at above, GDP is negative and insignificant relationship with ROE which coefficient value is -0.0773. In line with the research of Liu & Wilson (2010), the main reason is because the bank unable to keep and hold the profit in long term or more than one year. In deeper understand, it can be caused by limitation on regulation, less business activity and charged less

proportion of tax on profit. Other than that, the customer behavioural which included the deposit fund and take loan in random amount will direct lead to the imbalance of bank demand and supply problem. As a conclusion, as unpredictable consumer behavioural indirectly influence the ROE due to bank unable to estimate the amount of customer deposit and loan. Other than that, it also due to bank did not had enough information about domestic economic changed (Kanwal & Nadeem, 2013). According to research of Alper & Anbar (2011), they also met a same result as our research. From a situation of identify bank's ownership, we knew that the reason of this result came out because no matter banks operate in domestic market or foreign market; the profit will not be influenced deeply.

### **III. Unemployment Rate (UNM)**

The relationship ROE and UNM was negatively and significant correlated due to the coefficient value is -5.9915. UNM is weighted by unemployment workers in a labour force or also can be calculated by divide unemployment worker with labour force and it is stated in percentage. Based on a consistent result from Bordeleau & Graham (2010) research, they stated that when financial crisis occurred, it caused original laws and regulation of financial system was outdated or not suitable for country. This is because the current regulation is no beneficial to the country's financial system. Then, unemployment will increase in the country due to lack of regulation. Hence, less people will deposit or borrow loan from bank, the bank's profitability is reduce or minimize. According to Rauličkis & Jurevičienė (2018), when unemployment rate reduces, the demand of new loan increases, the income of bank increases, hence, ROE increases. However, when the unemployment rate increases, the credit risk increases due to the people unable to pay payment of loan as increase the default risk. Lastly, it will decrease the ROE.



### 4.3 Conclusion

As a conclusion, Chapter 4 discuss about the result of testing and analysis of the result. Lastly, Chapter 5 will discuss the major finding, policy implication, limitation and finding of this paper.

## CHAPTER 5:

### DISCUSSION, CONCLUSION AND IMPLICATIONS

#### 5.0 Introduction

In chapter 5, it describes about the findings, limitations of doing this research paper and some recommendations to future researcher.

#### 5.1 Summary of Statistical Analysis

Table 5.1 Summary of Diagnostic Checking's Result

Diagnostic Checking	Test Statistical	Decision	Result
Multicollinearity	Refer to Table 4.4	Do not reject null hypothesis	No serious multicollinearity problem.
Heteroscedasticity	0.2788	Reject null hypothesis	There is no heteroscedasticity.
Autocorrelation	0.0716	Reject null hypothesis	There is no autocorrelation.

## 5.2 Discussion of Major Finding

Table 5.2 Result of Test Statistic

Variable	Coefficient	T –statistic(p-value)	Relationship
NPL	-1.3224	-4.1220*** (0.0001)	Negative significant
NIIM	5.2958	2.9377*** (0.0044)	Positive significant
INF	-0.1731	-2.4929** (0.0149)	Negative significant
GDP	-0.0773	-0.4731 (0.6375)	Negative insignificant
UNM	-5.9915	3.3156*** (0.0076)	Negative significant
R-squared	0.311020	Adjusted R-squared	0.2645

\*significant at 10% \*\*significant at 5%;\*\*\*significant at 1%

From the table shown, Return on Equity (ROE) as the dependent variable, and the other 5 independent variables are made up by non-performing loan (NPL), net interest income margin (NIIM), inflation (INF), gross domestic product (GDP) and unemployment (UNM). In the hypothesis testing, there are 4 independent variables are significant due to their probability are lower than the significant level, and the only one that be insignificant is GDP, its probability is higher compare to 5% significant level. Besides that, NIIM is the one which have the positive relationship with ROE. Other than that, the R-squared shown on the table is 0.3110 while the adjusted R-squared is 0.2644.

## **I. Non-Performing Loan**

The Non-Performing Loan (NPL) has a negative relationship and significant impact on bank probability supported by Khan, Annuar, Choo & Khan (2011). Naceur & Goaid (2005) stated that the NPL can become higher as the default risk and credit risk increased. As good as the bank performance subjects the effect of strength of environmental variables, the higher the ratio of NPL will lead the bank probability turn into lower by Osuagwu (2014), Zhao & Murinde (2011) and Kumbakhar et al (2001). Besides that, based on the research with panel data, it represents NPL is a crucial towards to the profitability of bank (Garcia-Herrero, Gavila & Santabarbara, 2009).

The result of hypothesis testing demonstrates the bank profitability influenced by NPL significantly, likewise they have a negative relationship. The NPL increases, the bank profitability will decrease as the banks need to cover the losses or debt by using the provisions expenses. Since the higher the default risk and credit risk will raise the NPL, due to the borrower cannot pay within the period and cause default payment or loan (Pop, Cepoi & Anghel, 2017). The profitability of banks will decline according to this happened to the banks. The ratio of NPL can reflect how well of the bank management. Hence, the banks' managers should pay more attention on the bad loans, and look for the suitable way to solve the problem to maintain the profitability of banks.

## **II. Net Interest Income Margin (NIIM)**

According to Claessens, Coleman & Donnelly (2018), the interest will direct impact on the net interest income margin (NIIM), for instance, as the interest decreases, the NIIM will also drop, meanwhile it will affect the bank profitability decline. The relationship between NIIM with ROE is positive and significant, since both of them are in the same categories of bank profitability which can be

conscious of how the management team manages the bank efficiency, not only this, NIIM and ROE have the positive relationship is due to the two variables and interest rate have the “Low-For-Long” condition (Lartey, Antwi and Boadi, 2013).

From the result shown on the table, the NIIM and ROE are positively significant related to each other. It means that the NIIM will directly affect the ROE, the ROE will increase as the NIIM increases and the interest rate is the main factor between of them. The higher the NIIM represents the bank has an efficiency management in bank as the ROE also become higher. Moreover, if the interest rate can control in a well risk management, the bank profitability will be increased because interest rate is tied up with NIIM and ROE.

Therefore, to ensure the bank profitability is good, the manager should be pay attention on the interest rate.

### **III. Inflation (INF)**

Based on the researches, the inflation and bank profitability can be in positive relationship (Sufian & Habibullah, 2010), this is because the inflation will become higher due to the interest rate of loan increase (Petria, Capraru & Ihnatov, 2015).

While the bank managers also can regulate or predict the future trend of the interest rate and inflation rate, and it can assist the bank to control the bank profitability (Tan, 2016). However, according to the Munyambonera (2013), there is a negative relationship between inflation and bank profitability, if misjudge the interest or cannot regulation accurately.

Besides that, the table shown the inflation rate and ROE will have a negative and significant relationship. It means the higher the inflation rate, the lower the ROE. As a result, the higher the inflation will increase the financial cost of bank and reduce the income, thus, it should affect the bank profitability directly (Duraj & Moci, 2015). On the other hand, the ROE will drop is owing to the bank managers underrate the interest rate, and unable to dispatch in the real situation. Therefore, the bank should pay close attention to the interest rate since it can predict the movement in future, as it also linked with the inflation and it will influence the ROE too (Tan, 2016).

#### **IV. Unemployment ((UNM)**

The higher the unemployment rate will reduce the bank profitability, it is called negative relationship. The reason of this relationship is because the inflation rate, for instance the inflation rate increases will cause the unemployment increases due to the demand of loan and credit risk affected, hence, this will make the profitability of bank decrease (Rauličkis and Jurevičienė, 2018). In addition, unemployment and bank profitability will have a significant relationship as the default on loan will directly influence the unemployment and it will lead to the profitability of bank become lesser (Bordeleau and Graham, 2010).

The table shown is same like as the above said, the unemployment and ROE have a negative and significant relationship. This means the higher the unemployment rate, the lower the ROE. Meanwhile, according to Anwar (2018), the economy downturn will cause the profitability of bank decreases because it incurs the activity in bank motionless. Moreover, the bank should confine the default of customer loan as it can ensure the unemployment rate and bank profitability in a good condition. In short, from the unemployment rate will disclose the ROE ratio and the economy in the country, like this, the bank managers may focus on the default of loan to make sure the efficiency of bank.

## V. Gross Domestic Product (GDP)

Naceur & Omran (2011) and Bouzgarrou, Jouida& Louhichi (2017) argued that there is a positive relationship between Gross Domestic Product (GDP) with bank profitability. Because of the increases in GDP will lead the profitability of bank increases, due to the default risk and credit risk. Moreover, the bank profitability will drop as the non-performing loan (NPL) increases and NPL will be affected by the GDP. For example, when the GDP rise would increase the NPL and it leads to reduce the bank profitability (Robin, Salim& Bloch, 2018). The GDP can reflect the stability of financial condition in bank, since it linked to the demand and supply of activities, loans, and deposits (Bouzgarrou, Jouida& Louhichi, 2017).

However, the result of hypothesis testing shown there are negative and insignificant relationship between GDP and ROE. It means that as the GDP increases, the ROE will decrease. According to Kanwal & Nadeem (2013), the insignificant and negative relationship may causes by the customers who like to save more or take loans, and cannot get the information accordingly about the economics change, these kinds of reasons will influence the goods and services become lesser.

### 5.3 Policy Implication

The main focus of our study is to determine the impact of microeconomic and macroeconomic factors that affect the profitability of bank in Malaysia. Therefore, government, policy makers and society should be involved as participants in this study. This is because the bank performance not only give impact to operation of a bank but also affect the economy of a country.

From our result, net-interest income margin (NIIM) have a positive and significant relationship with return on equity (ROE). In other researches, NIIM is also an indicator used to measure the bank profitability which means that NIIM and ROE are in the same financial categories. Consequently, we suggest that banks may rise both the interest rate for loans and the interest rate on deposits in the range by following the rules set by Bank Negara Malaysia. However, the interest rate on deposits will not rise as much as the interest rate for loans, this is because to ensure that the interest expenses is less than the interest incomes so that this can lead to enhance the NIIM of banks in the long run (English, Heuvel, & Zakrajšek, 2018). Other than that, banks may be concerned about the spread on loans over deposits rate in order to avoid keeping increase in spread. Otherwise it will lead to the risk of default that resulting in rise the probability of non-performing loan (Claessens, Coleman, & Donnelly, 2018). Since both loan and deposit rate increase at the same time, this will not decline the customers' willingness of lending and depositing. This is due to it will form a win-win situation for both sights of bank and customers as it satisfies their demands for earning different interests respectively.

In addition, there is negative and significant relationship between ROE and non-performing loan in the result of our study. Credit risk due to the default on loan repayment is one of the most important risk which influencing the bank profitability significantly. Hence, we suggest that banks may improve its ability in analysis of customers' credits and offer and management of loans. For example, the established lending policies of a bank should always be updated annually according to the changes of economy, so the policies will be more conservative and suitable to the current need of society. Those bankers must follow the lending policies to offer loans rather than looking at the relationship between the banker and borrower or the reputation of the borrower (Petria, Capraru, & Ihnatov 2015). According to Bongini, Cucinelli, Battista, and Nieri (2018), it suggested that more professional workers who are expert in credit analysis and loan administration are needed by the bank in order to effectively reducing the default risk of bank. It is



important for banks to minimizing the problem of non-performing loans for the purpose on increasing the bank profitability.

According to the result, it shown that inflation rate is negative and significant relationship with ROE. We recommend that the monetary authority might reduce inflation rate and maintain it in lower level in order to ensure stable monetary policy in the economy. This is due to bank profitability is affected by the inflation volatility. Therefore, improvement in loan interest rate, reserve requirement ratio and selective credit control by commercial banks are essential which help in declining the inflation rate. For example, there will no exogenous problem of money shock caused by the monetary phenomenon control when using interest rate as an instrument for monetary policy. It indicates that strong monetary policy management decline the problem caused by inflation volatility which in turn increase the profitability of bank (Umar, 2014).

Although our result indicates that there is negative and insignificant relationship between ROE and gross domestic product (GDP), but rising in GDP increases the economy of a country which will increase the wealth of citizens. Thus, we suggest that the government may well develop the financial sector by continuing to open the banking and stock market time by time which will boost the bank profitability. Moreover, improvement in labour management and training skill help in increasing the productivity of economy which in turn enhance the ability of customers for loan repayment that leads to raise the bank profitability (Tan & Floros, 2012). Other than that, increase in GDP leads to higher net interest income due to customers will decide to borrow or invest more in the economy. Banks will be required to fulfil higher transaction demands and loan portfolio maintenance when the economic activity is increasing (Naruševičius, 2017).

Based on the result, we found that the bank profitability (ROE) is negatively affected by the unemployment. This is due to unemployment is one of the key factors that increasing the probability of default on loans (Bordeleau & Graham,

2010). Moreover, we suggest that the government may create more job opportunity to the fresh graduates and also may encourage those have ability to start a business which may boost up the employment rate in short term. Furthermore, the government also may hold talks or campaigns about the selection of career which provide information of different careers and spread experience of seniors to those teenagers for choosing the most suitable job (Nachiappan et al., 2018). If the unemployment rate reduce, the demand of loan will increase and the default risk also will be declined which increase the bank profitability.

#### 5.4 Limitations of Study

In this study, we are using 8 commercial banks and 10 years as our observations from year 2007 to 2016. In the beginning, we planned to use the data from year 2008 to 2017 which included 80 observations by using panel data method. However, there is incompleteness of the annual report from year 2008 to 2017. As Malaysia Handbook will only publish 1 time every 2 years, we could not collect the data of year 2017. Finally, we decided to collect the data from year 2007 to 2016 of 8 commercial banks.

Next, we only focus on local commercial bank in Malaysia from period 2007 to 2016 due to lack of time. We can collect more data to compare foreign bank and Islamic bank if we have sufficient time. Thus, we can get more effects or explanations on the model.

In addition, we only focused on the micro and macro factor of these 8 commercial banks as our research determinants for bank profitability. Hence, we might get an

inaccuracy data and insufficient variables to test for the bank profitability. As a result, the test result might inequitable.

## 5.5 Recommendations

In our research, the most important part is the sample size. We are highly recommended the other researchers that have interest to study further to increase the sample size by using accurate data. Since the more sample size the more information can be used and thus reduce the chances or probability of the model suffers from heteroscedasticity, autocorrelation and multicollinearity problem. Therefore, semi-annually, quarterly and monthly data should be used to reduce the model problem such as autocorrelation, heteroscedasticity and multicollinearity problem.

Next, we are highly recommended the next researchers who have interest to further study this topic include the foreign bank and Islamic bank so that they can compare the model and compare the result. In addition, the next researchers also can include the foreign bank and the local bank so that they able to compare the bank performance of local and foreign bank.

Moreover, the future researchers are recommended to increases the independent variables such as bank size, financial crisis, capital adequacy and etc. The more independent variables can provide more information to explain more about the model.

## 5.6 Conclusion

This chapter is describing about the policy implication, limitation, recommendation and some major findings of this paper.

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APPENDICES

Appendix 1.0 Raw data of dependent and independent variables for eight local  
Commercial banks in Malaysia from 2007 to 2016.

Bank (S)	Year	ROE	NIIM	NPL	UMM	GDP	INF
Affin Bank	2007	5.94	1.841059	8.010707	3.23	9.427665	92.70468
Affin Bank	2008	6.64	1.966111	3.248522	3.34	3.319594	97.74854
Affin Bank	2009	7.85	2.048065	3.825677	3.69	-2.52583	98.31871
Affin Bank	2010	9.39	1.786839	3.724567	3.25	6.980957	100
Affin Bank	2011	9.08	1.618238	2.900951	3.05	5.293913	103.2
Affin Bank	2012	10.41	1.606233	2.313714	3.04	5.473454	104.9
Affin Bank	2013	10.19	1.52922	2.007506	3.11	4.693723	107.1
Affin Bank	2014	7.67	1.423769	1.846725	2.88	6.006722	110.5
Affin Bank	2015	4.59	1.406229	1.924597	3.1	5.028006	112.8
Affin Bank	2016	6.64	1.408903	1.685249	3.44	4.219851	115.2
Alliance Bank	2007	5.51	2.168839	5.620424	3.23	9.427665	92.70468
Alliance Bank	2008	14.65	2.300697	3.342583	3.34	3.319594	97.74854
Alliance Bank	2009	8.27	2.076851	1.833766	3.69	-2.52583	98.31871
Alliance Bank	2010	10.21	1.948192	1.780749	3.25	6.980957	100
Alliance Bank	2011	12.19	1.858126	3.343736	3.05	5.293913	103.2
Alliance Bank	2012	13.06	1.701524	2.5953	3.04	5.473454	104.9
Alliance Bank	2013	13.34	1.671836	1.158361	3.11	4.693723	107.1
Alliance Bank	2014	13.53	1.619636	0.717133	2.88	6.006722	110.5
Alliance Bank	2015	11.81	1.544158	0.622429	3.1	5.028006	112.8
Alliance Bank	2016	10.78	1.524064	0.73482	3.44	4.219851	115.2
Am Bank	2007	-0.83	1.745184	6.651282	3.23	9.427665	92.70468
Am Bank	2008	11.18	1.960061	3.777162	3.34	3.319594	97.74854
Am Bank	2009	11.1	1.976034	2.652003	3.69	-2.52583	98.31871
Am Bank	2010	10.59	1.955428	1.579161	3.25	6.980957	100
Am Bank	2011	13.16	1.953683	3.818089	3.05	5.293913	103.2
Am Bank	2012	13.6	1.846896	2.943013	3.04	5.473454	104.9
Am Bank	2013	12.89	1.750109	2.359306	3.11	4.693723	107.1
Am Bank	2014	13.28	1.716563	2.108361	2.88	6.006722	110.5
Am Bank	2015	13.18	1.480627	1.652204	3.1	5.028006	112.8
Am Bank	2016	8.68	1.224362	1.859063	3.44	4.219851	115.2
CIMB Bank	2007	17.29	2.426219	3.93389	3.23	9.427665	92.70468
CIMB Bank	2008	10.96	2.254374	2.326494	3.34	3.319594	97.74854
CIMB Bank	2009	13.45	2.528879	2.013891	3.69	-2.52583	98.31871
CIMB Bank	2010	15.18	2.426919	6.460793	3.25	6.980957	100
CIMB Bank	2011	15.17	2.225797	5.333304	3.05	5.293913	103.2
CIMB Bank	2012	14.98	2.194253	3.921986	3.04	5.473454	104.9
CIMB Bank	2013	14.76	2.144479	3.236534	3.11	4.693723	107.1
CIMB Bank	2014	8.27	2.089923	3.171402	2.88	6.006722	110.5
CIMB Bank	2015	6.86	2.022879	3.128452	3.1	5.028006	112.8
CIMB Bank	2016	7.72	2.022766	3.375477	3.44	4.219851	115.2
Hong Leong Bank	2007	13.3	1.636884	1.960589	3.23	9.427665	92.70468

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Hong Leong Bank	2008	14.45	1.780451	1.432272	3.34	3.319594	97.74854
Hong Leong Bank	2009	15.66	1.704084	1.357435	3.69	-2.52583	98.31871
Hong Leong Bank	2010	15.38	1.6323	1.195346	3.25	6.980957	100
Hong Leong Bank	2011	15.2	1.13232	2.351474	3.05	5.293913	103.2
Hong Leong Bank	2012	14.43	1.648939	1.737113	3.04	5.473454	104.9
Hong Leong Bank	2013	14.24	1.536606	1.42453	3.11	4.693723	107.1
Hong Leong Bank	2014	14.47	1.562789	1.200766	2.88	6.006722	110.5
Hong Leong Bank	2015	13.3	1.489621	0.845456	3.1	5.028006	112.8
Hong Leong Bank	2016	9.01	1.398677	0.800766	3.44	4.219851	115.2
Maybank	2007	16.37	1.999835	3.02655	3.23	9.427665	92.70468
Maybank	2008	14.94	2.016639	1.919149	3.34	3.319594	97.74854
Maybank	2009	2.91	1.904976	1.505168	3.69	-2.52583	98.31871
Maybank	2010	13.84	2.010953	1.102683	3.25	6.980957	100
Maybank	2011	7.72	0.892173	1.890926	3.05	5.293913	103.2
Maybank	2012	13.46	1.713739	1.098635	3.04	5.473454	104.9
Maybank	2013	14.18	1.710303	0.962153	3.11	4.693723	107.1
Maybank	2014	12.62	1.515493	1.051838	2.88	6.006722	110.5
Maybank	2015	11	1.569031	1.43157	3.1	5.028006	112.8
Maybank	2016	9.88	1.571867	1.618567	3.44	4.219851	115.2
Public Bank	2007	22.07	1.862475	1.258257	3.23	9.427665	92.70468
Public Bank	2008	25.64	1.900109	0.876197	3.34	3.319594	97.74854
Public Bank	2009	21.78	1.858945	0.810313	3.69	-2.52583	98.31871
Public Bank	2010	22.65	2.0313	1.15875	3.25	6.980957	100
Public Bank	2011	22.65	1.994672	0.869357	3.05	5.293913	103.2
Public Bank	2012	20.98	1.91339	0.70088	3.04	5.473454	104.9
Public Bank	2013	19.37	1.822072	0.676697	3.11	4.693723	107.1
Public Bank	2014	15.8	1.715388	0.612075	2.88	6.006722	110.5
Public Bank	2015	15.85	1.753094	0.49733	3.1	5.028006	112.8
Public Bank	2016	14.9	1.820907	0.509313	3.44	4.219851	115.2
RHB Bank	2007	11.62	1.996028	3.491963	3.23	9.427665	92.70468
RHB Bank	2008	13.39	2.120238	2.28094	3.34	3.319594	97.74854
RHB Bank	2009	13.83	2.099352	4.861549	3.69	-2.52583	98.31871
RHB Bank	2010	14.32	2.067051	4.520819	3.25	6.980957	100
RHB Bank	2011	13.13	1.829034	3.675573	3.05	5.293913	103.2
RHB Bank	2012	11.67	1.565547	3.054294	3.04	5.473454	104.9
RHB Bank	2013	10.88	1.713584	2.866451	3.11	4.693723	107.1
RHB Bank	2014	10.92	1.500463	2.0558	2.88	6.006722	110.5
RHB Bank	2015	6.59	1.430232	1.89946	3.1	5.028006	112.8
RHB Bank	2016	7.75	1.459137	2.461399	3.44	4.219851	115.2

Source: Targeted financial institutions' annual reports and World Bank.

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Appendix 1.1 Result of Correlation among Independent Variables

	NIIM	NPL	INF	GDP	UMM
NIIM	1.000000	0.419073	-0.545436	-0.118732	0.300944
NPL	0.419073	1.000000	-0.444907	0.207397	0.057800
INF	-0.545436	-0.444907	1.000000	-0.034415	-0.317227
GDP	-0.118732	0.207397	-0.034415	1.000000	-0.664642
UMM	0.300944	0.057800	-0.317227	-0.664642	1.000000

Appendix 1.2 Result of Breusch Pagan Godfrey Test for Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey  
Null hypothesis: Homoskedasticity

F-statistic	1.287137	Prob. F(5,73)	0.2788
Obs*R-squared	6.400388	Prob. Chi-Square(5)	0.2692
Scaled explained SS	19.84346	Prob. Chi-Square(5)	0.0013

Test Equation:  
Dependent Variable: RESID^2  
Method: Least Squares  
Date: 03/21/19 Time: 20:45  
Sample: 1 80  
Included observations: 79

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.416172	0.567017	0.733967	0.4653
LOGNIIM	-0.044813	0.079425	-0.564215	0.5743
LOGNPL	0.007764	0.020443	0.379765	0.7052
LOGINF	-0.238514	0.238152	-1.001520	0.3199
LOGGDP	-0.032511	0.045945	-0.707611	0.4814
LOGUMM	0.223423	0.245955	0.908389	0.3667

R-squared	0.081018	Mean dependent var	0.016388
Adjusted R-squared	0.018074	S.D. dependent var	0.044443
S.E. of regression	0.044040	Akaike info criterion	-3.334545
Sum squared resid	0.141582	Schwarz criterion	-3.154587
Log likelihood	137.7145	Hannan-Quinn criter.	-3.262448
F-statistic	1.287137	Durbin-Watson stat	2.144403
Prob(F-statistic)	0.278789		

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Appendix 1.3 Result of Breusch Godfrey LM Test

Breusch-Godfrey Serial Correlation LM Test:  
Null hypothesis: No serial correlation at up to 5 lags

F-statistic	2.135084	Prob. F(5,68)	0.0716
Obs*R-squared	10.71946	Prob. Chi-Square(5)	0.0572

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 03/21/19 Time: 20:43

Sample: 1 80

Included observations: 79

Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGNIIM	-0.119090	0.256276	-0.464695	0.6436
LOGNPL	0.029794	0.061562	0.483970	0.6300
LOGINF	0.197903	0.748866	0.264270	0.7924
LOGGDP	0.060023	0.141776	0.423365	0.6734
LOGUMM	0.651434	0.768718	0.847430	0.3997
C	-0.749469	1.785162	-0.419832	0.6759
RESID(-1)	0.301411	0.126628	2.380295	0.0201
RESID(-2)	0.125550	0.142958	0.878233	0.3829
RESID(-3)	0.101938	0.132381	0.770038	0.4439
RESID(-4)	-0.047882	0.134045	-0.357207	0.7220
RESID(-5)	-0.005328	0.124273	-0.042874	0.9659
R-squared	0.135689	Mean dependent var	-1.43E-15	
Adjusted R-squared	0.008585	S.D. dependent var	0.128832	
S.E. of regression	0.128277	Akaike info criterion	-1.140701	
Sum squared resid	1.118948	Schwarz criterion	-0.810778	
Log likelihood	56.05769	Hannan-Quinn criter.	-1.008524	
F-statistic	1.067542	Durbin-Watson stat	1.995235	
Prob(F-statistic)	0.399098			

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Appendix 1.4 Result of Redundant Fixed Effect Tests

Redundant Fixed Effects Tests  
Equation: Untitled  
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	6.653439	(7,67)	0.0000
Cross-section Chi-square	42.221012	7	0.0000

Cross-section fixed effects test equation:  
Dependent Variable: ROE  
Method: Panel Least Squares  
Date: 03/21/19 Time: 20:38  
Sample: 2007 2016  
Periods included: 10  
Cross-sections included: 8  
Total panel (balanced) observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NIIM	6.758011	1.679833	4.023026	0.0001
NPL	-2.063344	0.313918	-6.572882	0.0000
GDP	0.035864	0.199431	0.179829	0.8578
INF	-0.205293	0.076129	-2.696635	0.0087
UMM	-5.616555	2.695574	-2.083621	0.0406
C	44.42771	15.12986	2.936425	0.0044

R-squared	0.437672	Mean dependent var	12.44213
Adjusted R-squared	0.399677	S.D. dependent var	4.551700
S.E. of regression	3.526682	Akaike info criterion	5.430630
Sum squared resid	920.3737	Schwarz criterion	5.609282
Log likelihood	-211.2252	Hannan-Quinn criter.	5.502257
F-statistic	11.51915	Durbin-Watson stat	1.100027
Prob(F-statistic)	0.000000		



Appendix 1.5 Result of Breusch Pagan Test

Lagrange Multiplier Tests for Random Effects

Null hypotheses: No effects

Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided  
(all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	19.80157 (0.0000)	0.374782 (0.5404)	20.17635 (0.0000)
Honda	4.449895 (0.0000)	-0.612194 (0.7298)	2.713664 (0.0033)
King-Wu	4.449895 (0.0000)	-0.612194 (0.7298)	2.932493 (0.0017)
Standardized Honda	5.496878 (0.0000)	0.320523 (0.3743)	0.548710 (0.2916)
Standardized King-Wu	5.496878 (0.0000)	0.320523 (0.3743)	0.806659 (0.2099)
Gourieroux, et al.*	--	--	19.80157 (0.0000)

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Appendix 1.6 Result of Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

\* Cross-section test variance is invalid. Hausman statistic set to zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
NIIM	4.857083	5.295760	1.055187	0.6693
NPL	-0.892950	-1.322378	0.024492	0.0061
GDP	-0.139433	-0.077336	0.000438	0.0030
INF	-0.145282	-0.173146	0.000883	0.3485
UMM	-6.252030	-5.991489	0.030254	0.1342

Cross-section random effects test equation:

Dependent Variable: ROE

Method: Panel Least Squares

Date: 03/21/19 Time: 20:39

Sample: 2007 2016

Periods included: 10

Cross-sections included: 8

Total panel (balanced) observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	41.71319	13.91047	2.998690	0.0038
NIIM	4.857083	2.074809	2.340979	0.0222
NPL	-0.892950	0.356949	-2.501620	0.0148
GDP	-0.139433	0.164785	-0.846155	0.4005
INF	-0.145282	0.075548	-1.923060	0.0587
UMM	-6.252030	2.191165	-2.853290	0.0058

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.668270	Mean dependent var	12.44213
Adjusted R-squared	0.608855	S.D. dependent var	4.551700
S.E. of regression	2.846705	Akaike info criterion	5.077868
Sum squared resid	542.9500	Schwarz criterion	5.464947
Log likelihood	-190.1147	Hannan-Quinn criter.	5.233059
F-statistic	11.24760	Durbin-Watson stat	1.415968
Prob(F-statistic)	0.000000		

Macro and Bank Specific Determinants that Affect Profitability of Commercial  
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Appendix 1.7 Result of Random Effect Model

Dependent Variable: ROE  
 Method: Panel EGLS (Cross-section random effects)  
 Date: 03/21/19 Time: 20:39  
 Sample: 2007 2016  
 Periods included: 10  
 Cross-sections included: 8  
 Total panel (balanced) observations: 80  
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NIIM	5.295760	1.802677	2.937720	0.0044
NPL	-1.322378	0.320813	-4.121964	0.0001
GDP	-0.077336	0.163450	-0.473148	0.6375
INF	-0.173146	0.069455	-2.492926	0.0149
UMM	-5.991489	2.184251	-2.743041	0.0076
C	43.70657	13.18228	3.315554	0.0014

Effects Specification		S.D.	Rho
Cross-section random		1.648633	0.2512
Idiosyncratic random		2.846705	0.7488

Weighted Statistics			
R-squared	0.311020	Mean dependent var	5.962803
Adjusted R-squared	0.264467	S.D. dependent var	3.468572
S.E. of regression	2.974758	Sum squared resid	654.8398
F-statistic	6.681035	Durbin-Watson stat	1.260173
Prob(F-statistic)	0.000035		

Unweighted Statistics			
R-squared	0.394947	Mean dependent var	12.44213
Sum squared resid	990.3022	Durbin-Watson stat	0.833293