

IMPACT OF MACROECONOMIC VARIABLES AND
BANK SPECIFIC CHARACTERISTICS ON
COMMERCIAL BANK'S PERFORMANCE IN
MALAYSIA PRE AND POST CRISIS PERIOD

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DECLARATION

We hereby declare that:

- (1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.
- (2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.
- (3) Equal contribution has been made by each group member in completing the research project.
- (4) The word count of this research report is 14,173 words.

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LIST OF ABBREVIATIONS

BLR	Base Lending Rate
BNM	Bank Negara Malaysia
CA	Capital
CAMELS	Capital Adequacy, Asset Quality, Management Quality, Earning Quality, Liquidity, Sensitivity
CPI	Consumer Price Index
FEM	Fixed Effect Model
GDP	Gross Domestic Product
M0	Money Supply
MENASA	Middle East, Africa, and Southeast Asia
NIM	Net Interest Margin
OLS	Ordinary Least Square
PCB	Private Commercial Banks
REM	Random Effect Model
ROA	Return on Assets
ROE	Return on Equity
SBM-DEA	Slack-Based Data Envelopment Analysis
SCP	Structure, Conduct and Performance Theory
SCB	State Owned Commercial Banks
VIF	Variance Inflation Factor

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PREFACE

Financial crisis has struck nationwide from year 2007 to 2009 and leave great impact on the economies of many countries. Malaysia is one of the countries that have been affected by financial crisis. Next, financial crisis has brought the negative impacts to the banking system as it affects bank performance greatly. In this research, the factors affected the bank performance will be examined by using Eviews software. The research data are retrieved from year 2005 to 2007 and year 2009 to 2011. The year 2008 is the year of financial crisis happening, thus it will be set at the standpoint to differentiate the bank performance for pre and post crisis period.

In this research, the bank performance is measured by total loan of bank. This is because total loan is one of the assets that will generate the most profit for the bank. Besides, determinants of bank performance are categorized into bank-specific and macroeconomic factors. The bank-specific factors are bank capital and bank liquidity; while macroeconomic factors are base lending rate, consumer price index and money supply.

The process of carrying out the research is quite challenging as we have faced different problems and difficulties in accomplishing the research. However, we are able to learn how to solve the problems faced effectively and efficiently after conducted this research. Furthermore, the guidance from our supervisor and contribution from all the group mates are much appreciated. Supervisor has helped us a lot by giving valuable advices and guidance in conducting the research. Meanwhile, we have also built a good relationship and teamwork among every group mate in overcoming problems that we faced. From this research, we have learned a lot of knowledge about banking field and we believe that this knowledge will benefit us in the future career.

ABSTRACT

This research aims to study the bank specific and macroeconomics factors that affect the performance of commercial banks during pre and post crisis period in Malaysia. This research utilizes the secondary data collected from the monthly financial reports of commercial banks in Malaysia during the pre-crisis period (year 2005 to 2007) and post-crisis period (year 2009 to 2011). The explanatory variables are categorized into bank specific factors and macroeconomic factors. The bank specific factors include bank capital and liquidity; meanwhile the macroeconomic factors include base lending rate (BLR), consumer price index (CPI) and money supply. According to the result, both of the base lending rate (BLR) and consumer price index (CPI) do not have significant impact on performance of commercial banks during pre-crisis period. However, they both have significant impact on commercial bank performance during post-crisis period. This is simply because the economy condition is well developed during pre-crisis period. Citizens in Malaysia are able to afford the interest rate charged on loan, and they are also not interested in borrowing money from banks. Besides, the bank liquidity has no significant effect on commercial bank performance for both pre and post crisis period. Last but not least, the result shows that the bank capital and money supply have significant impact on performance of commercial banks during pre and post crisis period in Malaysia.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Commercial bank is one of the main players in the banking system. There are a lot of commercial banks shutting down after the financial crisis. Thus, the competition becomes stronger among the commercial bank sectors, commercial banks attempt to maintain sustainability of growth and stability of performance by controlling the bank-specific and macroeconomic variables pre and post crisis. Chapter one in this research will be displayed in eight sections which are background of this research paper, problem statement, targeted research objectives and questions, hypothesis and implications of the research, outline of the chapters and conclusion. The background and performance of the banking sector in Malaysia will be defined firstly in this chapter. Next, it is followed by the problem statement that will discuss the core research problems and research objectives. Moreover, the significance of study is constructed to identify the involvement of this study. Furthermore, chapter layout will give a summary of the entire five chapters in this research. Lastly, a summary of chapter one will be made as conclusion.

1.1 Research Background

In Malaysia, banking industry has played a significant role in contributing to the economic growth of the country. There are three main structures of banking system in Malaysia such as financial institutions, non-banking financial intermediaries and financial market. For the financial institution, it can be further

divided into Central Bank, commercial bank, investment bank and also Islamic bank. Different types of banks provide different financial services to fulfill the demands of a wide variety of customers with different preferences and requirements. Significantly, the commercial banks are considered as the biggest group, as well as the most vital participants in the banking industry of Malaysia. This is due to commercial bank roles in providing funds or liquidity in the banking system through the deposit taking and lending services (Kashyap, Rajan & Stein, 2002). The banks accept the deposit from the groups of people who have excess funds such as households, government or firms, then it will use the deposit to issue loan for the deficit units who are in need of funds. So, the banks can create liquidity to safeguard their profitability. Therefore, the local commercial banks in Malaysia have been targeted in the research.

Besides, the performance of the bank is considered one of the important aspects concerned by reviewing on the bank profitability which indicates the stability and performance of the bank. Eventually, it will also promote the economic growth of a country (Alkhazaleh, 2017). Normally, the profitability of the bank is calculated by using the ratio of return on assets (ROA) or return on equity (ROE). For return on assets (ROA), it can be calculated by dividing the net profit after tax by total assets of the bank. ROA measures how efficient a bank in its operation based on the revenue created from the total assets. The higher ROA of a bank has resulted in the better performance of the bank (Kabajeh, AL Nu'aimat & Dahmash, 2012). In this study, the performance of the commercial banks is evaluated with total loan.

In this research, the determinants of the commercial bank performance have been classified into two categories, which are bank specific characteristics and macroeconomics variables. The purpose of this categorization allows us to have a clearer view on how different types of factors affecting the bank performance significantly. Bank capital and bank liquidity have been chosen as the bank specific characteristics that determine the performance of the commercial banks. Conversely, macroeconomics variables are the external determinants of bank

performance that are not under the bank management's control, meanwhile the variables have also played roles in affecting the bank performance. The macroeconomics variables used in this research are base lending rate, money supply and consumer price index (CPI) in Malaysia.

On the other hand, Malaysia has experienced subprime financial crisis during year 2007-2009. According to Mirzaei (2013), the crisis has given a negative effect to the most of the banking sector performance and profitability around the world. The performance of the commercial banks in Malaysia has also been affected during the crisis period. For instance, as well as other banks in other countries, Malaysia commercial banks have suffering financial loss reported on the financial reports due to the economic recession. Hence, period from year 2005 to 2011 have been targeted for this research. In addition, there are also past studies that investigated the performance of banks. Unlikely, the researchers have focused on different period either pre crisis, during crisis or post crisis period only for their researches. For instance, Sufian and Habibullah (2009) have conducted their research in China for pre-crisis period; while Athanasoglou, Brissimis and Delis (2008) have done the research about the commercial bank performance in Greek for pre-crisis period. Furthermore, Ali, Akhtar & Sadaqat (2011) and Bilal et al. (2013) have both focused on the during-crisis period in their research in Pakistan. Moreover, Olson and Zoubi (2016) have their research conducted based on post-crisis period to evaluate the commercial bank performance in Middle East, Africa, and Southeast Asia (MENASA) region. There are few past studies emphasized on both pre and post crisis periods in evaluating the performance determinants of commercial banks. In short, this research is to study the impact of macroeconomics variables and bank specific characteristics on commercial banks performance in Malaysia pre and post crisis.

1.2 Problem Statement

The banking system in Malaysia consists of Bank Negara Malaysia (BNM), investment bank, Islamic bank and commercial bank. Commercial bank is the most significant funds provider in Malaysia banking system. Most of the bank performance experience downturn because of the financial crisis.

During the year 2007 to 2009, Malaysia has faced subprime financial crisis which brought a significant and negative impact on the Malaysia's economy. This global economy recession has caused public anxiety because bank performance is a well concerned topic. Public is worried about whether the domestic commercial banks in Malaysia could sustain in that country's financial condition (Khong et al., 2015).

Subsequently, the commercial bank performance in Malaysia also gets affected during this financial crisis. In other words, it leads to a drop in credit activities of bank and trigger the accessibility of funds and capital in the economy. This is simply because commercial banks make money by providing loans and earn interest income from those loans. The amount of non-performing loans will be mounting up to be a massive amount. As a significant funds provider, commercial bank performance has influenced the whole financial economy system. It shows that a sound financial economy system must come with the well performance of banking system (Hamedian, 2013). The banking institutions have to increase their profitability and liquidity before the crisis occurs in order to sustain their banking operations and strengthen their banks performance during the crisis period. Besides, the banking institutions should ensure that there is sufficient amount of capital and liquidity in the bank when country's economy is hit by the financial crisis. In brief, it can help to lower down the risk of bank failure in the financial market.

During the subprime financial crisis, the troubled banks have been bailed out by the government and Central Bank. Central bank disposes its resources to help out troubled bank according to the government safety net. Meanwhile, there are many banks have been rescued by financial assistance of government. The banks should take accurate and precise decision in order to sustain their banking operation. Apart from that, some of the banks decide to merge together and increase the size of bank to protect themselves from being bailed out. The pre-merger periods are year 1999 to 2001 and post-merger periods are year 2002 to 2010. In other words, there are the periods before, during and after the financial crisis (Khong et al., 2015).

On the other hand, one of the macroeconomic factors will be discussed which is money supply. This is simply because the interest rate of bank will affect the money supply in a country, and this phenomena causes the GDP of a country will be affected. For example, the GDP growth of Malaysia declines sharply in year 2009 due to the economy shock (Bank Negara Malaysia, 2009). As Malaysia is a highly open economy country, the trade financing sectors are greatly affected when the financial crisis occurs. For instance, the export and output to foreign countries decrease and investment from foreign investors in Malaysia will be decreased too. At the same time, the customer confidence towards to banks will decline. Therefore, it is important to determine the banking institution performance pre and post financial crisis period.

In this research, a good opportunity is given to recognize further about the impact of variables that influence the performances on the commercial banks pre and post crisis. It analyses the relationship between the performance of Malaysia commercial banks and two bank specific characteristics together with three macroeconomic variables. The bank specific characteristics include the bank liquidity and bank capital meanwhile the macroeconomic variables include the consumer price index (CPI), base lending rate and money supply. This research is

useful in the future especially for the financial sectors. The research data are taken from year 2005 to 2007 (before crisis) and from year 2009 to 2011 (after crisis).

1.3 Research Objectives

1.3.1 General Objective

The general objective in this study is to figure out bank-specific and macroeconomics factors that affect the performance of commercial banks during pre and post crisis period in Malaysia.

1.3.2 Specific Objectives

- I. To determine the determinants that affect the performance of commercial banks in Malaysia during pre and post crisis period.
- II. To determine the difference in the determinants that affect the performance of commercial banks in Malaysia during pre and post crisis period.

1.4 Research Questions

The research aims to figure out which variable that will affect the performance of commercial banks in Malaysia during pre and post crisis period in Malaysia.

- i. Does the bank capital have a significant relationship with commercial banks performance during pre and post crisis period in Malaysia?
- ii. Does the bank liquidity have a significant relationship with commercial banks performance during pre and post crisis period in Malaysia?
- iii. Does the base lending rate (BLR) have a significant relationship with commercial banks performance during pre and post crisis period in Malaysia?
- iv. Does the consumer price index (CPI) have a significant relationship with commercial banks performance during pre and post crisis period in Malaysia?
- v. Does the money supply have a significant relationship with commercial bank performance during pre and post crisis period in Malaysia?

1.5 Hypothesis of Study

H₁: There is a significant relationship between bank capital and commercial banks performance during pre and post crisis period in Malaysia.

H₂: There is a significant relationship between bank liquidity and commercial banks performance during pre and post crisis period in Malaysia.

H₃: There is a significant relationship between base lending rate and commercial banks performance during pre and post crisis period in Malaysia.

H₄: There is a significant relationship between consumer price index and commercial banks performance during pre and post crisis period in Malaysia.

Hs: There is a significant relationship between money supply and commercial banks performance during pre and post crisis period in Malaysia.

1.6 Definition of Variables

1.6.1 Bank Specific Characteristics

The internal determinants that can be adjusted by the bank administrators or the bank features which give impact to the bank performance.

1.6.2 Macroeconomics Variables

The external determinants or factors that are not under the bank management's control which contribute to the changes in performance of a bank.

1.6.3 Crisis

The occurrence of economic recession or economic downturn due to insufficient liquidity in the financial institutions.

1.7 Significance of Study

The main purpose of this research is to investigate the determinants of bank-specific and macroeconomic factors that affect the commercial bank performance in Malaysia pre and post economic crisis period. The dependent variable of this research is profitability of commercial banks; meanwhile the independent variables are consumer price index, base lending rate, bank capital, money supply and bank liquidity respectively.

This research allows government to take action or modify on their current policies. It is vital that government to engage themselves with the commercial bank performance as the government plays a role in controlling the whole economic of a country. This research facilitates the government to prevent the crisis in Malaysia as prevention is better than cure. Besides, this research helps to build an understanding for those investors and shareholders who are interested to involve in the financial activities with commercial banks. This research acts as guidelines for them. This is significant that the investors know better the factors that affect commercial bank performance as their initiative is to earn profitable return on their investment and prevent unnecessary losses. Moreover, this study is important for academic purpose. Students are able to have more understanding related to the determinants of commercial bank performance, and it is useful as guidance for their further research.

Last but not least, this research is helpful for bank managers. It provides directions and additional information to bank managers, so that they are able to make precise and smart decision on every financial transaction. Apart from that, the bank operators are able to take actions immediately and accurately when facing the economic crisis in the country. Thus, it helps the banks to sustain their operations in long term. In short, it improves the reputation of the bank and the overall bank performance.

1.8 Chapter Layout

This research paper has been divided into 5 chapters. The layout of this study is as follows:

1.8.1 Chapter 1

An introduction of the chapter, which is also the research overview of this study consists of research background, description of problem statement, research objectives, the hypothesis to be tested and significance of study.

1.8.2 Chapter 2

Review the previous studies conducted by researchers that are related to the factors which affecting the performance of commercial banks. This chapter provides the basic idea of theoretical framework to identify the relationship among the variables.

1.8.3 Chapter 3

This chapter has explained the methodologies used to conduct this research in terms of the research design, data collection method, sampling design, research instruments, constructs measurements, data processing and data analysis.

1.8.4 Chapter 4

This chapter has delivered the research results and findings. It has involved the investigation on the significant and insignificant effect between the macroeconomic factors and bank specific characteristics on the commercial bank performance. This chapter includes introduction, inferential analysis and conclusion.

1.8.5 Chapter 5

The last chapter will conclude the summary from chapter 1 to chapter 4. In addition, this chapter has also discussed the limitations of the study and recommendations for future studies.

1.9 Conclusion

The objective of this research is to study the impact of macroeconomic and bank-specific determinants on the financial performance of commercial banks during pre and post crisis period in Malaysia. It focuses on the relationship among the variables that can affect the commercial bank sector. In next chapter, the related variables and theoretical framework will be further explained.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The previous studies and theoretical models related to this research topic will be reviewed in this chapter. There is a number of studies that have been conducted on the determinants of bank profitability and effects of the variables on the bank performance. The bank performance has been affected by the internal and external variables. The internal factors are also known as the bank-specific determinants which are under control by the banks. Internal factors in this study are bank capital and bank liquidity. Meanwhile, the external factor is beyond the control of the banks which also known as the macroeconomic factor. The external factors in this study are base lending rate, customer price index (CPI) and money supply. Furthermore, the conceptual framework has been formulated in this chapter to create a mind-set and a picture of the network for relationship among the research factors with the bank performance in this study. On the other hand, this chapter has formulated the theoretical framework by the past studies that have been reviewed with the objective to investigate the determinants of commercial bank performance in Malaysia during the pre-crisis period (from year 2005 to 2007) and post crisis period (from year 2009 to 2011). In order to reinforce the consistency of the theoretical model, numerous current empirical proofs that have been reviewed systematically. Lastly, this chapter will present and provide a basis to improve a superior and stronger framework for the further research and hypothesis testing.

2.1 Review of Relevant Theoretical Models

This part has listed out the theoretical models applied by the researchers in evaluating the determinants of banks' financial performance in the previous literatures, such as Structure, Conduct and Performance Theory (SCP) and Theory of CAMELS.

2.1.1 Structure, Conduct and Performance Theory (SCP)

This theory has been commonly applied to study the bank profitability. This is simply because SCP hypothesis the causal relationship between markets structure, the conduct of firms in that market and the performance of the economy. Besides, this theory plays a significant role in the competition policy. For instance, a drop in competition level and a rise in concentration of an industry will result in the increased revenue of that industry (Yudaruddin, 2012). Researchers have found this theory useful as it allows differing across market in which banks operate.

There are some researchers employed SCP in conducting their studies. According to Sathye and Sathye (2004), they have studied SCP relationship in Indian banking market using the data of year 1998. The results showed that the performance and efficiency are significantly and positively related. Additionally, Yudaruddin (2012) also conducted his research by applying SCP with 15 largest banks in Indonesia from year 2009 to 2013. Yudaruddin (2012) stated that the concentrated market structure tends to lead to collusive action for the aim of maximizing profit. Apart from that, Gavurora et al. (2012) explored the performance and structure at the European Union banking market as a whole between year 2008 and 2015 using SCP. By employing SCP, Gavurora et al. (2012) is able to study whether SCP is presented in the European Union. Lastly, the outcome indicated that concentration and performance is negatively related at European banking market.

2.1.2 Theory of CAMELS

In Malaysia, the bank supervisory authorities have used CAMELS to evaluate the bank performance since CAMELS is the well-known international rating system of banks. CAMELS stand for capital adequacy, asset quality, management, earnings, liquidity and sensitivity to market risk. During the on-site examinations, the manager of banks practice CAMELS rating system to rate the bank performance. Every factor has different scale to measure the performance as scale one is the best and scale five is the worst performance. The results of CAMELS ratings are significant for the bank performance, so the past studies have captured CAMELS as the important internal factor in the field of banking. The past studies researched by Berger & Bouwman (2013) and Echekeba, Egbunike & Ezu (2010) have used this rating system approach to explain and find out the reasons of bank failure during the crisis period.

2.2 Review of the Literature

This part will review the relevant literatures on the dependent variable and five independent variables that consist of bank specific as well as macroeconomic variables that related to the research topic.

2.2.1 Financial Crisis

The subprime financial crisis has struck nationwide from year 2007 to 2009 and leave great impact on the economies of many countries. According to Mirzaei (2013), the crisis has casted its long shadow negatively on most of the banking sector performance and profitability around the world. For example, the banks in nationwide have experienced financial loss reported in the financial reports due to the economic downturn. In fact, there are few determinants that can lead to the happening of financial crisis. Based on the research conducted by Verick & Islam (2010) and Merrouche & Nier (2010), the financial crisis is caused by monetary policy that is too loose, increasing in global disparity due to high inflows of capital and financial regulations that are not strict enough.

Fang et al. (2012) have investigated on the financial performance of commercial banks after subprime crisis. The researcher has utilized panel data regression in evaluating the data of 200 top commercial banks nationwide. The empirical result has concluded the negative effect of the crisis on the commercial banks performance. For example, the bank liquidity, asset quality and the profitability of the bank will be affected during crisis period. Additionally, Jouda et al. (2018) has indicated that financial crisis influencing the financial system and financial strength in the research conducted. By using GMM method, the profitability of both domestic and foreign banks operating in France from year 2000 to 2012 is being examined. The research findings showed the profitability of banks is negatively influenced by the financial crisis. This result is in line with the research conducted by Tunay et al. (2017) that has evaluated the stability of banks from year 1999 to 2014. The methodology used in the research is two-step dynamic panel data analysis.

On the other hand, Kamarudin, Sufian & Nassir (2016) have conducted research to evaluate the profitability of commercial banks in Bangladesh banking sector. The researchers have emphasized on 31 commercial banks operating in Bangladesh, which are Private Commercial Banks (PCBs) and State Owned Commercial Banks (SCBs) from year 2004 to 2011. In the study, Slack-Based Data Envelopment Analysis (SBM-DEA) method is being applied to compute the

performance of the commercial banks. Yet, the research result is incompatible with those proposed in previous literatures that support the negative effect of crisis on the banks' profitability. This is due to the profitability for both PCBs and SCBs have increased during crisis period as stated in the research findings. It has concluded that crisis giving positive impact on the commercial bank performance.

2.2.2 Bank Performance

This research paper has been conducted to determine the factors that affect the bank performance. From the previous studies, the bank performance could be measured by the various numbers of determinants. Return on equity (ROE) and return on assets (ROA) is profitability ratio that used to measure the performance of bank. Next, net interest margin (NIM) is used to calculate the difference between the interest income and interest expense (Anbar & Alper, 2011). According to Alexiou and Sofoklis (2009), ROE indicates the rate of return to shareholders on their equity. The higher return of assets indicates that the banks will generate more profit and have better performance (Samad & Hassam, 1999). Besides, the return of assets also can be differentiated into internal and external factors (Dietrich & Wanzenried, 2011). The internal factors are bank-specific variables such as bank capital and bank liquidity, while external factors are macroeconomic variables such as base lending rate, consumer price index and money supply. For example, Bordeleau & Graham (2010), Olweny & Shipho (2011), Athanasoglou et al. (2008), Kanwal & Nadeem (2013), Peter (2017), Obillo (2015) and Okoye & Eze (2013) have examined the profitability of bank with the bank-specific and macroeconomic factors. All of these studies on commercial banks have been measured with different variables, time periods and countries. Meanwhile, these studies have used return on assets as a tool to measure the bank performance.

2.2.3 Bank Capital

The bank capital is the foundation of a bank, thus bank capital plays an important part in bank sustainability and bank profitability all the times including crisis time (Berger & Bouwman, 2013). Capital is also one of the significant bank-specific variables in explaining bank profitability and it affects the bank performance too (Robin, Salim & Bloch, 2018; Athanasoglou, Brissimis & Delis, 2008). The volume of the capital indicates the capability of a bank to cushion the losses because of the low asset quality (Robin, Salim & Bloch, 2018). Most of the studies have used equity to asset ratio and capital ratio which is total capital divided by total assets to measure the capital. The common perspective of bank capital regulation indicates that the higher the bank capital, the better the performance of banks (Garel & Petit-Romec, 2017). The examples of bank capital are currency notes, government securities and other assets that are proved as the sources of capital by consultants (Beltratti & Stulz, 2012).

There is a number of past studies proved that there is positive relationship between bank capital and the commercial bank performance. Before the crisis has occurred, the less capitalized commercial banks will be exposed to higher uncertainty and it will cause the banks having bad performance during crisis (Beltratti & Stulz, 2012). Besides, Garel and Perit-Romec (2017) have also proved that bank capital has positive relationship with the performance of banks. The small bank can increase their earnings and market share by the help of capital while the big bank can improve their bank performance with capital during the financial crisis period (Berger & Bouwman, 2013). Furthermore, Valencia (2016) has studied that banks that are holding more capital can protect itself against the negative financial future shock. Besides, the high capitalized banks that sustain throughout the crisis are capable to make more loans and earn more profits to

become stronger bank (Cohen & Scatigna, 2016; Robin, Salim & Bloch, 2018). Next, the high capital banks have higher loan loss reserves thus the banks are extra effective and profitable. The banks located in high capital countries with a good institutional environment can be more effective to the finance resources, well supervision and prudent risk management (Bitar, Saad & Benlemlih, 2016). Banks with high volume of capital have sufficient liquidity so they do not need borrowing therefore the cost of funding is low (Robin, Salim & Bloch, 2018). Hence, it is the responsibility of regulator to ensure that the banks have maintained high capital and increased the number of credit portfolio.

Meanwhile, there are also some past studies studied the negative relationship between bank capital and bank performance. Athanasoglou, Brissimis & Delis (2008) have stated that the bank capital have negative relationship with the bank performance. It is due to high level of capital will increase the level of exposure towards the risk although capital is an important determinant in explaining the bank profitability. Therefore, the bank profitability will be decreased as well.

Other than that, during the crisis period, the banks with higher capital will suffer from higher betas and higher level of stock volatility. The beta is used to indicate the bank's total risk that associated to the capital and indicate the unsystematic risk that associated to capital during the crisis period. Bank capital is served as the indicator of asset quality and it acts as a cushion when having losses. However, the high capitalized bank is unable to cover the losses of the high asset risk when the asset risk is high (Akhigbe, Madura & Marciniak, 2012). The higher capital ratio will have a negative impact towards the profitability and efficiency of a bank because it may decrease the level of efficiency and earnings of a bank (Bitar, Pukthuanthong & Walker, 2018). As conclusion, there are presences of both positive and negative relationship between bank capital and commercial bank performance in Malaysia.

The variable will be studied as followed:

H_1 : There is a significant relationship between bank capital and commercial bank performance during pre and post crisis in Malaysia.

2.2.4 Bank Liquidity

Liquidity refers to the ability of conversion from asset to cash. Liquid asset is the asset that can be converted quickly to cash in order to meet the financial obligations. To maintain the daily operations, financial intermediaries must remain at certain amount of liquid assets to meet the short term financial obligations such as lending a loan to borrowers and withdrawing cash by depositors (What is the difference between bank liquidity and its capital, 2014).

According to Vuong et al. (2016), they have studied on the inter relationships between liquidity creation, regulatory capital and bank profitability of United States banks from year 1996 to 2013. Vuong et al. (2016) have found out that the regulatory capital and liquidity creation have positive relationship with bank profitability. This study has showed that holding liquidity assets will generate more profit of bank due to it can reduce the default risks in both low capitalized banks and high capitalized banks. Bordeleau and Graham (2010) have carried on a study on the impact of liquidity on bank profitability. The objective of this study is to determine the impact of holding of liquid assets on bank profitability in United State and Canadian banks from year 1997 to 2009. In this study, the liquidity is defined as a tool to measure the bank performance during financial crisis period. Holding liquid assets can help banks to meet their short term obligations since financial crisis is unpredictable. Based on the findings, Bordeleau and Graham (2010) has demonstrated the bank business model and used it to examine the liquidity and profitability performance of banks. Next, the

empirical result has showed the positive relationship between liquidity and bank profitability. However, the profitability of banks will be reduced if banks are holding too many liquid assets. Echekeba, Egbunike and Ezu (2010) have studied the determinants of bank profitability in Nigeria by using CAMELS rating model from year 2001 to 2010. The empirical result has showed that the liquidity has a significant relationship with bank profitability. Besides, holding liquid assets can help the banks to meet the daily obligations in order to boost investor and customer confidence. According to Tan & Floros (2012) and Rahman, Hamid & Khan (2015), the researchers have studied on the determinants of bank profitability. The empirical results of these studies show the positive relationship between liquidity and bank profitability.

Olweny and Shiphoo (2011) have carried out a study about the effects of banking sectorial factors on the profitability of commercial banks in Kenya. The objective of this study is to determine and evaluate the effects of bank-specific factors and market structure factors on the commercial bank performance from year 2002 to 2008. Based on the empirical results, it has showed a negative relationship between liquidity and the profitability of bank. This is due to holding liquid assets will reduce the bank's long term investments. Additionally, the liquid assets are used to keep as reserves to meet the short term obligations. Molyneux and Thornton (1992) have carried out a study on the determinants of European bank profitability. This study also supports the negative relationship between liquidity and bank profitability. According to Ongore and Kusa (2013), they have studied the determinants of financial performance of commercial banks in Kenya from year 2001 to 2010. From the findings, the liquidity is not strong enough to affect the performance of commercial banks (Ongore & Kusa, 2013). On the other words, liquidity is insignificant to the performance of commercial banks. Choong, Thim and Kyzy (2012) have examined the determinants that affect the performance of Islamic commercial banks in Malaysia. According to the study, the liquidity of bank is insignificant to performance of Islamic commercial banks in Malaysia.

The variable will be studied as followed:

H_1 : There is a significant relationship between bank liquidity and commercial bank performance during pre and post crisis in Malaysia.

2.2.5 Base Lending Rate

Base lending rate (BLR) is one of the macroeconomic variables that affect the commercial bank profitability. According to the Collins English Dictionary (n.d.), it can be defined as the minimum interest rate computed by the banks instead of Bank Negara Malaysia (BNM) that set as the lending rate for the borrowers. Base lending rate is calculated by including the cost of funds and other managerial cost. In fact, commercial banks are able to generate revenue in the form of interest income by the base lending rate charged to borrowers.

According to Malik et al. (2014), he has studied the impact of interest rate on the profitability of the banks in Pakistan. A total of 10 banks, which involves four banks in public sector and six banks in private sector in Pakistan are targeted for the study. In the research, interest rate is represented by the bank lending rate, while the bank profitability is measured by return on asset (ROA) and return on equity (ROE). Additionally, the approach used to evaluate the data is regression technique. The result has showed the significant and positive relationship between the bank lending rate and bank profitability for both private sector and public sector in Pakistan.

Besides, the positive relationship between the bank lending rate and bank profitability is supported by Obillo (2015), Kirimi (2015), Sinaida (2017) and Peter (2017). Those researchers have all targeted on the financial performance of commercial banks operating in Kenya in the studies. Additionally, the methodology applied by the researchers to examine the data is multiple regression analysis. Most of the studies have assumed the bank lending rate as a proxy for base lending rate. For instance, Obillo (2015) has monitored the bank performance for five years which is from 2010 to 2014 by utilizing SPSS version 2.0. As a result, the increase in the bank lending rate will result in the increase of bank profitability. The outcome is same with the research done by Kirimi (2015) which is carried out by aiming at the financial performance of 43 commercial banks operating in Kenya from year 2007 to 2014. Kirimi (2015) has explained that the lending interest rate has occupied a large portion of interest income for the banks. Thus, the bank can generate more interest income when the lending rate is high which directly leads to the increase in the bank profitability.

Moreover, Sinaida (2017) has conducted the investigation on the impact of lending interest rate on the profitability of 42 commercial banks in Kenya from year 2012 to 2016. The finding by the researcher is consistent with the result in the previous studies that indicates the strong positive relationship between the bank lending rate and the financial performance of commercial banks. According to Sinaida (2017), increase in the bank lending rate is followed by the increase in the profitability of the banks because of the rising in the banks' operating income. It is in line with the research findings obtained by Peter (2017) who has established that higher lending interest rate results in higher bank profitability due to more revenue can be generated by the higher lending interest rate.

Meanwhile, Guru, Staunton & Shanmugam (n.d.) and Jasmine et al. (2011) have both carried out the studies on determinants for the profitability of the commercial banks in Malaysia. By referring to the research conducted by Guru, Staunton & Shanmugam (n.d.), the average annual base lending rate (BLR), which is the indicator for the market interest rate has been considered as one of the external

factors that affect the commercial bank financial performance. In the same way, Jasmine et al. (2011) has utilized both multiple linear regression analysis and also the correlation analysis in evaluating the data. The research findings by both of the researchers are consistent with each other which indicate that the base lending rate affects the profitability of commercial bank in a positive way.

Additionally, Okoye and Eze (2013) have conducted a research on the effect of the bank lending rate on the bank performance in Nigeria. They have targeted on the deposit money banks in Nigeria from year 2000 to 2010 in order to carry out their investigation. Based on the finding in the research, it has manifested the significant and positive relationship between the bank lending rate and the performance of the banking industry in Nigerian.

On the other hand, Khan and Sattar (2014) have studied on the effect of changes in the lending interest rate on the profitability of commercial banks in Pakistan from year 2008 to 2012. The researches have used Pearson Correlation Method to examine the relationship between two variables. Additionally, the result shows a strong and negative relationship between the interest rate and the bank profitability. The result is irreconcilable with the findings concluded in other researches that support the positive relationship between lending interest rate and bank profitability. It is explained by the huge banking spread experienced by the banking industry in Pakistan, which can assimilate any changes in the lending interest rate easily. Additionally, the commercial banks in Pakistan do not rely on the interest income as they also emphasize on gaining the revenue from investment.

The variable will be studied as followed:

H_1 : There is a significant relationship between base lending rate and commercial bank performance during pre and post crisis in Malaysia.

2.2.6 Consumer Price Index

Consumer Price Index is kind of measurement tool used by government to measure the prices for basket of goods and services in a country and it reports the inflation or deflation in a country.

According to Tan & Floros (2012) in China, there is a positive relationship between the inflation measured by the consumer price index and bank profitability among year 2003 to 2009. Tan and Floros (2012) have stated that the inflation in China can be fully anticipated and the interest rates are adjusted accordingly. The methodology used by Tan and Floros (2012) in the research is GMM estimation that has involved two step generalized methods. Athanasoglou et al. (2008) have also applied the same method in their research and found a significant positive relation of inflation on Greek's bank performance. Besides, the researchers face the limitation that only few determinants being examined and only specific banks performance being evaluated.

Apart from that, inflation is estimated to have a positive impact on profitability of bank (Guru et al., n.d.; Molyneux & Thornton, 1992). Guru et al. (n.d.) have claimed that inflation rate is one of the significant environmental conditions that will affect both of the bank costs and revenues. When revenues increase faster than cost, it will lead to inflation anticipated fully, thus results in the inflation rate positively related with the profitability. This statement is supported by Petria et al. (2015) which has stated that anticipated inflation rates causing a rise in the loan interest rate, and it will lead to a rise in bank revenues.

However, the bank profitability is negatively affected by the inflation when the banks could not react to the inflation stepped out immediately (Boyd & Champs, 2006). The researchers have revealed that bank profitability will be affected by the increasing bank cost while the free-of-charge service will lead to a reduction in gross income of a bank. Thus, it results in profit reduction of the bank. Furthermore, Boyd et al. (2000) have provided a consistent result that inflation is negatively related with bank performance. The researcher have realized that the marginal impact of inflation on banking lending activities and stock market development diminishing quickly when the inflation rises in a country. Based on their research, they have also stated that the financial sector performance experiencing a drop as the inflation rate exceeds fifth teen percent in an economy.

In addition, Yakubu (2016) has claimed that inflation rate is negatively affecting the commercial bank profitability in his research. Based on the empirical results carried out by Yakubu (2016), the estimated coefficient of inflation is negative. In other words, it proves its inverse impact to the bank profitability. The result is consistent with Vejzagic and Zarafat (2014), who have investigated the macroeconomic determinants of commercial banks profitability in Malaysia. Some researchers also discovered consumer price index has actually contributed an insignificant effect on the commercial banks profitability (Yakubu, 2016; Vejzagic and Zarafat, 2014; Alper & Anbar, 2011).

Last but not least, Kanwal and Nadeem (2013) have claimed that inflation rate has a neutral effect either positive or negative effect on bank profitability. The inflation will have a positive influence when economies are in boom and there is well developed financial market in the countries. In contrast, inflation will have a negative impact when the countries are undergoing economy recession.

The variable will be studied as followed:

H_1 : There is a significant relationship between consumer price index and commercial bank performance during pre and post crisis in Malaysia.

2.2.7 Money Supply

Based on the theory of New Keynesian model, Central Bank actualizes monetary policy by adjusting short-term interest rate and long term interest rate. Monetary policy shock has happened when it loses its ability to stimulate the economic activity. After the financial crisis in year 2008, monetary policy has been considered as an “unconventional” tool that might lead monetary policy to escape from this “liquidity trap” (Badarudin et al., 2013).

Al-Qudar and Jaradat (2013) have proposed that the money supply has positive effect on the bank profitability. It indicates that increase in the money supply will result in the increase the profitability of banks measured by ROA and ROE. Furthermore, the study of Pan and Pan (2014) has stated that the money supply growth plays a significant role in improving the commercial bank performance. It can be explained by the rising of the funds available in bank and thus the money supply will be increase too. Furthermore, the number of loan issued will be increased too and it will directly results in the increase of the bank interest income. Besides, the bank is able to reduce the financial uncertainty when the money supply is high (Adrian & Shin, 2008).

Moreover, the high money supply and low policy rates will lead to the rising of price for real estate and financial assets, increasing leverage and reducing the bank uncertainty, even the lending standards remain constant. In addition, increase in the average income and wealth will lead to high risk tolerance on borrower;

then it results in the reduction of lending standards and higher leverage for the borrowers. In other words, the higher the money supply, the higher the loanable funds for those borrowers who have high risk tolerance. Thus, it can indicate a better bank performance (Neuenkirch & Nöckel, 2018).

Besides, Matousek and Solomon (2018) have used the change in the money supply as the proxy of the measure for the monetary policy position. Based on the empirical result, the supply of loans is more sensitive to the changes in interest rate if compared with the changes in money supply. Based on the bank lending channel theoretical from Orzechowski (2017), a contractionary monetary policy indicated decrease in the money supply, will reduce the deposits amount in the bank. It will then cause the aggregate loan supply to drop. Based on most of the money and banking related textbooks, the relationship between interest rate and monetary policy, as well as the relationship between loan growth and monetary policy should be negative in the long-run data. In the study of Eltabakh, et al. (2014), there is negative relationship between money supply and bank profitability of Islamic bank. The evidence shows that Islamic bank gets lower profitability when the money supply is higher. Investors will avoid to invest in Islamic banks in the highly money supply environment.

The monetary policy is less sensitive in influencing the bank lending decision for the bigger capitalised bank; while the small American firm is harder to get loan from bank. Thus, the monetary policy is significantly affecting the lending behaviour (Talavera et al., 2012). Moreover, small banks face difficulty in raising non deposit funds from clients which aims to offset the tightening of monetary policy and to keep the loan supply at a desired level. For contractionary monetary policy, small banks will lend out less funds compared with large banks (Jimborean, 2009).

The variable will be studied as followed:

H_1 : There is a significant relationship between money supply and commercial banks performance during pre and post crisis in Malaysia

2.3 Conclusion

In summary, chapter two reveals the past literatures and theoretical models that have been carried out by previous researchers to study the determinants of commercial bank profitability. In this research, the selected independent variables such as capital, liquidity, base lending rate, consumer price index and money supply are assumed to have significant impacts on commercial bank profitability. Lastly, the methodologies used in this research will be discussed in the following chapter to figure out whether the hypothesis is stated correctly.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This chapter will discuss the approaches and methodologies applied in collecting data and information in order to accomplish a successful research study. As a result, it can contribute to the development of an effective and critical thesis. Besides, all the sections of the studies, empirical findings and analysis are organized on this chapter to deliver more specific research objectives and research questions. In short, this chapter defines the methods of how the research is carried out in terms of research framework, methods of data collection and data analysis.

3.1 Research Design

The objective of this paper is to investigate the impact of the internal and external variables towards the commercial bank performance in Malaysia. This study has used quantitative data to analyse the commercial bank performance. Additionally, the data used is secondary data and it is obtained from different published sources in Malaysia such as Central Bank of Malaysia along with Department of Statistics Malaysia. The internal factors are bank capital and liquidity while external factors are consumer price index, money supply and base lending rate. Besides, monthly data has been applied to determine the commercial bank performance in Malaysia pre and post crisis period. The pre-crisis period data is collected from year 2005 to year 2007 while post crisis period data is collected from year 2009 to year 2011. The reasons of using the time-series analysis are to understand the past history and predict the consequences that will happen in future as prevention is better than cure.

3.2 Data Collection Method

The research has applied secondary data to run empirical test. There are few resources of macroeconomic and bank-specific resources employed for the methodology part. The time-series data has been divided in two periods which are

pre-crisis period (year 2005 to 2007) and post-crisis period (year 2009 to 2011). The monthly data is the most suitable range targeted for the research period. The data for year 2008 is not included in the research due to the happening of financial crisis. Otherwise, the research result will be influenced by the large variation in the indicator and measurement data. Furthermore, the level of loan performance in Malaysia is retrieved from Bank Negara Malaysia website; while the data for the bank specific and macroeconomic variables are downloaded from Datastream by using Bank Negara Malaysia data resources.

3.2.1 Total Loans

According to the traditional concept, commercial banks make profit by collecting the customer deposit and lending the money to borrower with higher interest rate charged. Loan can be divided into long-term (more than one year) and short-term (less than one year). For instance, line of credit and account receivable loans are categorized under short-term loan; while real estate loan, vehicle and equipment loan are considered as long term loan.

3.2.2 Bank Capital

Bank capital is one of the bank specific factors in determining bank profitability. Bank capital is also considered as the net worth of the bank, which indicates the

value computed from the reduction of bank asset by the bank liability. Big capitalized banks are more likely to make high profit due to economies of scale. Besides, large banks are able to modify their loan portfolio easily. According to Valencia (2016), high capitalized bank can issue more loans to customers during financial crisis because of their ability to hold the borrowing risk.

3.2.3 Bank Liquidity

Banks should have adequate liquidity to secure unexpected cash outflow. To maintain the public confidence in financial institution, the banks have to be solvent which is holding liquid asset more than liabilities. Liquidity net surplus is selected as the indicator to measure the liquidity of commercial banks in Malaysia. According to Elliott (2014), the ability of bank to avoid itself from bad financial performance when it is in trouble depends on the level of bank liquidity. It indicates that bank liquidity played a significant role to sustain the bank profitability during economic recession. The higher the level of bank liquidity, the higher the ability of the bank to escape from the financial loss when it is in trouble.

3.2.4 Base Lending Rate

Base lending rate is the borrowing rate charged on the customers by the bank. The higher base lending rate will result in more interest income generated. According to Malik et al. (2014), there is positive relationship between the bank lending rate

and banks profitability for both private sector and public sector in Pakistan. To maximize profit and adjust the risk, the banks will change their loan portfolio based on the change in the interest rate (Badarudin et al., 2013).

3.2.5 Consumer Price Index

Inflation defines the increase in the average price of products and services. Meanwhile, consumer price index (CPI) is a tool to measure the prices for basket of goods and services in a country. CPI is more related to the cost living fees, while the calculation of the CPI refers to eight sections, which are food, accommodation, entertainment, transportation, clothing, household goods and education expenses. If the inflation has anticipated, the Central Bank will adjust the interest rate so it will also increase the profitability of banks.

3.2.6 Money Supply

The Central bank has a right to print notes and mint coins for country use. It will affect the market by applying monetary policy. In addition, Central Bank will adjust the interest rate and required reserve along with purchase the country bond to control the money supply. Money supply is divided into three types which are M0, M1 and M2. M0 is the money equivalents that can be converted easily to cash

and the narrow money in circulation; M1 is the sum of M0 and the total amount of negotiable certificates of deposit (NCD) issued by licensed bank together with short-term time deposits in banks; M2 is the total of M1 and deposits held by public (Hong Kong Monetary Authority, 2002).

3.3 Data Analysis

The data collected will be analysed using regression analysis and inferential analysis. At the same time, Eview is used to carry out the diagnostic tests and also create the regression results.

3.3.1 Multiple regression analysis

Multiple regression analysis is the normal form to predict the relationship between dependent variable and independent variables (“What is Multiple Linear Regression?”, n.d.). To form the multiple regression models, there are some assumptions of the multiple regression analysis:

- i. Linear relationship between the dependent variable and the independent variables.
- ii. The variables are normally distributed (normality).
- iii. The independent variables are not correlated with each other (no multicollinearity).
- iv. The variance of the error terms is same across the independent variables (no heteroscedasticity).

Once all of the assumptions are fulfilled, the linear regression model will become the Best Linear Unbiased Estimator (BLUE). The BLUE is defined as the estimator that has the dependent variable with the smallest variance which is linear and unbiased. Therefore, the results obtained will be reliable and high accuracy.

The regression of this research is shown as below:

$$\begin{aligned} LNLOAN_t = & \beta_0 + \beta_1 LNCAP_t + \beta_2 LNLIQU_t + \beta_3 LNBLR_t + \beta_4 LNCPI_t \\ & + \beta_5 LNM0_t + \mu_t \end{aligned}$$

Where,

β_i = Slope coefficient

$LNLOAN_t$ = Logarithm total loan of commercial bank from year t

$LNCAP_t$ = Logarithm capital of commercial bank from year t

$LNLIQU_t$ = Logarithm liquidity of commercial bank from year t

$LNBLR_t$ = Logarithm base lending rate from year t

$LNCPI_t$ = Logarithm consumer price index from year t

$LNM0_t$ = Logarithm money supply from year t

μ_t = Error term

3.3.2 Diagnostic Tests

3.3.2.1 Multicollinearity

Multicollinearity is a problem that happens when the independent variables are highly correlated with each other in the same regression model. If the multicollinearity problem exists, the regression model is failed to explain the

independent variables affecting the dependent variable. To determine the existence of multicollinearity problem, Variance Inflation Factor (VIF) is used in this model. If the result obtained is less than 10, there will be considered as low multicollinearity problem. However, if the result obtained is more than 10, there will be concluded as existence of high multicollinearity problem. The formula of VIF is $VIF = \frac{1}{1-R^2}$.

Table 3.1 Measure of VIF Value for Multicollinearity Problem

VIF Value	Interpretation
VIF =1	There is no multicollinearity problem in the regression model.
$1 < VIF < 10$	There is low multicollinearity problem in the regression model.
$VIF \geq 10$	There is high multicollinearity problem in the regression model.
VIF = ∞ (Undefined)	There is perfect multicollinearity problem in the regression model.

3.3.2.2 Normality

Normality is used to evaluate whether the sample is normally distributed from a population. If the error terms are not normally distributed, there is difficult to conclude that the sample size data can explain the population. Besides, normality test can be tested by Jarque-Bera test. If the p-value collected from E-views output is more the 1% / 5% / 10% of significance level, it will be concluded that there is no normality problem.

H_0 : There error terms is normally distributed

H_1 : There error terms is not normally distributed

Decision Rule: Reject H_0 if the p-value is less than significance level (1% or 0.01) / (5% or 0.05) / (10% or 0.1). Otherwise, do not reject the H_0 .

3.3.2.3 Autocorrelation

Autocorrelation is the problem when the observation's error terms are correlated with another observation's error terms. There are two types of autocorrelation problems such as pure autocorrelation problem and impure correlation problem. Pure autocorrelation problem exists in the correct regression model while the impure autocorrelation is the problem when the error term is omitted variables. Autocorrelation problem can be detected by the Breusch-Godfrey LM test. If the p-value collected from Eviews output is more the 1% / 5% / 10% of significance level, it will be concluded that there is no autocorrelation problem.

H_0 . : There is no autocorrelation problem

H_1 : There is autocorrelation problem

Decision Rule : Reject H_0 if the p-value is less than significance level (1% or 0.01) / (5% or 0.05) / (10% or 0.1).
Otherwise, do not reject the H_0 .

3.3.2.4 Remedy of autocorrelation

When the autocorrelation problem in the regression model exists, there is a remedy to solve this problem which is Cochrane-Orcutt two-steps method ("Testing and Remedial Measures for Autocorrelation", n.d.). Firstly, to determine the first-order autocorrelation based on the regression of the equation.

$$\hat{\varepsilon}_t = \rho \hat{\varepsilon}_{t-1} + v_t$$

This step is to determine the estimated rho (ρ) then add it to the regression model to run the second step of Cochrane-Orcutt two-steps method.

$$Y_t^* = \beta_0 + \beta_1 PC_t^* + \beta_2 PB_t^* + \beta_3 YD_t^* + v_t$$

where $Y_t^* = (Y_t - \hat{\rho}Y_{t-1})$

$$PC_t^* = (PC_t - \hat{\rho}PC_{t-1})$$

$$PB_t^* = (PB_t - \hat{\rho}PB_{t-1})$$

$$YD_t^* = (YD_t - \hat{\rho}YD_{t-1})$$

After all the steps have done, the Durbin Watson statistics will be improved hence the autocorrelation problem will be solved from the regression model.

3.3.2.5 Heteroscedasticity

Heteroscedasticity problem exists when the error terms have different variance independence of error term. When this problem is occurred, the ordinary least square estimator becomes inefficient due to the increasing in the variances of the distributions. To determine this problem, White test is used for this study. If the p-value collected from Eviews output is more the 1% / 5% / 10% of significance level, it will be concluded that there is no heteroscedasticity problem.

H_0 : There is homoscedasticity.

H_1 : There is heteroscedasticity.

Decision Rule : Reject H_0 if the p-value is less than significant level (1% or 0.01) / (5% or 0.05) / (10% or 0.1).
Otherwise, do not reject the H_0 .

3.3.2.6 Model specification

Model specification problem occurs when the regression model omits relevant variables or includes any unnecessary variables. If this problem is happened, the estimators of the regression model will become biased and inconsistent. Furthermore, the misspecification error will also affect the assumption of normal distribution for the error terms. To determine this problem, the Ramsey RESET Test is used for this study. If the p-value collected from Eviews output is more the 1% / 5% / 10% of significance level, it will concluded that the model specification is correct.

H_0 : Model specification is correct.

H_1 : Model specification is incorrect.

Decision Rule : Reject H_0 if the p-value is less than significance level (1% or 0.01) / (5% or 0.05) / (10% or 0.1). Otherwise, do not reject the H_0 .

3.4 Conclusion

This chapter has described the data and methodology used to practise the data analysis and run the test in Chapter 4. The sources of secondary data and the economic model related to this research have been discussed in this chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In previous section, the data collection, model specification and data processing have been discussed in detail. Meanwhile, this section provides the outcomes of the empirical analysis which study on the factors that affecting the commercial bank performance pre and post crisis in Malaysia. The interpretation and investigation of the results will be presented in the inferential analysis section in

order to confirm the trustworthiness of the model and determine the significant relationship between variables. Lastly, the discussion on each variable will be presented clearly in this section and it is followed by a conclusion.

4.1. Multicollinearity Test

Multicollinearity problem refers to the circumstance which at least two independent variables in a multiple regression model are highly correlated to each other. Once this problem is being ignored, it will lead to the difficulty in evaluating the impacts of independent variables on the dependent variable. Therefore, variance inflation factor (VIF) has been used in this research to detect the existence and seriousness of the multicollinearity problem in the regression analysis. The measure of the VIF value for the multicollinearity problem has summarized in the table 4.1.

Table 4.1 Measure of VIF Value for Multicollinearity Problem

VIF Value	Interpretation
VIF =1	There is no multicollinearity problem in the regression model.
$1 < \text{VIF} < 10$	There is low multicollinearity problem in the regression model.
$\text{VIF} \geq 10$	There is high multicollinearity problem in the regression model.
VIF = ∞ (Undefined)	There is perfect multicollinearity problem in the regression model.

Table 4.2 VIF Values for the Independent Variables Pre and Post Crisis Period

According to the table above, the mean value of the VIF for the model is 4.0858 for year 2005 to 2007 and 4.6054 for year 2009 to 2011. Additionally, the VIF values for all the variables, as well as the mean VIF value lie between 1 and 10. Thus, it indicates that the model is free from serious multicollinearity problem. Therefore, there is sufficient evidence to conclude that the model does not suffer from serious multicollinearity problem.

	2005-2007	2009-2011
Variable	VIF	VIF
Capital	8.6994	8.8064
Liquidity	2.1688	2.5150
Base Lending Rate	3.5540	1.3609
Consumer Price Index	1.8265	1.5577
Money Supply	4.1805	8.7872
Mean VIF	4.0858	4.6054

4.2 Heteroscedasticity Test

Heteroscedasticity problem takes place when there is difference in the variance of the error term in the regression model throughout the observation. In this research, White Test is chosen to distinguish the presence of heteroscedasticity problem in the regression model.

H_0 : There is homoscedasticity.

H_1 : There is heteroscedasticity.

Decision Rule : Reject H_0 if p-value is smaller than the significance level.

Otherwise, do not reject H_0 .

Table 4.3 Results of White Test

White Test		
Year	2005-2007	2009-2011
P-value	0.4604	0.6293

Since the p-value 0.4604 (year 2005 to 2007) and 0.6293 (year 2009 to 2011) is more than the significance level of 0.05, there is insufficient evidence to conclude that the heteroscedasticity problem is existed in the model.

4.3 Normality Test

Normality is an important underlying assumption when conducting statistical analysis. It tests the degree of normality of variables in a model. Thus, Jarque-Bera test is carried out to determine whether a data set is normally distributed. If the condition is not satisfied, the test result may provide a wrong finding.

H_0 : The error term is normally distributed.

H_1 : The error term is not normally distributed.

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

Table 4.4 Results of Jarque-Bera (JB) Test

Jarque-Bera Test		
Year	2005-2007	2009-2011
P-value	0.7910	0.5769

Since the p-value 0.7910 (year 2005 to 2007) and 0.5769 (year 2009 to 2011) is more than the significance level of 0.05, there is insufficient evidence to conclude that the error term is not normally distributed.

4.4 Autocorrelation Test

Autocorrelation problem which is also known as serial correlation, it reflects the relationship between observations among the same variable over different periods of time. The autocorrelation problem leads to the estimated variances of the regression coefficients become biased and inconsistent. In other words, the hypothesis testing is no longer valid. In order to detect the autocorrelation issue in a model, Breush-Godfrey LM Test is carried out.

H_0 : There is no autocorrelation problem.

H_1 : There is autocorrelation problem.

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

Table 4.5 Results of Breusch-Godfrey LM Test

Breusch-Godfrey LM Test		
Year	2005-2007	2009-2011
P-value	0.0009	0.3458

For the year 2009 to 2011, the the p-value (0.3458) is more than the significance level of 0.05 thus there is insufficient evidence to conclude that there is autocorrelation problem in the model. Yet, for the year 2005-2007, the p-value (0.0009) is less than the significance level of 0.05, so there is sufficient evidence to conclude that there is autocorrelation problem in the model. Therefore, the autocorrelation problem in the model can be solved by using remedy which is Cochrane-Orcutt method as showed in the table 4.6.

Table 4.6 Results of Durbin Watson test after solved by Cochrane-Orcutt method

Durbin Watson test	
Year	2005-2007
Durbin Watson statistics	1.175129 (After solved by Cochrane-Orcutt method)

According to the table, after being solved by Cochrane-Orcutt method, the Durbin Watson statistics 1.175129 (year 2005 to 2007) is between d_U (1.1600) and d_L (1.8030) at significance level of 0.05, hence there is sufficient evidence to conclude that there is no autocorrelation problem in the model.

4.5 Model Specification Test

The types of model specification error include the omission of relevant variables, the inclusion of an unnecessary variable and adoption wrong functional form of dependent and independent variables. It is essential to identify the model specification error because it provides biased and inconsistent coefficients that cause unreliable hypothesis testing and inaccurate prediction. Thus, the Ramsey's RESET test is carried out to detect this econometric problem.

H_0 : The model specification is correct.

H_1 : The model specification is incorrect.

Decision Rule : Reject H_0 if p-value is smaller than the significance level.

Otherwise, do not reject H_0 .

Table 4.7 Results of Ramsey's RESET Test

Ramsey's RESET Test		
Year	2005-2007	2009-2011
P-value	0.4139	0.7863

Since the p value 0.4139 (year 2005 to 2007) and 0.7863 (year 2009 to 2011) is more than the significance level of 0.05, there is sufficient evidence to conclude that the model specification is correct.

4.6 Inferential Analysis

In Chapter 3, the regression model for both pre and post crisis period has shown as follow:

$$LNLOAN_t = \beta_0 + \beta_1 LNCAP_t + \beta_2 LNLIQU_t + \beta_3 LNBLR_t + \beta_4 LNCPI_t + \beta_5 LNM0_t + \mu_t$$

According result obtained from this research, the regression is stated as follow:

Equation 4.1: Before Crisis

$$LNLOAN_t = 3.9539 + 0.4423 LNCAP_t + 0.0355 LNLIQU_t + 0.2298 LNBLR_t - 0.0061 LNCPI_t + 0.1801 LNM0_t + \mu_t$$

Equation 4.2: After Crisis

$$LNLOAN_t = 2.2294 + 0.9393 LNCAP_t - 0.0192 LNLIQU_t - 0.1900 LNBLR_t + 0.0087 LNCPI_t + 0.1054 LNM0_t + \mu_t$$

Table 4.8: Summary of Regression Results For Commercial Bank Performance Pre And Post Crisis Period

Variables	Before crisis (2005-2007)	After Crisis (2009-2011)
	Coefficient	Coefficient
Constant	3.953872 (0.0000)	2.229351 (0.0000)

CAP	0.442338*** (0.0015)	0.939322*** (0.0000)
LIQU	0.035542 (0.1792)	-0.019220 (0.3903)
BLR	0.229793 (0.1037)	-0.189966* (0.0912)
CPI	-0.006122 (0.6705)	0.008739** (0.0303)
M0	0.180052** (0.0101)	0.105361* (0.0981)
R-Squared	0.897990	0.989312
Adjusted R ²	0.880402	0.987531
F-statistics	51.05729*** (0.0000)	555.3849*** (0.0000)

Note: ***Significant at 1% level, **Significant at 5% level, *Significant at 10% level Values in parentheses is p-value

According to the regression result in the table 4.8, , the R-squared for this model is 0.897990 which showed that 89.79% of the variation in total loan explained by the capital, liquidity, base lending rate, consumer price index and money supply before crisis. Meanwhile, the R square for this model is 0.989312 which showed that 98.93% of the variation in total loan explained by the capital, liquidity, base lending rate, consumer price index and money supply in Malaysia after crisis.

Since the R-squared for pre and post crisis are more than 80%, it proves that the model has no problem.

Besides, the result also indicates that capital (CA) and money supply (M0) have significant impact on the commercial bank performance before crisis period. Simultaneously, capital (CA), base lending rate (BLR), consumer price index (CPI) and money supply (M0) are the significant factors that affect the commercial bank performance after crisis period. However, the result also indicates that liquidity is insignificant in influencing commercial bank performance.

4.6.1 Bank Capital

Based on table 4.3, the result shows that bank capital is significantly and positively correlated with commercial banks performance for both pre and post crisis period. Before crisis, the coefficient for capital is 0.442338 which indicates that if the bank capital increases by 1%, on average, total loan will increase by 0.4423%. On the other hand, the coefficient for capital after crisis is 0.939322 which shows that if the bank capital increases by 1%, on average, total loan will increase by 0.9393%.

Furthermore, this result indicates that the high volume of currency notes, government securities and other assets can increase the performance of commercial banks. This finding is found similarly with the previous researchers such as Beltratti & Stulz (2012), Garel & Perit-Romec (2017), Berger & Bouwman (2013), Valencia (2016), Cohen & Scatigna, (2016), Robin, Salim & Bloch (2018) and Bitar, Saad & Benlemlih (2016). First and foremost, Beltratti and Stulz (2012) have claimed that commercial bank with less capitalized will

lead to a bad performance. This statement is parallel with Garel and Perit-Romec (2017). Meanwhile, Berger and Bouwman (2013) have stated that banks can enhance their market share and earnings by increasing the bank capital. Apart from that, the positive relationship between bank capital and commercial bank performance is also supported by Valencia (2016), who has stated that banks holding more capital can absorb future unexpected financial shock. Besides, there are researchers mentioned that banks with high capitalized are able to create more loans to public and generate more revenues to the bank (Cohen & Scatigna, 2016; Robin, Salim & Bloch, 2018). They have proved that high capitalized banks are more profitable and effective due to the higher loan loss reserves. Furthermore, Bitar, Saad and Benlemlih (2016) have suggested that banks situated in high capitalized countries with a well development environment will be more effective to the financial management of banks. Last but not least, high capitalized banks are claimed to have sufficient liquidity, and tend to lower the funding cost of the banks (Robin, Salim & Bloch, 2018).

4.6.2 Liquidity

Based on the result, it has shown that liquidity has an insignificant impact on performance of commercial banks for both pre and post crisis period. This result is consistent with the findings obtained by Elahi (2017), Maudos & Solis (2009) and Kawshala & Panditharathna (2017). The insignificant interaction between these two variables have been explained by Elahi (2017), who has claimed that ROA provides only information on how much return a bank earns on its asset. Furthermore, Maudos and Solis (2009) have also found an insignificant long run relationship between performance and liquidity in their study. This outcome is in line with the findings by Kawshala and Panditharathna (2017). Even though the coefficient of liquidity has represented an expected negative relationship in the

study, but this investigation has found that liquidity is an insignificant factor for profitability of commercial banks (Kawshala & Panditharathna, 2017).

4.6.3 Base Lending Rate

The empirical result shows that the base lending rate is positively affecting the bank performance yet the relationship is insignificant. This is due to the public have the financial ability to afford the base lending rate charged on their borrowings since the economy is still in good condition before crisis. However, there is significant and negative relationship between base lending rate and commercial bank performance after crisis. According to the table 4.8, the base lending rate has a coefficient of -0.189966 which reveals that when the base lending rate increases by 1%, on average, the total loan will decrease by 0.1899%. The outcome is supported by the research conducted by Ogunbiyi & Ihejirika (2014), Khan & Sattar (2014). When there is increase in the base lending rate, it will be followed by the decrease in the bank profitability (Ogunbiyi & Ihejirika, 2014). In addition, Khan and Sattar (2014) have justified the changes in the lending interest rate can be absorbed by the huge banking spread in commercial bank. Furthermore, the commercial bank also emphasize on gaining return from investment or other non-interest income instead of rely fully on the interest income generated from lending interest rate.

4.6.4 Consumer Price Index

According to the results, it shows there is an insignificant relationship between consumer price index before the crisis in Malaysia. This is simply due to the economy is well developed before crisis, which lead to many people in the country do not necessary to lend money from commercial banks in Malaysia.

Apart from that, commercial banks issue loan to businessmen and investors based on floating interest rate, which is kind of adjustable interest rate that does not have a fixed interest rate over the life of the loan. Lastly, the insignificant relationship is also caused by the businessmen who pay loans with nominal interest rate as the nominal interest rate does not take inflation into account.

Furthermore, the results conclude that the consumer price index has a significant impact and positive relationship on the commercial bank performance after crisis. The coefficient of consumer price index is 0.008739 after crisis and it means that when the consumer price index increases by 1%, on average, the total loan will increase by 0.0087%. This statement is supported by studies done by Tan & Floros (2012), Athanasoglou et al. (2008), Guru et al. (2002), Molyneux & Thornton (1992) and Petria et al. (2015). Firstly, Tan and Floros (2012) have mentioned the positive effect of consumer price index on performance of commercial banks due to inflation can be anticipated fully in a country. This explanation is parallel with the research conducted by Athanasoglou et al. (2008). Apart from that, Guru et al. (2002) has stated that consumer price index is one of the important environment conditions that will influence the bank cost and revenue. It is also claimed that the inflation is anticipated fully when revenues increase faster than the cost and it causes the inflation has a positive relationship with the bank performance (Guru et al., 2002). Lastly, Petria et al. (2015) has explained that anticipated inflation in an economy will lead to a rise in the loan interest rate, and eventually it will cause a rise in banks revenues. Therefore, all of these explanations have supported the significant and positive effect of consumer price index on commercial bank performance.

4.6.5 Money Supply

Money supply has reflected a significant and positive relationship with the commercial bank performance for both pre and post crisis period. For the pre-crisis period, the money supply has coefficient of 0.180052 which indicates that when the money increases by 1%, on average, the total loan will increase by 0.18%. At the same time, the coefficient for the money supply after crisis is 0.105361 and it states that when the money supply increases by 1%, the total loan will increase by 0.1053% on average.

This result is consistent with the findings by Pan & Pan (2014), Akomolafe et al. (2015), Nguyen et al. (2017) and Adrian & Shin (2008). According to Pan & Pan (2014), the enhancement in the performance of commercial bank can be explained by the money supply growth. This is due to the increase in the money supply will lead to increase in the funds available in the commercial bank. As a consequence, the interest income of commercial bank will be boosted as well as more loans can be issued with interest rate charged. This finding is in parallel with Akomolafe et al. (2015) who states that money supply is a significant determinant of bank profitability. Similarly, Nguyen et al. (2017) has concluded the strong and positive relationship between money supply and commercial bank performance in the study. An increase in the money supply will directly results in the increase in the commercial bank profitability. Besides, Adrian & Shin (2008) have pointed out the bank financial uncertainty can be reduced by the increase in money supply.

4.7 Conclusion

In a nutshell, it is found that the bank capital, base lending rate, consumer price index and money supply have a significant impact on the commercial bank performance during pre and post crisis period in Malaysia. However, the bank liquidity is claimed to have an insignificant effect according to the empirical results provided by E-Views software. All the findings are parallel with and supported by the previous researchers. Next, this study will proceed to the

following chapter to discuss on the limitation of this study and recommendation for future research.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

This chapter has summarized the entire research. It includes the interpretation of statistical analysis which has been discussed in the previous chapter. Besides, the

major findings and implications of the study will be presented as well. It is then followed by the discussion of limitation of the study and the recommendation for future studies along with the conclusion that outlines the research.

5.1 Summary of Statistical Analysis

Table 5.1 Summary of Statistical Analysis

Diagnostic Test	Test Statistic	Decision Making	Result (2005-2007)	Result (2009-2011)
Multicollinearity	Variance Inflation Factors (VIF)	$1 < VIF < 10$	No serious multicollinearity problem.	No serious multicollinearity problem.
Heteroscedasticity	White test	Do not reject H_0	There is homoscedasticity.	There is homoscedasticity

Autocorrelation	Breusch-Godfrey LM test and Durbin Watson statistic	Do not reject & $dL < d^* < dU$	There is autocorrelation problem. (solved by Cochrane-Orcutt method)	There is no autocorrelation problem.
Normality Test	Jarque-Bera test	Do not reject H_0	The error term is normally	The error term is normally

			distributed	distributed
Model Specification Test	Ramsey Reset Test	Do not reject H_0	There is model specification is correct.	There is model specification is correct.

5.2 Discussions of Major Findings

5.2.1 Base Lending Rate

Based on the result demonstrated in the previous chapter, the base lending rate has positive relationship with the commercial bank performance before crisis period in Malaysia. Yet, the relationship is insignificant. This is because of the economy before crisis is in good condition and the base lending rate charged is affordable for every resident.

On the other hand, the result shows that the base lending rate is significantly and negatively affecting the commercial bank performance after crisis period. Joe and Oh (2017) has explained that the financial crisis is greatly affecting the behaviour of foreign investors by changing their preference in investment. For example, they have focused on the firms with more profitable, more liquidity and well growth. This finding is reinforced by Khan & Sattar (2014) and Ogunbiyi & Ihejirika (2014). The banking spread in the commercial bank is very big and it is able to absorb the variation of the lending interest rate. Additionally, the commercial banks in Malaysia do not wholly depend on the interest income created by the lending interest rate to sustain the bank operation while it also makes investment

in acquiring the return (Khan & Sattar, 2014). According to Ogunbiyi & Ihejirika (2014), the researchers have indicated that the increase in the base lending rate will cause the bank performance to be dropped.

5.2.2 Consumer Price Index

Consumer price index is found to have an insignificant impact on the commercial bank performance before crisis period. This statement can be explained by the sound and positive economy in Malaysia before the crisis, the citizens are not interested in borrowing money from the commercial banks. Besides, the insignificant relationship can be clarified by the commercial banks who issue loan to the businessman using both floating interest rate and nominal interest rate. Before crisis, the interest rate is high and people prefer to spend more; after crisis, people tend to borrow because the base lending rate is adjusted to be lower.

On the other hand, the result shows that there is a significant and positive impact of consumer price index on commercial banks after crisis. This is simply due to the failure of company governance and loose government policies in responding to the core element of financial crisis (Grosse, 2017). There are few core elements of behavioral finance can be used to distinguish the crisis including insufficient guidance of traders in banks and high leverage of nonbank financial institutions that accelerated the crisis (Grosse, 2017).

Furthermore, the significant relationship is supported by studies done by Tan & Floros (2012), Athanasoglou et al. (2008), Guru et al. (2002), Molyneux & Thornton (1992) and Petria et al. (2015). Tan and Floros (2012) have stated that the fully anticipation of inflation will cause a positive effect on commercial bank

performance in a country. Athanasoglou et al. (2008) has achieved the similar result, which also claimed that consumer price index is positively related with banks performance. Besides, consumer price index is considered as one of the vital environment conditions that will affect the bank cost and revenue (Guru et al., 2012). Guru et al. (2012) has also proved that the fully anticipation of inflation is caused by the revenues faster than the cost. In other words, it has caused the inflation to have a positive impact on the bank performance. Lastly, the anticipated inflation will increase the interest rate of loan, and eventually lead an increment in banks profit (Petria et al., 2015). In conclusion, the result that shows significant and positive impact on commercial bank performance is supported by the previous researchers.

5.3 Implication of Study

This study emphasizes on the determinants of commercial bank performance in Malaysia pre and post crisis which can be used as knowledge and information for those related parties such as students, investors, bankers, depositors and future researchers, who are interested on this research. This is simply due to the commercial banks have played an important role in financial markets, which can enhance the economy growth in a country. Therefore, the implication and function of this study will be written in this section.

Apart from that, this study has included both bank-specific characteristics and macroeconomic factors which are very useful to those related parties. For the bank-specific characteristics that influence the bank profitability, bank regulators are able to define whether the bank is well-capitalized or undercapitalized, which

could ensure the safety and soundness of the financial system. The increasing capital will reduce risk by cushioning the volatility of earnings, restricting growth opportunities and lowering the probability of bank failure. Meanwhile, the decreasing capital will increase risk by increasing financial leverage and probability of bank failure. Besides, this study can act as guidelines for the bank managers to make appropriate financial decision and utilize the bank resources efficiently.

Furthermore, the macroeconomics factors such as consumer price index and base lending rate should be taken into consideration by the bank managers in making financial decisions. This is simply due to the inflation rate and lending rate affect greatly on the overall performance of the commercial banks. Moreover, this study facilitates the investors to avoid losses from their investment decisions and maximize their profit. This study also contributes deeper understanding for the government and policy regulators, as they could create few policies to maintain the stability of banking system and thus boost the economy growth in a country.

Last but not least, this study is able to deliver further understanding to undergraduate students for their academic purpose. Additionally, this study acts as useful references to those future researchers who target to survey the determinants that affect commercial bank performance.

5.4 Limitation of the Study

The main challenge in this research is the process of data collection. The monthly data of bank-specific variables for this research is collected from DataStream. As a result, the sample size is small and the number of observation is limited. This is simply because of the data prior to year 2005 in DataStream is not available which the observed time range is short. Thus, the result might contain some errors if compared with the research of longer period.

Furthermore, the studies that measure the bank performance by total loans are rare. Most of the researchers have evaluated the bank performance by referring to the Return on Asset (ROA) or Return on Equity (ROE), while the evaluation of bank performance based on total loan is limited. In addition, this research has targeted all the commercial banks in Malaysia which the number of observations is huge. Additionally, the financial ratio is difficult to compute by using the monthly data obtained from Bank Negara Malaysia. However, the annual data that provided in the annual report of commercial banks can be easier to analyse the bank performance. Besides, the bank performance in the research is measured by total loans, because the main income of banks is derived from loans.

Apart from that, this research has only studied the commercial bank performance in Malaysia. Thus, the implications and findings of this research are only applicable for the future researchers, commercial banks or Central Bank in Malaysia. This is due to different countries have own rules and regulations, country policies as well as country cultures. As a result, the commercial bank performance of other countries might be different. Therefore, this research can only act as source of reference for other countries.

5.5 Recommendation

In this research, the total loan of commercial banks in Malaysia is endogenous to consider the profitability of the bank. For future study, ROA and ROE can be considered as dependent variables to express the bank performance. This is due to the bank performance can be evaluated directly by referring to the ROA and ROE figures if compared to the indirect evaluation based on total loan.

Besides, this research has only used DataStream for data collection. Thus, future researchers are recommended to collect data from World Bank Indicators because World Bank Indicators have more reliable and accurate data. In addition, future researchers require larger sample size and wider time range in order to have an accurate research.

Furthermore, this research has only targeted on the commercial bank performance in Malaysia pre and post crisis period. In fact, there is other financial institution such as Islamic bank that can be studied on. Commercial banks are operated by collecting the deposit from customers and lending with higher interest rate to earn profit; while the riba (interest) is prohibited in Islamic bank according to the principle of Islamic banking. Therefore, the researcher can compare the performance of commercial banks along with the Islamic bank in Malaysia pre and post subprime crisis period.

Besides, the research has proven that one of the exogenous variables which is bank liquidity has no significant impact on the commercial bank performance for both pre and post crisis period. Thus, the future researchers that study on the bank performance are suggested to exclude the bank liquidity as variable in the study. On the other hand, the future researchers are suggested to use Fixed Effect Regression Model (FEM) and Random Effect Regression Model (REM) to run data instead of the ordinary least square (OLS) method. This is due to the FEM and REM model can run more complicated behavioural models such as time-invariant variables.

Moreover, the commercial banks can be categorized into local bank and state-owned enterprise. Most of the countries will list the highly capitalised bank as state-owned enterprise. Therefore, the performance for the bank of state-owned enterprise will be distinguished with other local commercial banks. For future

study, the performance of commercial banks, by categorizing into local bank and state-owned enterprise can be compared for both pre and post crisis period.

5.6 Conclusion

The objective of this research is to figure out the bank-specific and macroeconomic factors that affect the performance of commercial banks during pre and post crisis period in Malaysia. In this research, capital, liquidity, base lending rate, consumer price index and money supply are used to measure the bank performance. The result of data analysis shows that capital, base lending rate, consumer price index and money supply is significant to bank performance, yet liquidity is insignificant to bank performance. The major findings of this study discuss on the difference in the result of base lending rate and consumer price index for both pre and post crisis period. Lastly, this study has provided the limitation and recommendation for future researcher to have a better research.

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APPENDICES

Chapter 4: Chapter Analysis

Appendix 1.1 Initial Ordinary Least Squares from year 2005 to 2007

Dependent Variable: LOAN
 Method: Least Squares
 Date: 06/03/18 Time: 20:50
 Sample: 2005M01 2007M12
 Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAP	0.358254	0.111819	3.203869	0.0032
LIQU	0.053204	0.030311	1.755251	0.0894
BLR	0.203952	0.117829	1.730920	0.0937
CPI	-0.004869	0.012935	-0.376449	0.7092
MO	0.273460	0.069109	3.956963	0.0004
C	5.559034	0.708162	7.849950	0.0000

R-squared	0.938766	Mean dependent var	13.28697
Adjusted R-squared	0.928560	S.D. dependent var	0.068659
S.E. of regression	0.018351	Akaike info criterion	-5.007233
Sum squared resid	0.010103	Schwarz criterion	-4.743313
Log likelihood	96.13020	Hannan-Quinn criter.	-4.915118
F-statistic	91.98490	Durbin-Watson stat	0.976196
Prob(F-statistic)	0.000000		

Appendix 1.2 Variance Inflation Factors from year 2005 to 2007

Variance Inflation Factors
 Date: 06/03/18 Time: 20:51
 Sample: 2005M01 2007M12
 Included observations: 36

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
CAP	0.012504	160928.9	8.699397
LIQU	0.000919	11645.50	2.168759
BLR	0.013884	5201.653	3.553996
CPI	0.000167	20.13585	1.826549
MO	0.004776	55108.74	4.180514
C	0.501493	53609.16	NA

Appendix 1.3 White test from year 2005 to 2007

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

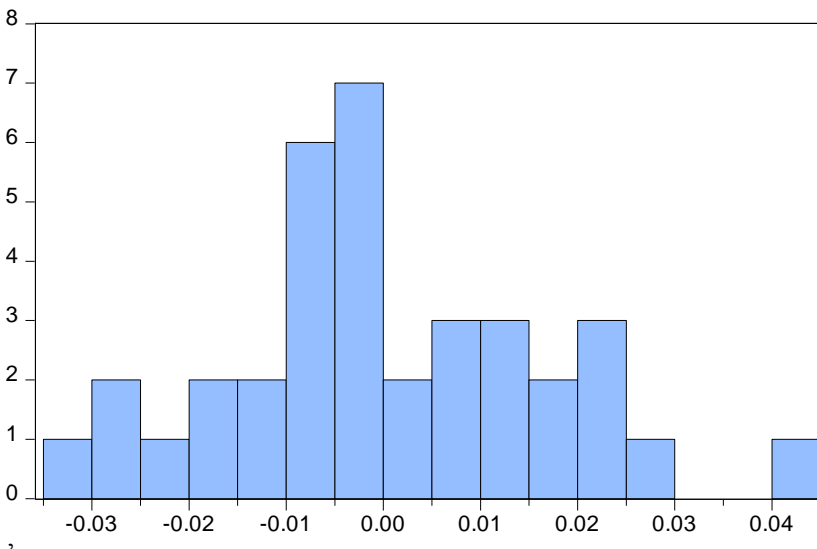
F-statistic	0.889426	Prob. F(5,30)	0.5005
Obs*R-squared	4.647606	Prob. Chi-Square(5)	0.4604
Scaled explained SS	3.077005	Prob. Chi-Square(5)	0.6881

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/03/18 Time: 20:52
Sample: 2005M01 2007M12
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.004462	0.008171	-0.546056	0.5891
CAP^2	6.76E-05	0.000112	0.606012	0.5491
LIQU^2	-2.67E-05	3.08E-05	-0.866023	0.3934
BLR^2	0.000279	0.000717	0.388744	0.7002
CPI^2	-0.000106	0.000160	-0.665406	0.5109
M0^2	-1.01E-05	7.21E-05	-0.139876	0.8897

R-squared	0.129100	Mean dependent var	0.000281
Adjusted R-squared	-0.016050	S.D. dependent var	0.000393
S.E. of regression	0.000396	Akaike info criterion	-12.67851
Sum squared resid	4.71E-06	Schwarz criterion	-12.41459
Log likelihood	234.2132	Hannan-Quinn criter.	-12.58640
F-statistic	0.889426	Durbin-Watson stat	1.981844
Prob(F-statistic)	0.500479		

Appendix 1.4 Normality test from year 2005 to 2007



Series: Residuals
Sample 2005M01 2007M12
Observations 36

Mean -7.15e-16
Median -0.002678
Maximum 0.042917
Minimum -0.033579
Std. Dev. 0.016990
Skewness 0.275634
Kurtosis 2.906740

Jarque-Bera 0.468891
Probability 0.791009

Appendix 1.5 Breusch-Godfrey LM test from year 2005 to 2007

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	8.825193	Prob. F(2,28)	0.0011
Obs*R-squared	13.91913	Prob. Chi-Square(2)	0.0009

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/03/18 Time: 20:53
Sample: 2005M01 2007M12
Included observations: 36
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAP	0.142730	0.096909	1.472836	0.1519
LIQU	-0.031157	0.026226	-1.188023	0.2448
BLR	-0.004353	0.095977	-0.045360	0.9641
CPI	-0.014479	0.011182	-1.294830	0.2060
M0	-0.145501	0.066454	-2.189497	0.0371
C	0.307628	0.585026	0.525837	0.6031
RESID(-1)	0.578504	0.182038	3.177933	0.0036
RESID(-2)	0.264642	0.186454	1.419342	0.1668
R-squared	0.386643	Mean dependent var	-7.15E-16	
Adjusted R-squared	0.233303	S.D. dependent var	0.016990	
S.E. of regression	0.014877	Akaike info criterion	-5.384930	
Sum squared resid	0.006197	Schwarz criterion	-5.033036	
Log likelihood	104.9287	Hannan-Quinn criter.	-5.262109	
F-statistic	2.521484	Durbin-Watson stat	1.840662	
Prob(F-statistic)	0.038256			

Appendix 1.6 Remedies for autocorrelation: The Cochrane-Orcutt two-step
method from year 2005 to 2007

Dependent Variable: RESID01
Method: Least Squares
Date: 06/16/18 Time: 15:04
Sample (adjusted): 2005M02 2007M12
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID01(-1)	0.312639	0.163072	1.917189	0.0636
R-squared	-0.293111	Mean dependent var		0.004256
Adjusted R-squared	-0.293111	S.D. dependent var		0.006562
S.E. of regression	0.007462	Akaike info criterion		-6.929761
Sum squared resid	0.001893	Schwarz criterion		-6.885323
Log likelihood	122.2708	Hannan-Quinn criter.		-6.914421
Durbin-Watson stat	2.088036			

Dependent Variable: LOAN-0.312639*LOAN(-1)
Method: Least Squares
Date: 06/16/18 Time: 15:01
Sample (adjusted): 2005M02 2007M12
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAP-0.312639*CAP(-1)	0.442338	0.126096	3.507947	0.0015
LIQU-0.312639*LIQU(-1)	0.035542	0.025821	1.376462	0.1792
BLR-0.312639*BLR(-1)	0.229793	0.136795	1.679837	0.1037
CPI-0.312639*CPI(-1)	-0.006122	0.014244	-0.429829	0.6705
M0-0.312639*M0(-1)	0.180052	0.065428	2.751921	0.0101
C	3.953872	0.606739	6.516597	0.0000
R-squared	0.897990	Mean dependent var		9.137405
Adjusted R-squared	0.880402	S.D. dependent var		0.045738
S.E. of regression	0.015817	Akaike info criterion		-5.300599
Sum squared resid	0.007256	Schwarz criterion		-5.033968
Log likelihood	98.76049	Hannan-Quinn criter.		-5.208558
F-statistic	51.05729	Durbin-Watson stat		1.175129
Prob(F-statistic)	0.000000			

Appendix 1.7 Ramsey RESET test from year 2005 to 2007

Ramsey RESET Test

Equation: UNTITLED

Specification: (LOAN-0.312639*LOAN(-1)) (CAP-0.312639*CAP(-1)) (LIQU
-0.312639*LIQU(-1)) (BLR-0.312639*BLR(-1)) (CPI-0.312639*CPI(-1)) (M0-0.312639*M0(-1)) C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	2.092386	28	0.0456
F-statistic	4.378077	(1, 28)	0.0456
Likelihood ratio	5.084697	1	0.0241

Appendix 1.8 Best Ordinary Least Square from year 2005 to 2007

Dependent Variable: LOAN-0.312639*LOAN(-1)

Method: Least Squares

Date: 06/16/18 Time: 15:01

Sample (adjusted): 2005M02 2007M12

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAP-0.312639*CAP(-1)	0.442338	0.126096	3.507947	0.0015
LIQU-0.312639*LIQU(-1)	0.035542	0.025821	1.376462	0.1792
BLR-0.312639*BLR(-1)	0.229793	0.136795	1.679837	0.1037
CPI-0.312639*CPI(-1)	-0.006122	0.014244	-0.429829	0.6705
M0-0.312639*M0(-1)	0.180052	0.065428	2.751921	0.0101
C	3.953872	0.606739	6.516597	0.0000
R-squared	0.897990	Mean dependent var		9.137405
Adjusted R-squared	0.880402	S.D. dependent var		0.045738
S.E. of regression	0.015817	Akaike info criterion		-5.300599
Sum squared resid	0.007256	Schwarz criterion		-5.033968
Log likelihood	98.76049	Hannan-Quinn criter.		-5.208558
F-statistic	51.05729	Durbin-Watson stat		1.175129
Prob(F-statistic)	0.000000			

Appendix 1.9 Initial Ordinary Least Squares from year 2009 to 2011

Dependent Variable: LOAN
Method: Least Squares
Date: 06/03/18 Time: 21:02
Sample: 2009M01 2011M12
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAP	0.939322	0.059397	15.81426	0.0000
LIQU	-0.019220	0.022051	-0.871625	0.3903
BLR	-0.189966	0.108853	-1.745151	0.0912
CPI	0.008739	0.003843	2.274088	0.0303
M0	0.105361	0.061704	1.707518	0.0981
C	2.229351	0.388679	5.735711	0.0000
R-squared	0.989312	Mean dependent var		13.66833
Adjusted R-squared	0.987531	S.D. dependent var		0.103747
S.E. of regression	0.011585	Akaike info criterion		-5.927217
Sum squared resid	0.004026	Schwarz criterion		-5.663297
Log likelihood	112.6899	Hannan-Quinn criter.		-5.835102
F-statistic	555.3849	Durbin-Watson stat		1.574285
Prob(F-statistic)	0.000000			

Appendix 2.0 Variance Inflation Factors from year 2009 to 2011

Variance Inflation Factors
Date: 06/03/18 Time: 21:03
Sample: 2009M01 2011M12
Included observations: 36

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
CAP	0.003528	125626.6	8.806372
LIQU	0.000486	17052.24	2.515044
BLR	0.011849	8121.550	1.360873
CPI	1.48E-05	3.435332	1.557706
M0	0.003807	118348.4	8.787189
C	0.151072	40522.91	NA

Appendix 2.1 White test from year 2009 to 2011

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

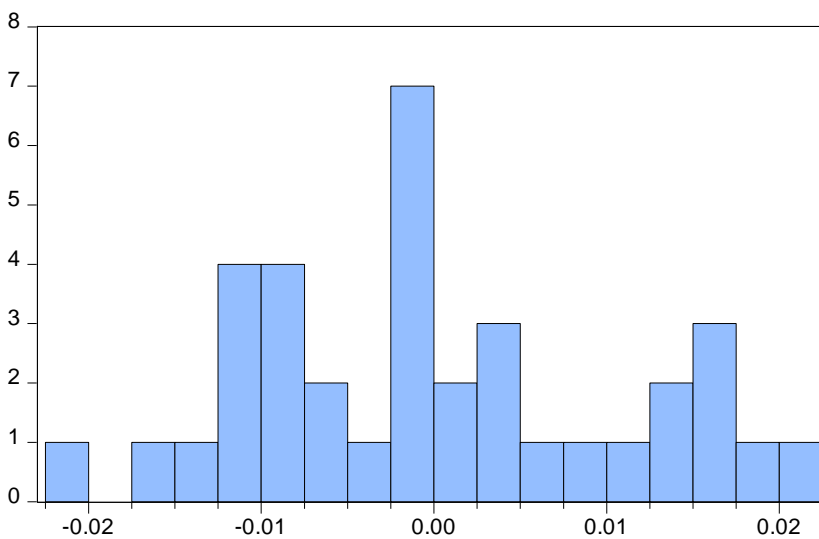
F-statistic	0.638199	Prob. F(5,30)	0.6723
Obs*R-squared	3.461054	Prob. Chi-Square(5)	0.6293
Scaled explained SS	1.582008	Prob. Chi-Square(5)	0.9034

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/03/18 Time: 21:03
Sample: 2009M01 2011M12
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001164	0.002041	0.570490	0.5726
CAP^2	7.45E-06	2.95E-05	0.252153	0.8026
LIQU^2	-1.34E-06	1.02E-05	-0.131680	0.8961
BLR^2	-4.63E-05	0.000389	-0.119101	0.9060
CPI^2	3.75E-05	2.28E-05	1.641101	0.1112
M0^2	-1.54E-05	3.20E-05	-0.480328	0.6345

R-squared	0.096140	Mean dependent var	0.000112
Adjusted R-squared	-0.054503	S.D. dependent var	0.000130
S.E. of regression	0.000134	Akaike info criterion	-14.85181
Sum squared resid	5.36E-07	Schwarz criterion	-14.58789
Log likelihood	273.3326	Hannan-Quinn criter.	-14.75970
F-statistic	0.638199	Durbin-Watson stat	1.884668
Prob(F-statistic)	0.672262		

Appendix 2.2 Normality Test from year 2009 to 2011



Series: Residuals	
Sample 2009M01 2011M12	
Observations 36	
Mean	-1.11e-16
Median	-0.001208
Maximum	0.020902
Minimum	-0.021926
Std. Dev.	0.010726
Skewness	0.257997
Kurtosis	2.316415
Jarque-Bera	1.100307
Probability	0.576861

Appendix 2.3 Breusch-Godfrey LM Test from year 2009 to 2011

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.877681	Prob. F(2,28)	0.4269
Obs*R-squared	2.123752	Prob. Chi-Square(2)	0.3458

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 06/03/18 Time: 21:04

Sample: 2009M01 2011M12

Included observations: 36

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAP	-0.008270	0.060064	-0.137680	0.8915
LIQU	0.010870	0.024011	0.452683	0.6543
BLR	0.029618	0.111672	0.265225	0.7928
CPI	-7.25E-05	0.003865	-0.018751	0.9852
M0	-0.004498	0.062922	-0.071487	0.9435
C	-0.027938	0.391132	-0.071429	0.9436
RESID(-1)	0.199717	0.191507	1.042870	0.3059
RESID(-2)	0.145131	0.207707	0.698730	0.4905

R-squared	0.058993	Mean dependent var	-1.11E-16
Adjusted R-squared	-0.176259	S.D. dependent var	0.010726
S.E. of regression	0.011632	Akaike info criterion	-5.876911
Sum squared resid	0.003789	Schwarz criterion	-5.525018
Log likelihood	113.7844	Hannan-Quinn criter.	-5.754091
F-statistic	0.250766	Durbin-Watson stat	1.927510
Prob(F-statistic)	0.967672		

Appendix 2.4 Ramsey RESET Test from year 2009 to 2011

Ramsey RESET Test

Equation: UNTITLED

Specification: LOAN CAP LIQU BLR CPI M0 C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.273616	29	0.7863
F-statistic	0.074866	(1, 29)	0.7863
Likelihood ratio	0.092817	1	0.7606

Appendix 2.5 Best Ordinary Least Squares from year 2009 to 2011

Dependent Variable: LOAN
 Method: Least Squares
 Date: 06/03/18 Time: 21:02
 Sample: 2009M01 2011M12
 Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAP	0.939322	0.059397	15.81426	0.0000
LIQU	-0.019220	0.022051	-0.871625	0.3903
BLR	-0.189966	0.108853	-1.745151	0.0912
CPI	0.008739	0.003843	2.274088	0.0303
MO	0.105361	0.061704	1.707518	0.0981
C	2.229351	0.388679	5.735711	0.0000
R-squared	0.989312	Mean dependent var		13.66833
Adjusted R-squared	0.987531	S.D. dependent var		0.103747
S.E. of regression	0.011585	Akaike info criterion		-5.927217
Sum squared resid	0.004026	Schwarz criterion		-5.663297
Log likelihood	112.6899	Hannan-Quinn criter.		-5.835102
F-statistic	555.3849	Durbin-Watson stat		1.574285
Prob(F-statistic)	0.000000			