NEAR EAST UNIVERSITY

The Graduate School of Social Sciences

Banking and finance

Masters programme

MASTERS THESIS

The Impact of Monetary Policy on Stock Market in Malaysia

Mohamed SULAYMAN

Nicosia

(2017)

NEAR EAST UNIVERSITY

The Graduate School of Social Sciences

Banking and finance

Masters programme

MASTERS THESIS

The Impact of Monetary Policy on Stock Market in Malaysia

Mohamed SULAYMAN

Supervisor

Assist .Prof .Turgut Tursoy

Nicosia

(2017)

NEAR EAST UNIVERSITY

GRADUATE SCHOOL OFSOCİAL SCİENCES

BANKING AND FINANCE Master Programme

Thesis Defence

Thesis Title: The Impact of Monetary Policy on Stock Market in Malaysia

Prepared by: Mohamed Sulayman

We certify this thesis is satisfactory for the award of the degree of Master of Science in BANKING AND FINANCE

Examining Committee:

Assoc. Prof. Dr. Turgut Tursoy — **Department of banking and finance**
Near East University.

Assoc. Prof. Dr. Nil Gunsel resatoglu — **Department of Banking and Finance**
Near East University.

Assist. Prof. Dr. Behiye cavusoglu — **Department of Economics,**
Near East University.

Approval of Director of Graduate School of Social Sciences

ASS. PROF. DR. MUSTAFA SAĞSAN

ACTING DIRECTOR

DECLARATIONS

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results to this work.

Name, Surname: MOHAMED SULAYMAN

Signature:

ACKNOWLEDGEMENT

In the name of **Allah**, the beneficent, the most merciful. All praise is to **Allah** (SWT) who in his ultimate and bountiful mercy gave me the opportunity to study up to this level. May peace be upon our holy Prophet **Muhammad** (SAW), his companions, and those who follow his path until the Last Day.

First and foremost, I would like express special thanks to my supervisor, ASSIST. **Prof.** TURGUT TURSOY for his guidance and support during my studies here in Cyprus. He has always supported me academically and has given me the best guide ever in my academic life. Working with such respected and inspirational person has been a privilege and has ignited my interest in econometric analysis.

My sincere appreciation goes to the all academic and non academic staff of banking and finance Department, Near East University, for their valuable and commendable helping hand to me. Deep appreciation is extended to **Assist. Prof. Dr. Nil gunseil , Mrs Behiye Tuzel, Mrs berna , , and dr. Karen howels** for doing their best to deliver quality education, and also **Mrs Tijen Özügüney** for their help and for providing me with helpful information during my studentship at Near East University.

I wish to express my respect and appreciation to my parents DR.saad sulayman and DR mabrouka abdaljalil and my entire family for their love, care and protection towards me and courage they have given me throughout my entire life. May Allah (SWT) reward you in abundance.

Special thanks to faisal sher his invaluable generosity. he has been helpful and kind to me right from the day I set my foot in Near East University.

I would like to express my profound gratitude to my colleagues and friends for their help in many ways.

Dedicated with Love to my parents…………….

ABSTRACT

This study examines the impact of monetary policy on the Malaysian stock market using ARDL and VAR techniques over the period of January, 2003 to December, 2016. We use equity index as a measure of activity of the Malaysian stock market. The independent variables include the monetary policy variables MMR, M1, M2, and M3 along with reserve and real exchange rate. All the variables are found to be I(1) after conducting a stationarity test using KPSS, ADF and PP. the result reveals that the variables used in the stock market equation are cointegrated. The money supply variables (M2 and M3) are found to have significant impact on the Malaysian stock market in the long run at 5 per cent significance level. MMR and real exchange rate do not have any significant effect on the market in the long run. The reserve is significant and inversely affecting the Malaysian stock market in the long run. Short run outcome, on the other hand, indicates that reserve and M2 affects the stock market significantly but with a lag. Increase in reserve tends to improve the stock market in the short run. Real exchange and M3 rate also have a significant positive impact on the stock market in the short run, and their impact is instantaneous. Considering that reserve has a negative impact on the stock market in the long run, the government should adopt fixed exchange rate regime in order to curve the negative impact of exchange rate uncertainty that accompanies floating regime. Given that M3 and reserve have instant impact on the stock market, the central bank should pay attention to increasing these two when considering improving the situation of Malaysian stock market in the short run.

Key words: ARDL, VAR, equity index, MMR, M1, M2, M3, reserve, real exchange rate, stationarity test.

ÖZ

Bu çalışma, para politikasının Malezya borsası üzerindeki etkisini ARDL ve VECM tekniklerini kullanarak Ocak 2003 – Aralık 2016 dönemi boyunca incelemektedir. Malezya borsasının faaliyet göstergesi olarak hisse endeksi kullanılmıştır. Bağımsız değişkenler, rezerv ve reel döviz kuru ile birlikte MMR, M1, M2 ve M3 para politikası değişkenlerini içerir. KPSS, ADF ve PP kullanılarak istikrarlılık testi yapıldıktan sonra tüm değişkenlerin I (1) olduğu tespit edilmiştir. Sonuç, borsa denkleminde kullanılan değişkenlerin eşbütünleştiğini ortaya koymaktadır. Para arzı değişkenlerinin (M2 ve M3), uzun vadede Malezya borsası üzerinde yüzde 5 anlamlılık düzeyinde belirgin bir etkiye sahip olduğu bulunmuştur. MMR ve reel döviz kurunun uzun vadede piyasada önemli bir etkisi olmadığı ortaya konulmuştur. Rezerv değişkeni, önemli ve uzun vadede Malezya borsasını ters yönde etkilemektedir. Kısa vadede ise rezerv ve M2 hisse senedi piyasasını önemli derecede- ancak gecikmeli olarak etkiliyor. Rezervin artması, kısa vadede borsayı iyileştirme eğilimindedir. Gerçek döviz ve M3 oranı da kısa vadede borsa üzerinde önemli bir pozitif etkiye sahiptir ve etkileri anlıktır. Rezervin, uzun vadede borsa üzerinde olumsuz bir etki yarattığını göz önüne alındığında, hükümet, dalgalı rejime eşlik eden döviz kuru belirsizliğinin olumsuz etkilerini gidermek için sabit döviz kuru rejimini benimsemeli. M3 ve rezervin hisse senedi piyasasında ani bir etkisi olduğu göz önüne alındığında, merkez bankası kısa vadede Malezya borsasının durumunu iyileştirmek içinher iki değişkeni de artırmaya dikkat etmelidir.

Anahtar kelimeler: ARDL, VAR, hisse senedi endeksi, MMR, M1, M2, M3, rezerv, reel döviz kuru, durağanlık testi.

CONTENTS

NEAR EAST UNIVERSITY .... **Error! Bookmark not defined.**

ABSTRACT... Error! Bookmark not defined.

LIST OF FIGURES .... **xii**

LIST OF TABLES .... **xiii**

CHAPTER ONE **1**

1.1 Introduction 1

1.2 Research Questions 1

1.4 Significance of the Study 2

1.5 Organization of the Study 2

CHAPTER TWO **3**

2.1 Introduction 3

2.2 The Development of Malaysian Stock Market 3

2.3 Malaysian Stock Market Index 4

2.4 Foreign Portfolio Investment in Malaysia.. 5

2.5 Overview of Malaysian monetary policy 6

2.5.1 Pre-liberalization period 7

2.5.2 Post-liberalization period... 7

2.6 Malaysian Monetary Policy Tools 9

2.6.1 Direct monetary instruments 9

2.6.2 The indirect instruments 10

2.7 Theoretical Background: 11

2.7.1 Arbitrage Pricing Theory (APT) 11

2.7.2 Capital Asset Pricing Model (CAPM).. 11

2.7.3 The Stock Valuation Model 12
2.7.4 The monetary portfolio model 13
2.8 Relationship between the stock returns and the monetary policy variables 13
2.8.1 Equitty and MMR 13
2.8.2 KLCI and Money Supply 13
2.9 Transmission Mechanisms of Monetary Policy 14
2.9.1 Transmission through Asset Price 14
2.9.2 Transmission via Interest Rate Channel 14
2.9.3 Transmission through Credit. 14
2.9.4 Exchange Rate Channel 15
CHAPTER THREE 17
LITERATURE REVIEW 17
CHAPTER FOUR 24
METHODOLOGY AND DATA ANALYSIS 24
4.1 Method of Data Collection 24
4.2 Method of Data Analysis 24
4.3 Model Specification 25
4.4 Description of the Variables 26
4.4.1 Equity 26
4.4.2 MMR 26
4.4.3 M1, M2 and M3 26
4.4.4 Real Exchange Rate (REX) 26
4.5 Unit Root Test 27
4.6 ARDL Approach to Cointegration 31

4.7 Empirical Results 32
4.7.1 Unit Root Test Results........ 32
4.7.2 Bounds Test Results 35
4.7.3 Long Run and ECM Models........ 36
4.7.4 Diagnostic Test 40
4.7.4 Stability test 41
4.7.6 The VAR estimate 42
4.7.7 Vector Error Correction Model 44
4.7.8 Impulse response 44
4.7.9 Variance Decomposition 44
4.7.10 Granger Causality 47
4.7.11 The Inverse Root 48
CHAPTER FIVE 49
SUMMARY, CONCLUSION AND FURTHER RESEARCH AREAS 49
5.1 Summary 49
5.2 Conclusion........ 50
5.3 Further Research Areas. 50
REFERENCES........ 52

LIST OF FIGURES

Figure 1. 1: Malaysian Stock Returns ***Error! Bookmark not defined.***

Figure 1. 2: Quarterly Net Portfolio Investment In Million Malaysian Ringgit**.** ***Error! Bookmark not defined.***

Figure 1. 3: GDP and Net of Portfolio investment in Million Malaysian Ringgit. *6*

Figure 1. 4: Money Supply M1, M2 and M3 (USD Millions) from 2006M07 to 2016M08 *8*

Figure 1. 5: Money Market Rate (2004M11 to 2014mM09) *9*

Figure 4. 1: Procedure for Testing for Unit Root *30*

Figure 4. 2: : Plots of Actual and Fitted Values *40*

Figure 4. 3: Plots of Cumulative Sum of Recursive Residuals *41*

Figure 4. 4: Plots of Cumulative Sum of Squared Recursive Residuals *42*

Figure 4. 5: The Impulse Response Graphs *45*

Figure 4. 6: Variance Decomposition Graphs*46*

Figure 4. 7: Inverse Rootsof AR Characteristis Polynomials ***Error! Bookmark not defined.***

LIST OF TABLES

Table 4. 1: Variables and Data Sources *27*

Table 4. 2: Augmented Dickey Fuller test *33*

Table 4. 3: Phillips-Perron Test *34*

Table 4. 4 KPSS Test ***Error! Bookmark not defined.***

Table 4. 5: Bounds test results *35*

Table 4. 6: The Long Run Model *37*

Table 4. 7: The short run model *39*

Table 4. 8: The Unrestricted VAR ***Error! Bookmark not defined.***

Table 4. 9: Cointegration Result *43*

CHAPTER ONE

1.1 Introduction

The Malaysian economy is increasingly getting liberalised, which allows for free inflow and outflow of capital. However this liberalisation has brought with it positive as well as negative effects on the Malaysian stock market. To make this effect favourable, the Malaysian central bank, also known as Bank Negara Malaysia (BNM), engages in using various monetary policy tools such as control of money supply and manipulation of interest rate policy. For this important reason, this study is aimed at investigating the effect of monetary policy on the Malaysian stock market by employing return of Kuala Lumpur Composite Index (KLCI) as dependent variable, with money market rate (MMR), M1, M2 and M3 as independent variables.

1.2 Research Questions

This study attempts to answer the following questions

- How can the relationship between stock returns and monetary policy variables be modelled and also estimated?
- In what ways monetary policy affects stock returns in Malaysia?
- What are the policy implications of the estimates?

These questions are relevant for their answers could serve as a guide on how to implement monetary policy that will be favourable to stock market in Malaysia. Moreover, this study is necessary because answers to these questions and policy recommendations cannot be based on personal opinions.

1.3 Aims and Objectives of the Study

The study focuses on appraising the effect of monetary policy on stock market in Malaysia. Other objectives may include the following;

- To establish suitable modelling technique for estimating the relationship between monetary policy variables and stock return in Malaysia.
- To estimate the relationship between monetary policy variables and stock returns.

- To analyse the policy implications of monetary policy on stock returns and offer meaningful recommendations.

1.4 Significance of the Study

This study seeks to explain how monetary policy affects stock market in Malaysia. It differs from other similar studies conducted on Malaysia in the sense that it measures the variables in terms of US dollars instead of the Malaysian Ringgit. Moreover, this study uses money market rate (MMR) as a measure of monetary policy instead of official rate. In addition to this, the study covers the most recent period as it includes observations of the late 2016. The outcome of this study is expected to change or shape the subsequent academic writing in the subject matter. Therefore, the research findings will add to the examined literatures and knowledge on the subject matter. The outcome of this study could be a reliable guide for Malaysia's monetary policy.

1.5 Organization of the Study

This research consists of five chapters, each of which covers different aspect of the study. Chapter one centres on the general introduction of the research essay. The second chapter covers the theoretical link between monetary policy and stock market. Chapter three will be dealing with previous studies. Chapter four covers methodology and empirical results. The last chapter consists of summary and conclusion of the study, policy recommendations, limitations and further research areas.

CHAPTER TWO

2.1 Introduction

This section is devoted to surveying the theoretical and framework on the relationship between monetary policy and stock market. The aim is to discuss the connection between the stock market variables and monetary policy variables theoretically. This will help us determine the appropriate dependent and independent variables. Moreover this section will give more light on how the variables are related and the constructs used for measuring these variables

It is very essential to note that this survey of literature is limited to the effects of monetary policy variables such as interest rates, money supply and exchange rates on asset prices. We will see in the theoretical literature how these variables are operationalized.

2.2 The Development of Malaysian Stock Market

The establishment of the Malaysian stock market, formerly referred to as Malayan Stock Exchange, could be traced to the year 1960, when public trading of shares officially began. There was of change of name to Stock Exchange of Malaysia in 1964, and to Kuala Lumpur Stock Exchange (KLSE) in 1976. It was also renamed to Bursa Malaysia in 2004. Its fast development is a result of globalization as well as its high level of liberalization (trade opening). It is one of the biggest stock markets in Southeast Asia. For this, it has attracted much attention of not only the academics but also policy makers. The capitalization of Malaysian stock market had been relatively small till 1990. However, increased industrialization in 1980s has brought rapid economic growth in the country. This in turn brought about a rise in the capitalization of Bursa Malaysia (see Yeoh, Hooy & Arsad, 2010).

Two hundred and seventy one (271) companies were in listed in the Kuala Lumpur Stock Exchange, with a combined market capitalization of $47.87 billion in 1990 (Yeoh, Hooy & Arsad, 2010).

There were 986 listed companies in 2007 but the number dropped to 976 in 2008 obviously due to the global financial crisis. Currently there are 806 listed in Bursa Malaysia[1]

2.3 Malaysian Stock Market Index

For the purpose of this study, we use Kuala Lumpur Stock Index (KLCI), or KLSE. The FTSE Bursa Malaysia KLCI is a capitalization-weighted stock market index compiled for the thirty largest companies on the Bursa Malaysia. The composition of these companies is based on Ground Rules of the FTSE Bursa Malaysia Index.

(kuala lumpur composite index return)

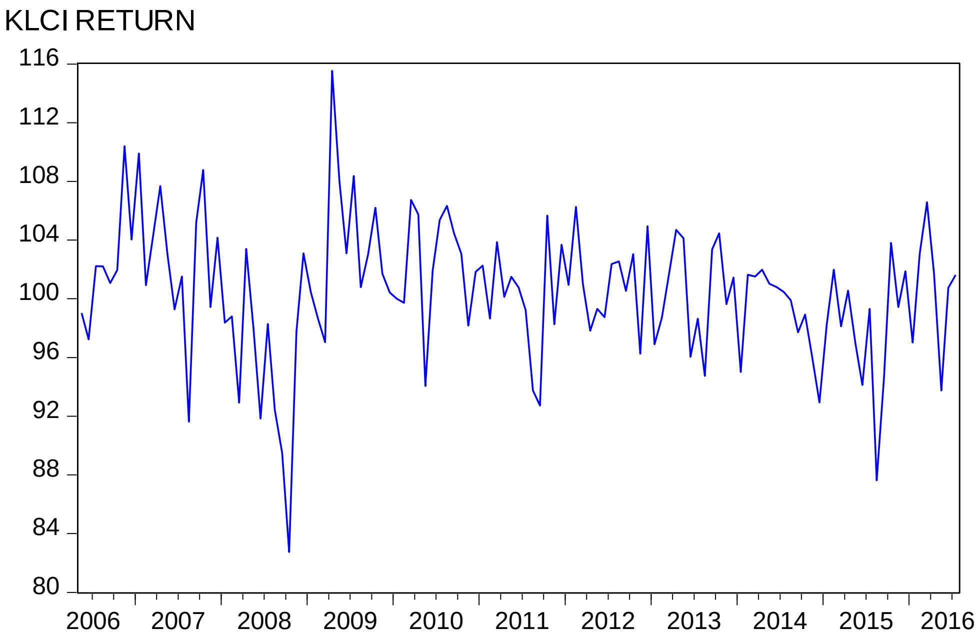


Figure1. 1: Malaysian Stock Returns

Source : bursa Malaysia

Figure 1.1 illustrates the movement of the Malaysian stock returns from May 2006 to July, 2016. The minimum return was 82.7 in August 2008, while the maximum return was 115.5 in April 2009. The movement of these variables reflects the impact of Global Financial Crisis of 2008/2009.

[1] See http://www.bursamalaysia.com/market/listed-companies/list-of-companies/main-market for details.

Aizenman and Sun (2009) argue that economies with a more sound stock market performance absorb the negative impact of sudden and unexpected capital flight and exchange rate depreciation that accompany the global financial meltdown to a larger extent.

2.4 Foreign Portfolio Investment in Malaysia

Malaysia recorded its lowest net portfolio investment of -53,607 million Malaysian Ringgit in the third quarter of 2008. This reflected the global financial crisis in the year. The largest net portfolio investment was recorded in the second quarter of 2011. The amount is 48,036.00 million Malaysian Ringgit which is equivalent to 21.43 per cent of the gross domestic product of that quarter.

(net foreign portfolio investment)

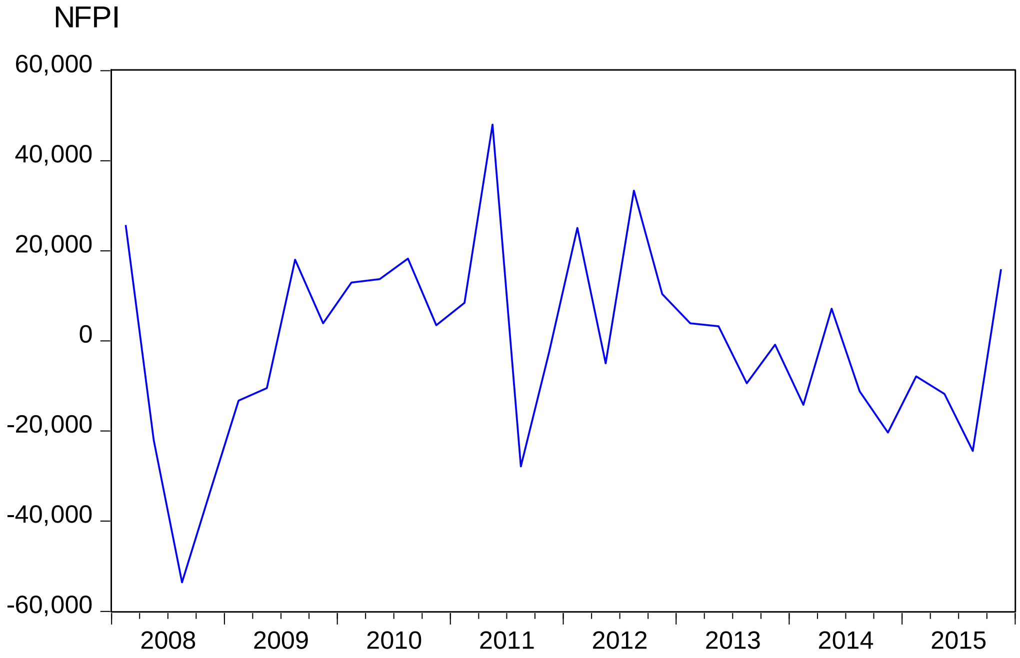


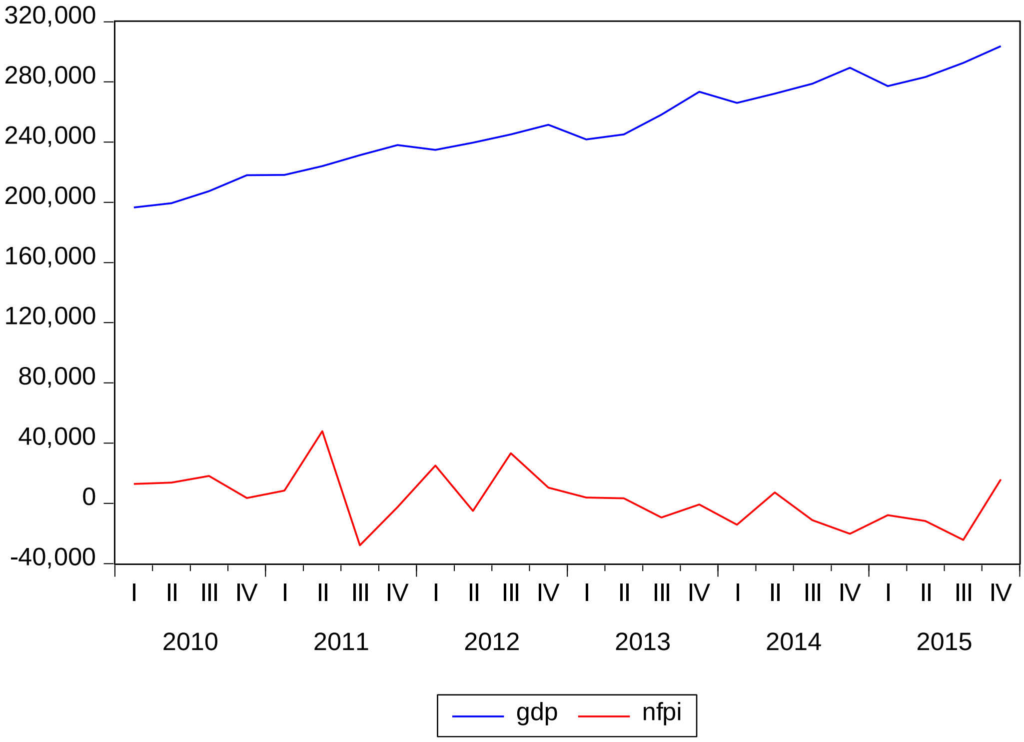
Figure1. 2: Quarterly Net Portfolio Investment In Million Malaysian Ringgit .

Source :(World Bank)

The figure also reveals that Malaysia has been recording deficit right from the 3rd quarter of year 2013 up to the 3rd quarter of 2015, with only exception of the second quarter of 2014 where the net portfolio investment was positive. This could be attributable to the stable low interest rate adopted by the Malaysian Central Bank. This does not augur well for the economy. However the net portfolio investment jumped from a negative of -24405.68521 in the third quarter of 2015 to a positive of 15887.16647 in the fourth quarter of the same year. This jump could be partly explained by the rise in the interest rate in the late 2014. With efficient monetary policy, this trend can be changed in favor of the country.

Figure 1.3 depicts the movement of Gross domestic product and net portfolio investment over the period of 2010 to 2015. There seems to be a negative correlation between Gross Domestic product and net portfolio investment from the third quarter of 2012 up to the third quarter of 2015.

Malaysian GDP and net foreign portfolio investment)



Source : (international financial statistics , world banks)

Figure 1. 1: GDP and Net of Portfolio investment in Million Malaysian Ringgit.

2.5 Overview of Malaysian monetary policy

The genesis of implementation Malaysian monetary policy can be categorized into two main time stamps; the first is the period before liberalization and the second one is the period after liberalization (border opening) (Ngah, Saini, Habibullah, & Mohamed, 2000). This categorization plays an important role in explaining the implementation of monetary policy in Malaysia.

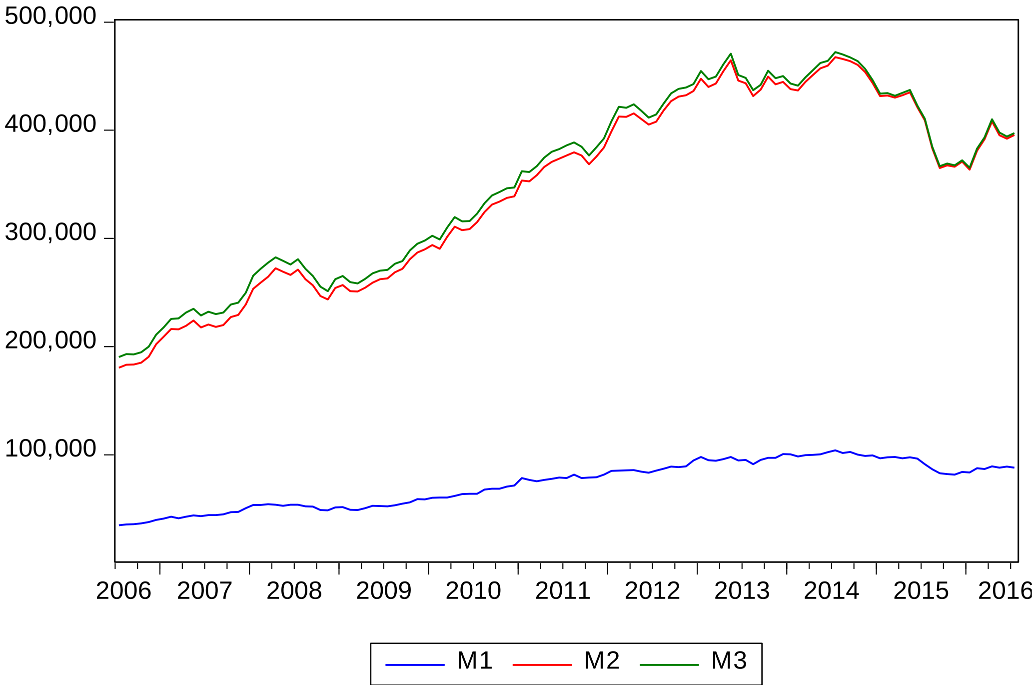
2.5.1 Pre-liberalization period

Monetary policy during this period involved first decade after independence (1957), during which development of integrated financial system was of utmost importance for the Malaysian monetary policy. Promotion of the banking system promoted in 1970's led to increase in the demand for banking services, as it was evident in the significant increase in financial loans. Bank Negara Malaysia (BNM) performs its duties through controlling money supply and loans of financial institutions with the help of various monetary policy tools. These tools include statutory reserve requirement, volume and distribution of credit, moral suasion, interest rate, minimum liquidity requirement (Mohamadpour, Behravan, Espahbod and Karimi, 2012).

2.5.2 Post-liberalization period

On the other hand, Malaysia pursued monetary policy after opening its borders. This period began in the year 1978. There are also two stages in the implementation of monetary policy during this period; the first stage coincided with the moving maturity period of the monetary policy which lasted for a decade from 1979. The second stage began during a period of challenge from 1989 to 1995. Commercial banks were allowed to fix the rate of interest at their own discretion but based on the cost of loan. This same period saw the significant reduction in Minimum Lending Rate and elimination of credit quotas. However, Bank Negara Malaysia was responsible for supervising mortgages and the loans meant for setting up businesses. During 1979 to 1988, inflation and interest rate for banking sectors stood and 3.7 per cent 11.54 per cent respectively. These were the highest rates since independence. In addition to this, there was significant reduction in the growth of money supply. In other words, Bank Negara Malaysia pursued contractionary monetary policy with the aim of rectifying the effect of global economic crisis that occurred in 1980s. However, during the second stage of 1989 to 1994, Malaysia witnessed incredible economic growth rate of 8.6 per cent on average.

Bank Negara Malaysia responded to this situation of increased money demand by pursuing expansionary monetary policy (Ngah, Saini, Habibullah, & Mohamed, 2000). Bank Negara Malaysia controls interest rate and three Monetary aggregates which include M1, M2 and M3 as monetary policy instruments in Malaysia.



Source : (international financial statistics)

Figure 1. 2: Money Supply M1, M2 and M3 (USD Millions) from 2006M07 to 2016M08

Figure 4 indicates that M1 is quite stable over the period, but M2 and M3 indicate an upward trend (increase in money supply) till August of 2014. The two show a downward trend (decrease in money supply) afterwards.

Figure 1.5 depicts how the Malaysian Central bank sets the money market rate. The highest is 3.52 per cent in September 2004 and the lowest is 2.00 per cent over the period of March 2003 to February 2010.

Malaysian money market rate

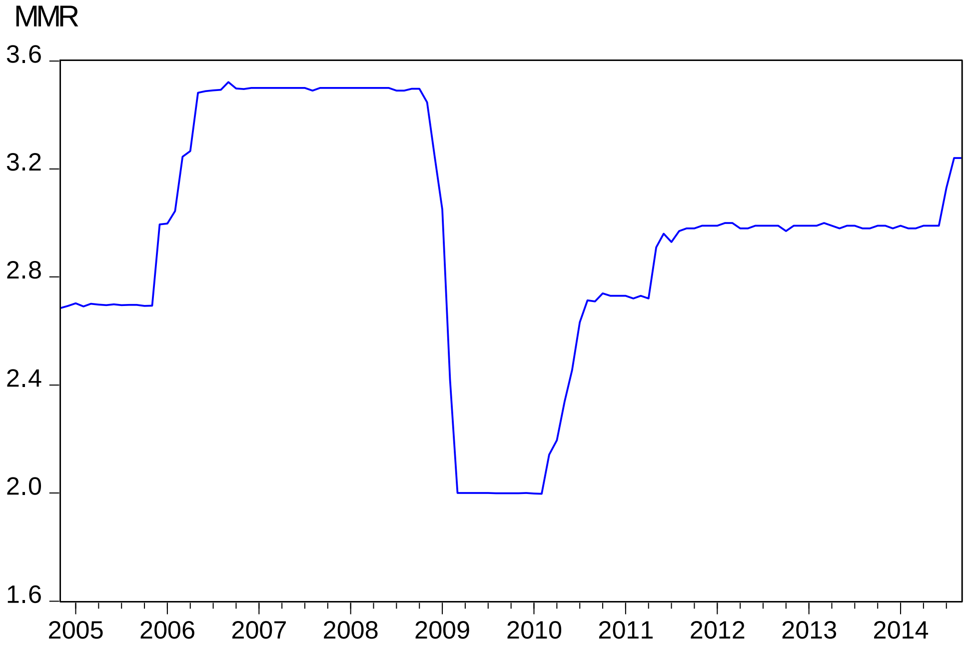


Figure 1. 3: Money Market Rate (2004M11 to 2014mM09)

Source : international financial statistics

2.6 Malaysian Monetary Policy Tools

To achieve economic growth, favorable balance of payment and price stability, sound macroeconomic policies are needed, monetary policy is one of the two major policies. However, the ultimate aim of the monetary policy is to achieve some national objectives through the use of such economic variables as money supply and interest rate (Handa, 2009). These goals could be achieved through the use of monetary policy instruments which are broadly categorized into two: direct and indirect instruments.

2.6.1 Direct monetary instruments

Some of the direct instruments of monetary policy include;

- Selective credit control

This involves fixing maximum amount of credit and setting ceilings on the sectorial distribution of loan by the apex bank (Handa, 2009). This could come in various forms which include imposition of ceilings on deposits for individuals as well as for organization.

- Direct regulation on interest rate

This regulation involves setting of deposit and lending rates that guides the range within which financial institutions are expected to charge.

- Moral suasions

Moral suasions implies the situations whereby the central bank undertake subtle appeals to financial institutions through bank committee and other channels of communication to briefly correct, compel and give guidelines to commercial banking operators (Handa, 2009).

2.6.2 The indirect instruments

The indirect instruments, on the other hand, also called the market weapons are;

- Open Market Operations (OMO).

Open market operations mean nothing but the purchase or sale of government securities or treasury bills with the sole aim of controlling the base money or its components that ultimately affects the reserve balance of financial institutions.

- Reserve Requirement

Reserve requirement means the minimum amount of eligible liquid asset that financial institutions, specifically banks, must have in proportion of total deposit liabilities. This is designed with the aim of protecting customers' deposits by ensuring some minimum level of bank liquidity (Abdullahi, 2014).

- Discount rates.

Discount rate is interest rate at which future payments and receipts are discounted to find their present value. In other words, it is the price offered by the owner of financial securities to the apex bank for transforming the securities into cash. The aim of this is to determine the cost and availability of loanable fund and hence, the supply of money in the economy. The central bank’s ability to apply this policy points to its role as the lender of last resort (Ibeabuchi et al, 2007, via Abduallah, 2014).

2.7 Theoretical Background:

This section discusses the some of the theories and models developed in order to explain the relationship or link between monetary policy and stock market.

2.7.1 Arbitrage Pricing Theory (APT)

This study is grounded on Arbitrage Pricing Theory (APT), which postulates that the return of asset is expected to have a linear relationship with several macro-economic variables or factors. Since monetary policy is aimed at stimulating macroeconomic variables, then APT is the most appropriate theory that provides the connection between monetary policy and the performance of stock market. Some of the variables in APT price level, interest rate an inflation rate (Vickers, 1999).

Mathematically,

$$r = \alpha + \beta F + \varepsilon$$

Where α is a constant, F is a column vector that contains various factors (macroeconomic variables), ε is a column vector which is made up of random variables, r signifies the expected return of asset. The expected value of the model is given by E[r] = α (Huberman and Wang, 2005)

Asset prices have an influence on the investment decision of the public, for example; lower stock prices increases the cost of equity financing, which negatively affects investment growth (Issing, 2009).

2.7.2 Capital Asset Pricing Model (CAPM)

The capital asset pricing model attributed to William Sharpe (1964) and John Lintner (1965) laid the foundation of asset pricing theory. Prior to the development of CAPM there was no model that could be used to test and predict risk and return. The application of CAPM is still wide and is employed to evaluate the cost of equity capital for organisation and analyse the performance of managed portfolios (Fama & French, 2004).

Assets are priced according to their systematic estimation risk and systematic intrinsic risk. One of the assumptions of this model is that risk premium and volatility depend on information.

2.7.3 The Stock Valuation Model

The Stock Valuation Model is the best model for explaining the factors that influence average price of stock of all companies (Keran, 1971). In other words, the essential factors in the individual case tend to die out in the aggregate. Based on this, a model can be developed according to the standard formula for the estimation of a single stock (Ibrahim, 2009). The model for determining and explaining the intrinsic value of the sum-total of all stocks can be written algebraically as follows:

$$PVS_t = \frac{ED_{t+1}}{(1+r)} + \cdots + \frac{ED_{t+n}}{(1+r)^n} + \frac{ESP}{(1+r)^n}$$

where PVS_t signifies the present value of the stock at time t, ESP is the expected stock price, ED is the expected dividend and r is the expected rate of return, t stands for time (day, week, month or year) and n is the frequency of the stock valuation .

From this model, we can establish a connection between monetary policy and stock prices. For example, if we hold ED constant, increase in money supply leads to decrease in the rate of return thereby increasing the present value of the stock, and the reverse is true. In other words increase in money supply has positive relationship with present value of the stock. Similarly, there is inverse relationship between the present value of the stock and interest rate.

The above equation is in discrete form (difference equation). Expressing the model as a continuous form (differential equation), Cross (1984) simplifies the stock valuation model as follows:

$$PVS_t = \frac{\sum ECE_{t+I}}{(1+r)^i}$$

Where ECE stands for expected corporate earnings.

The above equation is trying to link monetary policy and expected corporate earnings. In other words, the stock price stands for the discounted present value of the firm's expected future cash flows (Ibrahim, 2009; Ibrahim, 2000; Ibrahim and Wan Yusof (2001).

2.7.4 The monetary portfolio model

Some of the pioneers of this model include Brunner (1961), Friedman (1961), Friedman and Schwartz (1963) and Cagan (1972). However, propagation of the model is attributable to Rozef (1974) (see Ibrahim, 2009, p.51)

This model explains how an investor reaches an equilibrium whereby he holds a number of assets apart from money in his portfolio of assets. The investors' decision whether to substitute between money and other financial assets is influenced by money supply shocks. Rozef (1974) postulates that there is a lag between investors' response and the impact of money growth. In short, this model is saying that the impact of money growth on stock market is positive.

2.8 Relationship between the stock returns and the monetary policy variables

This section evaluates the theoretical and empirical relationship between the stock returns and the monetary variables one by one.

2.8.1 Equitty and MMR

Based on the Stock Valuation Model, there should be a negative relationship between the stock return (equity index) and the MMR. For this, we can have the following hypothesis:

Hypothesis 1: There is an inverse or a negative relationship between the stock return (equity index) and MMR.

2.8.2 KLCI and Money Supply

Increased money supply means increase in economic activity, which translates into increase in stock returns. In other words, a positive relationship is expected between equity index and money supply. Maysami, Lee & Hamzah (2004) confirms this relationship. Hence we have the second hypothesis;

Hypothesis 2: There is a positive relationship between the money supply M1 and Malaysian stock return (equity index)

Hypothesis 3: There is a positive link between the money supply M2 and Malaysian stock return (equity index).

Hypothesis 4: A positive relationship holds between the money supply M3 and Malaysian stock return (equity index).

2.9 Transmission Mechanisms of Monetary Policy

Mishkin (1996) identifies the channels of transmitting monetary policy transmission as follows:

2.9.1 Transmission through Asset Price

This assesses the transmission of monetary policy through the wealth effect on consumption, which is linked to Life cycle Model of Modigliani (1963). The Life Cycle Model explains consumption expenditure as a function of the resources accumulated over lifetime, and these resources include inheritance, savings, human capital and real capital. Contractionary monetary policy will diminish the supply of money, making public poorer. This in turn reduces the value of saving as well as the consumption. The reverse is true. In other words, more money supply leads to higher price of equities, more wealth, more consumption and higher national income.

2.9.2 Transmission via Interest Rate Channel

This channel serves as the foundation of basic Keynesian IS-LM model in macroeconomics. This transmission channel is used to explain how increase in money supply can cause a fall in the interest rate, which in turn leads to a rise in investment. In relation to the stock market, the fall in the interest rate means higher present value of stock.

2.9.3 Transmission through Credit.

The transmission channel of monetary policy is an indirect augmentation mechanism that works simultaneously with the interest rate channel. Therefore, the credit channel is not a separate, standalone substitute for the traditional monetary policy transmission mechanism; it could be seen as a supplement of the interest rate channel (Bernankeand Gertler, 1995).

There are two categories of credit channel: Bank lending and Balance sheet channel

2.9.3.1 Bank lending Channel

The basic intuition pertaining to this channel is that banks are the back bone of financial system because of their role of mobilizing deposits as well as making loans accessible for which close substitutes are very rare.

Higher money supply makes more funds available in deposit banks, thereby enabling them to grant more loans. This will increase investment and the value of financial returns.

$$M\uparrow \ldots\ldots \text{ Loanable funds}\uparrow \ldots . I\uparrow \ldots\ldots \text{Value of the stock returns}\uparrow$$

The scheme above shows that as a result of expansionary/contractionary monetary policy leads to increase/decrease in the value of the stock returns. In short, there is positive relationship between credit and the value of stock.

2.9.3.2 The balance sheet channel

This form of transmission via this channel implies that the size of premium of the external finance should, in principle, be negatively correlated with the net worth of the borrower. Therefore, agents with higher net worth could present more collateral to put up against the funds they need and they are therefore in a better position to get fully collaterised than agents with low net worth. For this, lenders assume less risk when lending to agents with high net worth and also presumes lower agency.

2.9.4 Exchange Rate Channel

Exchange rate channel takes into consideration the effects of interest rate. When domestic real interest rate rises above the foreign real interest rate, domestic currency becomes more attractive compared to foreign currencies leading to appreciation of domestic currency compared to the foreign one. The higher value of the domestic currency makes domestic goods less attractive as they become more costly than the foreign ones thereby leading to a decrease in net economic activities. Eventually exchange rate, price of foreign currency expressed in terms of domestic currency, affects stock market negatively.

$$ir\uparrow \ldots\ldots Exch\downarrow \ldots\ldots stock\ price\downarrow$$

The above scheme shows how contractionary/expansionary monetary policy leads to a rise/fall in the domestic interest rate which makes exchange rate to increase/fall.

CHAPTER THREE

LITERATURE REVIEW

Throughout the recent literature on monetary policy and stock market, there exists a general consensus that interest rate exert negative impact on equity returns (Brown and Karpavičius, 2016; Ioannidis & Kontonikas, 2008; Rigobon & Sack, 2004; Bernanke & Kuttner, 2005; and Kim, 2002).

Empirical studies use various econometric techniques to estimate the relationship between monetary policy and stock market. Some of the techniques include Vector Autoregressive (VAR) model, Vector error correction model (VECM), Autoregressive Distributed Lag (ARDL), OLS, Correlation analysis, Granger Causality and so on.

Some of the studies that employed VAR include Cassola and Morana (2004), Crowder (2006), Dufour & Tessier (2006) and Bjornland (2009). Ioannidis and Kontonikas (2008) employ regression analysis to estimate the relationship between the monetary variables and stock market variable.

Several studies related to impact of money supply on stock market find mixed results Hayo and Niehof (2011), Hussain (2011), Angeloni and Ehrmann (2003) report positive impact of monetary policy on stock market. Few studies on the other hand do not any significant relationship between monetary easing and stock prices (see Fiordelisi et al., 2014; Bredin et al, 2009).

Measuring and modeling monetary policy appropriately has always presented a great deal of challenge in evaluating the impact of monetary policy. Some of the previous studies have used four ways to measure monetary policy changes (Karim & Zaidi, 2015)... First, some studies modelled monetary shock with the help of Structural VAR (SVAR) approach (Bjarmaland and Leitemo, 2009; Lastrapes, 1998; Thorbecke, 1997; and Patelis, 1997). Second, Some studies use changes official rates or market interest rates to measure the monetary policy (Jensen and Mercer, 2002; Quiros and Timmermann, 2000). Third, some studies employ event study methodology to model the monetary policy. This gives room for analysis of higher frequency data such as quarterly or monthly series (Basistha and Kurov, 2008; Bredin, Hyde, Nitzsche and O'reilly, 2007; Ehrmann and Fratzscher, 2004; Kuttner, 2001). Fourth, some studies uses the presence of hetroscesdascity in the high-frequency data to model the monetary policy (see for example Caporal, Cipollini and Demetriades, 2005; Rigobon and Sack, 2004; Rigobon, 2003)

Karim and Zaidi (2015) provide new empirical evidence on the impact of monetary policy shocks on equity returns in Malaysia using firm-level data of 449 firms. The study covers the panel period of 1990–2008, and employ augmented Fama-French (1992, 1996) multifactor model. Based on system GMM estimations, the study reveals that firms' stock returns react negatively to monetary policy shocks. In addition to this, the study establishes that the effect of domestic monetary policy shocks have significant impact on small firms' equity returns but insignificant on large firms' stock returns. The study also finds the effect of international monetary policy to have significant impact on equity returns of large firms but insignificant on the small firms' equity returns. In other words, the study reveals that domestic monetary policy has impact on small firms' equity returns only, while international monetary policy has effects on large firms only.

Pennings and Ramayandi (2011) conducted their study on Canada, Australia, United Kingdom, New Zealand, Korea, Indonesia, Thailand and Malaysia during financial crisis. The outcome of the study confirms the effectiveness of monetary policy on financial market in these countries.

Using data from Singapore and Malaysia for the period 1988–1996, Lau, Lee & McInish (2002) study the relationship between stock returns and beta, size, the earnings-to-price ratio, the cash flow-to-price ratio, the book-to-market equity ratio, and sales growth. In other words, this study ignores the role of monetary variables in influencing the stock market.

Tsen (2017) studies the relationships between real exchange rate returns and real stock price returns in Malaysia, the Philippines, Korea, Japan, Singapore, the United Kingdom, and Germany. The study employs constant conditional correlation (CCC) or dynamic conditional correlation (DCC)-multivariate generalized autoregressive conditional heteroskedasticity (MGARCH) model. The relationship shows that real exchange rate return and real stock price return are found insignificant for Japan, Germany and the Philippines, but negative and significant for Korea, Singapore, and Malaysia.

Mohamadpour et’al (2012) investigates the relationship between monetary policy and the performance of stock market for sample of quarterly data from 1991 to 2011 in Malaysia. The independent variables in this study include real interest rate, M1, M2, and M3. The study also uses the returns Kuala Lumpur Composite Index (KLCI) as exogenous variable. Based on Vector Error Correction Model (VECM), M1 and M2 are found to affect Kuala Lumpur Composite Index significantly in the long run.

Ibrahim (2009) analyses the interaction between exchange rate and stock prices in Malaysia using Cointegration and Granger Causality test by using three measures of exchange rate, M2 and reserve as exogenous variables. Without M2 and reserve, estimation shows no sign of cointegration. This means money supply and reserve are very vital in determining the long run relationship between exchange rate and stock market.

Habibullah & Baharumshah (1996) determines the importance of macroeconomic variables in such as money supply and output in predicting stock prices in Malaysia with the help Monthly data from January 1978 to September 1992. The dependent variable is the stock price indexes in the form of Composite, Industrial, Finance, Property, Plantation and Tin. While the independent variables include M1, M2 and real Gross Domestic Product. The outcome of the study implies that Malaysia's stock market has positive correlation with money supply and output.

Allen and Cleary (1998) reports the outcome of a series of tests of factors affecting returns in the Malaysian Stock Market. The period of the study runs through 1977 to 1992. However this study also does not account for monetary variables.

Ioannidis and Kontonikas (2008) find a significant impact of monetary policy on stock market, after conducting a study on 6 member countries of Organization for Economic Co-operation and Development (OECD) for the period spanning 1972 to 2002.

Another study on the monetary policy and stock market relationship was conducted by Dufour and Tessier (2006). Their findings indicate that monetary policy has no significant impact on the stock market return in United States. According to outcome of their study, monetary aggregates affect income and inflation in long run. There are some findings which reveal the relationship between money supply; inflation and GDP in Canada (see Mohamadpour et’al, 2012)

Bohl, Siklos and Sondermann (2008) investigate the response of stock markets to unexpected interest rate vagaries in European countries. Their study shows a significant relationship between unanticipated interest rate changes and the stock market indices.

Chortareas, Nankervis and Noikokyris (2010) examine the influence of monetary policy on stock return before in UK (1982 to 2010). The study establishes a negative relationship monetary policy and assets before the implementation of targeting policy

Ioannidis and Kontonikas (2006) employ regression technique to examine the impact of monetary policy on stock returns in thirteen (13) OECD countries over the period of January 1972 to July 2002. The findings of the study show that monetary policy shifts significantly affect stock returns.

Tursoy, Gunsel and Rjoub (2008) ground their study on APT to analyses the impact of macroeconomic variables on Istanbul Stock Market. The study employs monthly data on money supply (M2), export, gold price, crude oil price, consumer price index (CPI), exchange rate, interest rate, gross domestic product (GDP), industrial production, import, foreign reserve, unemployment rate and market pressure index (MPI) from February 2001 to September, 2005, as exogenous variables. The econometric technique employed is ordinary least square method (OLS) on stock returns of eleven industry portfolios.

Valera, Holmes, & Hassan (2016) analyses the stock market uncertainty and interest rate behavior with the help of panel GARCH approach over the period 1994:Q1–2015:Q1 for 10 Asian countries. The study establishes a significant positive relationship between stock market uncertainty and interest rate volatility. Other independent variables include CPI and GDP.

Ho (2017) examines the factors affecting the stock market development in Malaysia using annual data from1981 to 2015. The study explore the effect of banking sector development, economic performance, inflation rate, foreign direct investment and trade openness on the development of Malaysian stock market. Using the ARDL bounds testing procedure, the study contends that economic performance and trade openness have positive long-run impacts, whereas banking sector development has a negative long-run impact on stock market development

Miyakoshi, Shimada, & Li (2017) examines the impact of monetary policy of the United States, European Union and Japan on the stock prices of eight Asian Emerging Markets (AEMs) over the period of 2001–2016, which reflect different periods of quantitative easing (QE) policies. The study employs VAR models to reveal that the QE policy has positive impact on stock prices of the AEMs. The study further confirms that financial integration and interest differentials are very important mechanisms in the transmission of monetary policy.

Huang, Rollick & Nguyen (2016) uses weekly data from January 3, 2003 to March 27, 2015 in order to investigate the responses of U.S. stock returns to monetary policy. Based on Vector auto-regressions (VARs), the outcome of the study suggests significant linkages.

Bahmani-Oskooee and Saha (2016) contends that Exchange rate changes effect depends on whether firms are export-oriented or they rely heavily on imported inputs. In addition, the study uses Nonlinear ARDL approach to cointegration and error-correction model in order to investigate symmetric and asymmetric effects exchange rate changes on stock prices. Based on monthly data from Brazil, Canada, Chile, Indonesia, Japan, Korea, Malaysia, Mexico, and the U.K., the study finds Asymmetric effects of exchange rate on stock prices.

Torso (2017) investigates the interaction between real exchange rates and stock prices and with the help of monthly data from Turkey for the period spanning January 2001 to September 2016. Using autoregressive distributed lag (ARDL) model and the Error Correction Model (ECM), the study reveals the evidence of strong long-run cointegration. The Granger causality test reveals bidirectional causality between stock prices and real exchange rates in the long-run, and also a short-run unidirectional causality from the real exchange rates to the stock prices.

Table 3. 1: Summary of Previous Studies

Study	Country	Series	Methodology	result
Karim and Zaidi (2015)	Malaysia	Panel1990-2008 (A)	GMM	Mixed result
Pennings and Ramayandi (2011)	Malaysia and other 7 countries		OLS	Positive effect
Tsen (2017)	Malaysia	1985 to 2015 (Q)	CCC, MGARCH	Mixed outcome
Mohamadpour et'al (2012)	Malaysia	1991 to 2011 (Q)	VECM	Positive effect
Ibrahim(2009)	Malaysia	1995 to 2004 (m)	Johansen cointegration and Granger Causality	Positive effect
Habibullah & Baharumshah (1996)	Malaysia	1978 to 1992(m)	Cointegration test	stock market is informationally efficient with respect to money supply
Allen and Cleary (1998)	Malaysia	1977 to 1992 (A)	nonparametric tests	Strong effect
Ioannidis and Kontonikas (2008)	OECD	1972 to 2002(M)	OLS	Significant positive effect
Dufour and Tessier (2006).	USA		VAR	No Significant positive effect
Chortareas, Nankervis and Noikokyris (2010)	UK	1982 to 2010 (M)	OLS, EGARCH	Negative effect
Tursoy, Gunsel and Rjoub (2008)	Turkey	2001 to 2005 (M)	OLS	Money supply is significant
Valera, Holmes, & Hassan (2016)	Asian countries	1994 to 2015 (Q)	GARCH	significant positive relationship
Ho (2017)	Malaysia	1891to 2015 (A)	ARDL	Positive impact
Miyakoshi, Shimada, & Li (2017)	USA,EU and Japan	2001–2016 (M)	VAR	Positive impact
Huang, Rollick & Nguyen (2016)	USA	2003 to 2015 (W)	VAR	Significant relationship
Bahmani-Oskooee and Saha (2016)	Malaysia and 8 other countries		Nonlinear ARDL	Asymmetric effect of exchange rate.
Torso (2017)	Turkey	2001 to 2016 (M)	ARDL, Granger Causality	bidirectional causality between stock prices and real exchange rates

Source : author

Based on the literature survey, we realize that it will be a good idea if the macroeconomic variables are expressed in US dollars rather than the local currency. Moreover using ARDL approach to estimate the relationship between monetary policy and stock, based on monthly data, will provide a good insight. Therefore, instead of using exchange rate as an independent variable, this study will use it to convert variables measured in local currency into US dollars. We use the US dollars because it provides a universal yardstick for international comparison.

Therefore this study will use such monetary policy variables as interest rate, money supply (M1, M2, and M3, measured in US dollars) as independent variables. The returns of Kuala Lumpur Composite Index (KLCI) will be used as the dependent variables.

CHAPTER FOUR

METHODOLOGY AND DATA ANALYSIS

4.1 Method of Data Collection

The study will employ monthly time series data estimation technique, from January 2003 to December 2016, in order to empirically examine the effect of monetary policy on stock in Malaysia. The choice of the sample period and the frequency of data is governed by the data. The data for each of the variables were obtained from secondary source: the International Financial Statistics (IFS) database (http://elibrary-data.imf.org/FindDataReports.aspx)

4.2 Method of Data Analysis

This study investigates long-run and short-run relationships between monetary policy variables and the Malaysian stock market using ARDL approach and equilibrium correction mechanism (ECM). The approach is appropriate given the fact it gives room for testing for cointegration regardless of whether the regressors are individually I(1) or I(0) (Pesaran, Shin and Smith, 2001). The bounds test is conducted by testing the null hypothesis that there exists no long run relationship in levels against the alternative of hypothesis of long run relationship. The can be performed among the included variables, irrespective of whether the regressors are purely I(0), purely I(1) or mutually cointegrated (Pesaran, Shin and Smith, 2001). Put differently, the approach makes possible the mixture of I(0) and I(1) variables unlike the Johansen Co-integration Technique, which is limited to application on the variables of the same order of integration.

All the variables in this study become stationary at the first difference. In technical term, all the variables are I(1), or first difference stationary. Among the advantages of ECM over other estimation techniques is that it includes both the short-run information and the long-run dynamics.

To determine the suitability of using the data series for conditional ECM, empirical tests of unit root and the bounds test approach to co-integration are employed. Kwiatkowski-Phillips-Schmidt-Shin test statistic (KPSS), Augmented Dickey-fuller (ADF) as well as Phillips-Perron (PP) are employed to determine the order of integration of the series. All the three tests reveal that, at 5 per cent significance level, the time series data are integrated of order one. This outcome makes it possible for estimation ARDL and VAR models.

Econometric views (Eviews 9.5, Student Version) and Microsoft Excel 2016 are the computer packages used for data processing in this study.

4.3 Model Specification

In order to investigate the impact of monetary policy on the stock market in Malaysia, it is important to note that there are many factors other than monetary policy which can affect the Malaysian stock market and that these factors are taken into account in this study in order to reflect the Arbitrage Pricing Theory.

$$EQ = f(MMR, M1, M2, M3, REX, RES)$$

Where;

- EQ is the equity
- MMR stands for the money market rate.
- M1, M2 and M3 are the various categories of money supply in dollar million
- REX is the real exchange rate
- RES is the reserve in dollar million

The equation can be transformed by using natural logarithm in order to make our interpretation based on elasticities as follows:

$$lEQ_t = \beta_0 + \beta_1 lM1_t + \beta_2 lM2_t + \beta_3 lM3_t + \beta_4 MMR_t + \beta_5 l\,REX_t + \beta_6 lRES_t + U_t$$

Where

- Subscript t signifies time (month)
- l stands for natural logarithms
- β_i stands for the model estimation parameters
- U_t is the white noise error term.

4.4 Description of the Variables

After specification of the models, the next important task involves describing the variables and their sources, as well as giving the theoretically expected signs of the coefficients.

4.4.1 Equity

For the purpose of this study, we employ equities index for Malaysia to serve as a proxy for Malaysian stock market. The monthly series can be downloaded from the database of international Financial Statistics

4.4.2 MMR

Money market rate is used to represent the Malaysian monetary policy rate. The monthly series is obtained from the IFS. If the domestic interest rate is higher than the foreign interest rate, it is expected that there will be more capital inflow which will lead to higher value of equity. Therefore, the relationship between MMR and equity to be positive. However based on valuation model, its coefficient should be negative,

We do not take the natural logarithm of MMR because it is already in percentage.

4.4.3 M1, M2 and M3

These three variables are used to represent money supply in Malaysia, and their volumes are determined by the Malaysian Central Bank. Increase in money supply stimulates effective demand and thereby brings positive impact on the stock market. Hence, we theoretically expect positive signs for these variables.

4.4.4 Real Exchange Rate (REX)

This variable is calculated based on the following formula:

$$REX_t = AVEX \times \frac{CPI_{US}}{CPI_{ML}}$$

Where:

- REX stands for the real exchange rate

- AVEX is the average exchange rate of Malaysian Ringgit per US dollar.
- CPI_{US} for the consuere price index of the United States of America
- CPI_{ML} Represents the consumer price index of Malaysia.
- t is time (month)

This study uses REX because it takes into account the competitiveness of the country's trade. The coefficient of REX is expected to be positive theoretically. This is because appreciation of REX signifies the weakness or depreciation of the Malaysian Ringgit. The depreciation of the Ringgit will eventually lead to increase in capital inflow as well as the value of the equities

Table 4. 1: Variables and Data Sources

Variables	Source(s) of data
EQUITY, INDEX	International Financial Statistics
M1	
M2	
M3	
MMR	
REX	
RES	
USA CPI	
MALAYSIAN CPI	

Source: International Financial Statistics

4.5 Unit Root Test

As mentioned before, this study uses ADF, KPSS and PP unit root test procedures. The three tests are discussed briefly below.

Dickey and Fuller (1979) pioneered ADF unit root test procedure which includes lagged terms of the dependent variables in order to eliminate autocorrelation. The optimal number of lags in this study is determined by the lag length necessary to "whiten" the residuals (in each case autocorrelation test on ADF Akaike Information Criteria (AIC).the study then estimated the regression to test for autocorrelation through LM tests.

The following equations provide the three possible forms of the ADF test:

$$\Delta Y_t = \alpha_0 + \delta Y_{t-1} + \alpha_2 t + \sum_{i=1}^{p} \Delta Y_{t-k} + u_t$$

$$\Delta Y_t = \alpha_0 + \delta Y_{t-1} + \sum_{i=1}^{p} \Delta Y_{t-k} + u_t$$

$$\Delta Y_t = \delta Y_{t-1} + \sum_{i=1}^{p} \Delta Y_{t-k} + u_t$$

Where ΔY_t stands for change in the dependent variable, α_0 is a constant term, α_2 represents the coefficient of a time trend t, ΔY_{t-k} stands for vector off lagged explanatory variables, u_t is assumed to be a white noise error term and k is the lag length. The presence of the deterministic elements α_0 and $\alpha_2 t$ is the difference among the three equations.

ADF unit root test involves testing the following hypothesis:

H_0: $\delta = 0$ (Y_t is not stationary or Y_t has a unit root)

H_1: $\delta > 0$ (Y_t is stationary)

The first hypothesis is saying that Y_t is not stationary or Y_t has a unit root, while the second is rejecting the null by implying that Y_t is stationary

Phillips and Perron (1988) developed a generalization of the ADF test procedure to take care of the wrong assumption made by ADF that "the error terms are statistically independent and have a constant variance" (Asteriou D and Hall S.G, 2007). Phillips-Perron test involves testing the following regression:

$$\Delta Y_{t-1} = \alpha_0 + \delta Y_{t-1} + \alpha_2 t + e_t$$

$$\Delta Y_{t-1} = \alpha_0 + \delta Y_{t-1} + e_t$$

$$\Delta Y_{t-1} = \delta Y_{t-1} + e_t$$

Where ΔY_{t-1} is the change in the lagged dependent variable, α_2 is a coefficient of a time trend t, α_0 is a constant term, Yt_{t-1} is the first lag of explanatory variable, and u_t is assumed to be a white noise error term. Again, the presence of the deterministic elements α_0 and $\alpha_2 t$ is the difference among the three equations

Similarly, Phillips-Perron unit root test involves testing the following hypothesis:

H_0: $\delta = 0$ (Y_t is not stationary or Y_t has a unit root)

H_1: $\delta > 0$ (Y_t is stationary)

However the procedure for KPSS test if quite different from the two above. It null and alternative hypotheses are given below:

H_0: Y_t is stationary or Y_t does not have a unit root)

H_1:Y_t is not stationary

The unit root test involves estimating the most general model and then answering some set of questions. The summary of the procedure is in the figure 4.1 below:

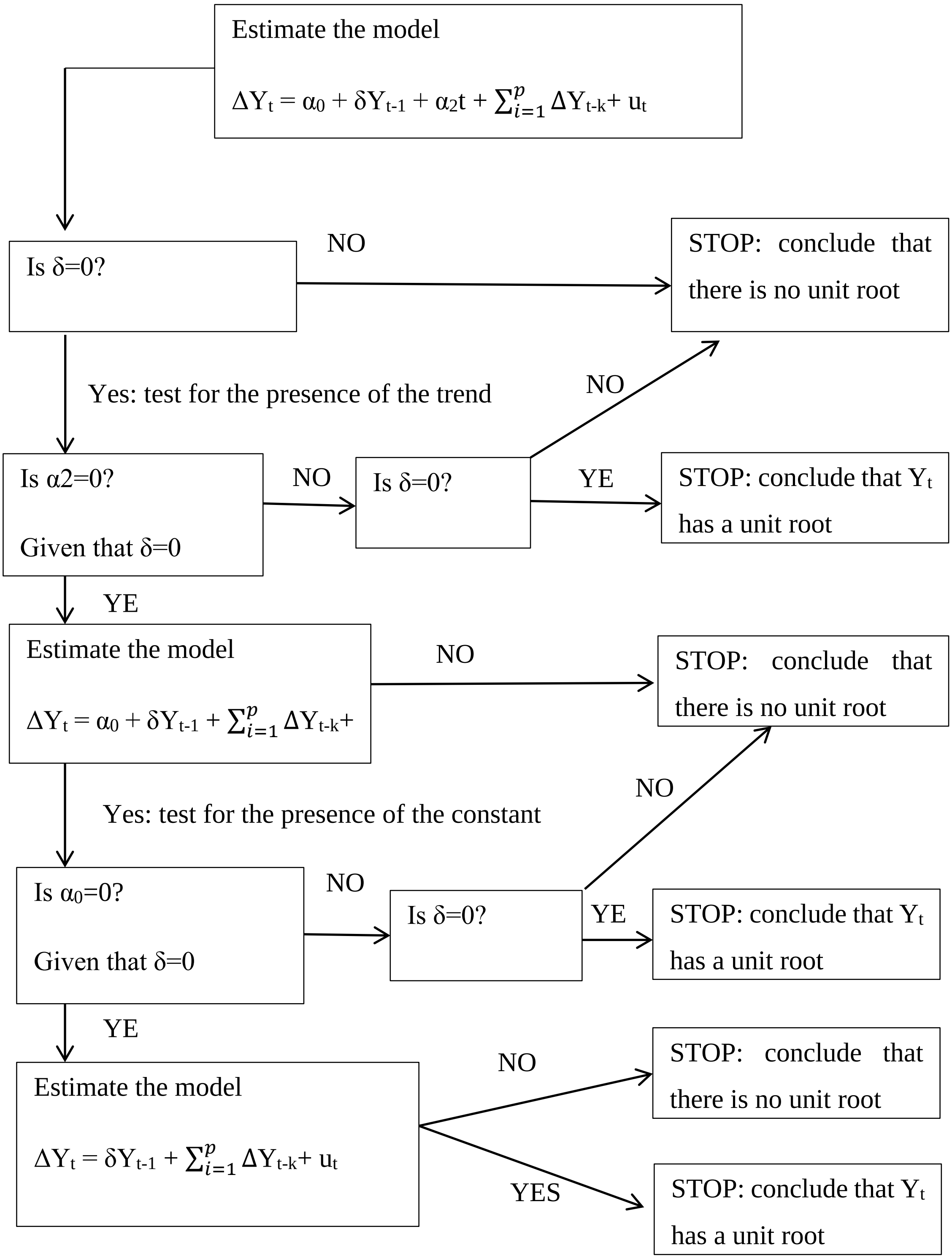


Figure 4. 1: Procedure for Testing for Unit Root

Source: Enders (2014)

4.6 ARDL Approach to Cointegration

To investigate the long-run relationship among the variables under consideration, the study adopt the bounds test for co-integration within ARDL in this study. Pesaran, Shin and Smith (2001) pioneered the model and can be applied regardless of the order of integration of the variables, regardless of whether regressors are purely I (0), purely I (1) or mutually cointegrated. In its simple algebraic form, the ARDL modeling technique involves estimating the following conditional error correction models:

$$\Delta Y_t = \alpha_0 + \alpha_2 t + \sum_{i=1}^{n-1} \Theta \Delta Y_{t-k} + \sum_{i=0}^{m-1} \gamma \Delta X_{t-k} + \delta_0 Y_{t-1} + \delta_i \mathbf{X}_{t-1} + u_t$$

In the equation above, Δ is the difference operator, Y_t is the endogenous variable, X_t is the exogenous variable and u_t white noise. We then use F-test to investigate one or more long-run relationships among the variables in the equation. This involves testing the null hypothesis of no co-integration against the alternative hypothesis of co-integration as follows:

$$H_0: \delta_0 = \delta_i = 0$$

$$H_0: \delta_0 \neq \delta_i \neq 0$$

The first hypothesis is the null hypothesis of no cointegration and the second is the alternative hypothesis of existence of cointegration. So rejection the null is the necessary condition for estimating the Error Correction Model.

In the case of co-integration based on the bounds test, ARDL can then be reparametrized to produce the error correction model (ECM) (Asteriou and Hall, 2007). Hence we can represent the error correction models of co-integration informatively as follows:

$$\Delta Y_t = \alpha_0 + \alpha_2 t + \sum_{i=1}^{n-1} \Theta \Delta Y_{t-k} + \sum_{i=0}^{m-1} \gamma \Delta X_{t-k} - \pi e_{t-1} + \varepsilon_t$$

In the above equation, Δ is the difference operator, ε_t is white noise, while π is the adjustment coefficient also referred to as error correction term, otherwise referred to as the adjustment coefficient, which is obtained from the long-run co-integration equation. In fact π provides information about how much of the disequilibrium error is corrected each month and it is expected to be negative and statistically significant. If the value of π is 0, then there is no adjustment and therefore long run relationship does not exist.

Based on the above ARDL equation, our model can be transformed by replacing Y with the LEQ and substituting X with the individual vectors of LMMR, LM1, LM2, LM3, LREX and LRES.

$$\Delta LEQt = \alpha 0 + \alpha 2t + \sum_{i=1}^{n-1} \theta\, \Delta LEQ_{t-i} + + \sum_{i=0}^{m-1} \gamma\, \Delta MMR_{t-i} + \sum_{i=0}^{m-1} \gamma\, \Delta LM1_{t-i} + \sum_{i=0}^{m-1} \gamma\, \Delta LM2_{t-i} + \sum_{i=0}^{m-1} \gamma\, \Delta LM3_{t-i} + \sum_{i=0}^{m-1} \gamma\, \Delta LREX_{t-i} + \sum_{i=0}^{m-1} \gamma\, \Delta LRES_{t-i} + \delta_0 LEQ_{t-1} + \delta_1 MMR_{t-1} + \delta_2 LM1_{t-1} + \delta_3 LM2_{t-1} + \delta_4 LM3_{t-1} + \delta_5 LREX_{t-1} + \delta_6 LRES_{t-1} - \pi e_{t-1} + u_t$$

4.7 Empirical Results

This section discusses the preliminary and final results of analysing the impact of monetary policy on the Malaysian stock market. The sample period spans from January, 2003 to December, 2016. Taking the lag of dependent and explanatory variables in the conditional ECM causes a loss of some observations at the beginning of the sample period. The model is estimated over the period of July 2003 to December 2016. The prerequisite for estimating the ECM model is to check for the long run relationship among the variables included in our equation.

Implementation of the ARDL approach to co-integration involves determining an optimal lag length and the orders of integration of the variables entering the models to check if there is no variable that is I(2). The augmented Dickey-Fuller (ADF), KPSS test and Phillips-Perron (PP) test are employed for the purpose of determining the order of integration of the variables: LEQ, MMR, LM1, LM2, LM3, REX and LRES. The outcome shows that all the variables in this study are integrated of order one. Therefore there is no variable which is I(0), or I(2).

4.7.1 Unit Root Test Results

In order to have reliability and validity of the results concerning the impact of monetary policy on the Malaysian stock market, a stationarity testing using ADF, KPSS and PP techniques was conducted. The aim is to ensure that all the variables are either I(1) or I(0). The results of the stationarity tests are reported in the following tables:

Table 4. 2: Augmented Dickey Fuller test

Country (sample)	ADF		ADF	
Malaysia (2003-2016)	LEVE L		FIRST DIFFERENCE	
Model	intercept	Intercept and trend	Intercept	Intercept and trend
LEQ	-2.303273	-2.981072	-5.504024**	-5.649844**
LM1	-2.007456	0.402907	-11.81241**	-12.19880**
LM2	-2.778069	0.489118	-8.621245**	-9.391660**
LM3	-2.186977	0.461026	-8.715853**	-9.188073**
LREER	-1.493128	-1.407137	-10.35173**	-10.38607**
LRES	-3.313352*	-1.787890	-7.172005**	-7.857882**
MMR	-2.312123	-2.303205	-7.386002**	-7.366305**
Note: (i) The EViews 9 (student version) software has been employed for the unit root tests. (ii) The Augmented Dickey Fuller unit root test was performed both at level and first diff erence (intercept, and both the trend and intercept) (iii) the selection of lag length k automatic based on Akaike Information Criterion.(iv). *, **, *** represents significant at 1, 5, and 10%.				

Source: calculated by author in E views 9.5 out put

This study compared the calculated T values obtained from E views 9.5 with the table T value available in dickey fuller (1979). If the calculated T statistics is lower than T value than we conclude that there is unit root otherwise the series is stationary.

If the series is not stationary at level, we conclude another unit root test at first difference.

Table 4. 3: Phillips-Perron Test

Country (sample)	PP		PP	
Malaysia (2003-2016)	LEVE L		FIRST DIFFERENCE	
Model	intercept	Intercept and trend	Intercept	Intercept and trend
LEQ	-1.965207	-2.265399	-9.684101**	-9.674349**
LM1	-1.929419	0.327543	-11.82061**	-12.19880**
LM2	-2.879748*	0.988185	-8.568110**	-9.371479**
LM3	-2.213816	0.816054	-8.715853**	-9.215399**
LREER	-1.145641	-1.177155	-10.28030**	-10.25845**
LRES	-3.310607*	-1.592674	-7.310686**	-7.997149**
MMR	-2.175490	-2.175197	-7.386002**	-7.366305**
Note: (i) The EViews 9 software has been employed for the unit root tests. (ii) The Phillips-Perron unit root test was performed both at level and first diff erence (intercept, and both the trend and intercept) (iii) The figures in the parenthesis represents the lags selected by using the Schwarz info criteria (SIC). (iv)*, **, *** represents significant at 1, 5, and 10%				

Source : calculated by author in E views 9.5 out put

In table 4.3 calculated T statistics are obtained from phillips- perron unit root test in E views 9.5 , as in the case of augmented dickey fuller test if the calculated T statistics is greater than the phillips -perron critical value than we do not reject the null hypothesis and conclude that the series is not stationary . we than difference the series and test again .until there is no unit root

Our unit root test results obviously reveal that the variables are purely I(1), none is I(0) or I(2). Therefore the model is suitable for the ARDL approach to cointegration and VAR estimation.

4.7.2 Bounds Test Results

After confirmation of the absence of I(2) in all the variables used in the trade models, we then check whether there exists a long run relationship among the variables. To do that, we estimate each of the equations ARDL in Eviews 9. The F-values obtained from this test are then compared with the lower and upper Critical value Bounds for the F-statistic found in Pesaran, Shin and Smith (2001).

Table 4. 4: Bounds test results

Estimated model	ARDL(6, 2, 4, 2, 1, 2, 0)			
Optimal lag length (AIC)	6			
F-values (bounds test)	5.438601*			
Critical value	1 per cent	2.5 per cent	5 per cent	10 per cent
Lower bounds I(0)	2.88	2.55	2.27	1.99
Upper bounds I(1)	3.99	3.61	3.28	2.94
R^2	0.563150			
Adjusted R^2	0.486621			
F-values	7.358689*			
Note: * represents significance at all levels of 1, 5, and 10%. The AIC criterion is used to determine the optimal lag. The critical values are determined from Pesaran, Shin, and Smith (2001). The ARDL model is estimated by using restricted constant.				

Based on the estimated value of the equation (1), the study tests the significance of the coefficient of the first lagged variable. The Table above reveals that the F-value in the bounds test result of LEQ equation is greater than the I(1) critical values. Therefore, the LEQ equation has a long run relationship with other regressors. Hence, the ECM for the

LEQ equation can be estimated. The decision whether to include the deterministic term or not is made after observing the graph of the endogenous variable (LEQ).

4.7.3 Long Run and ECM Models

Considering our findings about the presence of long run relationship in the LEQ equation, we begin by presenting the short run and long run coefficients as well as the error-correction term.

Table 4. 5: The Long Run Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LM1	-1.123031	1.176514	-0.954541	0.3415
LM2	1.537614	0.775271	1.983323	0.0493**
LM3	1.305063	1.314870	0.992541	0.3227
LRES	-0.720255	0.345999	-2.081669	0.0392**
LREX	0.156029	0.370791	0.420800	0.6746
MMR	-0.120508	0.082788	-1.455615	0.1478
D_2008	0.438672	0.150455	2.915640	0.0041*
C	-0.581404	5.159838	-2.050724	0.0422**
R^2	0.994070			
Adjusted R^2	0.993032			

*, **, *** represents significant at 1, 5, and 10%

The above Table contains the long run values and coefficients of LEQ equation. According to the probabilities, LM2, LRES, D_2008 and constant are statistically significant, while LM1, LM3, LREX and MMR appear to be statistically insignificant at 5 per cent level.

D_2008 is a dummy variable representing the period of financial crisis. We assign 1 for period before September, 2008, and 0 for other periods.

The table above shows positive value of dummy variable and that is indicates other things being equal, the activity in Malaysian stock market before 2008 was 0.48672 higher after 2008 , and this means the financial crisis has a negative effect on the activity of bursa Malaysia .

The coefficient of money supply M2 and M3 have the expected theoretical signs. However, LM1 contradicts the theory as it appears to have a negative sign. The coefficient of the LM1 is insignificant which means its contradiction of the theory does imply anything. The coefficient of LRES is also consistent with the a priori assumption. If reserve is rising, it signifies that Malaysia allows its currency to float. The floating regime brings uncertainty which negatively affects the stock market. The MMR and LREX are insignificant, implying that they do not have any effect on the stock market in the long run. The coefficient of the dummy variable is significant implying that the effect of 2008 financial crisis would continue to affect the activity the stock market even in the long run.

One per cent increase in money supply (M2) brings about 1.54 per cent increase in activity of Malaysian stock market in the long run. Similarly, one per cent decrease in reserve leads to decrease in the activity of Malaysian stock market by 0.72 per cent respectively in the long run. The significant value of the dummy simply means that the when we hold other things constant, the activity in Malaysian stock market before the crisis is 0.44 higher than in the post-2008 era.

The above Table 4.6 contains the short run values and coefficients of the LEQ equation. The coefficients of D(LM1), D(LM2), D(LM3), D(LRES), D(LREX) and D(MMR) represent the short run estimates of the LEQ equation. The table shows that the only statistically significant coefficients from this short run model are D(LM2(-1)), D(LM2(-3)), D(LM3), D(LRES), and D(LREX(-1)). It is obvious that money supply variable M2 affects the stock market with a lag in the short run. M3 has the theoretically expected sign, and its effect on the stock market is instant. Larger reserve seems to improve the stock market in the short run.

One per cent increase in money supply (M3) and reserve brings about 0.90 per cent and 0.26 per cent increase in activity of Malaysian stock market in the short run. The significant value of the dummy implies that the when we hold other things constant, the activity in Malaysian stock market before the crisis is 0.09 higher than in the post-2008 era.

Table 4.7, the error correction coefficient is estimated to be -0.144784 with corresponding probability of 0.0000, which means that it is statistically significant at 5 per cent significance level. This decision holds for all 1, 5 and 10 per cent level of significance. Given that the error correction term is large and significant, it implies that 14.48 per cent of the adjustment takes place every month. Despite the prevalence of many insignificant coefficients in this the, the regression fits reasonably well (see Figure 4.2) and the residual tests reveal no evidence of autocorrelation or heteroskedasticity.

Table 4. 6: The short run model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(LEQ(-1))	0.150454	0.067550	2.227313	0.0276**
D(LEQ(-2))	-0.036947	0.066874	-0.552489	0.5815
D(LEQ(-3))	0.099955	0.069976	1.428407	0.1555
D(LEQ(-4))	0.060296	0.065937	0.914443	0.3621
D(LEQ(-5))	0.133642	0.061544	2.171477	0.0316**
D(LM1)	0.106651	0.105682	1.009165	0.3147
D(LM1(-1))	0.133427	0.105616	1.263326	0.2086
D(LM2)	-0.106502	0.313633	-0.339575	0.7347
D(LM2(-1))	0.736162	0.320077	2.299952	0.0230**
D(LM2(-2))	-0.078351	0.114017	-0.687187	0.4931
D(LM2(-3))	-0.327429	0.111423	-2.938612	0.0039*
D(LM3)	0.897182	0.358475	2.502779	0.0135*
D(LM3(-1))	-0.670136	0.361902	-1.851704	0.0662***
D(LRES)	0.258652	0.080746	3.203271	0.0017*
D(LREX)	0.196607	0.199438	0.985804	0.3260
D(LREX(-1))	0.611775	0.206814	2.958094	0.0036*
D(MMR)	0.001175	0.024998	0.047012	0.9626
D(C_2003M01)	0.090013	0.025880	3.478109	0.0007*
ECMt-1	-0.144784	0.022012	-6.577467	0.0000*
R^2	0.563150			
Adjusted R^2	0.486621			
*, **, *** represents significant at 1, 5, and 10%				

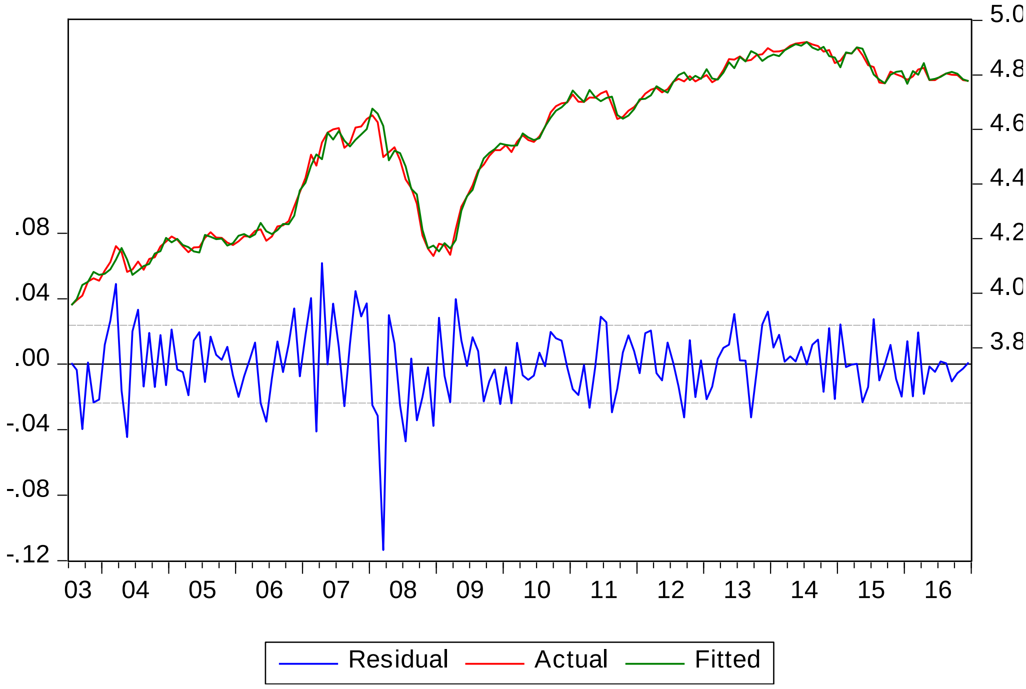


Figure 4. 2: : Plots of Actual and Fitted Values

4.7.4 Diagnostic Test

Table 4.8 shows that the model is not suffering from any of the residuals such as (serial correlation, heteroskedasticity, and arch)

All the values of the test that we mentioned earlier in the Malaysian case are all greater than 5 per cent which exactly indicates the fact that the model is not carrying any of the residuals.

The BPG is used for the Heteroskedasticity test and the lag included in the Arch test is 6 (the optimal lag).

Table 4. 7: Diagnostic Test for the ARDL Model

Diagnostic test	χ^2SC	χ^2H	χ^2AR	RAMSEY RESET TEST
Malaysia	0.030410 (0.9849)	30.20385(0.1781)	1.298360(0.2545)	0.005050 (0.9435)

Note: χ^2SC stands for serial correlation, χ^2H for heteroskedasticity, and χ^2AR for ARCH

4.7.4 Stability test

In order to test for structural break in model, a dummy variable is employed to test for post-2008-crisis period. The dummy variable shows a sign of structural break in both the short run and long run because it is significant in both the periods.

The following Figures depicts a family of Plots of Cumulative Sum of Recursive Residuals and Plots of Cumulative Sum of Squares of Recursive Residuals for the LEQ equation. The critical bounds at 5 per cent significance level are represented by the straight lines. The two figures further confirm that the LEQ equation is stable as the entire CUSUM test lines lie between the bounds of the straight lines.

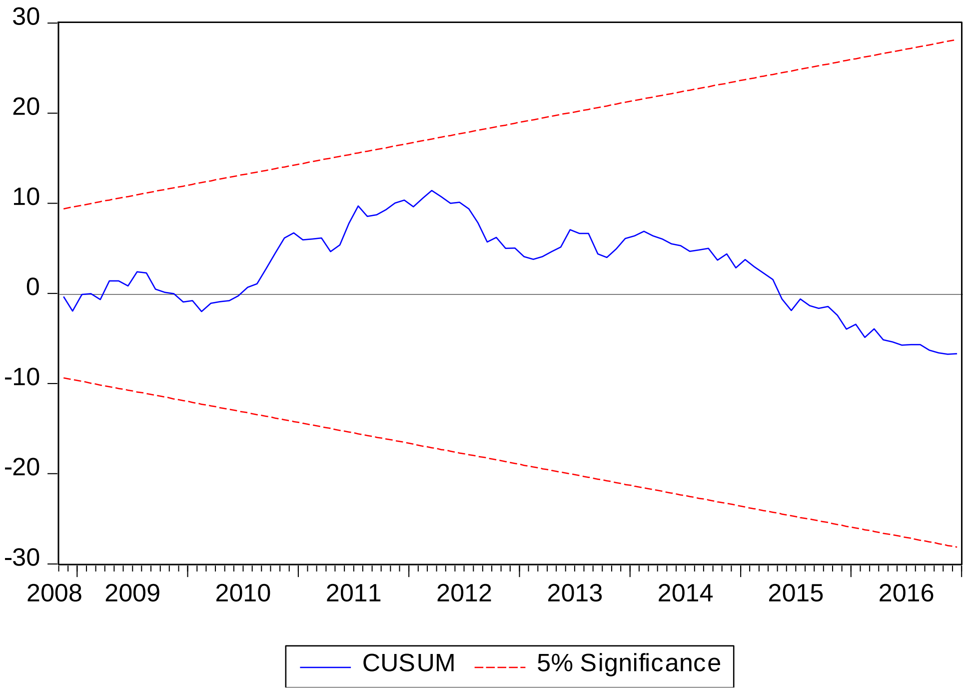


Figure 4. 3: Plots of Cumulative Sum of Recursive Residuals

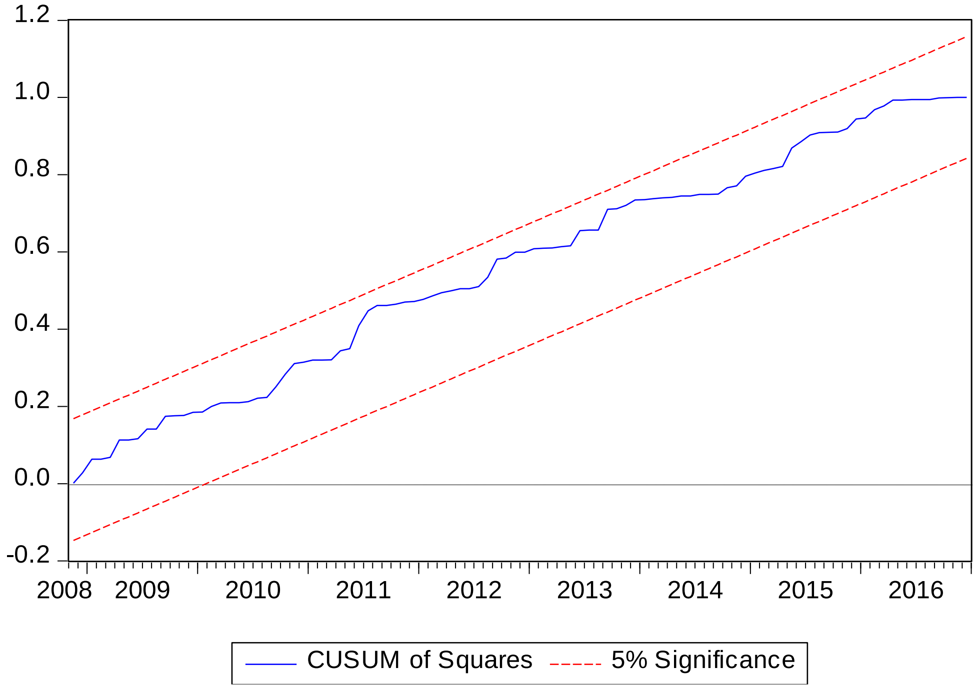


Figure 4. 4: Plots of Cumulative Sum of Squared Recursive Residuals

4.7.5 The VAR model

This section presents the results from the VAR (15) model in order to verify the outcome of the ARDL. The selection of the lag length is based on the optimal lag suggested by the information criteria in Eviews 9.

4.7.6 The VAR estimate

In this section we report the first lagged values of the regressors of the LEQ equation only. Table 4.9 below reports the optimal lag selected by each information criteria. SC and HQ indicated 1 lag, FPE selected 2 lags, while AIC and LR chose 15 lags. The optimal lag selected for this study is 15. Lag 15 gives the best model in terms of diagnostic tests.

Table 4. 8: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1079.627	NA	1.92e-15	-14.02127	-13.88263	-13.96495
1	2777.934	3219.012	8.33e-25	-35.58083	-34.47165*	-35.13027*
2	2847.771	125.9802	6.36e-25*	-35.85321	-33.77350	-35.00840
3	2876.434	49.08342	8.38e-25	-35.58737	-32.53713	-34.34831
4	2919.274	69.44061	9.25e-25	-35.50685	-31.48608	-33.87355
5	2962.135	65.55171	1.03e-24	-35.42660	-30.43529	-33.39905
6	2986.579	35.14897	1.49e-24	-35.10561	-29.14377	-32.68382
7	3025.644	52.59655	1.81e-24	-34.97574	-28.04336	-32.15969
8	3067.314	52.29230	2.18e-24	-34.87993	-26.97702	-31.66963
9	3104.452	43.20606	2.87e-24	-34.72486	-25.85143	-31.12033
10	3154.221	53.34699	3.32e-24	-34.73491	-24.89094	-30.73613
11	3202.331	47.16677	4.10e-24	-34.72328	-23.90878	-30.33025
12	3286.511	74.82628	3.34e-24	-35.18315	-23.39811	-30.39587
13	3345.892	47.34974	4.02e-24	-35.31885	-22.56328	-30.13732
14	3434.341	62.43475	3.62e-24	-35.83452	-22.10842	-30.25875
15	3557.412	75.61196*	2.32e-24	-36.80277*	-22.10613	-30.83275

* indicates lag order selected by the criterion

We then test for cointegration among the variables based on the optimal lag. Table 4.10 shows that there is cointegration among the variables. Hence we can go ahead to perform impulse response and variance decomposition analysis.

Table 4. 9: Cointegration Result

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.606252	444.7181	125.6154	0.0001
At most 1 *	0.474736	303.0474	95.75366	0.0000
At most 2 *	0.408184	205.1817	69.81889	0.0000
At most 3 *	0.346674	125.4486	47.85613	0.0000
At most 4 *	0.193099	60.74542	29.79707	0.0000
At most 5 *	0.147275	28.13311	15.49471	0.0004
At most 6 *	0.025439	3.916690	3.841466	0.0478

4.7.7 Vector Error Correction Model

Table 4. 10: The Long Run Result

Variable	LM2(-1)	LM3(-1)	LRES(-1)	LREX(-1)	MMR(-1)	C
coefficient	20.58319	27.71864	-14.3646	8.542383	1.203329	-110.197
Standard error	-5.29965	-8.16169	-2.71355	-4.53738	-0.47486	
t-stat	[3.88388]	[3.39619]	[-5.29366]	[1.88267]	[2.53408]	

Table 4.11 the long run coefficient from the (VECM) . LM2(-1) , LM3(-1) , RES(-1) and EX(-1) are significant and carry the expected sign .

Table 4. 11: The Short Run estimates

Variable	CointEq1	D(LEQ(-1))	D(LM1(-1))	D(LM3(-1))	D(LRES(-1))	D(LREX(-1))
coefficient	-0.01672	0.622408	-0.85378	-0.98048	-0.11514	0.013574
Standard error	-0.00969	-0.19429	-0.42729	-0.80017	-0.21987	-0.50323
t-stat	[-1.72505]	[3.20356]	[-1.99812]	[-1.22533]	[-0.52365]	[0.02697]

Table 4.12 shows that the error correction term is negative and significant means that adjustment is taking place every month.

D(LM(-1)) is the only significant coefficient among the regression , the results in ARDL and VECM are similar in both short run and long run .

4.7.8 Impulse response

The following figure displays the impulse response graphs based on VAR(15). The figure further reveals that the activity of the Malaysian stock market reverts to equilibrium whenever it receives shocks from any of the regressors.

4.7.9 Variance Decomposition

This analysis involves investigating the source of variation of the activity of the Malaysian stock market due to the dependent and independent variables.

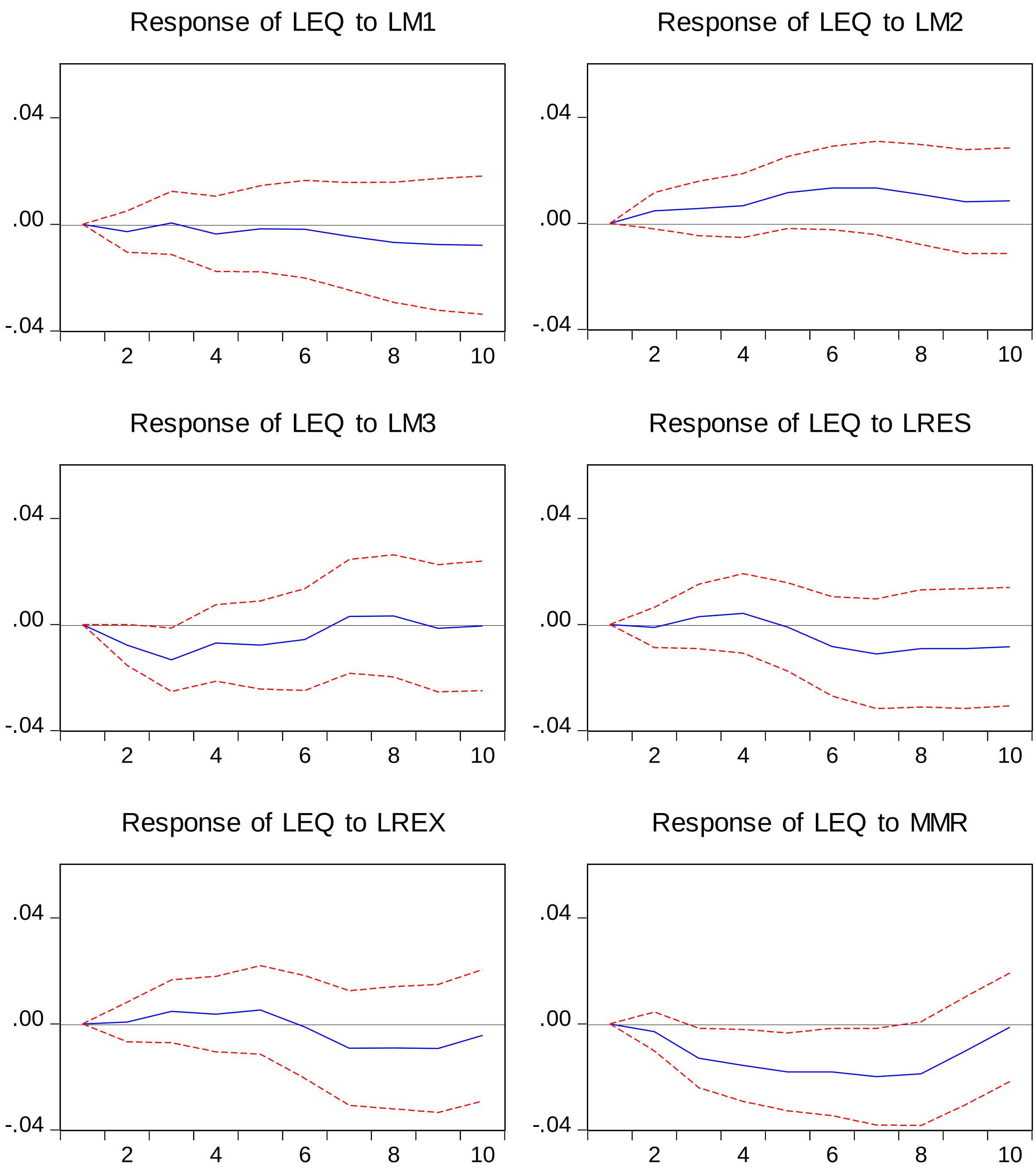


Figure 4. 5: The Impulse Response Graphs

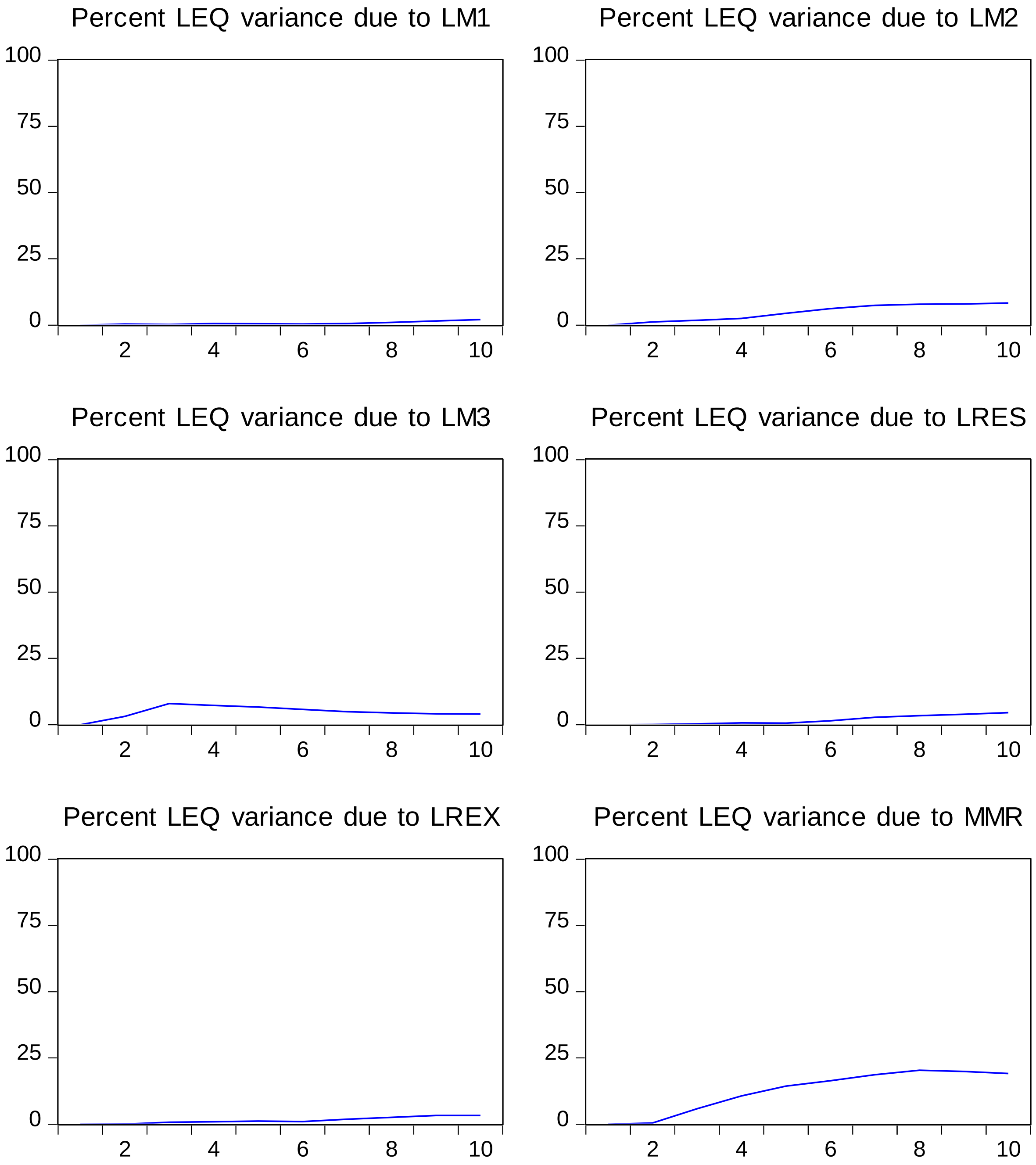


Figure 4. 6: Variance Decomposition Graphs

Figure 4.6 shows that the shock of LM1 has a negative effect on LEQ in the second period but the shock disappear in the third period. Shock from LM2 cause positive activities in the stock market, the shock lasts for about nine month befor it begin to diminish toward zero. The shock of LM3 has it is highest effect on LEQ in the third month, but this shock becomes positive over the range of the eighth to ninth months. The shock of LRES is positive at first but become negative around the fifth month. The shock of REX is positive over the range of the first sixth month, later becomes negative but slowly moving towards zero. The shock of MMR brings lower activity in bursa Malaysia but the shock disappears after ten months, in short shock from each regression disappears after few months

4.7.10 Granger Causality

The Table 4.13 below shows that none of the independent variables granger causes the LEQ. None of the probability values of the coefficients is less than 5 per cent.

Table 4. 12: Granger Causality

Dependent variable: D(LEQ)			
Excluded	Chi-sq	df	Prob.
D(LM1)	16.19215	15	0.3694
D(LM2)	20.61872	15	0.1495
D(LM3)	11.09938	15	0.7455
D(LRES)	8.416013	15	0.9060
D(LREX)	12.16798	15	0.6663
D(MMR)	15.67757	15	0.4038
All	88.98566	90	0.5104

Source : calculated by author in E views 9.5 output

4.7.11 The Inverse Root

The figure below shows the VAR model is stable because none of the blue dots is outside the unit circle.

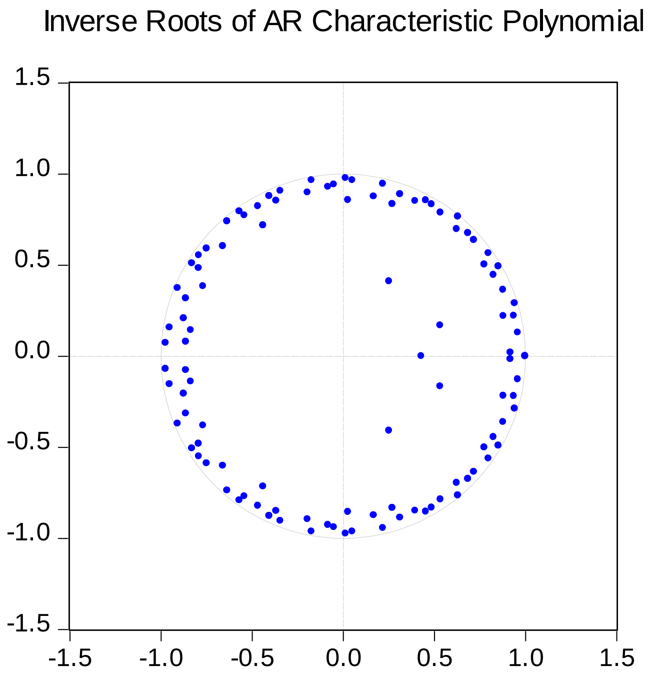


Figure 4. 7: Inverse Roots of AR Characteristic Polynomials

CHAPTER FIVE

SUMMARY, CONCLUSION AND FURTHER RESEARCH AREAS

5.1 Summary

This study investigates the impact of monetary policy on the Malaysian stock market using ARDL and VAR techniques.

The literature view related to this study indicates that monetary policy could have positive effect on Malaysian stock market and it could be negative or either mixed effect. It involves estimating equity index against the monetary policy variables MMR, M1, M2, and M3 along with reserve and real exchange rate.

All the data have been collected from the international financial statistics except the real exchange rate variable which is founded by the author with specific formula which is mentioned earlier. All the variables are estimated in natural logarithm except the MMR which is already in percentage. The econometric analysis employs monthly data for the period spanning January 2003 to December, 2016. All the variables are obtained from the IFS database, while the real exchange rate was calculated by the author. Moreover, all the variables are found to be I(1) after conducting a stationarity test using KPSS, ADF and PP.

The study reveals that only the variables used in the stock market equation are cointegrated. The money supply variables (M2 and M3) are found to have significant impact on the Malaysian stock market in the long run at 5 per cent significance level. MMR and real exchange rate do not have any significant effect on the market in the long run. The reserve is significant and inversely affecting the Malaysian stock market in the long run. Short run outcome, on the other hand, indicates that reserve and M2 affects the stock market significantly but with a lag. Increase in reserve tends to improve the stock market in the short run. Real exchange and M3 rate also have a significant positive impact on the stock market in the short run, and their impact is instantaneous.

All the coefficient are consistent with the theory except the reserve, the reserve effect the stock market inversely the reason is that increase in reserve means increase in the volatility of exchange rate.

De gravwe (1988) believes that the effect of the uncertainty of volatility could be negative or positive depending on the risk attitude.

5.2 Conclusion

Performance of the Malaysian stock market could be good or bad depending on the monetary policy pursued by the central banks.

Monetary policy variable affect the stock market which makes the outcome of this study and this special case could be helpful when the Malaysian government is considering the emperical results mentioned earlier which will stimulate the stock market toward improvement.

Hence the data was scar cited before 2003 duo to the inactivity of the Malaysian stock market at that time, and that is the reason made this study was conducted time series data among (2003 until 2016) , during the financial crisis in 2008 the model that used in this study suffered from structure break and therefor dummy variable were employed and assign 1 for the period before 2008 and 0 for the other period .

Based on the literature survey, macroeconomic variable should be presented in US dollars rather than the Malaysian currency (ringgit)

The findings of this study are intended to have practical application in Malaysia's monetary policy towards the stock market. In fact, it can also support a case for investors who can use the findings to convince the government to implement a monetary policy that is amicable to the stock market. Considering that reserve has a negative impact on the stock market in the long run, the government should adopt fixed exchange rate regime in order to curve the negative impact of exchange rate uncertainty that accompanies floating regime. Given that M3 and reserve have instant impact on the stock market, the central bank should pay attention to increasing these two when considering improving the situation of Malaysian stock market in the short run.

5.3 Further Research Areas.

For the fact this study has not covered everything in this area of monetary policy effect on the stock market, the following can give a better insight on the impact:

- Sector-specific studies (for example study on manufacturing sector) can lead to more revelation as to the level of the real impact of monetary policy on the stock market.
- There is need to investigate the impact of monetary policy on the stock market, when various estimation techniques are employed.

REFERENCES

[1]. Allen, D. E., & Cleary, F. (1998). Determinants of the cross-section of stock returns in the Malaysian stock market. International Review of Financial Analysis, 7(3), 253-275.

[2]. Ando, A., & Modigliani, F. (1963). The" life cycle" hypothesis of saving: Aggregate implications and tests. The American economic review, 53(1), 55-84.

[3]. Azman-Saini, W. N. W., Habibullah, M. S., & Azali, M. (2000). The relevance of financial development for economic growth: a bounds test approach. Pertanika Journal of Social Science and Humanities, 8(1), 51-57.

[4]. Bahmani-Oskooee, M., & Saha, S. (2016). Do exchange rate changes have symmetric or asymmetric effects on stock prices?. Global Finance Journal, 31, 57-72.

[5]. Balasubramaniam, A. (2017). Oil Price Shocks and Sectoral Outputs: Empirical Evidence from Malaysia. Economics Bulletin, 37(1), 38-47.

[6]. Bernanke, B. S., & Gertler, M. (1995). Inside the black box: the credit channel of monetary policy transmission (No. w5146). National

[7]. Bjornland, H.C., & Leitemo K. (2009). Identifying the interdependence between US monetary policy and the stock market. Journal of Monetary Economics, 56(2): 275-282.

[8]. Bohl, M. T., Siklos, P. L., & Sondermann, D. (2008). European stock markets and the ECB's monetary policy surprises. International Finance, 11(2), 117-130.

[9]. Brown, A., & Karpavičius, S. (2016). The Reaction of the Australian Stock Market to Monetary Policy Announcements from the Reserve Bank of Australia. Economic Record.

[10]. Brunner, K. (1961). A schema for the supply theory of money. International Economic Review, 2(1), 79-109.

[11]. Cagan, P. (1972). The channels of monetary effects on interest rates. The National Bureau of Economic Research. Retrieved from: http://papers.nber.org/books/caga72-1

[12]. Cheah, S. P., Yiew, T. H., & Ng, C. F. (2017). A nonlinear ARDL analysis on the relation between stock price and exchange rate in Malaysia. Economics Bulletin, 37(1), 336-346.

[13]. Chortareas, G., Nankervis, J., & Noikokyris, E. (2010). Stock Returns and Monetary Policy under the MPC Framework: Do Inflation Targeting and Central Bank Communication Make a Difference? Retrieved from: http://www.professorchappell.com/Papers/SEA_2010/Chortareas_SEA_2010.pdf

[14]. Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of the American statistical association, 74(366a), 427-431.

[15]. Dufour, J.-M., & Tessier D. (2006). Short-Run and Long-Run Causality between Monetary Policy Variables and Stock Prices. Working Papers 06-39, Bank of Canada, 28.

[16]. Fama, E. F., & French, K. R. (1996). Multifactor explanations of asset pricing anomalies. The journal of finance, 51(1), 55-84.

[17]. Fama, E. F., & French, K. R. (2004). The capital asset pricing model: Theory and evidence. The Journal of Economic Perspectives, 18(3), 25-46.

[18]. Friedman, M. (1961). The lag in effect of monetary policy. Journal of Political Economy, 69(5), 447-466.

[19]. Friedman, M., & Schwartz, A. (1963). A monetary history of the United States. Princeton University

[20]. Habibullah, M. S., & Baharumshah, A. Z. (1996). Money, output and stock prices in Malaysia: an application of the cointegration tests. International Economic Journal, 10(2), 121-130.

[21]. Handa, Jagdish (2009). Monetary economics, 2nd edition. New York, Routledge publisher.

[22]. Ho, S. Y. (2017). The Macroeconomic Determinants of Stock Market Development: Evidence from Malaysia. Munich Personal RePEc Archive

[23]. Ho, S. Y. (2017). The Macroeconomic Determinants of Stock Market Development: Evidence from Malaysia.

[24]. Huang, W., Rollick, A. V., & Nguyen, K. H. (2016). US stock markets and the role of real interest rates. The Quarterly Review of Economics and Finance, 59, 231-242.

[25]. Huberman, G. & Wang Z (2005). Arbitrage pricing theory (No. 216). Staff Report, Federal Reserve Bank of New York.

[26]. Ibrahim MF (2009): The Relationship between Monetary Policy and Islamic Stock Market. Labuan e-Journal of Muamalat and Society, Vol . 3, p . 49 – 64

[27]. Ibrahim, M. (1999). Macroeconomic variables and stock prices in Malaysia: an empirical analysis. Asian Economic Journal, 13(2), 219-231.

[28]. Ibrahim, M. H. (2000). Cointegration and Granger causality tests of stock price and exchange rate interactions in Malaysia. ASEAN Economic Bulletin, 36-47.

[29]. Ioannidis, C., & Kontonikas, A. (2006). Monetary policy and the stock market: some international evidence. UK: University of Bath and University of Glasgow.

[30]. Issing, O. (2009). Asset Process and Monetary Policy. Cato J., 29, 45.

[31]. Karim, Z. A., & Zaidi, M. A. S. (2015). Monetary Policy, Firm Size and Equity Returns in An Emerging Market: Panel Evidence of Malaysia. Asian Academy of Management Journal of Accounting and Finance (AAMJAF), 11(2), 29-55.

[32]. Karim, Z. A., & Zaidi, M. A. S. (2015). Monetary Policy, Firm Size and Equity Returns in An Emerging Market: Panel Evidence of Malaysia. Asian Academy of Management Journal of Accounting and Finance (AAMJAF), 11(2), 29-55.

[33]. Keran, M. W. (1971). Expectations, money, and the stock market (pp. 16-31). Research Department [of the] Federal Reserve Bank.

[34]. Khong, L. Y., & Lee, Y. S. (2017). Relationship between Macroeconomics and Stock Market: Empirical Study in Malaysia. Journal of Research in Business, Economics and Management, 8(1), 1344-1369.

[35]. Lau, S. T., Lee, C. T., & McInish, T. H. (2002). Stock returns and beta, firms size, E/P, CF/P, book-to-market, and sales growth: evidence from Singapore and Malaysia. Journal of multinational financial management, 12(3), 207-222.

[36]. Mishkin, F. S. (1996). The channels of monetary transmission: lessons for monetary policy (No. w5464). National Bureau of Economic Research.

[37]. Miyakoshi, T., Shimada, J., & Li, K. W. (2017). The Dynamic Effects of Quantitative Easing on Stock Price: Evidence from Asian Emerging Markets, 2001-2016. International Review of Economics & Finance.

[38]. Mohamadpour, B., Behravan, N., Espahbodi, S., & Karimi, R. (2012). An empirical study of relationship between monetary policy and stock market: Performance in Malaysia. Australian Journal of Basic and Applied Sciences, 6(12), 142-148.

[39]. Mohamadpour, B., Behravan, N., Espahbodi, S., & Karimi, R. (2012). An empirical study of relationship between monetary policy and stock market: Performance in Malaysia. Australian Journal of Basic and Applied Sciences, 6(12), 142-148.

[40]. Mohamadpour, B., Behravan, N., Espahbodi, S., & Karimi, R. (2012). An empirical study of relationship between monetary policy and stock market: Performance in Malaysia. Australian Journal of Basic and Applied Sciences, 6(12), 142-148.

[41]. Pennings, S., Ramayandi, A., & Tang, H. C. (2015). The impact of monetary policy on financial markets in small open economies: more or less effective during the global financial crisis?. Journal of Macroeconomics, 44, 60-70.

[42]. Rozeff, M. S. (1974). Money and stock prices: Market efficiency and the lag in effect of monetary policy. Journal of financial Economics, 1(3), 245-302.

[43]. Shaharudin, R. S., & Fung, H. S. (2009). Does size really matter? A study of size effect and macroeconomic factors in Malaysian stock returns. International research journal of finance and economics, 24, 101-116.

[44]. Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. The journal of finance, 19(3), 425-442.

[45]. Tsen, W. H. (2017). Real exchange rate returns and real stock price returns. International Review of Economics & Finance, Volume 49, May 2017, Pages 340–352.

[46]. Tsen, W. H. (2017). Real exchange rate returns and real stock price returns. International Review of Economics & Finance, Volume 49, May 2017, Pages 340–352.

[47]. Türsoy, T. (2017). Causality between Stock Prices and Exchange Rates in Turkey: Empirical Evidence from the ARDL Bounds Test and a Combined Cointegration Approach. International Journal of Financial Studies, 5(1), 8.

[48]. Tursoy, T., Gunsel, N., & Rjoub, H. (2008). Macroeconomic factors, the APT and the Istanbul stock market. International Research Journal of Finance and Economics, 22, 49-57.

[49]. Valera, H. G. A., Holmes, M. J., & Hassan, G. (2016). Stock market uncertainty and interest rate behaviour: a panel GARCH approach. Applied Economics Letters, 1-4.

[50]. Yeoh, B. K., Hooy, C. W., & Arsad, Z. (2010). Time-varying world integration of the Malaysian stock market: A Kalman Filter approach. Asian Academy of Management Journal of Accounting and Finance, 6(2), 1-17.

[51]. Yogaswari, D. D., Nugroho, A. B., & Astuti, N. C. (2012). The Effect of Macroeconomic Variables on Stock Price Volatility: Evidence from Jakarta Composite Index, Agriculture, and Basic Industry Sector. Journal of Business and Management, 46, 96-100.