

INFLUENCE OF MACROECONOMIC VARIABLES ON
STOCK PRICE INDEX: EVIDENCE FROM MALAYSIA

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- (2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.
- (3) Equal contribution has been made by each group member in completing the research project.
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LIST OF ABBREVIATIONS

ASI	All Share Index
ANOVA	Analysis of Variance
APT	Arbitrage Pricing Theory
ARCH	Autoregressive Conditional Heteroscedasticity
ASEAN	Association of Southeast Asian Nations
BLUE	Best Linear Unbiased Estimator
BNM	Bank Negara Malaysia
CAPM	Capital Asset Pricing Model
CLRM	Classical Linear Regression Model
CNY	Chinese Yuan
ER	Real Effective Exchange Rate
et al.	And others
EUR	Euro
E-views	Econometric Views
FBM	Financial Times Stock Exchange Bursa Malaysia
FDI	Foreign Direct Investment

FTSE	Financial Times Stock Exchange
GDP	Gross Domestic Production
GLS	Generalised Least Square
GST	Goods and Services Tax
HKD	Hong Kong Dollar
INF	Inflation Rate
IPI	Industrial Production Index
IR	Real Interest Rate
JB Test	Jarque-Bera normality test
JPY	Japanese Yen
KLCI	Kuala Lumpur Composite Index
KLSE	Kuala Lumpur Stock Exchange
LM Test	Langrange Multiplier Test
MLRM	Multiple Linear Regression Model
NPV	Net Present Value
OLS	Ordinary Least Square
OPR	Overnight Policy Rate
PPP	Purchasing Power Parity
RESET	Regression Specification Error Test
RMB	Yuan Renminbi

TOL	Tolerance Factor
TPP	Trans-Pacific Partnership
US	United States
USD	United States Dollar
UTAR	Universiti Tunku Abdul Rahman
VIF	Variance Inflation Factor
WLS	Weighted Least Square

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PREFACE

Stock price index is indicative of stock market performance of a nation at large. That being said, market participants are often concerned with how stock price index can be affected by economy indicators at macro-level. Although many studies had been conducted on this topic; however, studies in the case of Malaysia are still lacking and results are somewhat inconclusive.

By employing multi-regression model, this research intends to discover how Malaysia stock price index is influenced by macroeconomic variables. This research could provide useful information or guidelines to several parties such as policymakers, firms, investors, and researchers who want to gain more understanding and knowledge about Malaysian stock market performance.

ABSTRACT

This study examined the impact of selected macroeconomic variables on the performance of Malaysia stock market over the study period from year 1990 to 2014. The selected macroeconomic variables are interest rate, exchange rate, inflation rate and GDP growth. This study applied Ordinary Least Square method (OLS) to determine the effect of selective variables on stock market performance by using 25 annual data observations. The empirical results suggest that exchange rate has statistically significant positive effect on Malaysia stock market performance while interest rate and inflation rate has statistically significant negative effect on Malaysia stock market performance. However, GDP growth is found out to be insignificant in determining the stock market performance of Malaysia at 5% level of significance.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Chapter one introduces the outline of the research. The major concerns of this chapter, which are research background, problem statements, objectives, hypotheses and significant of the study will be included. The main objective of this research is to investigate the relationship between macroeconomics variables and stock market in Malaysia. The macroeconomics variables that have been chosen are interest rate, inflation, exchange rate and GDP growth. Layouts of the following chapters as well as the conclusion are presented at the end of this chapter.

1.1 Background

1.1.1 Background of Malaysia Economy

Since 1957, Malaysia's economic relied heavily on primary sectors such as forestry, mining, agriculture, and fishing. It then subsequently experienced economic transformation and became more dependent on manufacturing, construction, and services. However, in 1991, Malaysia liberalized its financial and economic by attracting foreign direct investment (FDI) into Islamic finance, financial services, and high-tech industry. These economic and financial plans did not only increase the productivity and employment rate, but also enhanced Malaysian economic growth (Bekhet & Mugableh, 2012). During the last three decades, Malaysia had suffered the Asian financial crisis of 1997-1998 and Global Financial Crisis in 2009. Nevertheless, the nation recovered rapidly and continued to grow steadily. Today, Malaysia is a major exporter of electronic products, petroleum products, chemical products, and palm oil products (MATRADE, 2017).

Malaysian government introduced Goods and Services Tax (GST) in 2015 and removed fuel subsidies in 2014 in order to increase national revenue. Moreover, the Ringgit fluctuated from 3.15 to 4.48 to the US dollar in the recent five years from 2012 to 2016 (Bank Negara Malaysia, n.d.). To encourage the steady growth of domestic economy, Bank Negara Malaysia (BNM) cut the Overnight Policy Rate (OPR) by 0.25% to 3% in July 2016. Another action of BNM to protect the value of Ringgit is to impose the regulation that exporters must convert 75% of export proceeds into ringgit (Nambiar, 2017). Therefore, this research studies the effects of the several determinants on the stock price performance in Malaysia so that each party can plan the strategies and make wise decision to overcome the conflict.

1.1.2 Background of Malaysia Stock Market

Bursa Malaysia is the national stock exchange of Malaysia. Being an important exchange holding company in Association of Southeast Asian Nations (ASEAN), it provides a comprehensive, wide range of investment opportunities as well as an attractive platform to global investors. Bursa Malaysia was previously known as Kuala Lumpur Stock Exchange (KLSE). The renamed action which was launched on 14 April 2004 aimed to attract customer and market orientation in order to improve its competitive position in universal trade market (Bank Negara Malaysia, n.d.).

The Kuala Lumpur Composite Index (KLCI) received international recognition as one of the best references in Asia Pacific stock market. In year 1995, the KLCI rose from 70 to 100 constituents. However, Bursa Malaysia made improvement to the KLCI. On 6 July 2009, the KLCI had been separated into two new indices. One of them is FTSE Bursa Malaysia KLCI, which consists of 30 most actively companies listed on the main board of Bursa Malaysia. The other index, which includes 70 companies, was named as FTSE Bursa Malaysia Mid 70 Index.

Meanwhile, the KLCI was replaced by the FTSE Bursa Malaysia KLCI. The objective to enhance the KLCI was to ensure that it is able to reflect how the Malaysian economy fluctuates from time to time (Azevedo, Karim, Gregoriou & Rhodes, 2014).

In addition, FTSE Bursa Malaysia KLCI is a heading capitalization-weighted stock index as well as a stock market barometer. This is because the whole performance of the listed shares on Malaysia Stock Exchange can be represented by the KLCI. In order to expand the influencing of market globalization, Bursa Malaysia had integrated KLCI with an internationally recognized index calculation methods. This enhancement will increase transparency as well as offer the equity market with a benchmark index that can be invested and traded (Zakaria & Shamsuddin, 2012b).

According to Bloomberg, FTSE Bursa Malaysia KLCI had experienced major fluctuation in recent years. The stock market returns ranged from a lowest of -46.96% in 1997 to a highest of 37.15% in 2007 (Knoema, 2016). The changes in the trend of stock market had brought many insights to the researchers relevant to the financial sector. Many theories and hypotheses are proposed during these times to explain the phenomena regarding the stock market performance.

1.2 Problem Statement

In recent times, stock market has become a popular issue discussed by many researchers. Stock market comprises of corporate capital and ownership, which is essential to reflect economy condition of a country. In details, it acts as a crucial tool to indicate performance and serve as a barometer of the country financial competitiveness, while providing guidelines for implementation of monetary policy. There are many relevant studies suggested different opinions regarding the stock market performance and its determinants, however their results are ambiguous. For instance, Naik and Padhi (2012) concluded that interest rate had not much effect on

stock price in Euro, but Amarasinghe (2015) indicates that interest rate volatility shows significant impact on the stock return.

Moreover, the effects of each macroeconomic variable on stock market vary across different time period and country. For instance, Joseph and Eric (2010) concluded that inflation may stimulate economic performance in term of short run, but this idea is rejected by Kimani and Mutuku (2013), who revealed that inflation and stock prices are negatively related. The identification of relationship between macroeconomic variables and stock market performance in Malaysia is essential for policy makers to implement appropriate monetary policy that is favourable to the Malaysia economy.

In addition, many studies in this relevant topic are outdated due to the ongoing current events. The results suggested by old studies are no longer suitable to apply for current economy condition nowadays. For example, Jones and Kaul (1996) stated that changes in oil prices have a detrimental effect on real stock returns in the United States, Canada, Japan, and the United Kingdom, however the result was only applicable for post-war period.

Current event such as sharp depreciation of Ringgit Malaysia and Brexit vote have significant contribution to the fluctuation of stock market performance in recent years. So far there are insufficient studies that have contributed to the literature in this field which focus on these current emerging financial events. Sathyanarayana and Gargesha (2016) concluded that stock market may become more volatile due to the Brexit event in the short run. Hence, this study aims to tackle the issues stated above by investigating is there any relationship between stock market in Malaysia and the selected macroeconomic variables.

1.3 Research Question

1. How Malaysia stock market react towards macroeconomic variables?
2. Does exchange rate significantly affect Malaysia stock market performance?
3. Does inflation rate significantly affect Malaysia stock market performance?
4. Does interest rate significantly affect Malaysia stock market performance?
5. Does gross domestic product (GDP) growth rate significantly affect stock market performance in Malaysia?

1.4 Research Objectives

1.4.1 General Objectives

The primary objective of this research is to study the reaction of Malaysia stock market performance towards macroeconomic variables from year 1990 to 2014.

1.4.2 Specific Objectives

Objective 1: To investigate how stock market react towards macroeconomic variables.

Objective 2: To examine if there is a long run relationship between interest rate and stock market performance.

Objective 3: To study if exchange rate affects stock market performance.

Objective 4: To explore the influence of inflation rate toward stock market performance.

Objective 5: To observe how GDP growth rate affects stock market performance.

1.5 Hypotheses of the Study

1.5.1 Real Interest Rate

H_0 = Interest rate has no significant relationship with stock market performance.

H_1 = Interest rate has a significant relationship with stock market performance.

1.5.2 Real Effective Exchange Rate

H_0 = Exchange rate has no significant relationship with stock market performance.

H_1 = Exchange rate has a significant relationship with stock market performance.

1.5.3 Inflation Rate

H_0 = Inflation rate has no significant relationship with stock market performance.

H_1 = Inflation rate has a significant relationship with stock market performance.

1.5.4 GDP Growth Rate

H_0 = GDP growth rate has no significant relationship with stock market performance.

H_1 = GDP growth rate has a significant relationship with stock market performance.

1.6 Significance of Study

This study aims to investigate the relationship of macroeconomic variables and stock market performance in Malaysia. Data and variables included are interest rate, exchange rate, inflation rate, GDP growth rate and KLCI index from year 1990 to 2014.

The main contribution of this study is that it focuses on the findings from previous studies within the latest 7 years (2010- 2016). Although previous studies on this topic are extensive, many of them are obsolete as they are conducted and published long time ago. Today's world is experiencing an increase in globalization and global financial integration, causing information to expire and gets replaced very quickly. Hence, including these updated studies can better capture latest trend of stock market which evolves over time due to continuous stock market development. Consequently, policymakers could discover the consistency of result of this study with other latest studies. They are able to look into updated implications from issues and discussions included in literature review.

This research is also be able to benefit active stock trader and investors. To elaborate, economic condition is one of the criteria in fundamental analysis on stock trading. Therefore, they need to have knowledge on several major economic indicators and how are they going to affect stock price movement. A change in variables may cause good or bad effect on firms' profitability, thereby causing a change in stock price.

1.7 Chapter Layout

Chapter 1 is an introductory chapter and mainly focus on the research overview. It starts to highlight an introduction and background of this research. After that, problem statements, research objectives, questions, hypotheses and significance of study are continued to be presented. Lastly, a conclusion will be drawn as a brief outline.

Chapter 2 is the literature review on previous research papers that are relevant to stock market index. The relationship between dependent variable and selected independent macroeconomic variables will be studied in this chapter. Moreover, the theoretical models and the proposed conceptual framework are being further discussed.

Chapter 3 investigates the methodology of this research. It begins with research design, followed by data collection method and data processing. Furthermore, research analysis methods will be explained and applied on the econometrics model in this chapter.

Chapter 4 analyses the reliability of the empirical results. Diagnostic checking as well as hypothesis testing that had been discussed in chapter 3 will be carried out. Value of parameters and goodness of fit will be interpreted. Next chapter will further discuss the major findings based on the expected sign and actual sign of this study.

Chapter 5 is the last chapter that summarizes statistical analyses and the major findings of this paper. Additionally, this chapter provides implications, limitations and recommendations for future research. This chapter ends with an overall conclusion.

1.8 Conclusion

In this chapter, the background of economy and stock market in Malaysia has been discussed. Next, the research questions and objective of this study have been presented in this chapter. The hypotheses and significance of the study have been clearly addressed. The review on empirical studies regarding the link of stock market and macroeconomic variables will be discussed in the following chapter.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, results from previous studies about relationship between dependent and independent variables will be reviewed. The purpose of this chapter is to give a clearer picture in the related area of study by presenting different opinions suggested by different researchers. Independent variables include inflation rate, real effective exchange rate, gross domestic product (GDP) growth rate and real interest rate in Malaysia. Relevant theories in this study are such as Fisher effect, Gordon-growth model, arbitrage pricing theory, purchasing power parity and growth driven finance, where their respective linkages with the independent variables will be explained.

2.1 Review of Literature

2.1.1 Stock Index

Studies carried out on the linkage between stock index and macroeconomics variables have been extensive. However, responds of stock market towards macroeconomic variables vary across different countries and periods. Peiró (2016) concluded that macroeconomic variables, long term interest rates would clearly affect stock price in the European countries which are United Kingdom, Germany and France. Interestingly, he found out that over two sub periods, each macroeconomic variable would give different extent of impact toward stock price and level of dependence are not same over time. This is consistent with findings by Aloui and Ben Aïssa (2016) and Ooi, Arsad and Tan (2014). Also, when Peiró (2016) compared his study with results run on U.S., he discovered these

macroeconomic variables give different impact towards U.S. stock markets than his study on European countries over the period of 1969–2012.

In addition, Ooi, Arsad and Tan (2014) found that some actual sign of relationship has changed after the financial crisis in 2008. In their study, money supply, real exchange rate, 3-month Treasury bill, and industrial production index were employed as macroeconomic variables. They confirmed that after the financial crisis in 2008, industrial production had shifted from negative to positive impact to Malaysia stock prices. In other words, although macroeconomic variables may appear to be useful to forecast stock prices, however, their respective relationship with stock prices could shift at some point of time. This idea is also supported by Çakmakl and Van Dijk (2016). They claimed that investigating stocks prices with a limited number of individual macroeconomic variables over a certain period is difficult to generate accurate results.

Bhargava (2014) stated that stock prices are affected by macroeconomic variables due to the information in the stock market is disseminated via certain macroeconomic variables. As a result, this leads to stock price volatility in short run. Chee and Shiok (2015) mentioned that macroeconomic variables have impact towards stock market performance in Malaysia. They found that selected variables such as interest rate and money supply have positive effects on Malaysia's share prices while inflation has negative effect on Malaysia's share prices in long-run.

Garza-Garcia and Yue (2010) claimed that despite high degree of speculation and immaturity, the results of the used approach indicates that stock market in China still responded to a change in macroeconomic activities in the long term. Inflation had a negative relationship while short term interest rate, money supply, and exchange rate had positively impacted Chinese stock prices. This is consistent with the results by Bekhet and Matar (2013) who conveyed that the existences of positive correlation between stock price index and exchange rate in long run.

Singh (2010) emphasized that variables such as exchange rate and wholesale price index could not affect stock price in India. The other study revealed that exchange rate had negative correlation while gold price had positive correlation with stock price. Meanwhile, stock value had no significant relationship with foreign exchange reserve and inflation rate (Sharma & Mahendru, 2011).

Relationship between stock price and macroeconomic variables exist in emerging financial markets such as Romania, where the variable with the largest influence on the prices of the stock exchange assets is GDP (Sabau-Popa, Bolos, Scarlat, Delca & Bradea, 2014). As for South Africa, stock index shows a significant connection with all the macroeconomic variables which are inflation, exchange rate as well as money supply. Shawtari, Salem, Hussain, Hawariyuni and Thabet Omer (2016) stated that money supply had a positive relationship while inflation had a negative relationship with stock price. Therefore, stock price index can shed some light on the reaction of share market to macroeconomic variables for emerging markets (Bekhet & Matar, 2013).

Some researchers attempted to study stock prices and macroeconomic activities using crude oil prices and interest rate. Patel (2011) concluded that interest rate did not affect stock price to large extent in Euro nations. The variables are more likely to move independently in the long run. Besides, the influence of crude oil prices had reduced seriously. Other than that, the sensitivity of each country stock price was different in the post-Euro period.

2.1.2 Real Interest Rate

Interest rate is the cost of capital or the income demanded by investors for the loaned funds over a specific period. Normally, central bank uses the interest rate as a monetary policy tool to control the money supply and investment. Amarasinghe (2015) indicated that interest rate volatility shows significant and

negative impact on the stock return. This finding is consistent with Izgi and Duran (2016). Pirovano (2012) explained that some companies will borrow heavily in order to finance huge projects. Interest rate is equivalent to cost of borrowing. Therefore, as interest rate rises, production costs increases alongside, which subsequently leads to a reduction in expected future cash flow and stock price.

Other than that, Kasman, Vardar and Tunc (2011) stated that there is a negative and significant correlation between interest rate and bank stock return. Mugambi and Okech (2016) also agreed with it and pointed out two inferences. First, when interest rates (returns on government assets) increase and become more attractive to investors, they may close out their position in stock market, leading to a reduction in stock prices. Secondly, banks are forced to offer more favourable deposits rate to public to compete with higher Treasury bill rate. Banks' profitability will be adversely affected by the increment of interest rate expense and then deliver the undesirable message to investors. As a result, the demand for stock in bank sector will drop along with their prices.

Additionally, Moya-Mart ínez, Ferrer-Lape ña, and Escribano-Sotos (2015) stated that firms are benefited by dropping of interest rate. They also noticed that the linkage between industry return and volatility of interest rate can only be detected at longer horizons and some industries. From the general perspective, investors with long term horizons such as mutual funds or pension funds companies will choose to weigh more upon interest rate when making investment decisions than investors with short term horizons such as speculative traders. Muktadir-Al-Mukit (2013) and Pallegedara (2012) supported these ideas by claiming that interest rate has significant and negative influence on share price in long run.

However, Kishor and Marfatia (2013) notice an interesting finding which is the dropping of Federal Fund Rate during the 2008 financial crisis caused the European and the US stock market returns to decrease. The phenomenal of economic downturn and the unexpected interest rate cut affect the investors'

confidence level. A significant and positive correlation between interest rate and stock market in the short run is also identified by Ferrer, Bolos and Benitez (2016). The researchers explained the bursting of dot-com bubble, the September 11 attacks in the US, the geopolitical tensions of the Middle East, and the dramatic decline of interest rates to lowest level in 40 years were happened within the analysis period. In conclusion, stock price and interest rate will move in the same direction when the level of economic uncertainty is high.

Interestingly, there are a few studies which delivered the opinion that relationship between interest rate and stock price will not remain constant over time. Korkeamaki (2011) find that although changes in interest rate have negative and significant impact before the introduction of the Euro, after 1990 it turned to be insignificant. It is related to the argument that if the market in the home-currency interest rate is deeper, it may allow companies to manage their interest rate risk wisely. The author observed that countries with the limited development of local corporate bond markets in the pre-Euro era will have higher interest rate sensitivity. Apart from that, Peiro (2016) suggested a conclusion that initially interest rate was the main factor to influence stock market movement, but recently this variable become less importance in European countries. The responses may vary over time due to the stage of business cycle, time-varying financial integration and the time-variation in risk premium of stock itself (Kishor & Marfatia, 2013).

Although most of the researchers believe that interest rate is a significant variable to stock price, Addo and Sunzuoye (2013) argued that interest rate is weak to predict the stock market movement. The research conducted by Naik and Padhi (2012) also indicates that the short term interest rate cannot explain the variation of stock prices. Moreover, the impacts of interest rate on stock price differ across industries. For instance, the stock performance of real estate, food and beverages, utilities and banking are highly correlated with interest rate. On the contrary, interest rate has limited influence to the stock market movement of health care,

construction, chemicals and paper, industrials and financial services (Moya-Martinez et al., 2015).

2.1.3 Real Effective Exchange Rate

Exchange rate is described as the currency's value of a country expressed in terms of another (Veli & Seref, 2015). Most of the researches used causality test to examine whether there is causality exists between stock market performance and exchange rate. Ho and Huang (2015) and Ali, Anwar and Ziaei (2013) focused on the global financial crisis to examine the causal relation of stock market index and exchange rate in BRIC countries. Both have provided the same overall results as they found exchange rate has causal effect to stock market index except for China. The exchange rate is only permitted to move in a tightly band in China. Moreover, Tudor and Popescu-Dutaa (2012) and Barakat, Elgazzar and Hanafy (2016) tested the Ganger causality and showed that exchange rate changes can influence the stock market performance in the emerging financial markets. This outcome results in the exchange rate has a great impact towards the volatility of stock market. Tudor and Popescu-Dutaa (2012) said that Granger causality test cannot be used to forecast the sign of correlation between the exchange rate and stock market index even though it can illustrate the direction of causality. Therefore, the researchers should implement the correlation test to examine the relationship.

Tian and Ma (2010) mentioned that the effect of real effective exchange rate of RMB on the stock market performance is co-integrated after China liberalized its financial market. They also found that exchange rate has positive impact on stock market index. When exchange rate of RMB against the US dollar (CNY/USD) and HK dollar (CNY/HKD) increases one percent, the Shanghai A Share index will also increase by 32 and 38 percent respectively. When exchange rate rises by one percent, on average, Ghana stock returns will increase by 0.052 percent (Kuwornu, 2012). The depreciation of the exchange rate discouraged export but supports

import, by declining in economic activities as well as stock returns. Hence, the study has demonstrated the stock return seems to be in direct proportion to the foreign exchange rate. Furthermore, Bello (2013) measured the exchange rate for quotations expressed in a direct term. For one example, when foreign exchange rate (USD/EUR) goes down, home stock market (US) will go down too. It shows that the exchange rate and home share prices have significant positively relationship. On the other hand, due to large capital flows into the United States and imports from Japan decline, the Japanese yen depreciates lead to the foreign exchange rate (USD/JPY) goes down but the US stock market inversely rises. So, it can be found out that the exchange rate was negatively correlated to the share prices index. The results from findings can be concluded that the euro, pound and Chinese yuan are directly and positively correlated with the US stock market but the yen is adversely related.

Maku and Atanda (2010) investigated the long term role of exchange rate in explaining Nigerian stock returns. They found that Nigerian Stock Exchange (NSE) share index forms a cointegration relationship with changes in the long-run exchange rate. This is also supported by the Onasanya, Olanrewaju and Femi (2012) and mentioned that exchange rate has significant long run and short run impact on the Nigeria share prices index. They also revealed that not only the exchange rate is in statistically negative correlated with the average stock market performance, but also it is unidirectional. It means that only average share prices granger cause exchange rate. Apart from that, Jamil and Ullah (2013) showed that real effective exchange rate has short term effect on the stock market returns in Pakistan. It indicated that an increase in exchange rate will depreciate the Pakistani rupee, as well as decreases the returns of stock index and vice versa. Furthermore, real effective exchange rate should be retained in a profitable area towards stock market stability. Thus, it can be concluded as changes in the exchange rate will adversely influence changes in the stock market returns. In line with this, Tsai (2012) studied the linkage between stock price index of six Asian countries and exchange rate under different market conditions. The results produced a negative relationship

between equity market and foreign exchange market. Therefore, it can be concluded that according to the conditions of market, the relationship can change.

Singh (2010) and Zubair (2013) found that the relationship of exchange rate towards stock market index is not correlated, which denotes that exchange rate is not the main reason for resulting in the equity market fluctuations. This is supported by Zia and Rahman (2011), there is non-existence link between two variables. They also stated that the share prices index and foreign exchange rate do not move together in both long run and short run. In short, stock market movement cannot be predicted or forecasted by exchange rate.

2.1.4 Inflation Rate

Inflation is defined as a continuous growth in the general price level of common goods and services in a country (Hossain, 2012). According Kasidi and Mwakanemela (2013), high inflation rate would bring downfall to an economic growth through several means, such as lowering purchasing power of a nation's currency. Moreover, the study also stated that even moderate levels of inflation can adversely affect direct and indirect investment, as well as consumption decisions of a nation. However, Hossain (2012) argued that dropping inflation may cause lost in output or production in a country and thus increase rates of unemployment. In the line with this, Joseph and Eric (2010) concluded that inflation may stimulate economic performance in term of short run by expansionary macroeconomic policies; however, inflation can be harmful to a country's economic growth in long run. They explained that rising inflation rate increases welfare cost on society, causing intermediation more costly, and thus slows down financial development. As a result, as nation export prices become higher, their international competitiveness are reduced and finally adversely affect the balance of payment of the country. Therefore, economic growth of the country is distorted by inflation in term of long run.

Limpanithiwat and Rungsombudpornkul (2010) stated that historical stock prices have a close relationship with inflation. The study explained that stock prices rise according to inflation rate, as they have a positive relationship but in an indirect way. In details, this theory explains that inflation rate can influence stock prices through corporate income taxation, cost depreciation and taxation of nominal capital gains. Inflation rate can affect company performance and their income thus bringing indirect impact to their stock price. Besides, Taofik and Omosola (2013) had proved that inflation has a positive and significant effect on stock indexes, with a strong co-integration relationship between them. They stated that inflation would encourage flow of investment and influences direction of stock returns and stock prices, which is same as the theory proposed by Fisherian hypothesis. Furthermore, Chakravarty and Mitra (2013) found that inflation influences stock price in a positive way. Unexpected inflation can increase the company equity value if they are net debtor, while dropping inflation caused by monetary policy will reduce stock price, as investors have less fund to buy stocks or goods. Both effects suggest that inflation and stock price have a positive correlation.

Conversely, Kimani and Mutuku (2013) revealed that inflation and stock prices are negatively related. The journal established that rising inflation affects negatively on the general performance of the securities exchange, including stock returns and stock prices. In a major emerging market, Ali (2011) proposed that high inflation rate would either pressure company future incomes, or increasing nominal discount rates, which resulted in a decrease in present value of future profits. Both effects would bring adverse impact to the corporate profits and reducing both stock return and stock price. In addition, Eita (2012) also supported the theory by stating that rising inflation could cause prediction of future economic slowdown, which resulted in stock price depression. In details, increasing interest rate caused by inflation would make cash flow worth less after being discounted, and thus reducing the investment, stock returns and finally stock prices. Therefore, the study concluded that rising inflation is associated with reduces in stock prices, which is opposes the generalised Fisher hypothesis. Furthermore, Caroline, Rosle,

Vivin, and Victoria (2011) also confirmed the negative linkage between inflation and stock price, but only in term of long run. The study showed both expected and unexpected inflation in Malaysia influences adversely to the stock prices in the long run, but there is no effect in short run. Interestingly, Irum, Fiyaz and Junid (2014) suggested that inflation is affected negatively by pressure of stock prices, but not in the opposite direction. In details, the study stated that inflation has no effect to the stock price but rising stock prices can lower inflation rate in a one direction relationship.

There is also study that generalised the effect of inflation on stock price based on country. Vanita (2014) revealed that inflation and stock price have a positive relationship in India and China, but negative relationship in Russia and Brazil. However, the journal established that inflation and stock price have only contemporaneous relationship and insignificant integrated in term of long run, which is opposed the theory proposed by Caroline, Rosle, Vivin, and Victoria (2011) above. In addition, Tangjitprom (2012) and Bai (2014) both suggested that stock price index affected by inflation is very limited. The effect of inflation is insignificant to changes in stock price, but it plays a major role in macro economy.

2.1.5 GDP Growth Rate

GDP is one of the main indicators which measures the overall health of a nation's economy. Oskooe (2010) reveals that stock prices are positively affected by real GDP in long run. As GDP increases, this would in turn raise firm's expected future cash flow as well as profit, thus leading to an increase in stock price. Athanasios and Antonios (2012) found positive link between economic growth and general stock index. Economic growth, which is equivalent to expansion of economic activities, will increase firms' business opportunities and profitability. Boubakari and Jin (2010) found a positive relationship between economic growth and stock market. They discovered a strong and positive relationship particularly at countries

where stock markets are more liquid and active. Similar result is observed from Rahman and Salahuddin (2010), who obtained positive relationship between economy growth and stock market index in an efficient stock market because transaction cost in an efficient stock market is lower. In return, this increases the portion of funds that can be channeled and invested into other productive instruments. Hsing (2011) found that economic growth will affect stock price positively. The concept of this is that a growth in economy will cause equity market to develop by having more companies getting listed and an increase in market capitalization. Olusegun, Oluwatoyin and Fagbeminiyi (2011) exhibit a positive relationship exists between GDP and all-share index. They discovered that apart from domestic macroeconomic variables, global factors from foreign countries will have influence on local GDP too, which subsequently affect local stock price index. Alexius and Spang (2015) showed that stock prices, domestic GDP, and foreign GDP have a long run equilibrium relationship.

Conversely, Senturk, Ozkan and Akbas (2014) concluded that there was no long run relationship between economic growth and stock price, which was possibly caused by an imbalance of allocation of resources in financial market development and real economy production. Maghanga and Quisenberry (2015) found inconclusive relationship between economic growth and stock price. This trend is often seen when stock market are not efficient and less-developed. Nkechukwu, Onyeagb, Okoh (2015) studied how stock market is correlated with GDP in both long and short run. They found significant but negative relationship in long run, whereas in short run GDP is not significant to affect stock price. Al-Tamimi, Alwan and Abdel Rahman (2011) studied GDP on bank and non-bank firms using both internal and external factor that could influence stock price. Internal factors are firms underlying qualities such as earning-per-share (EPS) and dividend-per-share (DPS), while external factors are made up of macroeconomic variables such as GDP. The result showed GDP was significant for firms from banking sector, but insignificant for non-bank groups. Zakaria and Shamsuddin (2012a) concluded GDP to be insignificant to influence stock market.

There are also studies which show bi-directional relationship between these two variables. Ishioro (2013) stated a bi-directional causality between economic growth and stock market. Kyophilavong, Uddin and Shahbaz (2014) confirms that stock price and economic growth have long run positive relationship and on top of that, a bi-directional relationship is observed. In other words, while economic growth promotes financial development, at the same time, financial development causes economy to grow.

2.2 Review of Relevant Theories

2.2.1 Arbitrage Pricing Theory

The Arbitrage Pricing Theory (APT) was originally introduced by Stephen A Ross in 1976, who attempted to explain that return on any stock is linearly related to a set of systematic factors and risk free rate (Geambasu, Jianu, Herteliu & Geambasu, 2014). Investing Answers (2016) stated that in APT, the expected returns can be explained in two ways; influences of macroeconomic or security-specific variable and sensitivity of the asset to those influences. APT agrees that systematic risk can be minimized by large and well diversified portfolios. However, it cannot be eliminated since common economic factor can influence the entire stock prices in market, which cannot solve by diversification. Arbitrageurs usually apply APT model to search for arbitrage opportunity, in which the asset's price will have a difference with the theoretical price found by the model.

The following equation indicates linear combination of risk- free rate return and systematic risk return (Shaji, 2012):

$$E(r_j) = r_f + b_{j1}R_{P1} + b_{j2}R_{P2} + b_{j3}R_{P3} + b_{j4}R_{P4} + \dots + b_{jn}R_{Pn} + \epsilon_j$$

Where $E(r_j)$ = expected rate of return for asset.

r_f = risk-free rate.

b_j = the sensitivity of the asset's return to specific factor.

R_P = the risk premium in specific factor.

ε_j = error term.

APT is often considered as an alternative to the capital asset pricing model (CAPM). However, APT is a more powerful tool than CAPM because APT holds less strict assumption requirements than CAPM. Furthermore, APT takes into account both multi-period and single period cases whereas CAPM takes into account only single period. Although CAPM has better prediction of stock price in short term, however, results of APT are more accurate in medium and long term compare to CAPM. These have made APT generally acceptable by researchers and investors.

2.2.2 Gordon Growth Model

This model calculates the stock price by adding up all the expected future dividend payments and discounted back to their present values. In simple words, it measures a stock according to the net present value (NPV) of its expected future dividends. One of the assumptions is that dividends growth rate must be constant. This model is useful for mature corporate with stable dividend policy (Cancino, 2011). However, in reality, future cash flow of dividend remains as an uncertainty. Therefore, the assumption of constant growth rate is necessary.

$$P_0 = \frac{D_1}{k - g}$$

Where P_0 = Stock price

D_1 = Dividend payment in the next period

k = Required rate of return

g = Dividend growth rate

When interest rate increases, investors will seek for better return in stock market.

Therefore, required rate of return for investors will increase and this leads to a fall

in stock price. The model is easier to be understood because it values a stock without considering market conditions. Thus, it can be used to compare different sizes of companies from different industries. The Gordon Growth Model does not include the non-dividend factors like the ownership of intangible assets, brand loyalty, and customer retention which can increase the firm's value (Tarver, 2015).

2.2.3 Purchasing Power Parity (PPP)

PPP indicates that the exchange rate between two currencies is dependent on the proportion of the unit's purchasing power. PPP exchange rate is frequently used to reduce the misleading in comparisons of living standards internationally. According to Ocal (2013), PPP theory plays as a main role in understanding the behaviour of exchange rates. It can be viewed as when the purchasing powers of two countries are equivalent, the currency exchange rate is in balance. The Law of One Price means that without any transaction costs and other factors, the prices of basket of goods should be the same and fixed even though in different markets. Even if the Law of One Price applies to all goods in each country, the weighted difference will lead to absolute PPP. Manzur and Chan (2010) proposed that absolute PPP suggests the prices should be an international arbitrage. This means that when expressed the currency in a common term, the spot exchange rate will be identical between two different countries.

Absolute PPP can be showed as:

$$S_0 = \frac{P_1}{P_2}$$

Where S_0 = Spot exchange rate

P_1 = Price of the product in domestic currency

P_2 = Price of the product in foreign currency

However, Al-Zyoud (2015) mentioned that most commodity trading is a differentiated product, not a substitute good. Hence, this will lead to different

consumption across countries. This is incompatible with the absolute PPP theory so that the dynamic version of absolute PPP, which is relative PPP should be applied. The idea of relative PPP is a relationship between the relative variation in price levels of products in two nations over a time period and the foreign exchange rate change over that period. Simply, it means the exchange rate changes will be equivalent to differential rate of inflation (Manzur & Chan, 2010).

Relative PPP can be presented as:

$$S_t^{A/B} = S_0^{A/B} \times \left[\frac{(1 + \pi_A)}{(1 + \pi_B)} \right]$$

Where $S_t^{A/B}$ = Future exchange rate

$S_0^{A/B}$ = Spot exchange rate

π_A = Inflation rate for domestic country

π_B = Inflation rate for foreign country

In conclusion, purchasing power parity theory is suitable for employing in the long term instead of short term. If PPP theory indeed holds, it becomes a main underlying cause for predicting the foreign exchange rate movement.

2.2.4 Fisher Effect Hypothesis

Fisher effect hypothesis was introduced in 1930 to explain the relationship between inflation and interest rate. Dragos (2014) stated that the nominal interest rate is equal to the sum of expected inflation and real interest rate, with the assumption that inflation is independent to real interest rate. In details, this theory suggested a direct relationship between nominal interest rate and expected inflation. Besides, Dragos (2014) also proved that stock return should compensate the expected and unexpected changes in inflation, as stocks act as claims against real assets. In the line with this, the study of Bai (2014) had supported this statement by illustrating the positive correlation between stock return and inflation rate. It claimed that nominal interest rate would rise corresponding to inflation rate, while real interest rate is usually at a fixed value.

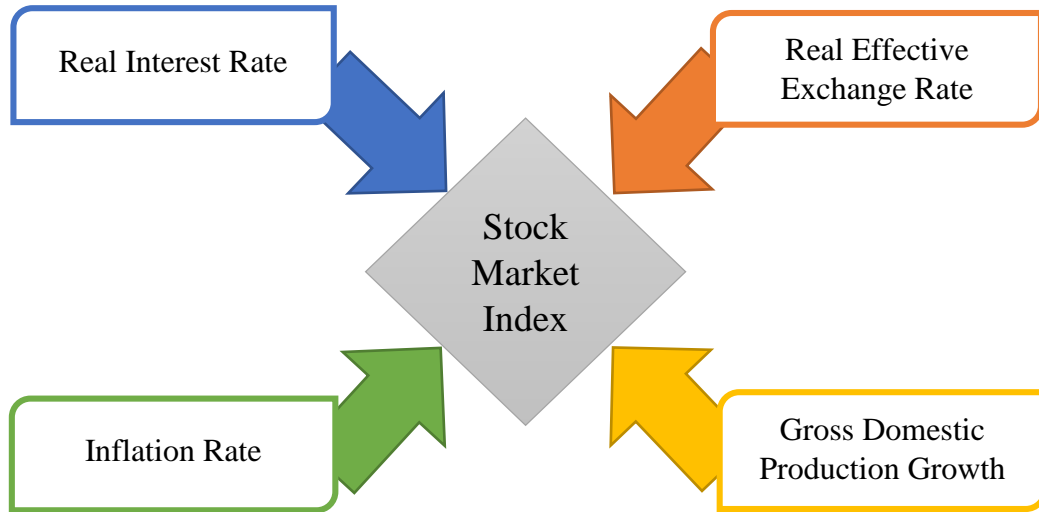
Taofik and Omosola (2013) and Chakravarty and Mitra (2013) suggested that fisher effect hypothesis hold in the stock market. In other words, investors would be well compensated when inflation and nominal interest rate move in the same direction. However, Ali (2011) and Eita (2012) proposed that fisher effect does not hold in the stock market. They argued that higher interest rate caused by inflation would lower stock return after the returns are being discounted.

2.2.5 Demand Following Hypothesis

Demand following hypothesis proposes that economy growth generates demand for different financial instruments, causing financial market to develop. A well-developed financial market plays a big role in encouraging the flow of fund from savers to lenders. As a result, savers with extra fund during good economic times will channel fund into productive investment such as stock market, thus pushing up stock price. Karimo and Ogbonna (2017) stated that when government insert money through expenditure into the economy, this will increase aggregate demand and income of the public. Subsequently, financial market will react and develop. This results in a more effective and efficient financial market at large, including stock market. An effective stock market is particularly important because, as supported by Boubakari and Jin (2010), GDP and stock price is strongly correlated in a highly liquid and active stock market. Also, Rahman and Salahuddin (2010) claimed a well-developed stock market with lower transaction cost is an essential factor for GDP and stock price to correlate well and have positive relationship. Tang (2013) also supported this idea where economic growth will bring effect to stock price changes.

2.3 Proposed Theoretical Framework

Figure 2.1: Proposed Theoretical Framework



2.4 Conclusion

Related studies about independent variables have been reviewed in this chapter. The highlight is that only journal from the most recent five years, year 2010-2016 are included. This is so as to better capture the current events and reflect their effects toward stock market performance in Malaysia. In details, some of the studies suggest same result while some do not. In order to examine the consistency of result obtained in previous studies, various tests will be carried out in the following chapters.

CHAPTER 3: METHODOLOGY

3.0 Introduction

Macroeconomics variables including interest rate, inflation rate, exchange rate and gross domestic product (GDP) growth rate are the four independent variables used to study against stock index price (KLCI) in this research. 25 annual data for each of the variables from 1990 to 2014 are collected. Data are obtained from World Bank database and Bloomberg terminal. Procedures of data processing and analysing are also clarified in this chapter.

3.1 Research Design

This research studies on quantitative data, whereby data are in numerical form, for instance, percentage, index, and descriptive statistics. Variables that are included in this model are as follows: one dependent variable (stock market index) and four macroeconomic variables (inflation rate, exchange rate, interest rate and GDP).

3.2 Data Collection Method

Secondary data is applied in this research. Data is collected from Bloomberg Terminal accessed through UTAR Library. This study uses time series data which is based on yearly basis from year 1990 to 2014 in Malaysia.

3.2.1 Secondary Data

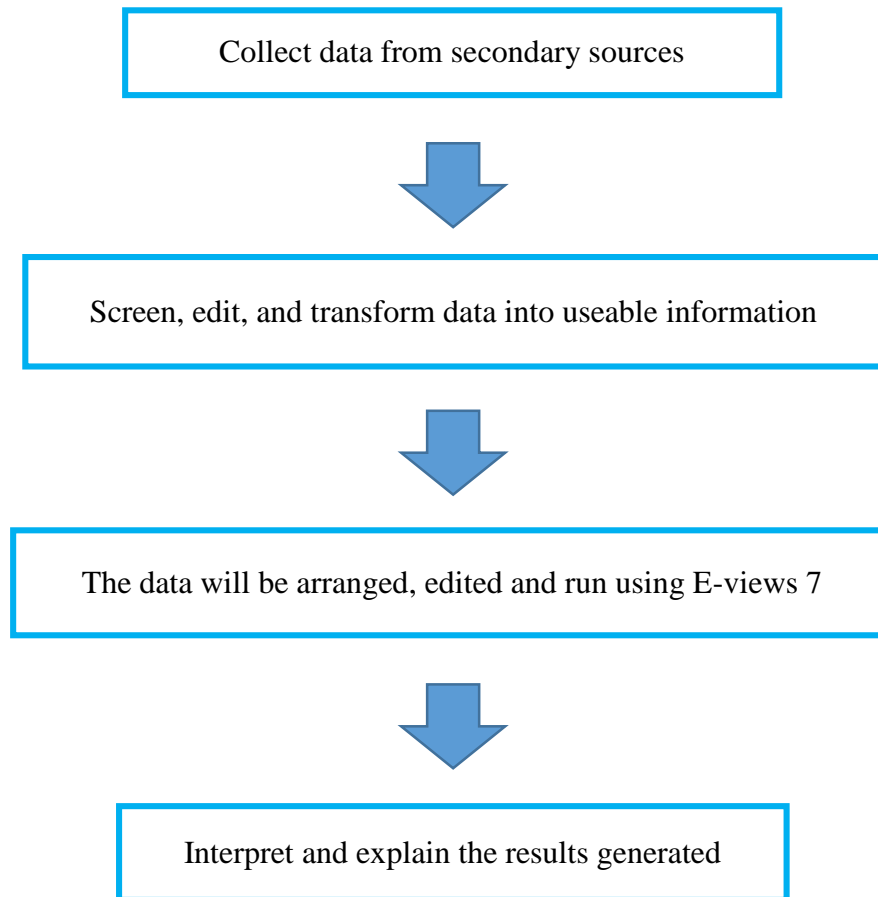
This research consists of 25 observations for every variable. Further information from journals, news, textbooks, and articles has also been referred so that the unit measurement of each variable will be more precise and consistent with the theory. The details of data are listed below:

Table 3.1: Secondary Data of Chosen Variables

<u>Variable</u>	<u>Proxy</u>	<u>Unit Measurement</u>	<u>Description</u>	<u>Sources</u>
Stock Market Index	KLCI	Index	Stock Market Index in Malaysia	Bloomberg
Real Interest Rate	IR	Percentage	Lending interest rate adjusted for inflation as measured by the GDP deflator.	Bloomberg
Real Effective Exchange Rate	ER	Index	Exchange Rate of Malaysia Ringgit (Base Rate 2010=100)	Bloomberg
Inflation Rate	INF	Percentage	Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole.	Bloomberg
Gross Domestic Production Growth	GDP	Percentage	Malaysia GDP annual growth rate	Bloomberg

3.3 Data Processing

Figure 3.1: Illustration for Data Processing



Data in this study was obtained from Bloomberg Terminal available in UTAR library. Subsequently, the data are arranged in Microsoft Excel, which is then used to run diagnostic checking using E-views 7. Results generated are presented, analysed and discussed in details.

3.4 Econometric Regression Model

3.4.1 Econometric Function

$\log(\text{KLCI}) = f[\text{Real Interest Rate (IR), Real Effective Exchange Rate (ER), Inflation Rate (INF), Gross Domestic Production Growth (GDP)}]$

3.4.2 Econometric Model

$$\log(Y_t) = \beta_1 + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \epsilon_t$$
$$\log(\text{KLCI}_t) = \beta_1 + \beta_2 \text{IR}_t + \beta_3 \text{ER}_t + \beta_4 \text{INF}_t + \beta_5 \text{GDP}_t + \epsilon_t$$

Where:

- $\log(\text{KLCI}_t)$ = The natural logarithm form of stock market index at year t
- IR_t = Real interest rate at year t (annual %)
- ER_t = Real effective exchange rate at year t (2010 = 100)
- INF_t = Inflation rate at year t (annual %)
- GDP_t = Gross domestic production growth at year t (annual %)

3.4.3 Multiple Linear Regression Model (MLRM)

Multiple Linear Regression Model (MLRM) is used to study the relationship between two or more independent variables with one dependent variable. It can be used to analyse the extent of impact for the independent variables on dependent variable. Besides, it could predict impacts of changes for dependent variable if independent variables change. Furthermore, MLRM could estimate trend or dependent variable by using sets of estimated exogenous variables (Schmidheiny, 2016). If the model fulfils certain assumptions, the model can be said to be Best Linear Unbiased Estimator (BLUE). A model is considered as BLUE if linear function in data for functional model of the estimator, unbiased which mean the

expected value is similar to the true value and efficient estimator which carry a minimum of variance.

3.5 Data Analysis

3.5.1 E-views 7

E-views 7 is a spreadsheet software which has some similarity to the commonly used Microsoft Excel. It provides various types of data analysis including simulation, macroeconomic forecasting, financial analysis, scientific data analysis and evaluation and so on. Furthermore, E-views 7 can be used for manipulating time series data and even large cross-section projects. It operates faster than its competitors in terms of calculation time and ease of use. Therefore, Ordinary Least Square (OLS) model in this research is run by E-views 7. The outcome of the OLS can be applied to check the significance of the variables and model using t-statistics hypothesis test (T-test) and F-statistics overall fitness test (F-test). Besides, the Jarque-Bera normality test (JB test) will be carried out to investigate the normality distribution of the error term of the model. E-views 7 also functions to detect the econometric problems by running Multicollinearity correlation table, Heteroscedasticity (ARCH) test, Autocorrelation (White) test and Ramsey-RESET test. The remedial test will be applied appropriately to solve the problems.

3.5.2 Ordinary Least Square (OLS)

Ordinary Least Square (OLS) is a formula to estimate the parameters in linear regression method. It is one of the most powerful and famous technique for regression analysis. The reason is the calculation for method of OLS is much easier than the substitution method, Maximum Likelihood and the two methods generally

produce almost the same results. Besides, OLS includes some attractive statistical properties under some assumptions which lead to a well-known and widely used method. It could help to analyse the data and constitutes the basis for some method, for instance, Analysis of Variance (Hutcheson, 2011).

3.5.3 Diagnostic Checking

3.5.3.1 Normality test

Most of the parametric tests such as T-test and regression are holding the assumption of normally distributed. Therefore, diagnose the normal distribution of the model must not be ignored. While normality assumption assumes that disturbances or error terms of the model are normally distributed. Since error terms are the variable that have been omitted, it is important that the impact of these omitted variables is small and at best random. If this assumption does not hold, this leads inaccurate results and draw misleading interpretations. There are two ways to check normality; graphical method by using graphs to visualize the distribution and normality test.

When dealing with small sample size data, it is vital to determine for a possible violation of the normality assumption. It is because normality tests often not sensitive enough at low sample sizes or very sensitive to large sample sizes. Therefore, comparison for both results of visual method and normality test is necessary in order to make sure the model is normally distributed.

Jarque-Bera test is an assessment for normality checking. This test require to compute the skewness (a measure of symmetry where a normal distribution will be zero) and kurtosis (a measure of how tall or squatty the normal distribution

where a normal distribution will be three) measures of the OLS residuals first. After that, the values will be used in computing Jarque-Bera statistic value.

3.5.3.2 Multicollinearity

Multicollinearity happens when two or more independent variables are highly correlated. Consequently, independent variables cannot accurately reflect to us their respective contributions towards the dependent variable.

Multicollinearity is often caused by the following reasons:

- Data collection method
- Over-defined model
- Model specification
- Constraints on models or in the population

There is no test, but there are signals to warn us about this problem in our model. The first signal is a high R-square value but insignificant t values. Next, one can detect multicollinearity by using Variance Inflation Factor (VIF), given the formula $VIF = 1 / (1 - r_{23}^2)$. A VIF value less than 10 normally suggests no multicollinearity exists in the model. Furthermore, this problem can be detected by looking at pair wise correlation variables. When pair-wise correlation coefficient, r_{23} between two independent variables exceed 0.80, this suggests that multicollinearity exists.

The presence of multicollinearity in the model does not violate assumptions for OLS, hence OLS estimates are still BLUE. However, OLS estimators will have large variances and covariances, making it difficult to obtain accurate estimation. Consequently, standard errors are higher, leading to a wider confidence interval. Subsequently, higher chances arise to not reject a false hypothesis (type 2 error). As a result, one of more t ratio might be statistically insignificant. Lastly, OLS

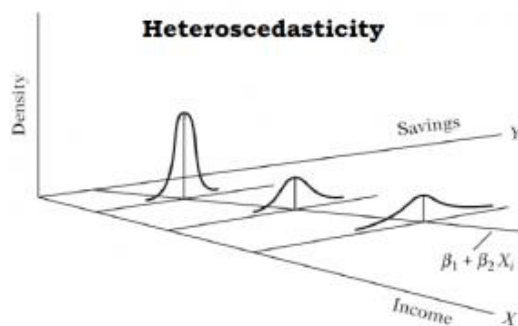
estimators and standard error may react sensitively towards small changes in data when there is multicollinearity.

To deal with multicollinearity, one may increase sample size to lower down standard error. It is not advisable to drop problematic variables as this will lead to specification bias, which is a more serious issue. Next, researchers may need to combine cross-sectional data and time series data in their model. One may also try to transform independent variables through ratio transformation.

3.5.3.3 Heteroscedasticity

When the variance of error term differs with each observation, in such case heteroscedasticity is said to be occurred. Unequal variance may violate the assumption of Classical Linear Regression Model (CLRM) and cause the model to be inefficient.

Figure 3.2: Illustration for Heteroscedasticity



$$\text{var}(u_i) = \sigma_i^2$$

Heteroscedasticity may occur due to the following conditions:

1. Error-learning model stated that as a person learns, the probability of error behaviour becomes smaller, so does the number of error become consistent.

2. According to common human behaviour, as their income increase, the choices of disposition of the income also increase.
3. Variance of data can be decreased when the data collection method improves.
4. Outlier observation can dramatically increase the variance in a sample size.

Although unequal variance violates the homoscedasticity assumption of CLRM, the estimator of OLS is still unbiased. However, it affects the minimum variance property and thus cause the estimator of OLS becomes inefficient. As a result, the results of t statistic and f statistic would become unreliable.

There are both formal and informal ways to detect heteroscedasticity. Informal ways include graphical method and nature of problems, while formal tests that can be carried out include Park Test, Glesjer Test, Breusch-Pagan Test, White Test and Autoregressive Conditional Heteroscedasticity (ARCH) Test. When heteroscedasticity is detected, Generalised Least Square (GLS) or Weighted Least Square (WLS) can be used to solve the problem.

3.5.3.4 Autocorrelation

Autocorrelation problem in a model is most probably found in time series data and it happens when error terms are related to each other. Autocorrelation can be categorized into two types which are pure serial correlation and impure serial correlation. The former occurs in a truly specified equation while the latter is caused by a model specification bias.

Generally, there are three reasons which lead to autocorrelation occurred in a model. First is omitting relevant independent variables. The error term will take into account when the model excludes an important explanatory variable. Second factor is the wrong functional form of explained variable and explanatory variables. Measurement errors is the third reason that may cause serially correlated. For

instance, if a variable is measured wrongly, the incorrect information will be captured by the error term.

The existence of autocorrelation does not fulfil the assumptions of CLRM which states that no relationship of error terms, thus, resulting in some consequences. Specifically, the OLS estimators are still unbiased and consistent even if there is autocorrelation. However, the OLS estimators are no longer BLUE due to their inefficiency. Therefore, it cannot minimize the estimated variances of coefficient and then causes OLS estimators are underestimated the standard errors. Consequently, the estimated parameters may become biased and discordant, leading hypothesis testing to become unreliable.

Apart from that, autocorrelation problem can be detected by three ways which are Durbin-Watson Test, Durbin's h Test (for the lagged dependent variable) and Breusch-Godfrey LM Test. Furthermore, if diagnostic checking shows that there is an autocorrelation problem, then researcher can follow some remedial measures to overcome it. Firstly, identify the model's autocorrelation problem whether is purely related or not. If the first step is fulfilled, secondly, GLS method can be applied to transform the original model into a new model which does not have the problem of autocorrelation. Lastly, for large sample size, Newey-West method could be applied to correct the standard errors of OLS estimators for autocorrelation.

3.5.3.5 Model Specification

Based on the assumption of CLRM, the regression model must be correctly specified to avoid biased and inconsistent results. Model specification problem exists due to the following reasons:

- i. Omission of a relevant variable
- ii. Inclusion of unnecessary or irrelevant variable
- iii. Incorrect specification of the stochastic error term
- iv. Adopting the wrong functional form
- v. Errors of measurement

In order to ensure model is correctly specified, researchers should choose the relevant independent variables that consistent with theory. Second, they have to confirm the selected independent variables are uncorrelated with error term. Third, researchers need to choose an appropriate form of variables to make sure that data of variable has stationary pattern. Lastly, they should confirm the estimated parameter value is stable.

Model specification bias can be detected by using Regression Specification Error Test (RESET) which is developed by Ramsey in 1969. The significant level, α is 0.10. By using E-views software to conduct Ramsey RESET test, probability value can be obtained. If probability value is less than α , reject H_0 . Otherwise, do not reject H_0 .

3.5.3.6 T-test

T-test was introduced by William Sealy Gosset in 1908 (Paret, 2012). It represents one of the hypothesis testing used to analyse average of two groups of samples by statistical examination. In details, t-test can examine how much population mean significantly differs from hypothesized mean of other population.

The formula is shown as below:

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$

In t-test, t-statistic, the degree of freedom and t-distribution are used to determine difference of two samples in term of means. The calculation of test statistic includes ratio, which numerator consist of mean difference of two populations, while denominator includes difference between standard error of the samples. The denominator aims to measure the dispersion and variability of the samples, which can be calculated by divide the sample variance by sample size, and the square root the sum of two samples.

3.5.3.7 F-test

F-test was introduced by George W. Snedecor in 1920 (Frost, 2016). The main function of F-test is to determine the overall significance of MLRM. F-test is actually calculated as ratio, where variation between samples means act as numerator, while variation within the samples act as denominator. It is also known as one-way ANOVA. The p-value of the f-test can be calculated by E-views to decide whether reject the null hypothesis or not. If p-value is smaller than significant level, null-hypothesis will be rejected. Hence, regression model is said to be significant at the significance level. R-squared obtained from F-test also provides an insight of robustness of the relationship between dependent and independent variables.

3.6 Conclusion

This chapter explains the methodologies and tests which will be used to investigate the relationship between the four macroeconomic variables and stock price movement. It also explains some of the purpose, features, rules and procedure for empirical tests which will be carried out in the following chapter. Data will be run using OLS Method. Several tests such as T-Test, F-Test, and Normality Test will be applied. Also, diagnostic checking include multicollinearity, heteroscedasticity, autocorrelation, model specification will also be tested in this research.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In this chapter, diagnostic checking and hypothesis testing would be carried out to study the data collected. This study uses E-views 7 to analyse data and conduct several tests such as Jarque-Bera normality test (JB Test), multicollinearity test, heteroscedasticity test (ARCH), autocorrelation test (Breusch-Godfrey Serial Correlation LM Test), regression specification test (Ramsey's RESET Test), individual partial regression coefficient test (T-test) and Overall significance of model test (F-test). In addition, figures and value generated from empirical results will be interpreted and showed in this chapter.

4.1 Ordinary Least Square Model

4.1.1 Estimation of the Econometric Model

$$\log(\widehat{Y}_t) = \widehat{\beta}_1 + \widehat{\beta}_2 X_{2t} + \widehat{\beta}_3 X_{3t} + \widehat{\beta}_4 X_{4t} + \widehat{\beta}_5 X_{5t}$$

$$\log(\widehat{KLCL}_t) = 6.844043 - 0.174446 IR_t + 0.014516 ER_t - 0.170552 INF_t - 0.030459 GDP_t$$

Where:

- $\log(\widehat{KLCL}_t)$ = Natural logarithm form of stock market index at year t
- IR_t = Real interest rate at year t (annual %)
- ER_t = Real effective exchange rate at year t (2010 = 100)
- INF_t = Inflation rate at year t (annual %)
- GDP_t = Gross domestic production growth at year t (annual %)

Table 4.1: Results of E-views

Variable	Coefficient	P-value	Expected Sign	Actual Sign	Result
Intercept	6.844043	0.0000	-	-	-
IR	-0.174446	0.0000	Negative	Negative	Significant
ER	0.014516	0.0121	Positive	Positive	Significant
INF	-0.170552	0.0000	Negative	Negative	Significant
GDP	-0.030459	0.1472	Positive	Negative	Insignificant
R-squared		0.599113	Adjusted R-squared		0.518935

4.1.1.1 Interpretation of the intercept and slope coefficients

$$\hat{\beta}_0 = 6.844043$$

When real interest rate, real effective exchange rate, inflation rate and gross domestic production annual growth equal to zero, the estimated KLCI stock market index is 6.844043 percent.

$$\hat{\beta}_1 = -0.174446$$

When real interest rate (IR) increases by one percent, on average, KLCI stock market index will decrease by 17.4446 percentage point, holding other variables constant.

$$\hat{\beta}_2 = 0.014516$$

When real effective exchange rate (ER) increases by one percent, on average, KLCI stock index will increase by 1.4516 unit, holding other variables constant.

$$\hat{\beta}_3 = -0.170552$$

When inflation rate (INF) increases by one percent, on average, KLCI stock market index will decrease by 17.0552 percentage point, holding other variables constant.

$$\hat{\beta}_4 = -0.030459$$

When gross domestic production annual growth (GDP) increases by one percent, on average, KLCI stock market index will decrease by 3.0459 percentage point, holding other variables constant.

4.1.1.2 Interpretation of the goodness of fit

$$\mathbf{R\text{-squared } R^2 = 0.599113}$$

There is 59.9113% of the total variation in the KLCI stock market index can be explained by the total variation in real interest rate, real effective exchange rate, inflation rate, gross domestic production annual growth.

$$\mathbf{Adjusted\ R\text{-squared } \bar{R}^2 = 0.518935}$$

There is 51.8935% of the total variation in the KLCI stock market index can be explained by the total variation in real interest rate, real effective exchange rate, inflation rate, gross domestic production annual growth, after taking into account the degrees of freedom.

4.2 Normality Test

4.2.1 Jarque-Bera Normality Test (JB Test)

Hypothesis

H₀: The error term in the model is normally distributed.

H₁: The error term in the model is not normally distributed.

Significance level

$$\alpha = 0.05$$

Decision rule

Reject H_0 if p-value is less than the significance level. Otherwise, do not reject H_0 .

Test statistics

Table 4.2: Jarque-Bera Normality Test

Jarque-Bera	Probability
0.081546	0.960047

Decision making

Do not reject H_0 since p-value of Jarque-Bera statistic (0.960047) is larger than the significance level (0.05).

Conclusion

There is insufficient evidence to conclude that the error term is not normally distributed at 5% significance level. Hence, the model does not have normality problem.

4.3 Diagnostic Checking

4.3.1 Multicollinearity Test

4.3.1.1 High R^2 but few significant t-ratio

Interpretation:

According to the appendix 1, this model contains moderately high R^2 which is 0.599113 and all t-ratio of the independent variables are significant at significance

level of 0.05, except for GDP. Therefore, this model is less likely to suffer from multicollinearity problem.

4.3.1.2 High pairwise correlation among X's

Table 4.3: Pairwise Correlation between Independent Variables

	IR	ER	INF	GDP
IR	1.000000	0.297414	-0.849121	-0.117698
ER	0.297414	1.000000	-0.081370	0.614918
INF	-0.849121	-0.081370	1.000000	0.151211
GDP	-0.117698	0.614918	0.151211	1.000000

Interpretation:

Pairwise correlation shows how an independent variable corresponds to another independent variable. In details, Gross Domestic Product (GDP) and exchange rate in Malaysia have a strong positive correlation. Furthermore, there is a strong negative relationship between interest rate and inflation which is -0.849121. By contrast, exchange rate and inflation have a negatively weakest correlation among all independent variables.

4.3.1.3 Variance Inflation Factor (VIF) and Tolerance Factor (TOL)

$$\text{VIF} = 1 / (1 - R^2)$$

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

To calculate the VIF, need to use the R^2 abstracted from auxiliary regression using different independent variables as the dependent variables. If there is a serious multicollinearity, the VIF will be more than 10 and TOL will be approximately close to 0.

Table 4.4: Results of VIF and TOL

Variables	R²	VIF	TOL	Conclusion
IR	0.804137	$\frac{1}{1-0.804137} = 5.1056$	$\frac{1}{5.1056} = 0.1959$	No serious multicollinearity
ER	0.585088	$\frac{1}{1-0.585088} = 2.4101$	$\frac{1}{2.4101} = 0.4149$	No serious multicollinearity
INF	0.762729	$\frac{1}{1-0.762729} = 4.2146$	$\frac{1}{4.2146} = 0.2373$	No serious multicollinearity
GDP	0.497532	$\frac{1}{1-0.482372} = 1.9902$	$\frac{1}{1.9902} = 0.5025$	No serious multicollinearity

Interpretation:

From above table, the highest VIF is 5.1056 which is less than 10. On the other hand, 0.1959 is the lowest TOL among all the variables. Hence, it can be concluded that there is no serious multicollinearity problem among four independent variables.

4.3.2 Heteroscedasticity Test (ARCH)

Hypothesis

H₀: There is no heteroscedasticity problem in the model.

H₁: There is heteroscedasticity problem in the model.

Significance level

$\alpha = 0.05$

Decision rule

Reject H₀ if p-value is less than the significance level. Otherwise, do not reject H₀.

Test statistics

Figure 3.3: Heteroscedasticity Test – ARCH

F-statistic	0.136607	Prob. F(1,22)	0.7152
Obs*R-squared	0.148106	Prob. Chi-Square(1)	0.7004

Decision making

Do not reject H_0 since p-value (0.7004) is larger than the significance level (0.05).

Conclusion

There is insufficient evidence to conclude that there is heteroscedasticity problem in the model at 5% significance level.

4.3.3 Autocorrelation (Breusch-Godfrey Serial Correlation LM Test)

Hypothesis

H_0 : There is no autocorrelation problem in the model.

H_1 : There is autocorrelation problem in the model.

Significance level

$\alpha = 0.05$

Decision rule

Reject H_0 if p-value is less than the significance level. Otherwise, do not reject H_0 .

Test statistics

Figure 3.4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.649382	Prob. F(2,18)	0.5342
Obs*R-squared	1.682445	Prob. Chi-Square(2)	0.4312

Decision making

Do not reject H_0 since p-value (0.4312) is larger than the significance level (0.05).

Conclusion

There is insufficient evidence to conclude that there is autocorrelation problem in the model at 5% significance level.

4.3.4 Regression Specification Test (Ramsey RESET Test)

Hypothesis

H_0 : Model specification is correct.

H_1 : Model specification is incorrect.

Significance level

$\alpha = 0.05$

Decision rule

Reject H_0 if p-value is less than the significance level. Otherwise, do not reject H_0 .

Test statistics

Figure 3.5: Ramsey RESET Test

F-statistic	2.924738	Prob. F(1,19)	0.1035
Log likelihood ratio	3.579416	Prob. Chi-Square(1)	0.0585

Decision making

Do not reject H_0 since p-value (0.1035) is larger than the significance level (0.05).

Conclusion

There is insufficient evidence to conclude that the model specification is incorrect at 5% significance level.

4.4 Hypothesis Testing

4.4.1 Hypothesis testing for overall model's significance (F-test)

Hypothesis

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

H_1 : At least one of the β_i is different from zero, where $i = 1, 2, 3, 4$

Significance level

$\alpha = 0.05$

Decision rule

Reject H_0 if p-value is less than the significance level. Otherwise, do not reject H_0 .

Test statistics

p-value (F-statistic) = 0.000749

Decision making

Reject H_0 since p-value (0.000749) is less than the significance level (0.05).

Conclusion

There is sufficient evidence to conclude that the overall model is significant at 5% significance level.

4.4.2 Hypothesis testing for individual partial regression coefficient (T-test)

4.4.2.1 Real Interest Rate

Hypothesis

$H_0: \beta_1=0$

$H_1: \beta_1 \neq 0$

Significance level

$\alpha = 0.05$

Decision rule

Reject H_0 if p-value is less than the significance level. Otherwise, do not reject H_0 .

Test statistics

Table 4.5: T-test for Real Interest Rate

T-statistic	Probability
-5.280885	0.0000

Decision Making

Reject H_0 since p-value (0.0000) is less than the significance level (0.05).

Conclusion

There is sufficient evidence to conclude that $\beta_1 \neq 0$. This result shows that there is significant relationship between real interest rate and KLCI stock market index at 5% significance level.

4.4.2.2 Real Effective Exchange Rate

Hypothesis

$H_0: \beta_2 = 0$

$H_1: \beta_2 \neq 0$

Significance level

$\alpha = 0.05$

Decision rule

Reject H_0 if p-value is less than the significance level. Otherwise, do not reject H_0 .

Test statistics

Table 4.6: T-test for Real Effective Exchange Rate

T-statistic	Probability
2.759867	0.0121

Decision Making

Reject H_0 since p-value (0.0121) is less than the significance level (0.05).

Conclusion

There is sufficient evidence to conclude that $\beta_2 \neq 0$. This result shows that there is significant relationship between real effective exchange rate and KLCI stock market index at 5% significance level.

4.4.2.3 Inflation Rate

Hypothesis

$H_0: \beta_3 = 0$

$H_1: \beta_3 \neq 0$

Significance level

$\alpha = 0.05$

Decision rule

Reject H_0 if p-value is less than the significance level. Otherwise, do not reject H_0 .

Test statistics

Table 4.7: T-test for Inflation Rate

T-statistic	Probability
-5.252139	0.0000

Decision Making

Reject H_0 since p-value (0.0000) is less than the significance level (0.05).

Conclusion

There is sufficient evidence to conclude that $\beta_3 \neq 0$. This result shows that there is significant relationship between inflation rate and KLCI stock market index at 5% significance level.

4.4.2.4 GDP Growth Rate

Hypothesis

$H_0: \beta_4 = 0$

$H_1: \beta_4 \neq 0$

Significance level

$\alpha = 0.05$

Decision rule

Reject H_0 if p-value is less than the significance level. Otherwise, do not reject H_0 .

Test statistics

Table 4.8: T-test for GDP Growth Rate

T-statistic	Probability
-1.508101	0.1472

Decision Making

Do not reject H_0 since p-value (0.1472) is greater than the significance level (0.05).

Conclusion

There is sufficient evidence to conclude that $\beta_4=0$. This result shows that there is insignificant relationship between gross domestic product annual growth and KLCI stock market index at 5% significance level.

4.5 Conclusion

Data collected for this research had been analysed and examined by five diagnostic checking as well as two hypothesis testing. The whole empirical results from the methodologies are significant. However, one of the independent variables, GDP showed a conflict result with expected sign. The results had been fully and clearly presented in table form. The detailed major findings shall be presented in the next chapter.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

In the previous chapter, various tests have been carried out to analyse data for this study. This chapter starts with a summary of results generated from previous chapter. The chapter is followed by discussion about these findings. Next, this chapter looks into some of the policy implications relevant to the respective independent variables in this research. Recommendations that may be carried out for future study are also included. Lastly, this chapter ends with limitations of this study.

5.1 Summary of Statistical Analysis

Table 5.1: Results of OLS Regression

Variables	P-value	Result
Real Interest Rate (IR)	0.0000	Significant
Real Effective Exchange Rate (ER)	0.0129	Significant
Inflation Rate (INF)	0.0000	Significant
Gross Domestic Production (GDP)	0.1620	Insignificant

Table 5.2: Expected and Actual Sign for Independent Variables

Variables	Expected Sign	Actual Sign
IR	Negative	Negative
ER	Positive	Positive
INF	Negative	Negative
GDP	Positive	Negative

Table 5.3: Results of Testing

Testing	P-value	Result
Jarque-Bera	0.954215	Error term is normally distributed.
Multicollinearity		
- Variance Inflation Factor (VIF)	Highest VIF = 5.1056	No serious multicollinearity problem.
- Tolerance Factor (TOL)	Lowest TOL = 0.1959	No serious multicollinearity problem.
Heteroscedasticity	0.6216	No heteroscedasticity problem.
Autocorrelation	0.4289	No autocorrelation problem.
Model Specification	0.1030	Model specification is correct.
Overall significance of model	0.000792	Overall model is significant.

5.2 Discussion of major findings

5.2.1 Real Interest Rate

Results in Chapter 4 show that the interest rate significantly affects stock price movement in the opposite direction. This result is consistent with earlier findings such as Amarasinghe (2015) and Moya-Martinez et al. (2015) who agree that dropping of interest rate will boost the stock price. A research conducted by Izgi and Duran (2016) also deduced that lower interest rate causing the stock price to rise. Besides, the idea of the interest rate adversely affects share price was also supported by Pallegedara (2012) and Muktadir-Al-Mukit (2013). Hence, results obtained are consistent with the previous studies.

Pirovano (2012) further explained that some corporates will borrow heavily to finance new investments. When interest rate increases, production cost of the firm also increases. This chain reaction will be cause a reduction of expected future cash flow and stock price. Besides, the contrasting effect of interest rates change on

stock returns has also been found in the latest study done by Assefa, Esqueda, and Mollick (2017).

5.2.2 Real Effective Exchange Rate

In this research, there is a positive link between real effective exchange rate and stock market index in Malaysia. The findings are consistent with the research by Tian and Ma (2010) who found that stock market and exchange rate were positively correlated. The depreciation of domestic currency will influence the stock price positively. Other than that, Bello (2013) also reported that local currency will appreciate when import to domestic increased but exports to foreign country declined. In this scenario, it will decrease the value of foreign exchange as well as lower the local stock market. This result is further supported by Kuwornu (2012) and examined that the stock prices may change positively with a drop in exchange rate. In line with this, change in foreign currency will lower the cost of imported inputs, which increases the local economic activities and hence stock returns.

According to Barakat, Elgazzar and Hanafy (2016), exchange rate has the largest and positive coefficient in the equity market performance. An increase in domestic currency value will cause people to have more money to invest in the equity market. This will lead to a rise in stock trading activity as demand for stock market increases, hence this pushes up the stock returns. Thus, the positive relationship exists in between the exchange rate and stock market index. Furthermore, Najafzadeh, Monjazebeh and Mamipour (2016) stated that when the exchange rate increases by one unit, on average, the stock returns will increase too, holding other variables constant. It indicates that increasing the volatility in the foreign exchange market will cause investors to lose their confidence to invest in forex market. Hence, the stock market will become the alternate choice for the investors in order

to reduce the foreign exchange risk, avoid losses and earn profits. This will also result in an increase in liquidity to the stock market and stock prices.

5.2.3 Inflation Rate

As mentioned in Chapter 2, Fisher effect hypothesis suggested that nominal interest rate equal to the sum of real interest rate and expected inflation. Taofik and Omosola (2013), Chakravarty and Mitra (2013) and Limpanithiwat and Rungsombudpornkul (2010) suggested that inflation has a positive relationship with the stock return, directly and indirectly. Hossain (2012) further explained that decreasing interest rate will worsen unemployment rate, and lower down the stock return.

Result of this study indicates a negative relationship between inflation and Malaysia stock returns. The results are consistent with the theory proposed by Kimani and Mutuku (2013), Ali (2011) and Eita (2012). Besides, Caroline, Rosle, Vivin, and Victoria (2011) also confirmed the negative relationship between expected or unexpected inflation and stock price appeared in the long run. The results generated from this study suggested that inflation in Malaysia will adversely affect the stock market KLCI in terms of stock price and stock returns.

5.2.4 GDP Growth Rate

Result from Chapter 4 show that GDP growth rate does not have long term relationship with stock market performance. This is consistent with findings from several researchers from literature review. Although this finding is different from priori, which expects GDP to be significant, this finding may be explained by looking at how stock price is driven. Stock price is a discounting mechanism of an enterprise value (Almeida, 2016). In other words, stock price is derived from the

firm's value plus its future cash flows being discounted to present value. In this context, a growth in firm business value is a more important to influence the stock index than an increase in economic growth rate.

Al-Tamimi, Alwan and Abdel Rahman (2011) studied how stock price is influenced by internal and external factors. Internal factors are company fundamentals such as earning-per-share (EPS) and dividend-per-share (DPS), while external factors are macroeconomic variables. They discovered that EPS, which belongs to internal factor, is the most important factor in influencing stock price movement as compared to external factor such as GDP and interest rate. Meanwhile, GDP tells us more on consumer spending and government expenditure and limited information about forces affecting firm valuation (Almeida, 2016). In other words, a well-performing economy does not necessarily guarantee investor higher returns in the stock market. In short, stock price is directly affected by the fundamentals such as, which subsequently drive cash flow. This leads to an increase in profit and eventually pushes up stock price.

5.3 Implication of the Study

5.3.1 Real Interest Rate

Central bank should always control interest rate at appropriate level to ensure steady and healthy growth for stock market. This will be very supportive to the monetary purposes of the government when the intention of investor to participate in stock market increase (Bekhet & Mugableh, 2012). On the other hand, the dropping of interest rate may increase the money supply in the market. Hence, the public will have extra fund to inject to the stock market and push up the stock price. However, the lowering of interest rate cannot be overdone. This is because a lower interest rate leads to a lower borrowing cost. Subsequently this will lead to

excessive money supply and eventually causing inflation. Therefore, governments are advised to maintain the optimal interest rate at optimal level to encourage a stable economic condition (Chirchir, 2014). When this happens, firms operate under good economic environment has higher chance to perform better, resulting in higher stock price.

Moreover, investors and portfolio managers are advised to consider the time- and investment horizon-dependence of the interest rate-stock market nexus in their investment decisions and diversification and risk management strategies (Ferrer, Bolós & Ben fez, 2016). For instance, investors will be able response to the market quickly when the announcement of rising or dropping OPR is released by Central Bank. They can make decision on whether to buy, hold or sell the stock in order to protect or increase their portfolio value. Therefore, investors can reallocate their asset among different financial products such as government bond, mutual fund and real estate (Kasman, Vardar & Tun ç, 2011).

Furthermore, firms should manage their cash flows wisely to lower the exposure of interest rate risk. Finance department in corporate firms have to implement a financial plan to ensure the company always has sufficient cash for daily operation. They have to manage budgets to ensure firms do not need to borrow fund especially when interest rate is unfavourable to them (Nangka, Pangemanan & Pandowo, 2013). When the interest rate is high, this equals to an increase in borrowing cost. Consequently, this will decrease profit of the corporate and convey a signal of losing competitiveness to the shareholders. Then, those disappointed shareholders will choose to sell off their position in the stock market and lead to the declining of stock price.

5.3.2 Real Effective Exchange Rate

Policy makers should develop a policy which is correlated to the impact of equity market volatility and its effect on the economic development. Therefore, policy makers must have a better understanding of the nature of the linkage between share prices index and the foreign exchange rate in order to deploying a rational and effective policy. Their overestimation or underestimation of this relationship would give them a false signal and would not achieve their desired policy targets (Olufeagba, 2016).

Apart from that, government or monetary committee should maintain foreign exchange rate in order to motivate and encourage foreign investors to invest in Malaysia (Najaf & Najaf, 2016). Foreign investments have brought a large capital flows into domestic equity market and stimulated economy growth as well as its stock market. Additionally, increasing aggregate demand in stock market will push up stock prices. Furthermore, government should also strengthen the rules and regulations as well as provide appropriate monitoring in foreign exchange market to prevent insider abuse problem (Zubair, 2013). This will continuously result in exchange rate fluctuations, thus, affecting volatility of stock market.

Investors cannot control the fluctuation of the foreign exchange rate. Therefore, similar to the policy makers, investors should concern and take the true relationship between the financial markets and macroeconomic into consideration (Barakat, Elgazzar & Hanafy, 2016). Having sufficient knowledge and a clear understanding on their relationship is essential for investors to make the best investment decisions.

5.3.3 Inflation Rate

In this study, stock market return is said to be adversely affected by inflation. The implication of this study is that to help policy makers to achieve stable and

improving stock market. Therefore, policy makers can plan the policy aimed to lower or maintain the stability of inflation rate in Malaysia. Caroline, Rosle, Vivin, and Victoria (2011) suggested that government can review and enhance the monetary policy in order to keep consistent with low inflation profile. Besides, government also can plan appropriate fiscal policy to achieve desired inflation rate in the nation (Bai, 2014). In addition, Eita (2012) stated that growth in economic activity can benefit stock market. Monetary policy can be tightened to maintain low inflation rate in order to protect stock market returns (Irum, Fiyaz & Junid, 2014). Moreover, Kasidi and Mwakanemela (2013) indicated that inflation rate should always be maintained at single digit, while Kimani and Mutuku (2013) suggested adjusting monetary and fiscal policy in order to gain highest confidence from the investing community.

According to Joseph and Eric (2010), policy makers are advised to draft monetary policy by selecting an optimal or suitable target for inflation indicator. After that, they can plan and design the most appropriate and critical policies to realize the target consequently. For example, they can focus on policies regarding prudent public expenditure management and stricken adherence to public procurement rules. Furthermore, proactive and efficient local revenue mobilization should be planned to accelerate growth in private sector. These steps can reduce and keep inflation at lower level in order to maintain stability of stock market.

5.3.4 GDP Growth Rate

According to Gajdka and Pietraszewski (2016), one may naturally think that real economy growth leads to stock return. However, in their studies, they found no correlation between stock return and economy growth for developed nations and some emerging markets. The study further explained that this result can be caused by a number of reasons. For example, big firms which has operation in international markets are exposed to more set of challenges, such as economy

stability and condition of foreign nation. Another reason as suggested by these author is earnings gained by firm would be diluted through the giving of employee stock options. Next, at times firm will be under pressure to grow at all cost, thus resulting in negative NPV investment. As a result, this would lower future profitability and hence, lowering down stock price.

Nkechukwu, Onyeagb, Okoh (2015) claimed it is difficult to predict stock market prices based on macroeconomic factors. Investors should not make their trading decisions solely based on the announcement of macroeconomic variables. This is due to the fact stock price movement are not only influenced by macroeconomic factors, but also by some other intervening factors. Firms should focus on improving profit and to improve firm performance. As a result, this would increase firm value, thus attracting more investor, which eventually pushing up stock price. Zakaria and Shamsuddin (2012a) stated an insignificant GDP towards stock market performance is justifiable for emerging market. This could be caused by dominance of non-institutional investors and the existence of information asymmetry problem among investors. These factors could contribute to a weak relationship between stock market and macroeconomic variables in the emerging market, particularly in Malaysia. Meanwhile, Al-Tamimi, Alwan and Abdel Rahman (2011) studied how stock market is influenced by internal and external factors. They discovered that EPS, which belongs to internal factor, is the most important factor in influencing stock price movement as compared to external factor such as GDP and interest rate.

5.4 Limitation

There are some limitations that may affect and disturb the accuracy of results in this research. Therefore, results obtained may not fully reflect the relationship between macroeconomic variables and stock market performance. The researchers who refer to this study have to be alert of the limitations mentioned below.

5.4.1 Use of Annual Data

Data for variables employed in this research are collected in annual basis. However, variables such as exchange rate and stock price index fluctuate daily. As a result, results generated using monthly data might be different with those results generated using annual data. In short, frequency of annual data might not fully capture the how these variables affect the volatility of stock price compared to variables collected in higher frequency data such as monthly or quarterly data.

5.4.2 Stock Index Restrictions

This research adopted FBMKLCI as benchmark to capture stock price volatility in Malaysia. There are total of 807 listed companies in Malaysia as of 4 March 2017. However, FBMKLCI only included top 30 listed companies in Malaysia which is insufficient enough to represent the majority of these companies. Besides, these 807 companies comprises of many sectors such as manufacturing, technology and plantation. Each sector might have different sensitivity to different macroeconomic variables.

Researchers should be alert to these limitations when adopting the information in this study. In short, potential users should refer to these limitations which can be raise for future study purpose.

5.5 Recommendation

5.5.1 Behavioural Finance

Many classical finance theories are drawn with assumptions that investors trade rationally. However, in real world practice, investors may not always be rational while trading stock. According to behavioural finance, psychological and emotional factors could influence investment decision to a large extent (Birau, 2012). One of the famous examples in behavioural finance is herd instinct (Moldovan, 2010). According to this theory, investors tend to follow the majority or made trading decisions based on conclusion drawn from single source or small sample data.

Psychological factor and human sentiment will violate stock market efficiency. Consequently, market prices tend to move differently from the fundamental values of organisation and this will lead to mispricing of stock prices. Therefore, researcher may consider including qualitative variables which are relevant to behavioural finance to better reflect a change in stock market performance.

5.5.2 Negative Shock

Negative shock can be one of the factors that affect the volatility of stock market performance. It may influence the stock market performance directly and indirectly through chain reactions (Arabi, 2016). For example, according Hisyam (2016) Malaysia stock market reacted negatively to Donald Trump won the United States President Election on November 2016. On that particular day, FTSE Bursa Malaysia KLCI closed at 1,642.45 points and dropped by 1.28 percent.

In this context, the victory of Trump became a shock in Malaysia due to the uncertainty of the changes in U.S trade policy. Trump has made changes to several policies in order to foster prosperity of U.S economy. Some of the changes include the withdrawal from Trans-Pacific Partnership (TPP) Agreement and impose higher tariffs on imports. When higher tariff is imposed, cost of imported goods for U.S will be higher. If this happens, this would adversely affect Malaysian exporters and hence lower down the stock market index due to a lower firm performance (Surendra, 2016). Researchers can focus on this latest event, or include any other relevant major events to better examine the impacts of negative shock on the stock market index.

5.5.3 Industrial Production Index (IPI)

IPI measures the real output of the manufacturing, mining, and electric and gas utilities industries. When IPI index increases, this shows that companies in that industry are well-performed and has higher output. This index will be in monthly basis and it reveals the industrial output of a nation. Peiro (2016) made an interesting discovery whereby there is a visible change over time in the relative importance of IPI and interest rates in European countries such as France, Germany and the United Kingdom.

The author noticed that IPI had become a much more important element to influence the stock performance at the expense of interest rate in recent years. At the same time, Aromolaran, Taiwo, Adekoya and Malomo (2016) found significant long run relationship with the performance of All Share Index (ASI) in Nigeria. Thus, further research can be carried out to investigate whether there is a change over time in the relative importance of IPI index towards stock market in developing countries such as Malaysia.

5.5.4 Include Qualitative Variables

Qualitative factor such as investors behaviour also play a big role in affecting stock index price. Qualitative data may include factor such as investors' feeling, behaviour and personal characteristic which cannot be captured by quantitative data (Madrigal & McClain, 2012). By including qualitative data, researchers could include qualitative data without being constrained by numerical form. This allow future study to better capture factors that drive stock market performance.

5.6 Conclusion

This study examines the effect of macroeconomic variables toward stock market performance in Malaysia. The findings confirmed that three independent variables, namely inflation rate, exchange rate, interest rate have long run significant relationship with KLCI index, while GDP growth rate does not significantly affect stock market performance in long run. To conclude, this paper has achieved its main objective, which is to examine the effect of macroeconomic factors toward Malaysian stock market performance from 1990 to 2014 in annual basis. Results and findings from this study could provide relevant information and better insights for governments, policymakers, researchers, academician and investors regarding this topic and area of study. Lastly, future study can be conducted by referring to limitation and recommendation of this research for further improvement.

This study is beneficial to our future career as we have gained knowledge about stock market in Malaysia. Stock market is a fast-paced, high return investment which comes with high risk. Therefore, stock market players should equip themselves with strong foundation of relevant knowledge instead of trading blindly following tips. As we have learnt how stock market is influenced by macroeconomic variables used in this study, it is important that we keep track of changes in these variables and more importantly, to process these information correctly for own advantages. Subsequently, we decide

whether to buy, hold or sell the existing stock on hand to maximize gain during favorable times, or to minimize loss during bad times. Lastly, we should bear in mind relationship proposed by theories may not necessary be consistent with empirical result all the time.

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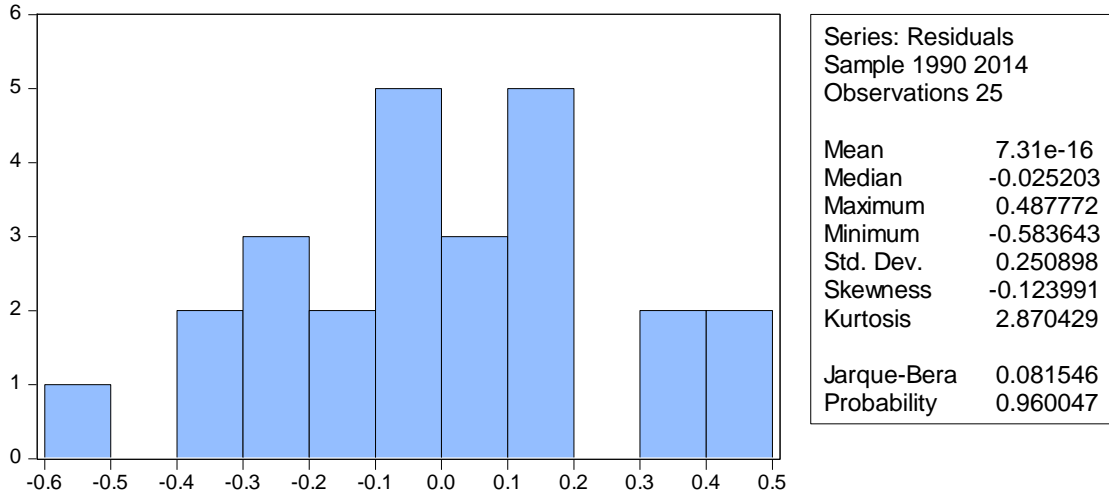
APPENDICES

Appendix 4.1: Ordinary Least Square (OLS) Method

Dependent Variable: LOG(KLCI)
 Method: Least Squares
 Date: 03/28/17 Time: 17:22
 Sample: 1990 2014
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.844043	0.406565	16.83384	0.0000
IR	-0.174446	0.033034	-5.280885	0.0000
ER	0.014516	0.005260	2.759867	0.0121
INF	-0.170552	0.032473	-5.252139	0.0000
GDP	-0.030459	0.020197	-1.508101	0.1472
R-squared	0.599113	Mean dependent var	6.866226	
Adjusted R-squared	0.518935	S.D. dependent var	0.396266	
S.E. of regression	0.274845	Akaike info criterion	0.431640	
Sum squared resid	1.510799	Schwarz criterion	0.675415	
Log likelihood	-0.395499	Hannan-Quinn criter.	0.499253	
F-statistic	7.472339	Durbin-Watson stat	1.395908	
Prob(F-statistic)	0.000749			

Appendix 4.2: Jarque-Bera Normality Test



Appendix 4.3: Multicollinearity Test – Auxiliary Model 1

Dependent Variable: IR
 Method: Least Squares
 Date: 03/28/17 Time: 17:25
 Sample: 1990 2014
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.691677	2.681503	-0.257944	0.7990
ER	0.086869	0.029118	2.983376	0.0071
INF	-0.848138	0.108454	-7.820260	0.0000
GDP	-0.224911	0.124063	-1.812884	0.0842
R-squared	0.804137	Mean dependent var	3.553470	
Adjusted R-squared	0.776156	S.D. dependent var	3.837529	
S.E. of regression	1.815616	Akaike info criterion	4.176374	
Sum squared resid	69.22571	Schwarz criterion	4.371394	
Log likelihood	-48.20467	Hannan-Quinn criter.	4.230464	
F-statistic	28.73922	Durbin-Watson stat	0.227360	
Prob(F-statistic)	0.000000			

Appendix 4.4: Multicollinearity Test – Auxiliary Model 2

Dependent Variable: ER
 Method: Least Squares
 Date: 03/28/17 Time: 17:25
 Sample: 1990 2014
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	64.52286	9.289058	6.946114	0.0000
IR	3.426656	1.148583	2.983376	0.0071
INF	2.321183	1.248440	1.859267	0.0771
GDP	2.675759	0.601015	4.452071	0.0002
R-squared	0.585088	Mean dependent var	101.5144	
Adjusted R-squared	0.525815	S.D. dependent var	16.55969	
S.E. of regression	11.40318	Akaike info criterion	7.851308	
Sum squared resid	2730.683	Schwarz criterion	8.046328	
Log likelihood	-94.14135	Hannan-Quinn criter.	7.905399	
F-statistic	9.871056	Durbin-Watson stat	0.670918	
Prob(F-statistic)	0.000290			

Appendix 4.5: Multicollinearity Test – Auxiliary Model 3

Dependent Variable: INF
 Method: Least Squares
 Date: 03/28/17 Time: 17:26
 Sample: 1990 2014
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.477845	2.713016	0.544724	0.5917
IR	-0.877676	0.112231	-7.820260	0.0000
ER	0.060894	0.032752	1.859267	0.0771
GDP	-0.122532	0.133062	-0.920867	0.3676
R-squared	0.762729	Mean dependent var	3.809183	
Adjusted R-squared	0.728834	S.D. dependent var	3.546827	
S.E. of regression	1.846962	Akaike info criterion	4.210608	
Sum squared resid	71.63664	Schwarz criterion	4.405628	
Log likelihood	-48.63260	Hannan-Quinn criter.	4.264698	
F-statistic	22.50218	Durbin-Watson stat	0.518299	
Prob(F-statistic)	0.000001			

Appendix 4.6: Multicollinearity Test – Auxiliary Model 4

Dependent Variable: GDP
 Method: Least Squares
 Date: 03/28/17 Time: 17:26
 Sample: 1990 2014
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.107124	3.917540	-2.324705	0.0302
IR	-0.601676	0.331889	-1.812884	0.0842
ER	0.181466	0.040760	4.452071	0.0002
INF	-0.316762	0.343982	-0.920867	0.3676
R-squared	0.497532	Mean dependent var	5.969600	
Adjusted R-squared	0.425750	S.D. dependent var	3.918765	
S.E. of regression	2.969611	Akaike info criterion	5.160386	
Sum squared resid	185.1904	Schwarz criterion	5.355406	
Log likelihood	-60.50482	Hannan-Quinn criter.	5.214476	
F-statistic	6.931226	Durbin-Watson stat	1.901410	
Prob(F-statistic)	0.002024			

Appendix 4.7: Heteroscedasticity Test - ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.136607	Prob. F(1,22)	0.7152
Obs*R-squared	0.148106	Prob. Chi-Square(1)	0.7004

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 03/28/17 Time: 17:30

Sample (adjusted): 1991 2014

Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.045240	0.016062	2.816564	0.0101
RESID^2(-1)	0.056894	0.153933	0.369604	0.7152
R-squared	0.006171	Mean dependent var	0.048757	
Adjusted R-squared	-0.039003	S.D. dependent var	0.062200	
S.E. of regression	0.063401	Akaike info criterion	-2.599005	
Sum squared resid	0.088434	Schwarz criterion	-2.500833	
Log likelihood	33.18805	Hannan-Quinn criter.	-2.572960	
F-statistic	0.136607	Durbin-Watson stat	2.327957	
Prob(F-statistic)	0.715212			

Appendix 4.8: Autocorrelation Test – Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.649382	Prob. F(2,18)	0.5342
Obs*R-squared	1.682445	Prob. Chi-Square(2)	0.4312

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 03/28/17 Time: 17:31

Sample: 1990 2014

Included observations: 25

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011299	0.414587	0.027253	0.9786
IR	0.003070	0.033949	0.090428	0.9289
ER	0.000355	0.005437	0.065363	0.9486
INF	-0.001968	0.033153	-0.059372	0.9533
GDP	-0.008700	0.023555	-0.369340	0.7162
RESID(-1)	0.250346	0.248079	1.009136	0.3263
RESID(-2)	-0.222095	0.284997	-0.779290	0.4459

R-squared	0.067298	Mean dependent var	7.31E-16
Adjusted R-squared	-0.243603	S.D. dependent var	0.250898
S.E. of regression	0.279794	Akaike info criterion	0.521971
Sum squared resid	1.409126	Schwarz criterion	0.863256
Log likelihood	0.475368	Hannan-Quinn criter.	0.616629
F-statistic	0.216461	Durbin-Watson stat	1.818647
Prob(F-statistic)	0.966589		

Appendix 4.9: Model Specification Test – Ramsey RESET Test

Ramsey RESET Test
 Equation: UNTITLED
 Specification: LOG(KLCI) C IR ER INF GDP
 Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.710187	19	0.1035
F-statistic	2.924738	(1, 19)	0.1035
Likelihood ratio	3.579416	1	0.0585

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.201539	1	0.201539
Restricted SSR	1.510799	20	0.075540
Unrestricted SSR	1.309260	19	0.068908
Unrestricted SSR	1.309260	19	0.068908

LR test summary:

	Value	df
Restricted LogL	-0.395499	20
Unrestricted LogL	1.394209	19

Unrestricted Test Equation:
 Dependent Variable: LOG(KLCI)
 Method: Least Squares
 Date: 03/28/17 Time: 17:40
 Sample: 1990 2014
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-38.51047	26.52306	-1.451962	0.1628
IR	2.150013	1.359551	1.581414	0.1303
ER	-0.180282	0.114015	-1.581211	0.1303
INF	2.098457	1.327124	1.581207	0.1303
GDP	0.394221	0.249071	1.582762	0.1300
FITTED^2	0.967308	0.565616	1.710187	0.1035

R-squared	0.652591	Mean dependent var	6.866226
Adjusted R-squared	0.561167	S.D. dependent var	0.396266
S.E. of regression	0.262504	Akaike info criterion	0.368463
Sum squared resid	1.309260	Schwarz criterion	0.660993
Log likelihood	1.394209	Hannan-Quinn criter.	0.449599
F-statistic	7.138111	Durbin-Watson stat	1.442480
Prob(F-statistic)	0.000654		