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MACROECONOMICS VARIABLES AND BANK-SPECIFIC  
FACTORS THAT AFFECT SELECTED BANK'S  
PROFITABILITY IN MALAYSIA

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- (2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.
- (3) Equal contribution has been made by each group member in completing the research project.
- (4) The word count of this research report is 14,169 words.

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## LIST OF ABBREVIATIONS

BNM	Bank Negara Malaysia
ROE	Return on Equity
INF	Inflation Rate
GDP	Gross Domestic Product
CAR	Capital Adequacy Ratio
NPA	Non-Performing Assets
ROA	Return on Assets
NIM	Net Interest Margin
ROUIA	Return on Unrestricted Investments Accounts
CPI	Consumer Price Index
EA	Equity-to-Assets Ratio
POLS	Pooled Ordinary Least Square
REM	Random Effect Model
FEM	Fixed Effect Model
BPLM	Breusch-Pagan Lagrange Multiplier
VIF	Variance Inflating Factor
TOL	Tolerance

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## ABSTRACT

This paper studied the effect of macroeconomics variables and bank-specific factors on selected bank's profitability in Malaysia during the period 2003-2016. Panel data which consist of 8 selected banks in Malaysia from year 2003 to 2016 has been used in this study. Bank's return on equity (ROE) has been used as an instrument to measure bank's profitability. Macroeconomics variables that used in this study included unemployment rate, inflation rate and GDP growth while bank-specific factors included bank size, capital adequacy ratio and non-performing assets. In order to study about this topic, the researchers obtained secondary data from World Bank, Bloomberg and annual report of each bank. Fixed effect model was chosen to examine the effect of macroeconomics variables and bank-specific factors toward bank's profitability. The researchers found that all the independents variables have negative relationship with bank's profitability except inflation rate. Other than this, inflation rate, bank size, capital adequacy ratio and non-performing assets is significant to affect bank's profitability while unemployment rate and GDP growth are insignificant variables that affect bank's profitability.



## **CHAPTER 1: RESEARCH OVERVIEW**

### **1.0 Introduction**

This chapter will give a general review about this research study. The researchers will discuss about the industry background, problem and objectives that cause the initiation of this topic. Hypothesis of the study, significance of the study, chapter layout and conclusion will also be discussed in this chapter. The researchers classified the independent variables into two categories, which are bank-specific factors and macroeconomic variables. Besides, the researchers also investigate the effect of them towards the profitability of 8 selected Malaysian bank from year 2003 to 2016.

### **1.1 Research Background**

Banking sector is one of the most important ways and sources that cannot be lack in one country, in other words, it is the primary sources in financing country economy. Malaysian banking industry has played a critical character in facilitating the development and transformation of Malaysian economy through many phases and ways. It is leading by the central bank of Malaysia, Bank Negara Malaysia (BNM) and make up by commercial banks, investment banks, Islamic bank, and others such as foreign banks and Labuan off-shore banks. Commercial bank is the major players in the Malaysia banking system. There are approximate 42% of the total assets of the financial system are accounted as commercial banks as at the end of 2007 (IBBM 2007). Furthermore, in May 2008, there were 22 commercial banks, 13 Islamic banks and 14 investment banks are the major players of total assets of the financial system.

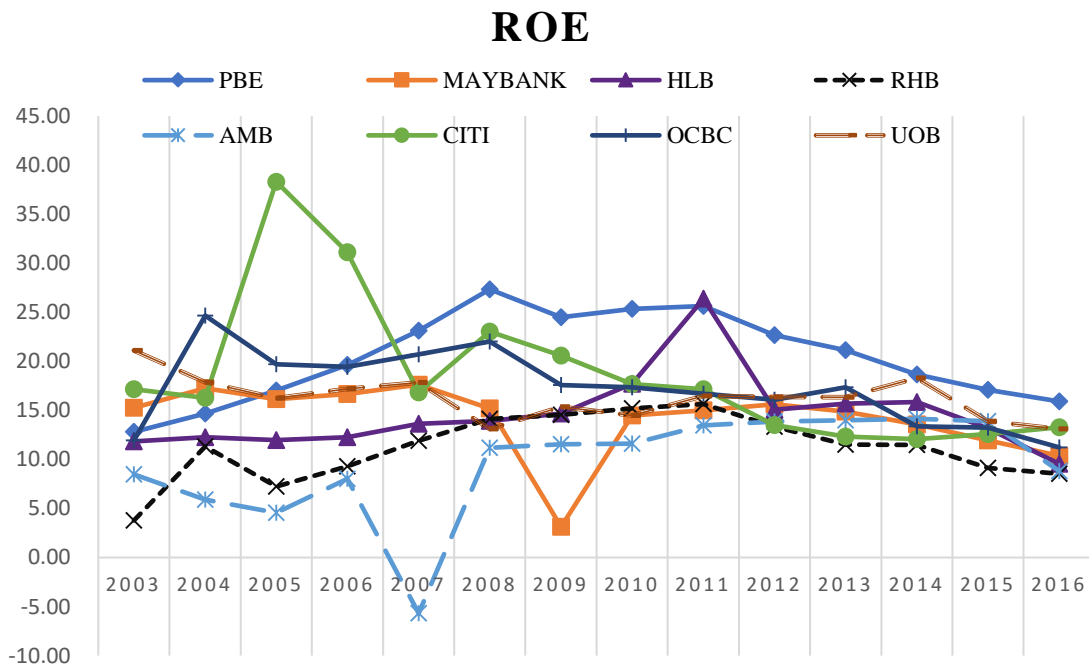
The banking sector in Malaysia has gone through many major developments and improvement changes over these years. The Malaysia Banking industry was developing by the rubber plantations and tin mining industry sectors in the early 1900s, as the location of Malaysia are full of natural resources such as rubber tree and various mine resources, this became one of the advantages of Malaysia banking sectors. By 1929, the British Malaya attained the highest per-capital GDP over any other country in Asia. After that, the foreign banks began to establish their branches in Malaysia and improved over years. The central bank of Malaysia, Bank Negara Malaysia (BNM) was start up in the year of 1959 to develop a truly Malaysian-oriented banking system. Nowadays, BNM role is to govern and oversee the activities and operations of all type of banks in Malaysia. Furthermore, BNM's main objectives are to maintain both financial and monetary stability at the same time in order to boost economy growth.

As to promote economic growth of a country, bank profitability is the first and most important sources since bank provide funds for government and businesses to carry out activities that may enhance a country development. Banks get funds from individuals who with surplus funds which refer savings and transfer the surplus funds to those who with deficit funds, banks will gain profit by providing these services. However, the profitability of bank in Malaysia having a decreasing trend over these year. The overall net interest margin of banks in Malaysia had been fell by 2.23% in September 2015 ("Malaysian banks under pressure, profit decline to linger", 2015). Furthermore, Malaysia's largest bank by assets, Malayan Banking Berhad which also known as Maybank had decrease 11% in its fourth-quarter net profit at year 2017 ("Top lenders Maybank, CIMB post mixed quarterly results", 2018).

## 1.2 Problem Statement

Banking sector is the important sector in every country. One of the major role of banks is to act as a financial intermediary which borrow funds from the surplus unit and lend it out to the deficit unit. Business use the funds that lend from bank to expands their businesses while government lends fund for development of a country. Both of these activities ensure the growth of economy in a country. As a result, banks have an important role to get the financial system run systematically and smoothly since it will affect a country's economy growth. However, as researchers mentioned above, the Malaysia banks profitability are having a decreasing trend recently.

Figure 1.1: Return on Equity (ROE) of Selected Bank in Malaysia



From Figure 1.1, the researcher found that the 8 selected major banks in Malaysia banking industry have a movement in return on equity (ROE), which is overall decreasing during the period 2003 to 2016. It is important for the government or relevant departments to find out the solution to solve this problem as a health and sound financial system may strengthen a

country's economy. Researchers believe that both bank-specific factors and macroeconomic factors may affect the bank's profitability. So, the researchers conduct this research to determine the factors that may affect it. Other than this, the researchers also want to investigate the link between the factors and bank's profitability. This may help the relevant departments take correct action against the problem.

## **1.3 Research Objective**

### **1.3.1 General Objective**

This research aims to examine the effect and relationship of chosen variables towards profitability of banks in Malaysia from 2003 to 2016. In this research, the researchers use return on equity (ROE) as the indicator of selected bank's profitability.

### **1.3.2 Specific Objective**

The purpose of this research is to

- (i) Examine the effect of unemployment rate towards selected bank's profitability in Malaysia.
- (ii) Examine the effect of inflation rate towards bank's profitability in Malaysia.
- (iii) Examine the effect of GDP growth towards bank's profitability in Malaysia.
- (iv) Examine the effect of bank size towards bank's profitability in Malaysia.
- (v) Examine the effect of capital adequacy ratio towards bank's profitability in Malaysia.

- (vi) Examine the effect of non-performing assets towards bank's profitability in Malaysia.

## **1.4 Research Questions**

- (i) Do the macroeconomic variables (unemployment rate, inflation rate and GDP growth) significantly affect bank's profitability in Malaysia?
- (ii) Do the bank-specific factors (bank size, capital adequacy ratio and non-performing assets) significantly affect bank's profitability in Malaysia?
- (iii) Does the model the researchers used contain any economic problem?

## **1.5 Hypothesis of the Study**

### **1.5.1 Macroeconomics Variables**

#### **1.5.1.1 Unemployment Rate**

H<sub>0</sub>: Unemployment rate has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Unemployment rate has impact on profitability of banks in Malaysia.

#### **1.5.1.2 Inflation Rate**

H<sub>0</sub>: Inflation rate has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Inflation rate has impact on profitability of banks in Malaysia.

### **1.5.1.3 GDP Growth**

H<sub>0</sub>: GDP growth has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: GDP Growth has impact on profitability of banks in Malaysia.

## **1.5.2 Bank-Specific Factors**

### **1.5.2.1 Bank Size**

H<sub>0</sub>: Bank size has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Bank size has impact on profitability of banks in Malaysia.

### **1.5.2.2 Capital Adequacy Ratio**

H<sub>0</sub>: Capital adequacy ratio has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Capital adequacy ratio has impact on profitability of banks in Malaysia.

### **1.5.2.3 Non-Performing Assets**

H<sub>0</sub>: Non-performing asset has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Non-performing asset has impact on profitability of banks in Malaysia.

## **1.6 Significance of Study**

The finding of this study is intensively crucial towards every individual inside or outside of Malaysia as the determinants of the bank's profitability playing a critical character in ensuring the soundness of the banking sector and financial performance of Malaysia. Banks generate profits through day-to-day transactions of the customers therefore banks are required to conduct assessment on many kinds of factors that will generate an impact on bank's ability to produce profit. Through this study, the bank management will have a better understanding about the influence of bank-specific factors and macroeconomic factors that may affect bank's profitability. Therefore, they can perform a well practice than their competitor.

Since all the banks in Malaysia are controlled by the central bank of Malaysia, Bank Negara Malaysia (BNM) and the bank's profitability can say as the determinant of economic growth of one country, it is important for the BNM to know more about the factor affect bank's profitability and implied suitable policy to keep the financial system stable. Otherwise bank may liable for any losses that are even not enough time to solve when it happens, if the situations become severer, major large banks will put the banking sector into a disastrous position inevitably causing the banks in Malaysia to fail thus all sectors will suffer from the domino effect. In essence, by determining the factors of bank's profitability may assist banks in Malaysia to operate better than the performance from year 2003 to 2016.

## 1.7 Chapter Layout

Throughout this research project, researchers have divide the results as per chapter organized accordingly. Our major chapter topic will be the introduction, literature review, data and methodology, empirical result, and lastly conclusion.

In the first chapter, introduction part, the researchers have included the overview of the whole research that would be carry out in this project, research background, problem statement, research objectives and question, initial hypothesis of the research, significance of the study, chapter layout and conclusion.

For the second chapter, Literature review, the researchers have set the independent variables which are the unemployment rate, inflation rate, GDP growth, bank size, capital adequacy ratio and non-performing assets to be used throughout the process of getting results. Aside from the summary of the journals, the relevant theoretical model, proposed of theoretical conceptual framework, and proposed hypothesis will be revealing in this chapter two as well.

Next is the data and methodology section, which mostly will describe how researchers utilize the data and method to run the data test. Besides, this part will also describe the variables in more detail before proceeding to the next chapter.

The fourth chapter consists of the results from the E-view tests conducted from the data researchers found in the database program. From this chapter, the researchers will interpret the actual results and the initial assumptions to get the conclusion for this research title.

Last but not least, the last chapter for this research project is the conclusion part that discusses the major findings of our research result, compare the actual and expected relationship and sign. After that, the researchers will insert the final comment of this project and stating the recommendation from researcher's opinion after all the researches and test conducted.



## **1.8 Conclusion**

In general, through this study, researchers' objective is to examine the effect between the certain macroeconomic variables and bank-specific variables that might affect the selected Malaysia bank's profitability from year 2003 up to year 2016. From the research conducted, the researchers will apply a few macroeconomic determinants, and bank-specific variables to investigate the return on equity of the bank. The macroeconomic variables chosen include inflation rate, growth of gross domestic product, and unemployment rate while bank-specific variables are bank size, capital adequacy ratio and non-performing asset. For the purpose of understand better the determinants of bank's revenue, the analysis and test will be conducted and to be explain in detail in next few chapter.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.0 Introduction**

There are a lot of journal and article which regarding to this topic has been review by the researchers. Through reviewed the journal, a more details knowledge on the variables that affect bank's profitability has been provided. Most of the study done by other researchers are focus on the foreign country such as Greek, Jordan, United Stated and so on. There are not much case which is based on Malaysia banking sector. Therefore, researchers set the target population at Malaysia banking sector.

### **2.1 Literature Review**

#### **2.1.1 Profitability of Bank**

Profit is one of the major concern for all the businesses include bank. According to Rose (2002), bank's profit can be defined as the net earnings or net income of a bank. It can be calculated by subtracting expenditure with revenue of the bank. However, some researchers found that net income is not a sufficient tool to explain bank's profitability as it hard to compare performance between banks. The researchers cannot compare bank's performance just based on an amount of profit because it does not take other factors such as bank's size, earning on equity investment and so on into account (Duraj & Moci, 2015). In addition to net income, financial ratio is the most common tools to measure the bank's profitability (Ong & Teh, 2013). Financial ratios consider about bank's size and does not influence by vary in price level. Due to these characteristics, it can be served as an industry's

benchmark and enables investor to compare which of the banks have better performance (Guru, Staunton & Balashanmugam, 1999; Ong & Teh, 2013).

Return on assets (ROA), return on equity (ROE) and net interest margin (NIM) are the financial ratio which is widely employed by previous studies to explain the bank's profitability. However, the researchers employed return on equity (ROE) as the measurement of bank's profitability in this study. This is because shareholders are more concern about the rate of return of their investments while return on equity able to meet their request as it can explain the capacity of bank in generate profit by using shareholder's investment. The used of return on equity (ROE) in measuring bank's profitability have been support by many other researchers in their studies. For example, Vasiliou & Frangouli (2000) employed ROE as the representative of bank's profitability to study the factors which may affect bank profitability in Greek banks as it is the most common instrument that used to measure bank's profitability. Alexiou & Sofoklis (2009) also adopted ROE as profitability measurement to examine the determinants of bank's profitability in Greek banking sector.

In the study of Duraj & Moci (2015), ROE be used by the researchers as the dependent variable to carry out a research. This research investigated about the impact of bank-specific factor and macroeconomic variables against bank profitability in Albania over the period 1999 to 2014. Both ROA and ROE has been used by Ali, Akhtar & Ahmed (2011) as the instrument to measure bank's profitability when conducting the research about bank-specific factor and macroeconomic variables that influence Pakistan bank's profitability. The variables involve in this study are capital adequacy ratio, bank size, operating efficiency, GDP growth and CPI. Both of these studies have get a similar outcome which the profitability of a bank will not only affect by bank-specific factors but also macroeconomic variables.

In this study, the researchers classified the factors that affect bank's profitability into two types which is macroeconomics variables and bank-specific factors. Bank-specific factors that included by the researchers are bank size, capital adequacy ratio and non-performing assets while the macroeconomics variables include unemployment rate, inflation and GDP growth.

## **2.1.2 Macroeconomics Variables**

### **2.1.2.1 Unemployment Rate**

Unemployment rate is macroeconomic variables that affect bank's profitability since it able to bring a chain reaction that may affect a country's economy (Ifeacho & Ngalawa,2014; Regehr & Sengupta,2014; Heffernan & Fu, 2008). It can be defined as the percentage of labor force that unemployed in a country. Not all the workforces that do not have a job is classified as unemployed. It should meet an important criterion which is the people that joblessness is trying to look for a job (Amadeo, 2017). For the workforce that unwilling to work or abundant seeking for job, it cannot be classified as unemployed. Unemployment rate can be measure through using total labor force divided by the number of unemployed. There are a lot of researchers studied about the relationship between unemployment rate and bank's profitability.

According to Ifeacho & Ngalawa (2014), high unemployment rate will slow down the economic growth since unemployment cause decrease in production and consumption. Bank's profit will be expected lesser when unemployment rate increases as it acts as a financial intermediary which borrows funds from supplier (party with excess money) and lends fund to demander (party that lack of money). When unemployment rate increase, the demand of loan will decrease and the loan default rate will increase at the same time (Singh & Sharma, 2016). This cause the

bank's profitability decrease. Hence, Ifeacho & Ngalawa (2014) suggested that unemployment rate will negatively affect bank's profitability in their study.

In the research of Heffernan & Fu (2008), they found that unemployment rate is a significant variable that affect bank's profitability in China during the period 1999-2006. The researchers found that unemployment may affect the borrower capacity to return the loan. The higher the unemployment rate, the higher the probability of the borrower default. The increase of loan default rate may lower the bank's profit.

Samhan & Al-Khatib (2015) studied the factor that effect Jordan's banks performance over the period 2000-2012. In this study, the researchers used Return on Assets (ROA), Return on Equity (ROE), and Return on Unrestricted Investment Accounts (ROUIA) as the instrument to measure the profitability of the bank. The results shown that there is negative association between unemployment rate and bank's profitability. This is supported by Abreu & Mendes (2001) which has studied about determinants of commercial bank profitability in European Countries. The studied of Regehr & Sangupta (2014) also shown the similar results.

Hence, the researchers of this study conclude that increase in unemployment rate will decrease bank profitability. The expected sign of unemployment rate will be negative.

#### **2.1.2.2 Inflation Rate**

Inflation can be stated as the rising of price level of good and services in a country. The citizen need to use more money to buy a product when inflation occurs. In other words, inflation may reduce the purchasing power of consumer since one unit of currency can buy lesser product. Inflation rate is a rate that use to measure the rise or decline of prices.

Revell (1979) has proposed that inflation might be a determinant in the causation of varieties in bank profitability despite the fact that this isn't generally examined in the researches somewhere else. Its impact relies upon the presumption that wages and other non-interest costs are becoming speedier than the inflation rate, which isn't abnormal and, as needs be, the yearly growth in the consumer price index (CPI) in every nation is utilized as an explanatory variable. In other research, done by Perry (1992) states that the degree to which inflation influences bank profitability relies upon whether expansion desires are completely foreseen. An inflation rate completely expected by the bank's administration suggests that banks can properly modify interest rates with the end goal to increment their incomes quicker than their expenses and gain higher financial benefits. Most researches have also demonstrated a positive connection between inflation and profitability (Athanasoglou, Brissimis & Delis, 2008; Bourke, 1989; Molyneux & Thornton, 1992).

In contrast, there were some researches that show inflation rate is adversely and essentially to credit risk for conventional banks. Castro (2013) suggested that high inflation could cause debt repayment easier by decreasing the genuine value of outstanding credits, this may lower the default rate of debt and increase bank's profitability in indirect way. However, in the meantime, it can debilitate borrowers' capacity to repay debt by lessening real income. The finding of this research also matches with the research of Shu (2002) who suggest that increasing speed in credit extension will bring down default rate as higher inflation triumph because of the way that inflation empowers borrowers to repay their advance from the accessibility of assets. However, Mkukwana (2013) demonstrates that higher inflation rate compelling borrowers to default in order to satisfy essential need on necessities.

In a nutshell, the researchers conclude that inflation rate has a positive impact on bank's profitability, since this fact and impact is supported by most researchers.

### **2.1.2.3 GDP Growth**

Gross domestic product (GDP) is the best approach to measure the economy of a country; it is the total value of a country economy and products. GDP growth also can be understood as the annual change of GDP within a country, it is also the most commonly used macroeconomic indicators. GDP growth is chosen as independent variables because it is expected affect the supply and demand for loans and deposits that provide by banking services, thus, it also can be selected as a macroeconomic indicator of the demand for banking services.

According to Ali et al. (2011), GDP growth is found out to be significant in their study which examine the Pakistan public and private commercial banks's profitability during the period of 2006-2009. This indicate that their bank profitability (ROE) significantly affect GDP growth. Based on the regression result, the researchers also found out that GDP growth has a positive effect on profitability as measured by ROA and ROE. GDP growth is also considered as an important macroeconomic variable and external factor of bank profitability because of its relevancy.

Furthermore, Duraj & Moci (2015) conducted a study to provide additional evidence for the factors influencing the bank profitability, and they use GDP growth as their external factors for bank profitability. The study conclude that the economy conditions of a country can lead to a change in bank profitability. A good economic condition will lead to the increase of demand for loans and after that will became a solvency for borrower to help ease their burden or debt and ultimately increase bank profitability while a bad economic condition will decrease bank profitability. The GDP growth is significant and positively related to bank profitability according to this study.

A study of impact of internal, external, macroeconomic and financial market structure on UK commercial bank's profit based on the panel evidence of 1995 - 2012 also include the GDP growth as their external determinants, because it reflects the state of the economic cycle and it is also expected to have a positive effect on UK commercial banks (Kosmidou, Tanna and Pasiouras, 2012). After the authors tested their regression and output, the result also shown that the commercial banks in UK have a positive relationship with GDP growth and inflation, as do concentration in the banking industry and stock market development.

In a conclusion, majority of journal and research study have shown that GDP growth is significant to bank's profit. It is expected to have a positive impact on banks profitability.

### **2.1.3 Bank-Specific Factors**

#### **2.1.3.1 Bank Size**

Total assets that owned by banks is used to determine bank size. A bank could charge a lower financial service when the bank has high asset ownership. The larger bank has greater impact on real economy compare to smaller bank. The study of Saona (2016) has performed the test by obtaining data on commercial banks in seven Latin American countries over the period 1995 to 2012. The findings of this study stated that bank size has a positive relationship with the bank performance where the large-sized bank will take higher risk than smaller banks and therefore large-sized bank will charge on a higher interest which would increase the profitability of bank. This finding is also agreed by Demirgüç-Kunt & Huizinga (2004), the profitability of bank can be positively affected by increasing returns portion of the average cost curve of the bank itself. In addition, study of Saona (2016) shows the positive relationship between bank performance and bank size as well as the amount of loans. The amount of loans is in form of proportion of total



assets, the deposits demanded by customers. These forms have positive effect on bank performance.

However, from the early study from Kosmidou et al. (2008), the researchers of this study claimed that the significant and negative association between bank profitability and bank size. Larger banks are likely to be make lower margin and profit compared to smaller banks. This outcome is supported by the study of Kosmidou et al. (2006) where the researchers compare and state that the smaller banks in UK during 1998 to 2002 have a better performance than those larger banks. This is because of either economy of scale for small-sized banks or diseconomies for larger banks.

Based on Goddard et al. (2004), researchers used cross-sectional and dynamic panel model to test the relationship between profitability of bank in six countries over the period 1992 to 1998. The outcomes show that different countries have different relationship between profitability and bank size.

According to the studies as mentioned above, the researchers conclude that effect of bank size on profitability can be either positive or negative depending on the willingness of bank management to take risk.

### **2.1.3.2 Capital Adequacy Ratio**

Capital adequacy of bank is measure by capital adequacy ratio. It also known as capital to risk-weighted assets ratio, it is one of the indicators in the model of CAMEL. This ratio was used to measure the performance of the banks whether they are over capitalized or under capitalize. Capital adequacy ratio included Tier 1 capital and Tier 2 capital. Tier 1 capital are always play an important role in cushion bank's losses like ordinary share capital, Tier 2 capital are the capital that will

protect the bank in case of liquidation and bank's failure, it is also used to absorb loss when bank losses all its Tier 1 Capital.

In the research of Flamini, McDonald & Schumacher (2009), capital was being addressed as an important indicator in measuring the profit of the banks. According to the researchers, capital and bank profitability are assumed to be negatively related. When a bank reserves is high, the risk will be lower, and at the same time, bank's profit will decrease. This is due to the bank prefer to choose the safer road and less risky in managing their capital and investment. This has been agreed by the research of Dore (2013) which also found that the bank's profitability is negative related to capital adequacy of banks. The well capitalized bank is expected to earn higher profit and lower the cost of the bankruptcy (Pastory & Marobhe, 2015).

Riazard and Mehar (2013) also stated that that capital adequacy decreases with bank profit is definitively linked with capital adequacy ratio. This result was supported by the other author of journal article, where in the study, it was mentioned that the greater capital to asset ratio will lead to a lower banks profit as the risk will be lower (Guru et al., 1999). Kishori & Sheeba (2017) argued that when the capital reserves are high, some of the banks would add more risk into their asset portfolio in order to maximize their return. Hence, under this special circumstance, positive relationship will occur between capital adequacy ratio and bank's profitability when the banks are risk taker.

Finally, the researchers conclude that the relationship between capital adequacy ratio and bank's profitability are still proven to be negative related to each other's by most researchers.

### **2.1.3.3 Non-Performing Assets**

Non- performing asset can be classified into several types of asset of the banks that leads to the losses in the account, one of the major cause is net performing loan. Any loan that lent out by the bank to the borrower is consider as an asset for the bank itself. Hence, when the rate of lending is high, the risk of loan default will increase simultaneously. When a loan was default by the borrower, it will take into the account of non- performing asset.

As mentioned by Kiran & Jones (2016), non- performing asset could affect the profitability of the banks when there is no revenue from the loans that are given out, based on their research, majority of the banks that are used for their study shows that the relationship between the non- performing asset and bank profitability is negatively related where the non-performing asset increasing represent the losses that the banks have to bear, will decrease the profit or return on equity of the banks. However, there are several banks that shows positive relationship between the two variables as well. In the research of Kiran & Jones (2016), it stated that the link between non- performing asset and return of equity will differ depends on the bank's management upon the non-performing asset. The larger the bank, the higher the ability of the bank to absorb the losses.

In additional, based on the study of Rathore (2016), from the regression analysis, the researcher concluded that the relationship between non-performing asset (NPA) and return on equity (ROE) is negatively related and is significant in the research study. When there is an increase in the NPA, the ROE of the bank will decline significantly as ROE is used to measure the performance of the bank. As long as the bank able to manage the assets and imply a strong credit policy, the chances of being affected by the non- performing asset will be reduced.

In the other hand, Kishori & Sheeba (2017) also mentioned that net performing asset is representing the bank's asset value, and has a significant influence towards the bank's return on equity. They have a negative relationship where non-performing asset increase, the profitability will deteriorate subsequently. Lastly, the researchers conclude that non-performing assets (NPA) is negative related to bank's profitability as supported by most literature reviews.

## **2.2 Review of Relevant Theoretical Model**

### **First relevant theoretical model:**

Kosmidou et al. (2008) has done a research to identifying the impact of bank-specific factors, macroeconomics variables and financial market structure towards bank's profitability in United Kingdom. The researchers conduct this research by using unbalanced panel data for 32 commercial banks during the period of 1995 to 2002. In this research, cost to income ratio (COST), liquidity ratio (LIQIUD), loan loss reserves to gross loans ratio (LOSRES), equity to total assets ratio (EQAS), bank size (SIZE), GDP growth (GDPGR), inflation (INF), concentration in banking industry (CONC) and stock market capitalization (MACPASS) have been used by the authors as the independent variables.

Figure 2.1: First Theoretical Model

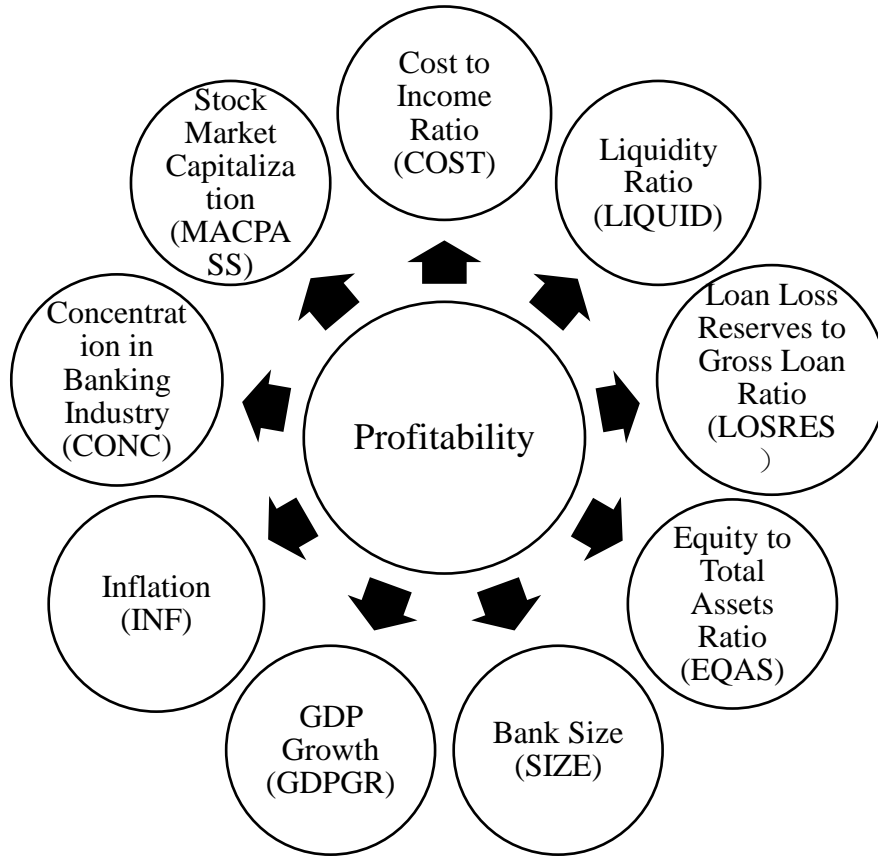


Table 2.1: Result of First Theoretical Model

Independent Variables	Significance	Relationship
Cost to Income Ratio	Significant	Negative
Liquidity Ratio	Significant	Positive
Loan Loss Reserves to Gross Loan	Insignificant	Positive
Equity to Assets Ratio	Significant	Positive
Bank Size	Significant	Negative
GDP Growth	Significant	Positive
Inflation	Significant	Positive
Concentration in Banking Sector	Significant	Positive
Stock Market Capitalization	Significant	Positive

**Second relevant theoretical model:**

The following model was proposed by Kishori & Sheeba (2017) with the objective to investigate the factors that affect banks profitability in India during the period 1996 to 2015. The researcher employed capital adequacy ratio (CAR), Nonperforming Asset ratio (NPA), loan to deposit ratio (LDR), cost per loan ratio (CLR), provision coverage ratio (PCR), and leverage ratio (LR) as their independent variables.

Figure 2.2: Second Theoretical Model

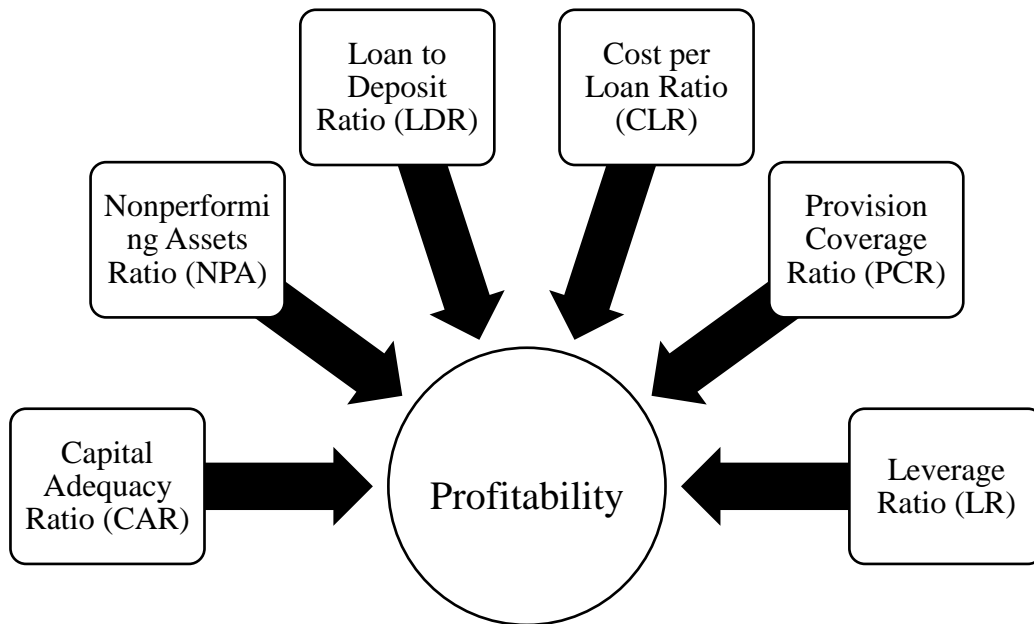


Table 2.2: Result of second theoretical model

<b>Independent Variables</b>	<b>Significance</b>	<b>Relationship</b>
Capital Adequacy Ratio	Significant	Positive
Nonperforming Assets Ratio	Significant	Negative
Loan to Deposit Ratio	Insignificant	Negative
Cost per Loan Ratio	Insignificant	Negative
Provision Coverage Ratio	Insignificant	Negative
Leverage Ratio	Significant	Negative

**Third relevant theoretical model:**

Research done by Mendes & Abreu (2001) tested the bank performance with various alternative dependent variables such as Interest Margin/Assets, Interest Margin/Equity, Return on Equity (ROE) and Return on Asset. The real GDP growth, unemployment rate, inflation rate, market share and nominal effective exchange rate index are included as domestic macroeconomic variables.

Figure 2.3: Third Theoretical Model

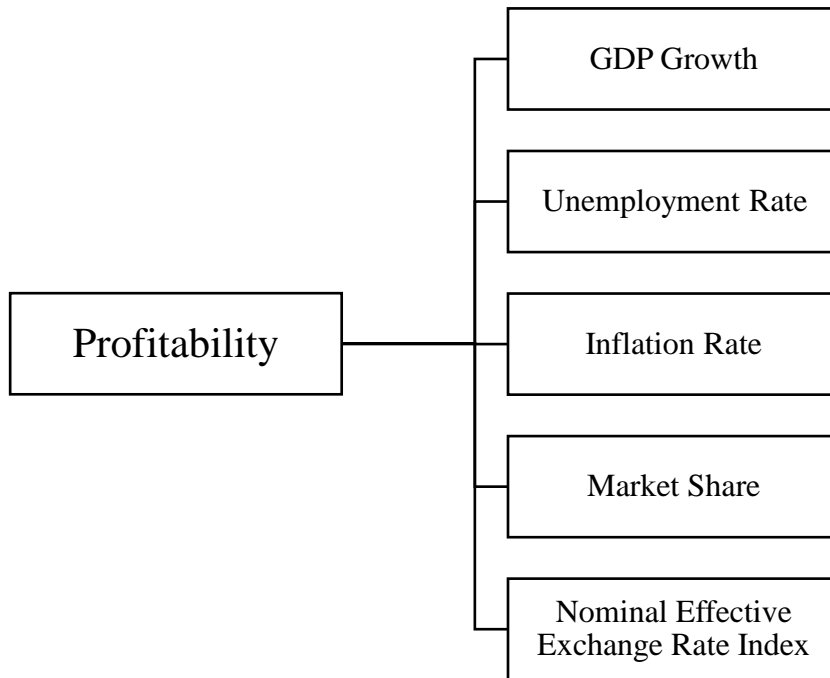
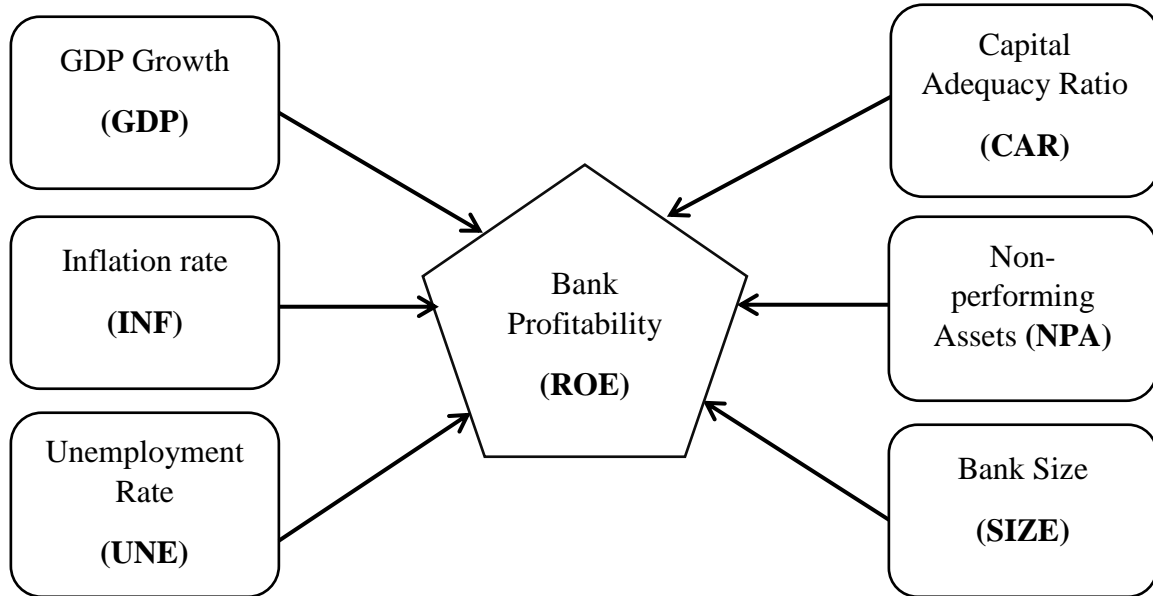


Table 2.3 Result of Third Theoretical Model

<b>Independent Variables</b>	<b>Significance</b>	<b>Relationship</b>
Market share	Significant	Positive
GDP Growth	Significant	Positive
Unemployment rate	Significant	Negative
Inflation rate	Significant	Negative
Nominal effective exchange rate index	Insignificant	Positive

## 2.3 Proposed of Theoretical and Conceptual Framework

Figure 2.4 Proposed Theoretical Frameworks



### 2.3.1 Profitability of Bank

Return on equity is the financial ratio that is widely used by most researchers as indicators of bank profitability. Dividing in net income by shareholder's equity has been adopted as a measurement to account return on equity (ROE). According to Duraj & Moci (2015), ROE and ROA are used by the researchers as the dependent variable to conduct their experiment study. Vasiliou & Frangouli (2000) research study employed the ROE as the representative of bank's profitability to study the factors which may affect bank profitability in Greek banks.



## **2.3.2 Macroeconomics Variables**

### **2.3.2.1 Unemployment Rate**

Unemployment rate can be explained as the percentage of unemployed labor forces in a country. High employment rate will slow down the economic growth by causing decrease in production and consumption (Ifeacho & Ngalawa, 2014). One things lead to another, slowing in economic growth will cause demand of loan to decrease and loan default rate will increase at the same time (Singh & Sharma, 2016). Thus, Ifeacho & Ngalawa (2014) conclude that unemployment rate is significant and negative related to bank's profitability.

### **2.3.2.2 GDP Growth**

GDP is the total value of everything that is produced within the country, GDP growth is the annual changes of GDP within a country. Ali et al. (2011) research study have conclude that the GDP growth is significant and positive related to banks profitability. Furthermore, Duraj and Moci (2015) also stated that GDP growth have a positive relationship with bank profitability.

### **2.3.2.3 Inflation Rate**

Inflation can be widely defined as increase continuously in the general price level for goods and services in a country. "Inflation might be a determinant in the causation of varieties in bank profitability" (Revell, 1979). Bourke (1989) and Molyneux and Thorton (1992) have researched that the connection between inflation and bank's profitability is positive. Furthermore, Castro (2013) also suggested that high inflation will lead to more debt repayment by decreasing the genuine value of outstanding credits, thus, increasing bank's profitability.

### **2.3.3 Bank-Specific Factors**

#### **2.3.3.1 Bank Size**

Bank size is determined and defined by the assets that owned by banks. Saona (2016) stated that the bank size in Latin American countries is significant and has a positive relationship with the bank performance where larger banks will have higher risks than small sized banks, so larger banks will charge higher interest on customer thus increasing the profitability of banks. On the other hands, the study of Kosmidou et. al (2008) claimed that there is a significant and negative relationship between bank size and bank's profitability.

#### **2.3.3.2 Capital Adequacy Ratio**

Capital adequacy ratio can be widely defined as a measurement of a bank's Tier 1 and Tier 2 capital and determine whether the banks is over-capitalized or under-capitalized. The research of Dore (2013) stated that the capital adequacy ratio is negatively affect the bank's profitability. Moreover, Riazard and Mehar (2013) also conclude that capital adequacy of the banks decreases with bank's profit.

#### **2.3.3.3 Non-performing Assets**

Non-performing assets can be introduced as the assets that lead to losses in the account, such as the loan lent out by bank is being defaulted by borrowers. Rathore (2016) research study state that relationship between non-performing assets and bank's profitability is negative and significant. Furthermore, based on Kiran & Jones (2016) study, their study shows that non-performing assets is negative related to bank's profitability, as increase in the non-performing assets will decrease the bank's profit.

## **2.4 Hypothesis of Study**

The hypothesis stated below are to determine whether the macroeconomic variables and bank-specific variables that are concerned in this research have an impact on probability of banks in Malaysia. The variables concerned included unemployment rate, inflation, gross domestic product, bank size, capital adequacy ratio and non-performing asset.

### **2.4.1 Macroeconomic Variables**

#### **2.4.1.1 Unemployment Rate**

H<sub>0</sub>: Unemployment rate has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Unemployment rate has impact on profitability of banks in Malaysia.

#### **2.4.1.2 Inflation Rate**

H<sub>0</sub>: Inflation rate has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Inflation rate has impact on profitability of banks in Malaysia.

#### **2.4.1.3 GDP Growth**

H<sub>0</sub>: GDP growth has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: GDP Growth has impact on profitability of banks in Malaysia.

## **2.4.2 Bank-Specific Factors**

### **2.4.2.1 Bank Size**

H<sub>0</sub>: Bank size has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Bank size has impact on profitability of banks in Malaysia.

### **2.4.2.2 Capital Adequacy Ratio**

H<sub>0</sub>: Capital adequacy ratio has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Capital adequacy ratio has impact on profitability of banks in Malaysia.

### **2.4.2.3 Non-Performing Assets**

H<sub>0</sub>: Non-performing asset has no impact on profitability of banks in Malaysia.

H<sub>1</sub>: Non-performing asset has impact on profitability of banks in Malaysia.

## **2.5 Conclusion**

To conclude this chapter, most of the past researcher's journal published are very helpful to support our statement throughout the literature review part, the researchers found that many scholars are expressing their opinion towards the outcomes of their studies in different country such as India, United State, Jordan and other countries. From all the empirical results, the level of significant of the variables are explained in detail. Hence, the next chapter of this study will discuss further about the method to use to analyze the data we obtained.

## **CHAPTER 3: METHODOLOGY**

### **3.0 Introduction**

In this chapter, methodology applied in this research will be discussed further. The collection of secondary research data done by the researchers from source World Bank, Bloomberg and the selected bank's financial report. The use of Eviews 9.5 in order to generate the test results on the research.

### **3.1 Research Structure**

This study relates on the macroeconomic variables and bank-specific factors that affect bank profitability in Malaysia. A quantitative research is used in collection of secondary data in this research. The purpose of this study is to examine the core determinants that affect the selected local and foreign bank credit risk ultimately the bank's profitability in Malaysia throughout the period of year 2003 to 2016 (14 years). Related secondary data is collected from World Bank, Bloomberg and financial statement of selected bank.

A quantitative research is where the endogenous and exogenous variables were examined and the correlation coefficients and coefficients of assurance were perceived so as to show the strength of connection between the factors. Thus, quantitative research assumes an essential part in approach.

## **3.2 Data Collection Method**

To conduct a research, there is two types of data that researcher would use on their research which is known as primary data and secondary data. In this research, secondary data was selected to proceed to the further discussion. Throughout the whole study, the researchers used 8 banks, local and foreign, as the main discussion issue with the period of 14 years (2003-2016) and the data collected from different sources which are World Bank, Bloomberg and financial statement of selected bank. Instead of time series analysis, the researchers apply panel data for this study for a better understanding in the research.

### **3.2.1 Secondary Data**

Secondary data is different than primary data where the information collected using the secondary data is not newly obtain for the researches. It has already been a past tense that used by others researcher to complete their studies. It can be found in the past journals or from the database sources which can be easily found and acquire. There is some data that the researchers could not obtain if using primary data. Hence, the researchers choose to use secondary data for this study. In additional, secondary data is much more convenient to look for the data itself because of its available in multiple sources. As primary data required the researcher to obtain the data through questionnaire and other time-consuming activities, by adopting secondary data it could solve the time insufficient issue and at the same time it helps to save the cost of conducting the research. Through the secondary data, the researchers can also make comparison between the results and findings from various researcher to make own assumptions and conclusion.

Table 3.1 Source of data

Variables	Units	Data Sources
<b>Dependent Variable</b>		
Return on Equity (ROE)	Percent (%)	Bloomberg and Annual Report
<b>Independent Variables</b>		
Unemployment (UNE)	Percent (%)	World Bank
Inflation (INF)	Percent (%)	World Bank
GDP Growth (GDP)	Percent (%)	World Bank
Log Bank Size (Log_Size)	RM million	Bloomberg and Annual Report
Capital Adequacy Ratio (CAR)	Percent (%)	Bloomberg and Annual Report
Non-Performing Asset (NPA)	Percent (%)	Bloomberg and Annual Report

### 3.3 Sampling Design

#### 3.3.1 Target Population

Throughout the whole study, the main targeted population is set to be the banking industry in Malaysia. In this research, the researchers used 5 local banks and 3 foreign banks that operates in Malaysia which in line with the project title. The data available for all these bank is contributed to the main factor for choosing these 8 banks as our target population. Below is the list of the banks that the researchers selected for this research:

Table 3.2 List of Bank for this Research

<b>Local Commercial Banks</b>	<b>Foreign Commercial Banks</b>
Maybank Berhad	OCBC Bank Berhad
Public Bank Berhad	Citibank Berhad
Hong Leong Bank Berhad	UOB Bank Berhad
Ambank Berhadd	
RHB Bank Berhad	

### **3.3.2 Sampling Technique**

As the research was carry out, Eview 9.5 has been used to run out test on all the data obtained from the secondary sources. This is due to Eviews function contains wide range of features which include for statistic, econometric study and other relevant programme to assist us in this project. There are several tests had been carry out for the research progress. The tests included POLS test, Random Effect Model (REM) test, Poolability F Test, BPLM test, Hausman test, Multicollllinearity test, Heteroskedasticity test, Autocorrelation test and Unit Root test.

### **3.3.3 Sampling Size**

For panel data, the researchers used the number of banks multiply with the number of year that used for the observation to get the sampling size. As the researchers used panel data as this study's method, the sample size is suggested to greater than 50 and above in order to obtain a better significant test effect and more precise in the outcomes. Since the data collected is within the year of 2003 up to 2016 for 8 banks, the total number of the sample size is 112.



### 3.4 Research Instruments

The research variables in this study are measured by the research instruments which is as shown below:

- i.  $ROE_{it}$  = Return on equity for bank  $i$  for year  $t$**   
**= Net Profit / Total Equity**

Net profit to total equity is representing the profitability of bank.

- ii.  $UNE_{it}$  = Unemployment rate for bank  $i$  for year  $t$**   
**= Percentage of total labor force**

The percentage of total labor force is the measurement for unemployment rate.

- iii.  $INF_{it}$  = Inflation for bank  $i$  for year  $t$**   
**= GDP deflator**

GDP deflator is the representative for inflation.

- iv.  $GDP_{it}$  = Gross domestic product for bank  $i$  for year  $t$**   
**= Annual percentage of GDP growth**

The annual percentage of GDP growth is the representative for gross domestic product.

- v.  $SIZE_{it}$  = Bank size of bank  $i$  for year  $t$**   
**= log Total asset**

Natural logarithm of total asset is the representative for bank size.

- vi.  $CAR_{it}$  = Capital adequacy ratio of bank  $i$  for year  $t$**   
**= Total Capital / Risk-Weighted Assets**

The capital adequacy ratio is the representative for a bank capital.

**vii.  $NPA_{it}$  = Non-performing asset of bank  $i$  for year  $t$**   
**= Non-Performing Asset / Total Asset**

The percentage of non-performing asset to total asset is the measurement of the NPA.

## **3.5 Data Analysis**

### **3.5.1 Panel Data**

In this study, the researchers used panel data to investigate the impact of macroeconomics variables and bank-specific factors towards the bank's profitability of 8 selected banks in Malaysia cover the duration of year 2003 to 2016. Panel data have been chosen in this study because it contains more accurate inference of model parameters, in another way it means that the data contains more detail and efficiency of econometrics estimates comparing to other data such as cross-sectional data. Furthermore, Hsiao (1995) stated that panel data have a greater capacity for capturing the complexity of human behavior than a single cross-section or time-series data. Pooled ordinary least square (POLS), fixed effect model (FEM) and random effect model (REM) are the three models including in panel data regression model estimation. The researchers have chosen FEM as the model in this study since majority of the independent variables are significant with it.

#### **3.5.1.1 Fixed Effect Model**

Fixed effect model (FEM) is one of the model in panel data. Similar with random effect model (REM), it consists of both individual effects and time effects. According to Gujariti & Porter (2009), FEM used to investigate the differences in intercepts across groups or time periods. In this research, the researchers found that FEM is the most suitable model to determine the effect of macroeconomic variables and bank-specific factors towards bank's profitability of 8 selected commercial bank

in Malaysia during the period 2003 to 2016 as it provides a better result than others model according to the test run on E-views 9.5. The fixed effect model is shown as below:

$$ROE_{it} = \beta_0 + \beta_1 UNE_{it} + \beta_2 INF_{it} + \beta_3 GDP_{it} + \beta_4 LOG(SIZE)_{it} + \beta_5 CAR_{it} + \beta_6 NPA_{it} + w_{it}$$

Where,

$ROE_{it}$  = Return on equity for each bank at t year

$\beta$  = the coefficient for each independent variable

$UNE_{it}$  = Unemployment rate for each bank at t year

$INF_{it}$  = Inflation rate for each bank at t year

$GDP_{it}$  = GDP growth for each bank at t year

$Log(SIZE)_{it}$  = Natural logarithm of bank size for each bank in at t year

$CAR_{it}$  = Capital adequacy ratio for each bank at t year

$NPA_{it}$  = Non-performing assets for each bank at t year

$w_{it}$  =  $\varepsilon_i + e_t + \mu_{it}$  (individual effect + time effect + error term)

### 3.5.2 Scale of Measurement

#### 3.5.2.1 Poolability F Test

In this study, the researchers have used poolability F test to determine whether pooled ordinary least square (POLS) model or fixed effects model (FEM) is better. The hypothesis is as shown below:

*$H_0$ : Pooled Ordinary Least Square (POLS) is endorsed in this study.*

*$H_1$ : Fixed Effect Model (FEM) is endorsed in this study.*

In poolability F test, the researchers will reject null hypothesis if p-value less than significant level which is 5%, otherwise, do not reject. If the researchers reject the null hypothesis, this means that FEM is better than POLS model in our study. According to Gujariti & Porter (2009), when the null hypothesis has been rejected, the researchers can conclude that fixed effect is more suitable or the goodness-of fit in the FEM have been increase.

#### 3.5.2.2 Breusch-Pagan Lagrange Multiplier (BPLM Test)

BPLM test is used to examine the pooled ordinary least square (POLS) model against random effect model (REM). The hypothesis is as shown below:

*$H_0$ : Pooled Ordinary Least Square (POLS) is endorsed in this study.*

*$H_1$ : Random Effect Model (REM) is endorsed in this study.*

The decision rule of BPLM test is reject null hypothesis if p-value less than 5% significant level, otherwise, do not reject. In BPLM test, if the null hypothesis is rejected, it means that REM has better effect than POLS model. In contrast, if the

alternative hypothesis is rejected, it means that there is no individual effect and POLS is more suitable (Gujarati & Porter, 2009).

### 3.5.2.3 Hausman Test

Hausman test is used to test for fixed effect model and random effect model. Since both poolability F test and BPLM test reject null hypothesis which means that FEM and REM are preferred respectively, so the researchers use this test to determine which model should be use as final model. The hypothesis is as shown below:

*H<sub>0</sub>: Random Effect Model (REM) is endorsed in this study.*

*H<sub>1</sub>: Fixed Effect Model (FEM) is endorsed in this study.*

When the p-value less than 5% significant level, the researchers will reject null hypothesis. If the null hypothesis being reject, FEM will be the final model. In contrast, if the null hypothesis is not rejected, REM will be the final model.

### 3.5.2.4 Multicollinearity

Multicollinearity may have a few antagonistic impacts on assessed coefficients in multiple regression analysis; subsequently, it is essential that researchers be prepared in distinguishing its existence. Multicollinearity happens when the variables are closely related to each other (Gujarati & Porter, 2009). At the point when multicollinearity exists in a model, the null hypothesis will be hard to reject since the estimators will have large variances which may leads to a wider confidence interval. There are no definite tests for multicollinearity issue but it can be recognized in a few ways which are stated as below:

- (1) Few significant t-ratio but greater R-square

- (2) High pair-wise correlation between explanatory variables (the correlation among the variable higher than 0.80 in correlation matrix method is classified as highly correlated)
- (3) Variance-inflating factor (VIF) and tolerance (TOL)

VIF is one way to test for the multicollinearity problem. The equation of VIF as below:

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

where  $R^2$  is the coefficient of connection amongst X1 and X2 factors.

At the point when VIF is lower than 10, multicollinearity between the variables are not exist. Other than VIF, TOL also is one way to measure the multicollinearity problem. The formula is as below:

$$\text{TOL} = \frac{1}{\text{VIF}}$$

When the TOL is equal to 1, it means that it does not consist any multicollinearity problem between the variables. In contrast, the model will appear to be multicollinearity when the TOL equal to 0. Among all of these ways, correlation matrix method has been employed by the researchers in this study.

### 3.5.2.5 Heteroscedasticity

Heteroscedasticity can be explained by the standard deviations of a variable are being monitored over a specific amount of time are non-constant. In other words, the variances of error term vary across the observations when there is heteroscedasticity problem. There are two forms of heteroscedasticity, which is conditional and unconditional, conditional heteroscedasticity can identify non-

constant volatility when future period volatility cannot be identified. In another way, when futures periods of high and low volatility can be identified, this is the time of using unconditional heteroscedasticity. A heteroscedasticity contains various test which are Breusch-Pagan-Godfrey (BG) test, Harvey test, Glejser test, ARCH test, and white test. In this study, the researchers used Breusch-Pagan-Godfrey test to test whether the model consist of heteroscedasticity problem or not. The hypothesis is as shown below:

***H<sub>0</sub>: There is no heteroscedasticity problem in the model.***

***H<sub>1</sub>: There is heteroscedasticity problem in the model.***

The hypothesis can be rejected if the p-value is lesser than the significance level at 5%. In conclude, if the null hypothesis is not rejected, it indicates that the model used is free from the heteroscedasticity problem.

### **3.5.2.6 Autocorrelation**

Autocorrelation which is also known as serial correlation occurs when the error term observations in a regression are dependent. There are two types of autocorrelation which is pure serial correlation and impure serial correlation. Pure serial correlation happens where error term observations of current period will be influenced by error term of last period, whereas impure serial correlation may be influenced by model misspecification error such as there are some important variables are omitted by researchers or an incorrect functional form, where these two types of autocorrelation can be solved. E-views 9.5 is used to conduct a hypothesis testing to obtain the p-value. Significant level been employed is 5%. The hypothesis is stated as below:

***H<sub>0</sub>: The model does not contain autocorrelation problem.***

***H<sub>1</sub>: The model contains autocorrelation problem.***

Reject the null hypothesis when p-value is less than 5% significance level, or else, do not reject null hypothesis. In others word, the model consists of autocorrelation problem if the alternative hypothesis is rejected.

### **3.5.2.7 Unit Root Test**

A unit root test is employed to determine whether the series is stable or not stable. Stationary means that the mean, variance and covariance do not change over time. In other ways, stationary is the stabilization of the data since it will return back to its long-run equilibrium after shock. There are a lot of test can be used to test for the unit-root of the series such as Levin, Lin & Chu test, Pesaran and Shin, ADF test and Phillips-Perron test. In this study, the researchers used ADF test to measure the stationary of each series. The hypothesis is as shown below:

***H<sub>0</sub>: The series is not stable and consist of unit root.***

***H<sub>1</sub>: The series is stable and do not consist of unit root.***

When the p-value of the unit root test is less than 5% significant level, the researchers will reject the null hypothesis. It means that the series does not contains unit root. In contrast, if the researchers do not reject the null hypothesis, it means that the series are non-stationary.



### **3.6 Conclusion**

In this chapter, it exposed to the further explanation of research structure, data collection method, sampling design, research instrument and lastly data analysis. There are three macroeconomic variables which are unemployment rate, inflation and gross domestic product, and three bank-specific variables which are bank size, capital adequacy ratio and non-performing asset will be used to investigate the relationship to the profitability of bank. Secondary data is being used and they are obtained from both World Bank and Bloomberg. In addition, unit root test, Redundant Fixed Effect (F Test), BPLM test, Hausman Test, multicollinearity, heteroscedasticity and autocorrelation are conducted to explain the relationship among the endogenous variable and the exogenous variables as mentioned above. Lastly, the empirical result will be deliberate and presented in the upcoming chapter.

## CHAPTER 4: DATA ANALYSIS

### 4.0 Introduction

The researchers have conducted the data analysis by using the panel data which contains 8 selected commercial banks in Malaysia during the period year 2003 to 2016. The data used in this research were acquired completely from Bloomberg and World Bank. After the data has been obtained, the researchers analysis the data through E-views 9.5. This chapter is going to interpret the result of the test that carried out by the researchers.

### 4.1 Scale of Measurement

#### 4.1.1 Poolability F-Test

Table 4.1: Result of Redundant Fixed Effects Test

Effect Test	Statistic	d.f.	Prob.
Cross-section F	5.560884	(7,98)	<b>0.0000</b>
Cross-section Chi-square	37.461145	7	0.0000

#### **Hypothesis:**

H<sub>0</sub>: POLS is endorsed in this study.

H<sub>1</sub>: FEM is endorsed in this study.

**Decision Rules:**

- (1) The researchers will reject null hypothesis ( $H_0$ ) when the p-value lower than the significance level (0.05). This indicates that FEM is better than POLS.
- (2) The researchers will not reject null hypothesis ( $H_0$ ) when the p-value greater than the significance level (0.05). This indicates that POLS is better than FEM.

**Conclusion:**

Based on Table 4.1, the researcher found that the p-value (0) is less than  $\alpha=0.05$ . It means that the  $H_0$  is being rejected. Therefore, the researcher conclude that FEM is endorsed at 5% significant level.

**4.1.2 Breusch-Pagan Lagrange Multiplier (BPLM Test)**

Table 4.2 Result of BPLM Test

	Cross-section	Time	Both
Breusch-Pagan	15.96250 (0.0001)	0.022094 (0.8818)	15.98459 <b>(0.0001)</b>

**Hypothesis:**

$H_0$ : POLS is endorsed in this study.

$H_1$ : REM is endorsed in this study.

**Decision Rules:**

- (1) The researchers will reject null hypothesis ( $H_0$ ) when the p-value lower than the significance level (0.05). This indicates that REM is better than POLS.

- (2) The researchers will not reject null hypothesis ( $H_0$ ) when the p-value greater than the significance level (0.05). This indicates that POLS is better than REM.

**Conclusion:**

Table 4.2 shown the result of the BPLM test which stated the p-value is 0.0001. It is less than  $\alpha=0.05$ . So, the researchers rejected  $H_0$  and conclude that REM is preferred in this study compare with POLS.

**4.1.3 Hausman Test**

Since the result of poolability F test and BPLM test show that FEM and REM are preferred respectively, the researchers conduct Hausman test to determine whether FEM or REM will be the most suitable model for this study.

Table 4.3 Result of Hausman Test

Test Summary	Chi-sq. Statistic	Chi-sq. d.f.	Prob.
Cross-section random	20.207643	6	<b>0.0025</b>

**Hypothesis:**

$H_0$ : REM is endorsed in this study.

$H_1$ : FEM is endorsed in this study.

**Decision Rules:**

- (1) The researchers will reject null hypothesis ( $H_0$ ) when the p-value lower than the significance level (0.05). This indicates that FEM will be the most suitable model for this study.

(2) The researchers will not reject null hypothesis ( $H_0$ ) when the p-value greater than the significance level (0.05). This indicates that REM will be the most suitable model for this study.

**Conclusion:**

The p-value that the researchers obtain from Table 4.3 is equal to 0.0025 which is less than  $\alpha=0.05$ .  $H_0$  will be rejected and the FEM will be the most suitable model for this study.

**4.1.4 Multicollinearity**

As mentioned at the previous chapter, when the exogenous variables in a regression model are highly correlated between each other, then this model will be contained the multicollinearity problem. Correlation matrix method has been used to determine the multicollinearity problem among the variables that employed in this study. The results are as shown at the table below:

Table 4.4 Result of Correlation Matrix Method

	ROE	GDP	INF	UNE	CA	NPA	LOG (SIZE)
ROE	1	-	-	-	-	-	-
GDP	-0.0069	1	-	-	-	-	-
INF	0.1621	0.3946	1	-	-	-	-
UNE	-0.0319	-0.3857	0.0751	1	-	-	-
CA	-0.2003	-0.0133	-0.1841	-0.0454	1	-	-
NPA	-0.4320	0.1338	0.1835	0.3742	-0.1145	1	-
Log (SIZE)	0.2494	-0.0036	-0.0944	-0.2285	-0.1484	-0.4458	1

**Decision Rules:**

- (1) If the correlation between each pair of variable is less than 0.80, this model will not consist any multicollinearity problem.
- (2) If the correlation between each pair of variable is more than 0.80, this model will consist multicollinearity problem.

**Conclusion:**

The empirical results shown in Table 4.4 shows there is no multicollinearity problem among the variables. This is because the correlations between each pair of variables is less than 0.80.

**4.1.5 Heteroscedasticity**

One of the disadvantages of E-views is it unable the researchers to run heteroscedasticity test when panel data is in used. Therefore, researchers used unstructured data to run the heteroscedasticity test. Breush-Pagan-Godfrey test has been used to examine this problem and the outcomes are as below:

Table 4.5 Result of Breusch-Pagan-Godfrey Test

F-statistic	2.021656	<b>Prob. F (6,105)</b>	<b>0.0691</b>
Obs*R-squared	11.59868	Prob. Chi-Square (6)	0.0715
Scaled explained SS	21.83748	Prob. Chi-square (6)	0.0013

**Hypothesis:**

- H<sub>0</sub>: There is no heteroscedasticity problem in the model.
- H<sub>1</sub>: There is heteroscedasticity problem in the model.

**Decision Rules:**

- (1) The researchers will reject null hypothesis ( $H_0$ ) when the p-value lower than the significance level (0.05). This indicates that there is heteroscedasticity problem in the model.
- (2) The researchers will not reject null hypothesis ( $H_0$ ) when the p-value greater than the significance level (0.05). This indicates that no heteroscedasticity problem in the model.

**Conclusion:**

Since the p-value (0.0691) is more than  $\alpha=0.05$ , the researchers do not reject  $H_0$ . The researchers proved that this model does not consist of heteroscedasticity problem at 5% significance level.

**4.1.6 Autocorrelation**

In this study, LM test was employed by the researchers to test the exist of autocorrelation problem in this model. This result is shown at the table below:

Table 4.6 Results of LM test

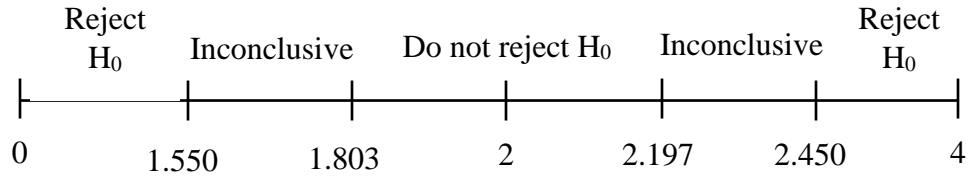
Durbin-Waston Stat	1.989155
--------------------	----------

**Hypothesis:**

$H_0$ : The model no contained autocorrelation problem.

$H_1$ : The model contained autocorrelation problem.

**Decision Rules:**



**Conclusion:**

Table 4.6 shows that Durbin-Watson Statistic value is 1.989155. The researchers do not reject  $H_0$  since the value fall between 1.803 and 2.197. The model does not contain any serial correlation problem.

**4.1.7 Unit Root Test**

Researchers have conducted the unit root test to detect whether the independent variables are stable or not stable. ADF test have been used by the researcher and the results are as shown below:

Table 4.7: Summary of Unit Root Test Result

<b>ADF</b>		
	Level	First Difference
<b>Dependent Variable</b>		
ROE	0.0301 **	0.0000 **
<b>Macroeconomic Variables</b>		
UNE	0.1593	0.0000 **
INF	0.0000 **	0.0000 **
GDP	0.0000 **	0.0000 **
<b>Bank-Specific Factors</b>		
Log(SIZE)	0.0443 **	0.0000 **



CA	0.1278	0.0000 **
NPA	0.0000 **	0.0000 **

\*\* significant at 5% significant level

**Hypothesis:**

H<sub>0</sub>: The series is not stable and consist of unit root.

H<sub>1</sub>: The series is stable and do not consist of unit root.

**Decision Rules:**

- (1) The researchers will reject null hypothesis (H<sub>0</sub>) when the p-value lower than the significance level (0.05). This shows that the series is stable and do not consist unit root.
- (2) The researchers will not reject null hypothesis (H<sub>0</sub>) when the p-value greater than the significance level (0.05). This shows that the series is do not stable and consist of unit root.

**Conclusion:**

According to Table 4.7, researchers found that all variables does not contain unit root which means that the variables are stationary, except unemployment and capital adequacy ratio at level. At first difference, researchers reject the null hypothesis for all variables at 5% significant level. In a nutshell, all the variables in this research are stationary and does not consist of unit root after first difference.

## 4.2 Inferential Analysis

The results from the Hausman test indicates that fixed effect model (FEM) is preferred and therefore researcher used the value of coefficient from FEM to explain the variables that may affect Malaysia's bank.

Table 4.8: Summary of Fixed Effect Model Results

<b>Dependent Variable: ROE</b>			
<b>Macroeconomics Variables</b>	<b>Coefficient</b>	<b>P-Value</b>	<b>Result</b>
UNE	-0.381429	0.8765	Negative and insignificant
INF	0.217741	0.0513 *	Positive and significant
GDP	-0.071006	0.7321	Negative and insignificant
<b>Bank-Specific Factors</b>			
Log(SIZE)	-1.832513	0.0351 **	Negative and significant
CA	-0.844345	0.0023 ***	Negative and significant
NPA	-0.890609	0.0007 ***	Negative and significant

\*\*\* Significant at 1% significant level (strong effect)

\*\* Significant at 5% significant level (medium effect)

\* Significant at 10% significant level (weak effect)

### 4.2.1 Profitability of Bank

In this research, returns on equity is used as the instrument to measure the profitability of 8 selected banks in Malaysia. The formula is as shown below:

$$ROE = \frac{\text{Net Profit}}{\text{Total Equity}} \times 100$$

The ROE ratio expresses how much profit that the bank can bring to the shareholder by using the funds they invested. The higher the ROE, the more efficient the bank generates profit using shareholder's funds. The empirical results shown that

inflation, capital adequacy ratio, non-performing asset and bank size is significant to affect bank profitability because the p-value is less than the significance level and researchers choose to reject the null hypothesis. On the other hands, GDP and unemployment rate are insignificant to affect the bank profitability.

## **4.2.2 Macroeconomics Variables**

### **4.2.2.1 Unemployment Rate**

According to Table 4.8, unemployment rate is insignificant at all the significance level and having a negative relationship with bank's profitability at Malaysia. The researchers do not reject the null hypothesis and conclude that unemployment rate has no effect on Malaysia's bank profitability since the p-value of unemployment rate is less than the significant level which are 0.01, 0.05 and 0.10. This has been supported by Ifeacho & Ngalawa (2014) in their study which the finding is unemployment rate insignificant to affect bank's profitability in South African. Besides that, the link between unemployment rate and bank's profitability is persistent with the study of Heffernan & Fu (2008), Samhan & Al-Khatib (2015) and Abreu & Mendes (2001). Therefore, the researchers conclude that as the unemployment rate increases by 1%, on average, the bank's ROE will decrease by 0.3814%.

### **4.2.2.2 Inflation Rate**

The empirical result show that inflation rate is a variable that may affect bank's profitability and having a positive relationship with the bank profitability at 10% significance level. The p-value, 0.0513 further signify that the inflation has a weak effect towards the bank profitability as it is lower than the  $\alpha=0.1$ . According to the study of Revell (1979), the impact of expansion on bank productivity relies upon

whether banks' wages and other operational costs increment at a higher rate than inflation. Most of the studies such as Bourke (1989) and Molyneux & Thornton (1992) have displayed a positive relationship among inflation and profitability. Hence, researchers conclude that if there are 1% increases in inflation rate, 0.2177% will be increases in the ROE.

#### **4.2.2.3 GDP Growth**

The result of fixed effect model shown that GDP growth is insignificant at 1%, 5% and 10% significance level. It means that the variables do not have effect on the bank profitability. Based on the economic output, the researchers do not reject the null hypothesis and persistent that GDP has no effect on profitability of selected banks in Malaysia. The research of Ong & Teh (2012) which target population is Malaysia's bank also stated that GDP growth does not have influence on bank's profitability. Although GDP growth is insignificant variables that affect bank's profitability, the relationship between them are still consistent with the previous study done by other researchers. The empirical result indicates that increase of GDP growth will leads to the increase of bank profitability. When the GDP growth increase by 1%, the bank profitability instrument, ROE will decrease by 0.0710%.

### **4.2.3 Bank-Specific Factors**

#### **4.2.3.1 Bank Size**

Based on Table 4.8, the effect of bank size on the profitability of both local and foreign bank in Malaysia has a negative correlation and is significant at both 5% and 10% significance level. The researchers reject the null hypothesis which stated that there is no relation between bank size and the profitability of banks in Malaysia since p-value (0.0351) is less than the significance level. According to Carter and

McNulty (2005), there is a contrary relationship between bank size and the profitability of bank where small-sized banks has better performance on small business lending compared to large-sized banks. There are several reasons to prove the negative relationship between bank size and profitability of banks. One of the reason is the costs of the large-sized bank, these banks might need higher costs to operate such as research and development costs, political costs, technological high costs and so on compared to small ones (Aladwan, 2015). These had supported with the result obtained from the researchers. Therefore, the researchers conclude that if bank size increase by 1%, the ROE of both local and foreign bank in Malaysia will decrease by 0.0183%.

#### **4.2.3.2 Capital Adequacy Ratio**

The empirical result conclude that capital adequacy ratio is negative related to ROE. The researchers reject the null hypothesis explained that capital adequacy is a significant variable that affect bank's ROE. The results that researchers get from E-views output is consistent with previous research. Flamini et al. (2009) stated that capital and bank profitability are negatively related since capital may tie up the funds that may use for other investment. Dore (2013) and Riazard & Mehar (2013) also supported that capital adequacy ratio is significant and negative related to the bank's profitability. Therefore, for every increase of 1% of capital adequacy ratio, the return on equity will depreciate by 0.08906% with the condition of other variable is remained constant.

#### **4.2.3.3 Non-Performing Assets**

From the results obtained, the relationship between the non-performing assets is significant with the dependent variable, ROE. The researchers rejected null hypothesis as the p-value of non-performing assets is 0.0007 which less than the

significance level. It significant at all the significance level, therefore the researchers conclude that non-performing assets has a sharp effect on bank's profitability in Malaysia. Based on the study of Sharma & Rathore (2016), non-performing assets and return on equity is negatively related to each other. They also stated that a bank's non-performing assets is a key to quantify the bank's performance. This statement has supported the empirical results conclusion from this study where, when there is an increase in non- performing assets, the return on equity will decrease at the same time. It leaves a negative relationship between them and by referring to the coefficient value in fixed effect model, it implies that when there is a rise of 1% in non-performing assets, the ROE will fall by 0.8906% by setting other variables as constant.

### **4.3 Conclusion**

The empirical result and major findings have been shown and being deliberated in this chapter. Model determine test like poolability F-test, BPLM test, Hausman test, diagnostic testing such as multicollinearity, heteroscedasticity, autocorrelation and unit root test, no adjustment have been made due to the model not contained any problem of above problem. After that, the researcher discussed the effect of endogenous variable and each exogenous variable. The result show that the inflation (INF), capital adequacy ratio (CAR), non-performing assets (NPA) and bank size (SIZE) have significance relationship with bank performance, on the other hand, gross domestic product (GDP) and unemployment rate (UNE) contained insignificance relationship with bank profitability. Further discussion on major finding, implications, limitations and recommendations of the research will be discussed by researchers in the next chapter.

## **CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS**

### **5.0 Introduction**

In this chapter, researchers will conclude all of the chapter that the researchers previously done. The researchers will discuss about the major findings of this research and shared our thought about the implications of this research study, recommendations of future research, and finally conclusion of this whole chapter.

### **5.1 Summary of Statistical Analysis**

Table 5.1 Summary of Diagnostic Checking Result

<b>Test</b>	<b>Description on result</b>
Poolability F Test	Fixed effect model is endorsed at 5 % level
BPLM Test	Random effect model is endorsed at 5 % level
Hausman Test	Fixed effect model is endorsed at 5% level
Multicollinearity	All variables not higher than 0.80 No Multicollinearity problem
Heteroskedasticity	No Heteroscedasticity problem
Autocorrelation	No Autocorrelation problem
Unit Root Test	All variables are stochastic

Table 5.1 above shown various test that the researchers have conducted at previous chapter which is chapter 3 and chapter 4. The econometric output no contained any of the potential problem such as heteroskedasticity, multicollinearity, autocorrelation. Thus, the result output is reliable and accurate.

## 5.2 Discussion of Major Findings

Table 5.2: Summary of Expected and Actual Sign

Variable	Expected	Actual	Significance
Unemployment Rate	-	-	Insignificant
Inflation Rate	+	+	Significant
GDP Growth	+	-	Insignificant
Bank Size	+/-	-	Significant
Capital Adequacy Ratio	-	-	Significant
Non-performing Assets	-	-	Significant

### 5.2.1 Macroeconomics Variables

#### 5.2.1.1 Unemployment Rate

According to the table above, the researchers found that unemployment rate is insignificant at 1%, 5% and 10% level while the expected sign is constant with the actual sign which is negative sign. According to Regehr & Sengupta (2014) and Heffernan & Fu (2008), unemployment rate is significant with the bank profitability since unemployment may affect the economic growth and thus lead to the profitability of the bank decrease. The researcher's findings are not consistent with this statement since the result that shown in E-views output is insignificant. This means that unemployment rate would not affect bank's profitability. This has been



supported by Ifeacho & Ngalawa (2014) study about the performance of banking sector in the South African. They found that unemployment rate is insignificant with the ROE but significant with the ROA.

The empirical results shown that the connection between unemployment rate and bank's profitability is negative. This relationship has been supported by Heffernan & Fu (2008), Samhan & Al-Khatib (2015), Abreu & Mendes (2001) and Regehr & Sangupta (2014) in their study. Unemployment rate is negative associated with bank's profitability because unemployment will affect the demand of loan and loan default rate at the same time. Hence, it will lead to the decrease in bank's profitability.

#### **5.2.1.2 Inflation Rate**

According to the empirical results in previous chapter, inflation rate as a determinant shows a significant influence towards bank profitability at 10% significance level. It is positively related with selected bank's profitability in Malaysia. The result was identical and consistent to other studies, which provided that the expected sign and actual sign for inflation is also consistently positive and have significant effect to be included into the model proposed.

In the research done by Athanasoglou et al. (2008), summarize that most researches Bourke (1989) and Molyneux & Thornton (1992) have demonstrated a positive connection between inflation and profitability. If the expenses increased quicker than inflation, the inflation rate will then positively influence the profitability of the financial institution.

Besides that, only minority of researches show insignificant relationship or have opposite relationship as discussed above. For example, Valahzaghari et al. (2012)

stated that inflation rate and credit risk have no significant relationship in Iran. Such consistency shown, it is undoubtedly inflation as the macroeconomic factor has an impact on the bank profitability and should be taken into account in further research. Therefore, it is proven that inflation is a one of the determinants for bank profitability in Malaysia.

### **5.2.1.3 GDP Growth**

Based on our research study and result on Eviews output, we found out that the independent variable GDP growth is insignificant at 1%, 5% and 10% level, and it has a negative connection with selected bank's profitability in Malaysia. The actual sign that derived from E views output is inconsistent with expected sign.

Although there are many research and study that had proved GDP growth have a positive effect towards bank's profitability, Ong & Teh (2012) clearly defined that the macroeconomic variable GDP growth do not affect the Malaysia bank's profitability and at the same time also inconsistent with the findings of Kosmidou et al. (2008) research study, which is GDP growth is positive related to bank's profitability in UK. Moreover, Hoggarth et al. (1998) also stated that the real GDP fails to explain the changes in bank's profitability in UK. Furthermore, there are also some research study that independent variable actual sign is inconsistent with their expected sign, Flamini et al. (2009) expected their GDP growth have a positive influence on bank's profitability in Sub-Saharan Africa, but after all test and econometric output have been conducted, they conclude that the GDP growth does not seems to affect bank's return in Sub-Saharan Africa. Thus, these researchers study support our actual result of relationship between GDP growth and bank's profitability and make our findings more accurate.

In a nutshell, we conclude that GDP growth is insignificant and negative related to selected bank's profitability in Malaysia.

## **5.2.2 Bank-Specific Factors**

### **5.2.2.1 Bank Size**

Based on the E-views output result, the researchers found that bank size is significant at 5% and 10% significance level and a negative relationship towards profitability of bank in Malaysia. Moreover, the expected sign and relationship of bank size has been discussed earlier in chapter 2, is that it can have a positive or negative relationship with bank's profitability. Therefore, both expected and actual sign are consistent.

Kosmidou et al. (2008) stated that there is a significant and negative relationship between bank size and profitability of bank in UK. The negative association between bank size and bank profitability is because in order to operate efficiently, larger bank may have more expenses on banking technology, environment factors and others compared to smaller-sized bank. These could lead larger bank to earn lower margins and profits than smaller bank. In addition, during the period of 1998 to 2002, the performance of smaller banks in UK has a better performance than larger banks (Kosmidou et al., 2006). This negative connection between bank size and bank profitability can be a result of economies of scale for smaller banks. Economies of scale which reduced the cost helped the bank to reduce the expenses. However, some research shows that economies of scale did not occur in banking sector.

According to the study of Aladwan (2015), the findings show that bank size is negatively impact the bank profitability and is significant towards bank profitability.

The researcher claimed that the larger bank tends to earn less than smaller bank due to the liquidity problems and diversifying risk which larger bank might faces. However, larger banks are more likely to be of advantage to the smaller banks as larger banks usually have some fail policy plans backed up.

Therefore, it is being proved that bank size and bank's profitability in Malaysia exist with a relationship of negative.

#### **5.2.2.2 Capital Adequacy Ratio**

Based on the study conducted, the expected sign towards the capital adequacy ratio to return on equity (ROE) is negative and significantly affect the dependent variable. The empirical result does match with the finding where it happens to be negative relationship with the bank profitability at different significant level. It was tested significant at 1%, 5% and 10% level where capital adequacy will influence the bank's profitability. From the analysis, this statement was supported by some of the researcher.

Refer to the study of Flamini et al. (2009), when capital adequacy ratio is used in the test of the study, the result showed the negative impact towards the bank's earning. The standard capital reserve requirement is 8% and every bank in Malaysia are obligated to abide to the requirements set by the Bank Negara Malaysia. When the capital reserve increased, the capital left for the bank to reinvest or loan out is lesser. This would significantly reduce the profit of the bank as they gain revenue from the interest of the loan. With lesser capital in hand, banks will face the difficulty to invest and became more challenging in raising their income effectively.

Besides, this negative relationship between capital adequacy and return on equity was also supported by Paudel & Khanal (2015), where it was mentioned that the

greater the capital adequacy ratio, the smaller the bank's revenue as the independency of managing capital is decreasing at some point. This could be explained by the common statement in finance world where it was known to be high risk, high return. Hence, the higher the capital adequacy ratio, the lesser the risk of insolvency and loan default and eventually, the profit will not be satisfyingly ideal for investor and shareholders of the bank.

### **5.2.2.3 Non-Performing Assets**

Non-performing asset indicates the quality of the credit policy of a bank. As non-performing loan is one of the indicator for the NPA to increase if the loan lent out was default by the borrower. From our research, the expected sign for this variable is negative sign with the support of several researcher's outcome. Furthermore, this expected sign are compatible with our finding where our actual sign obtained from the empirical result of E-view is negative as well. The researchers found that both of the expected and actual sign for non- performing asset is consistent.

To prove the impact of the non-performing asset to the bank's return on equity, there are several researches can be used to explain the causes. According to the Rathore (2016), it was stated that the NPA affect the profitability of the bank significantly as lender (bank) gain interest profit from the loan that are disbursed out. However, when the loan was default, the non- performing loan will increase and non-performing asset will rise in parallel to the loan default rate. In this case, the bank could not earn their revenue and hence, profit will be reduced.

In addition, Kishori & Sheeba (2017) mentioned that return on equity are the represent of the bank performance quality. Any changes in the non- performing asset would significantly influence the bank's revenue data and profitability. A strong bank's credit assessment on client will help to improvise the losing situation,

hence, the credibility of the borrower should be analyzed strictly to reduce the rate of default of the borrowers. In conclude, non-performing assets is one of the main determinants that affect commercial bank's profitability in Malaysia.

### **5.3 Implications of Study**

In this research, the main implication is to allow bank managers or any monetary authorities to identify the macroeconomic and bank-specific determinants that will affect the bank's profitability which ultimately influencing the bank credit risk in Malaysia. By understanding the factors along with its impact towards banks in Malaysia, bank managers could come out with solutions that may aid the bank performance meanwhile monetary authorities in Malaysia will be capable to manipulate these effects in order to ensure the stability of financial institutions or even the financial markets available. Bank Negara Malaysia as monetary authority in Malaysia serves an important role in this situation. BNM could adopt any frameworks or even policies that effectively enhance the performance of the bank and the banking sector stability thus improving the growth of Malaysian economy as a whole. With these in mind, the economic performance in Malaysia will be much stable even providing a better market place for businesses. Besides that, with sufficient information on the exogenous variables as suggested in previous chapters, bank managers may lower the bank credit risk. It will boost the confidence level of investors or entrepreneurs. Researchers recommend analyzing and discovering different types of variables other than macroeconomic and bank-specific factors stated for the purpose of generating a well-rounded model in further researches. Ascertain a consistent yet accurate model that suitable and well capable to explain the determinants of bank credit risk which adoptable worldwide as an ultimate goal.

## 5.4 Limitation of Study

Throughout the whole study, there are several constraints being faced by researchers. As the research conducted are using the panel data model, hence, researcher faced some difficulties in running the test using E-views. The E-view could not run the test of Heteroscedasticity and Autocorrelation smoothly and the data should change into unstructured data in order to obtain the results.

Besides, the data collected to conduct the test is restricted within a certain period of time. For this study, researcher used 14 years of period of time to make the analysis based on the empirical results acquired. As the period of time is short, therefore, the research results may lead to slightly imprecise. Another limitation is the researchers do not contain all Malaysia's local bank as the target population in this research since some of the local bank's data are not sufficient. Hence, researchers included both local and foreign banks in Malaysia to conduct this study.

In additional, in the previous chapters, the literature review used are the experiments research that investigated in other countries which comprised of the developed countries, developing countries and under developing countries. Thus, the significant sign of the relationship between the variables are not fully applicable to our finding as our main study is focusing on Malaysia which is categorized as developing country.

By the reason of this research is focusing mainly on one country, Malaysia, consequently, the outcomes are unable to compare exactly as the policy of the central bank for every country is different. Asides from the policy, the way of the bank's capital and credit management and external factors such as economic conditions, interference of government and politic could affect the profitability of the banks in the country accordingly.

## **5.5 Recommendation for Future Research**

This study is only investigated the factors that affect profitability of banks in Malaysia, this might lead Malaysian banks lacking the awareness of others specific factors that will also affect the bank's profitability in many ways. Therefore, future researchers are suggested to study on wider coverage of research such as in term of countries. Future research can also compare Malaysian banks with banks in China, Singapore, Thailand, Japan, the Indonesia and others. The comparison may help Malaysian banks to have better improvement as the management can know their weak points.

Moreover, future researchers are encouraged to use various kind of time level to carry out the empirical test. Different level which can be in yearly, quarterly, monthly, weekly or even daily basis. This recommendation is stated is because of some independent variables tend to be more and less sensitive at different period of time level. Besides that, researchers are also stimulating to take into account more macroeconomic variables since most previous researchers stated that macroeconomic variables have significant effect on bank's profitability and performance while on this research study the results show macroeconomic variables do not have much effect on profitability on bank in Malaysia. This is because only inflation rate is significant in affect the bank's profitability.

## **5.6 Conclusion**

In this topic research, the researchers have discussed the disparity between actual and expected sign between the relationship of independent variables and dependent variable. Among these independent variables, only GDP growth (GDP) and unemployment rate (UNE) are insignificant at 1%,5% and 10% level, the rest significant variables are inflation rate (INF), capital adequacy ratio (CAR), non-performing assets (NPA) and lastly the bank size (SIZE). The researchers conclude that bank-specific factors in significant to affect bank's profitability while the macroeconomic variables do not have much effect on bank's



profitability since only inflation rate is the significant variables. Regarding to the positive and negative effect of all variable on bank's profitability, all of the exogenous variables are negative related to selected bank's profitability in Malaysia except for inflation rate, it is positive related to bank's performance and ability to make profit. The main objectives to carry out this topic is to determine how the macroeconomic variables and bank's specific factors affect profitability of 8 selected domestic and foreign commercial banks during the period from 2003 to 2016, the outcomes that researchers derived from using fixed effect model (FEM) also matched and consistent with previous researcher's study over the world.

In addition, this chapter also discussed about the implications of the study allowing commercial banks in Malaysia have more understanding on the macroeconomic variables and bank-specific factors that affect bank's performance. Moreover, recommendations for forthcoming research also being conducted in this chapter to suggest that the necessary to do in order to make future research more accurate and successful.

Ultimately, although researchers met some obstacles during the research study, but at the end, researchers are able to overcome the difficulties and completed our research, the process of discussing among teammates are the most important part when we conduct our research. At last, our final year project research topic "Does macroeconomic variables and bank's specific factors affect selected bank's profitability in Malaysia" have being achieved successfully and thus can also be studied by future researchers or as a reference to conduct their research study.

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## APPENDICES

### Appendix 1: Result of Redundant Fixed Effects Tests (E-views)

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

Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.560884	(7,98)	0.0000
Cross-section Chi-square	37.461148	7	0.0000

Cross-section fixed effects test equation:  
Dependent Variable: ROE  
Method: Panel Least Squares  
Date: 03/02/18 Time: 21:28  
Sample: 2003 2016  
Periods included: 14  
Cross-sections included: 8  
Total panel (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.232667	12.32898	0.424420	0.6721
UNE	4.357633	2.452449	1.776850	0.0785
INF	0.255226	0.125197	2.038602	0.0440
GDP	0.130597	0.228161	0.572388	0.5683
LOG(SIZE)	0.141134	0.438970	0.321512	0.7485
CAR	-0.706269	0.279367	-2.528104	0.0130
NPA	-1.269495	0.233195	-5.443922	0.0000

R-squared	0.314528	Mean dependent var	15.25334
Adjusted R-squared	0.275358	S.D. dependent var	5.621199
S.E. of regression	4.785097	Akaike info criterion	6.029351
Sum squared resid	2404.201	Schwarz criterion	6.199257
Log likelihood	-330.6437	Hannan-Quinn criter.	6.098287
F-statistic	8.029851	Durbin-Watson stat	1.009482
Prob(F-statistic)	0.000000		

**Appendix 2: Result of Breusch-Pagan Lagrange Multiplier (BPLM) Test (E-views)**

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	15.96250 (0.0001)	0.022094 (0.8818)	15.98459 (0.0001)
Honda	3.995310 (0.0000)	-0.148640 (0.5591)	2.720006 (0.0033)
King-Wu	3.995310 (0.0000)	-0.148640 (0.5591)	3.133185 (0.0009)
Standardized Honda	5.257527 (0.0000)	0.718213 (0.2363)	0.186428 (0.4261)
Standardized King-Wu	5.257527 (0.0000)	0.718213 (0.2363)	0.778537 (0.2181)
Gourieroux, et al.*	--	--	15.96250 (0.0001)



**Appendix 3: Result of Hausman Test (E-views)**

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	20.207626	6	0.0025

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
UNE	-0.381431	2.976773	1.032002	0.0009
INF	0.217741	0.243150	0.000102	0.0117
GDP	-0.071007	0.064500	0.001857	0.0017
LOG(SIZE)	-1.832513	-0.154649	0.476719	0.0151
CAR	-0.844345	-0.787004	0.006549	0.4786
NPA	-0.890609	-1.090734	0.012230	0.0704

Cross-section random effects test equation:

Dependent Variable: ROE  
 Method: Panel Least Squares  
 Date: 03/02/18 Time: 21:28  
 Sample: 2003 2016  
 Periods included: 14  
 Cross-sections included: 8  
 Total panel (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	57.55838	20.27568	2.838789	0.0055
UNE	-0.381431	2.448506	-0.155781	0.8765
INF	0.217741	0.110367	1.972885	0.0513
GDP	-0.071007	0.206837	-0.343297	0.7321
LOG(SIZE)	-1.832513	0.857773	-2.136361	0.0351
CAR	-0.844345	0.270063	-3.126470	0.0023
NPA	-0.890609	0.253207	-3.517310	0.0007

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.509398	Mean dependent var	15.25334
Adjusted R-squared	0.444318	S.D. dependent var	5.621199
S.E. of regression	4.190271	Akaike info criterion	5.819876
Sum squared resid	1720.720	Schwarz criterion	6.159689
Log likelihood	-311.9131	Hannan-Quinn criter.	5.957749
F-statistic	7.827275	Durbin-Watson stat	1.333280
Prob(F-statistic)	0.000000		

**Appendix 4: Result of Fixed Effect Model (E-views)**

Dependent Variable: ROE  
 Method: Panel Least Squares  
 Date: 03/02/18 Time: 21:26  
 Sample: 2003 2016  
 Periods included: 14  
 Cross-sections included: 8  
 Total panel (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	57.55838	20.27568	2.838789	0.0055
UNE	-0.381431	2.448506	-0.155781	0.8765
INF	0.217741	0.110367	1.972885	0.0513
GDP	-0.071007	0.206837	-0.343297	0.7321
LOG(SIZE)	-1.832513	0.857773	-2.136361	0.0351
CAR	-0.844345	0.270063	-3.126470	0.0023
NPA	-0.890609	0.253207	-3.517310	0.0007

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.509398	Mean dependent var	15.25334
Adjusted R-squared	0.444318	S.D. dependent var	5.621199
S.E. of regression	4.190271	Akaike info criterion	5.819876
Sum squared resid	1720.720	Schwarz criterion	6.159689
Log likelihood	-311.9131	Hannan-Quinn criter.	5.957749
F-statistic	7.827275	Durbin-Watson stat	1.333280
Prob(F-statistic)	0.000000		

**Appendix 5: Result of Correlation Matrix Method (E-views)**

	ROE	GDP	INF	UNE	CAR	NPA	LOG (SIZE)
ROE	1	-	-	-	-	-	-
GDP	-0.00697	1	-	-	-	-	-
INF	0.162087	0.394606	1	-	-	-	-
UNE	-0.03193	-0.38577	0.075121	1	-	-	-
CAR	-0.20032	-0.01330	-0.18410	-0.04544	1	-	-
NPA	-0.43209	0.133759	0.183519	0.374152	-0.11451	1	-
Log (SIZE)	0.249382	-0.00369	-0.09446	-0.22857	-0.14847	-0.44589	1

**Appendix 6: Result of Breusch-Pagan-Godfrey Test (E-views)**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.021656	Prob. F(6,105)	0.0691
Obs*R-squared	11.59868	Prob. Chi-Square(6)	0.0715
Scaled explained SS	21.83747	Prob. Chi-Square(6)	0.0013

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 03/02/18 Time: 21:30

Sample: 1 112

Included observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-62.18941	111.9450	-0.555535	0.5797
UNE	50.82727	22.26782	2.282544	0.0245
INF	-0.336108	1.136764	-0.295671	0.7681
GDP	2.637101	2.071663	1.272939	0.2059
LOG(SIZE)	-2.577653	3.985774	-0.646713	0.5192
CAR	-5.871184	2.536607	-2.314582	0.0226
NPA	-1.155707	2.117370	-0.545822	0.5863

R-squared	0.103560	Mean dependent var	21.46608
Adjusted R-squared	0.052334	S.D. dependent var	44.63144
S.E. of regression	43.44786	Akaike info criterion	10.44146
Sum squared resid	198210.3	Schwarz criterion	10.61137
Log likelihood	-577.7219	Hannan-Quinn criter.	10.51040
F-statistic	2.021656	Durbin-Watson stat	1.791650
Prob(F-statistic)	0.069148		

**Appendix 7: Result of LM Test (E-views)**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	11.80368	Prob. F(2,103)	0.0000
Obs*R-squared	20.88366	Prob. Chi-Square(2)	0.0000

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 03/02/18 Time: 21:30

Sample: 1 112

Included observations: 112

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.550561	11.23310	-0.138035	0.8905
UNE	0.714473	2.254597	0.316896	0.7520
INF	0.024984	0.114939	0.217372	0.8283
GDP	-0.115742	0.211108	-0.548260	0.5847
LOG(SIZE)	-0.054750	0.402566	-0.136002	0.8921
CAR	0.060677	0.254746	0.238184	0.8122
NPA	0.085803	0.213104	0.402636	0.6881
RESID(-1)	0.426020	0.100174	4.252790	0.0000
RESID(-2)	0.040888	0.100665	0.406176	0.6855

R-squared	0.186461	Mean dependent var	-7.38E-16
Adjusted R-squared	0.123274	S.D. dependent var	4.653973
S.E. of regression	4.357685	Akaike info criterion	5.858704
Sum squared resid	1955.910	Schwarz criterion	6.077154
Log likelihood	-319.0874	Hannan-Quinn criter.	5.947336
F-statistic	2.950920	Durbin-Watson stat	1.989155
Prob(F-statistic)	0.005184		

**Appendix 8: Result of Unit Root Test at Level – ROE (E-views)**

Panel unit root test: Summary

Series: ROE

Date: 02/07/18 Time: 12:25

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 2

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-2.76540	0.0028	8	99
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-2.29296	0.0109	8	99
ADF - Fisher Chi-square	28.1776	0.0301	8	99
PP - Fisher Chi-square	30.5428	0.0154	8	104

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 9: Result of Unit Root Test at Level – GDP Growth (E-views)**

Panel unit root test: Summary

Series: GDP

Date: 02/07/18 Time: 12:53

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-8.80400	0.0000	8	103
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-5.63347	0.0000	8	103
ADF - Fisher Chi-square	58.2320	0.0000	8	103
PP - Fisher Chi-square	92.8643	0.0000	8	104

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 10: Result of Unit Root Test at Level – Inflation Rate (E-views)**

Panel unit root test: Summary

Series: INF

Date: 02/07/18 Time: 12:53

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-13.0742	0.0000	8	104
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-9.16511	0.0000	8	104
ADF - Fisher Chi-square	91.4768	0.0000	8	104
PP - Fisher Chi-square	91.5124	0.0000	8	104

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 11: Result of Unit Root Test at Level – Unemployment Rate (E-views)**

Panel unit root test: Summary

Series: UNE

Date: 02/07/18 Time: 13:01

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-3.84609	0.0001	8	104
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-1.57254	0.0579	8	104
ADF - Fisher Chi-square	21.5213	0.1593	8	104
PP - Fisher Chi-square	19.9173	0.2240	8	104

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 12: Result of Unit Root Test at Level – Capital Adequacy Ratio (E-views)**

Panel unit root test: Summary

Series: CAR

Date: 03/02/18 Time: 21:37

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 2

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-1.34926	0.0886	8	102
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-0.75916	0.2239	8	102
ADF - Fisher Chi-square	22.4982	0.1278	8	102
PP - Fisher Chi-square	37.9261	0.0016	8	104

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 13: Result of Unit Root Test at Level – Non-Performing Assets (E-views)**

Panel unit root test: Summary

Series: NPA

Date: 02/07/18 Time: 12:54

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 2

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-10.4912	0.0000	8	98
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-6.39104	0.0000	8	98
ADF - Fisher Chi-square	67.3042	0.0000	8	98
PP - Fisher Chi-square	98.4730	0.0000	8	104

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 14: Result of Unit Root Test at Level – Log Bank Size (E-views)**

Panel unit root test: Summary  
 Series: LOG(SIZE)  
 Date: 02/07/18 Time: 12:54  
 Sample: 2003 2016  
 Exogenous variables: Individual effects  
 Automatic selection of maximum lags  
 Automatic lag length selection based on SIC: 0 to 2  
 Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-5.11926	0.0000	8	101
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-1.62035	0.0526	8	101
ADF - Fisher Chi-square	26.7563	0.0443	8	101
PP - Fisher Chi-square	49.0556	0.0000	8	104

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 15: Result of Unit Root Test at First Differences – ROE (E-views)**

Panel unit root test: Summary  
 Series: D(ROE)  
 Date: 02/07/18 Time: 12:57  
 Sample: 2003 2016  
 Exogenous variables: Individual effects  
 Automatic selection of maximum lags  
 Automatic lag length selection based on SIC: 0 to 1  
 Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-17.6981	0.0000	8	95
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-12.7089	0.0000	8	95
ADF - Fisher Chi-square	111.944	0.0000	8	95
PP - Fisher Chi-square	108.051	0.0000	8	96

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.



**Appendix 16: Result of Unit Root Test at First Differences – GDP Growth (E-views)**

Panel unit root test: Summary

Series: D(GDP)

Date: 02/07/18 Time: 12:57

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-11.2143	0.0000	8	88
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-7.72892	0.0000	8	88
ADF - Fisher Chi-square	80.7936	0.0000	8	88
PP - Fisher Chi-square	169.533	0.0000	8	96

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 17: Result of Unit Root Test at First Differences – Inflation Rate (E-views)**

Panel unit root test: Summary

Series: D(INF)

Date: 02/07/18 Time: 12:57

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-18.6319	0.0000	8	88
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-13.7718	0.0000	8	88
ADF - Fisher Chi-square	132.569	0.0000	8	88
PP - Fisher Chi-square	151.787	0.0000	8	96

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 18: Result of Unit Root Test at First Differences – Unemployment Rate (E-views)**

Panel unit root test: Summary

Series: D(UNE)

Date: 02/07/18 Time: 12:58

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-6.56154	0.0000	8	91
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-4.58774	0.0000	8	91
ADF - Fisher Chi-square	49.4523	0.0000	8	91
PP - Fisher Chi-square	51.7741	0.0000	8	96

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 19: Result of Unit Root Test at First Differences – Capital Adequacy Ratio (E-views)**

Panel unit root test: Summary

Series: D(CAR)

Date: 03/02/18 Time: 21:38

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-8.10606	0.0000	8	95
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-6.51658	0.0000	8	95
ADF - Fisher Chi-square	66.3690	0.0000	8	95
PP - Fisher Chi-square	99.3599	0.0000	8	96

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 20: Result of Unit Root Test at First Differences – Non-Performing Assets(E-views)**

Panel unit root test: Summary

Series: D(NPA)

Date: 02/07/18 Time: 13:00

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-13.7875	0.0000	8	93
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-8.04734	0.0000	8	93
ADF - Fisher Chi-square	66.9536	0.0000	8	93
PP - Fisher Chi-square	75.9161	0.0000	8	96

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

**Appendix 21: Result of Unit Root Test at First Differences – Log Bank Size (E-views)**

Panel unit root test: Summary

Series: D(LOG(SIZE))

Date: 02/07/18 Time: 13:01

Sample: 2003 2016

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0 to 1

Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
<u>Null: Unit root (assumes common unit root process)</u>				
Levin, Lin & Chu t*	-7.27978	0.0000	8	95
<u>Null: Unit root (assumes individual unit root process)</u>				
Im, Pesaran and Shin W-stat	-5.80063	0.0000	8	95
ADF - Fisher Chi-square	60.0221	0.0000	8	95
PP - Fisher Chi-square	80.6221	0.0000	8	96

\*\* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.