

MACROECONOMIC DETERMINANTS OF THE  
STOCK MARKET RETURN: THE CASE IN  
MALAYSIA

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- (3) Equal contribution has been made by each group member in completing the research project.
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## LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
APT	Arbitrage Pricing Theory
CAPM	Capital Asset Pricing Model
CPI	Consumer Price Index
E-Views	Econometric Views
FTSE	Financial Times Stock Exchange
IR	Interest Rate
JB-Statistic	Jarque-Bera Statistic
KLCI	Kuala Lumpur Composite Index
KLSE	Kuala Lumpur Stock Exchange
KPSS	Kwiatkowski–Phillips–Schmidt–Shin
M1	Money Supply Category 1
M2	Money Supply Category 2
M3	Money Supply Category 3
MPT	Modern Portfolio Model
NZSE	New Zealand Stock Exchange
OLS	Ordinary Least Square
OP	Crude Oil Price
PP	Phillips-Perron
VAR	Vector Autoregression
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor

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## ABSTRACT

This paper examines the relationships between Kuala Lumpur Composite Index and four macroeconomic variables from January 1992 to December 2011 which contains a monthly data set of 240 observations. This paper employs Ordinary Least Square (OLS) to determine the statistical relationship. For the diagnostic checking, there are no heteroscedasticity, no autocorrelation, no model specification problem and it is normally distributed but there is existence of serious multicollinearity problem in the multiple regression model. Additionally, this paper investigates the short run and long run dynamic linkages by using Johansen Cointegration Test and Granger Causality test respectively. The results indicate that KLCI is consistently examined by interest rate, money supply and consumer price index in the short run and long run. For the crude oil price, there is a long run linkage with KLCI but turn to be insignificant in the short run.



## **CHAPTER 1: RESEARCH OVERVIEW**

### **1.0 Introduction**

In this new global economy, stock market return has become a central issue in Malaysia's stock market. It is also becoming difficult to ignore the importance of the stock market return which will represent a country's economic activity. However, the significant relationship between stock price and macroeconomic variables are highly important and has attracted concern of economists, policy makers and the investment community for a long time (Kutty, 2010). This is because the significant effects of macroeconomic variables on stock prices will help them to indicate informational inefficiency of the stock market. While the causal nexus between macroeconomic effect and stock price in developed economies is well recognized, only a few studies have been conducted for developing countries such as Malaysia. Thus, this research is aimed to investigate the monthly movement of KLCI's stock price index which influenced by Interest Rate (IR), Money Supply (MS), Consumer Price Index (CPI) and Crude Oil Price (OP) in Malaysia.

### **1.1 Research background**

The Malaysia stock market is known today as Bursa Malaysia has gained the fast momentum of globalization although Malaysia is small but open economy. With a history stretching back about 50 years ago, Malaysia stock market is one of the biggest stock markets in Southeast Asia. First of all, Bursa Malaysia is a holding company that controls a number of exchanges in Malaysia since 1964. It plays an important role in growing the Malaysian capital market's global reach by offering

competitive services and infrastructure through adoption of internationally accepted standards which are globally relevant ('FTSE Bursa Malaysia KLCI', 2011).

Occurrence of the global financial crisis of 2007 and 2008 affected all financial markets around the world and a major concern was about the unpredictability change in stock markets. The Kuala Lumpur Composite Index (KLCI) which is the main index and market indicator in Malaysia dropped around 558.93 points in 2008 and this lead to a drop around a 40 percent in its value (Angabini & Wasiuzzaman, 2011).

Thus, stock market had become essential in fostering capital formation and sustaining economic growth in Malaysia. The estimation of the variation in aggregate stock returns can be attributed to various types of economic views. Initially, stock markets are affected by many highly interrelated economic, political and even psychological factors. In a simple word, foreign capital can be attracted if stock prices are in an upward trend. Corporate wealth will be diminishing when there is a declining in stock prices which will also cause the reduction of the country's wealth. Finally, currency will depreciate due to a drop in the stock prices (Kutty, 2010). Therefore, it is interesting to investigate the changing of Malaysia stock market with some macroeconomic factors.

As part of Bursa Malaysia's strategic initiative, the Kuala Lumpur Composite Index (KLCI) which represents the top 30 companies and recognize as a stock market index since 1986. It is now known as the FTSE Bursa Malaysia KLCI which acts as an accurate performance indicator of the Malaysian stock market as well as the worldwide economy. Furthermore, KLCI is a representative of Malaysian stock market index by providing a platform for wider ranges of investment opportunities. In addition, it recognizes as FTSE Bursa Malaysia KLCI in order to enhance global relevance and recognition. Besides, the stability of the KLCI index value preserves

the historical movements of the Malaysian stock market ('FTSE Bursa Malaysia KLCI', 2011).

Moreover, several studies have been conducted in Malaysia about the relationship of KLCI stock market index and macroeconomics factors. However, most researchers focus on developed country by investigating their macroeconomic factors and stock prices in order to determine the lead-lag relationship. This is not only important for developed countries, but also important in Malaysia as developing country. It has become an important implication for the Efficient Market Hypothesis and stock price movements in Malaysia (Ibrahim, 1999). In order to contribute to this line of study into developing county like Malaysia, this paper extends the existing studies on the several macroeconomics effects such as Interest Rate (IR), Money Supply (MS), Consumer Price Index (CPI) and Crude Oil Price (OP) on the KLCI stock market index in Malaysia.

## **1.2 Problem Statement**

Stock market had become essential by playing important role in Malaysia in fostering capital formation and sustaining economic growth. It acts as a facilitator between savers and users. It not only consists of transferring and gathering of funds and wealth, but also sharing of risks. Furthermore, stock markets are important for economic growth because it ensures the flow of resources to the most productive investment opportunities. Dealer and broker will be responsible to help their customers in investment. There is no benchmark for the movement of stock prices. However, there are some macroeconomic factors that find it important in estimating the relationship between stock market return in Malaysia. This paper proposes that interest rate (Gan et al., 2006), money supply (MS) (Asmy et al., 2009), consumer price index (Menike, 2006), crude oil price (Ghorbel & Younes, 2010) have significant relationship with

stock price. Besides, this paper intends to investigate the relationship of all these corresponding macroeconomic variables with stock price in both short run and long run dynamic in Malaysia. The whole Malaysia economic activities would be affected due to the fluctuation of the stock prices.

## **1.3 Research Objective**

### **1.3.1 General Objective**

The current study will attempt to investigate and identify the most influencing factors in Malaysia stock markets in order to derive an appropriate policy instrument. Besides, it can be a useful tool for portfolio managers and also market participants. This is because they can determine the future behaviors and performance of stock prices. With the prediction of the market prices, it can also help to reduce the probability of future losses in the market. This current study will also attempt to investigate the time-series relationship between macroeconomic variables and stock price.

### **1.3.2 Specific Objective**

This paper tends to focus on

- i.) Examining the overall relationship between stock market return and each of the macroeconomic variables such as Interest Rate (IR), Money Supply (MS), Consumer Price Index (CPI) and Crude Oil Price (OP).

- ii.) This paper intends to show the significant relationship between stock price and consumer price index (CPI) in details.
- iii.) Due to the arguments of the previous researchers, this paper will use monthly interest rate as independent variable to investigate on the relationship with stock market return.
- iv.) This paper is using money supply as one of the independent variables in order to get more understanding how money supply affect stock prices to fluctuate in Malaysia.
- v.) To investigate the correlation between stock price and crude oil price in Malaysia together with other explanatory variables together.
- vi.) To examine the short run and long run relationship between dependent and independent variable.

## 1.4 Research Question

- i.) Can monthly time-series data of stock market return be significantly explained the relationship by the corresponding macroeconomic variables of interest rate, money supply, consumer price index and crude oil price in a developing country of Malaysia?
- ii.) Is the economic model free from economic problems?
- iii.) Are all the macroeconomic variables significant in both short run and long run?

- iv.) How the corresponding variables appear of bilateral relationship in the short run?
- v.) Did the determinants help out the stock market participant of investors, speculators, arbitrageurs, policy maker and so on?

## 1.5 Hypotheses of the Study

### 1.5.1 Interest Rate

*$H_0$ : There is no relationship between the stock return (KLCI) and interest rate (IR).*

*$H_1$ : There is a relationship between the stock return (KLCI) and interest rate (IR).*

In rationale, there should be a strong positive relationship between stock return (KLCI) and interest rate (Prashanta & Bushnu, 2009). Stock return will be affected when there is an increasing of interest rate. This can be explained by the attraction of the particular stock money would increase with the increasing of interest rate. People will deposit money in own country rather than foreign country in order to gain a higher stock return. Conversely, declining of interest rate may reduce the intention of resident to deposit money in their own country and reduce the return on stock as well (Maysami, Lee & Hamzah, 2004). From this, this paper rejects  $H_0$  saying that there is a relationship between the stock return (KLCI) and interest rate.

## 1.5.2 Money Supply

*H<sub>0</sub> : There is no relationship between the stock return (KLCI) and money supply (MS).*

*H<sub>1</sub> : There is a relationship between the stock return (KLCI) and money supply (MS).*

Maysami, Lee & Hamzah (2004) proposed that the relationship between money supply and stock returns by hypothesizing that the growth rate of money supply may affect the aggregate economy as well as expected stock returns. A raise in M2 would show that there is an excess of liquidity available for buying stock and resulting in higher stock prices due to an increase of demand to both common stock and the real good market. However, strengthen in monetary growth might lead to higher inflation and hence there will be increasing of nominal interest rate according to Fisher equation (Maysami, Lee & Hamzah, 2004). The higher interest rate leads to higher required rate of turn on the stock and vice versa. In conclusion, this paper rejects H<sub>0</sub> that means that this paper has sufficient evidence to conclude that there is a relationship between the stock return (KLCI) and money supply (MS).

### 1.5.3 Consumer Price Index (CPI)

*H<sub>0</sub> : There is no relationship between the stock return (KLCI) and CPI.*

*H<sub>1</sub> : There is a relationship between the stock return (KLCI) and CPI.*

Normally, CPI is proxy as inflation. This is due to the annual percentage change in CPI is used as a measure of inflation. Schwert (1981) notes that unexpected inflation benefit net debtors at the expense of net creditor when contracts are written in nominal term. Hence, stock return of net creditor should be negatively related to the current unexpected inflation rate. From first estimation, this paper rejects the H<sub>0</sub>.

### 1.5.4 Crude Oil Price

*H<sub>0</sub> : There is no relationship between the stock return (KLCI) and crude oil price.*

*H<sub>1</sub> : There is a relationship between the stock return (KLCI) and crude oil price.*

An increase in oil prices will cause expected earning to decline due to the transportation costs. The increasing of the transportation fees will be bear by customers and eventually hiking up the prices of all goods. Finally, stock price will reduce simultaneously due to demand on stock reduce. If the stock market is inefficient, stock return might be slowly affected too (Nooreen, Roohi &



Khalid, 2006). In conclusion, this paper estimates that there is a relationship between stock return (KLCI) and oil price.

## **1.6 Significance of the Study**

In this study, this paper intends to investigate the relationship between dependant variable (stock market return) and macroeconomic variables as the independent variables (interest rate, money supply, consumer price index and crude oil price). The main contribution of this study goes to evaluate the significant relationship between stock market return with other variables such as interest rate, money supply, consumer price index and crude oil price from the year of monthly data 1992 to 2011. All these are macroeconomic variables which stand an important tool for market participants such as policy maker, hedgers, speculators, normal investors and so on which will be discussed further. This paper tends to combine the idea of previous researchers with current study in order to newly create a research paper that is useful for the stock market participants. Plus, this paper updates the information from the pass to current.

As common, there are a lot of researches testing on the relationship of interest rate, money supply and consumer price index, but seldom testing crude oil price combining with all these indicators in Malaysia. Thus, the minor contribution of this study is investigating the significant relationship between stock return of Malaysia stock market and crude oil price by using monthly data. This paper has discovered that there is no previous researcher investigating the relationship between stock price and crude oil price in Malaysia with combining all these macroeconomic indicators together. This paper has found that there are abroad researchers doing on this variable (Crude Oil Price), but they have several different view points towards this variable. This might due to the different country's culture, management, exchange control and so on (Gonda, 2003).

Standing from policy maker in Malaysia, this study can be a useful tool for them to implement an appropriate policy. It can help the policy maker to make a correct decision in helping the stock market. Besides, it also helps to predetermine and stabilize and avoid volatility in stock return.

From perspective of investors, it can be useful information for them to decide on whether buying or selling the stock. For a portfolio manager and also fund manager, it provides them important information to hedge the stock immediately. Central bank also can keep an eye on those markets by using this efficient information. It also prevent bank run that will finally affect the whole financial system (Pearce, 1983).

## **1.7 Chapter Layout**

The balance of this paper is organized in the following manner. Chapter 2 reviews previous literature and elaborate the theoretical model. The data analysis is presented in Chapter 3 while Chapter 4 discuss about the findings and empirical results. Lastly, summary and conclusion are shown in the last section of this paper.

## **1.8 Conclusion**

Basically in Chapter 1, this paper kindly introduces the importance of the macroeconomic variables affect on stock market return. This study briefly explains the Malaysia stock market's background in order to provide a clearer picture and understanding towards Malaysia stock market. This paper has explained the intention of testing significant relationship between the macroeconomic variables (interest rate, money supply, consumer price index and crude oil price) and stock market return.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.0 Introduction**

This paper has reviewed a series of journal regarding this topic. However, this study finds that there are a lot of research studying on abroad, but not in Malaysia. Besides, developed countries also become most of the researcher's favorite, but not in developing countries instead. Therefore, this paper mainly focuses in Malaysia which is a developing country of Asian and would try to explain the significant relationship from the empirical results.

### **2.1 Review of the Literature**

Stock prices play an important role in concerning the future course of events for every country. Therefore, several literatures now exist in investigating the relationship between stock market returns and macroeconomic factors during the last few decades. The different of macroeconomic variable may influence the result of stock market price, as well as investor investment decision. As a result, it might become a motivation for most researchers to examine the relationship between the stock market prices and the macroeconomic variables. Researchers from different countries might select different macroeconomic variables as well as study period in order to examine the relationship with stock market prices in different countries.

Some studies have been conducted in developed or developing country. For example, Maskay and Chapman (2007) and Rahman and Mustafa (2008) are determining the relationship between the change in money supply and the level of stock market prices in U.S while Hsing (2011) is using same variable which is money supply but testing the stock market index in European Country. On the other hand, a study by Ali et al. (2010) is employed a set of macroeconomic variable which includes inflation, exchange rate, balance of trade and index of industrial production to examine the effect on stock exchange price. This exchange prices represented by the general price index of the Karachi stock exchange, which is the largest stock exchange in Pakistan.

Furthermore, Ahmed and Mustafa (2003) and Ali et al. (2010) have also investigate the real stock return in Pakistan but they are only using inflation as their main variable in their research. In addition, some researchers are also testing the effect of inflation to different stock price in their particular country. For instance, Schwert (1981), Quayes and Jamal (2008) and Ali et al.(2010) use inflation as a macroeconomic variable to investigate how the CPI will influence the daily stock return in New York. On the contrary, a set of macroeconomic variables such as interest rate, inflation, exchange rates, industrial production and money supply are used by Maysami, Lee and Hamzah (2004). However, these variables are mainly from the Singapore Stock Market Index (STI).

Besides of using inflation, money supply and exchange rates as the macroeconomic variables, many researchers have found that some other variables such as oil price and foreign exchange will also affect the stock price movement recent year. Maghayereh (2003) includes a number of independent variables for his empirical study compared to other researchers. He intends to determine the relationship of such variables which includes industrial production, inflation, interest rate, trade balance, foreign exchange, oil price and money supply with stock price in Jordan's market.

From the previous researches until present, they still don't have any new combination of these variables and explaining the effect on stock market in Malaysia. Thus, this paper attempts to choose several macroeconomic variables for seeking their hypothesized relations with the KLCI stock return in Malaysia which are discussed in next.

### **2.1.1 Stock Return (KLCI Stock Market Index)**

Stock market plays a major role in both developed and developing countries by controlling redundant resources from surplus to deficit units in the economy (Asaolu & Ogunmuyiwa, 2011). However, stock return is the rate of return of the stock market. Kuala Lumpur Composite Index (KLCI) is the main index and market indicator in Malaysia which gives the investor a general idea about the stock return of Malaysia as well as the direction and performance of the market. KLCI contains the selected 30 largest companies from main board by full market capitalization from Bursa Malaysia and comprise multi-sectors companies ('FTSE Bursa Malaysia KLCI', 2011). For the coverage, FTSE Bursa Malaysia KLCI will cover around 70 percents of the FTSE Bursa Malaysia EMAS index. The FTSE Bursa Malaysia EMAS index is a broad benchmark and aims to cover 98 percents of Bursa Malaysia's Main Board (Perrett et al., 2009).

The companies which listed in KLCI must fulfill the two main eligibility requirement stated in FTSE Bursa Malaysia Ground Rules which are free float and liquidity. A minimum of free float is 15 percent for each of the company for the purpose of determining the attribution of company's market activity in the index. The liquidity is to ensure the company stocks are liquid enough to be traded. The FTSE Bursa Malaysia KLCI implements an internationally

accepted index calculation methodology to provide a more investable, tradable and transparently managed index. Index is calculated by FTSE which uses the real time and closing prices sourced from Bursa Malaysia. Calculation is based on a value weighted formula and adjusted by a free float factor. The FTSE Bursa Malaysia KLCI values are calculated on a real time basis every 15 seconds ('FTSE Bursa Malaysia KLCI', 2011).

However, a number of studies about how macroeconomic factors affect stock return have been investigated by many researches long time ago. For example, Gan et al. (2006) are examining the relationship between New Zealand stock Index and seven macroeconomic factors. Pilinkus (2009) analyzes the relationship between a group of macroeconomic variables and Lithuanian stock market index. According to Harasheh and Abu-Libdeh (2011), they include GDP, inflation rate, exchange rate and others to examine the stock price in Palestine. Besides, other researcher like Pearce (1983) is involved in investigating the relationship between stock market and the economy too. The outcome of all these studies shows that macroeconomic factors have an effect on stock market returns.

The macroeconomic variables studied in this paper are interest rate (IR), money supply (MS), consumer price index (CPI) and crude oil price (OP) which will be discussed further in this chapter.

### **2.1.2 Interest Rate (IR)**

Interest rate is normally determined by the supply and demand, but it is also determined by the monetary policy of a country according to its economic situation. Higher interest rate in saving will be attracted for investors to keep in the bank rather than invest in the risky stock market. Conversely, investors will be involved in the stock market rather than bank account if the risk free return is having in downturn (Zafar, Urooj & Durrani, 2008).

Regarding the relationship between stock prices and interest rate, Elton and Gruber (1988) determine the relationship between the stock return and several macroeconomic variables like industrial production, money supply, crude oil price, short-term interest rate on Japanese. The result shows that there exist a positive relationship between stock prices and short-term interest rates. In addition, Maysami, Lee & Hamzah (2004) also show that there will have a positive effect on future expected return for the firm. When the interest rate rises, demand on deposit will increase rather than going for investment because the cost of borrowing is costly. Therefore, the return on the deposit may increase. Besides, Maysami, Lee and Hamzah (2004) also show that they have short term and long term interest rates respectively have significant mixed result with the Singapore's stock market.

In overall, the theoretical argument of negative relationship between stock price and prevailing interest rate is not rejected. Interestingly, in Malaysia, it is discovered that interest rate have no relation with share price but changes of interest rate have negative relationship with changes of share price (Alam & Uddin, 2009).

As substantial, higher borrowing costs will have to be paid by the investors in the future if there is a raise in interest rate. This is a bad news for an investor. In fact, the demand on purchased stock would be stands in a downward trend and might lead to reduce in requiring rate of return.

According to the Prashanta & Bushnu (2009), interest rate is negatively correlated with the stock market return. From the contractionary monetary policy, interest rate will be adjusted to be higher than original rate that is usually negatively affects stock market return. In theory, there is an inverse relationship between interest rate and equity value by using dividend discount model. In simple word, value of equity will eventually reduce as there is an increase of interest rate. Finally, it makes fixed income securities become more attractive and act as an alternative to hold the stocks. Investors would have to forgone the credit lending from bank due to higher borrowing costs which will affects their profit margin if they do so. Thus, for a rational investor, he will choose to invest in stocks market which will earn him a return. On the contrary, standing from expansionary monetary policy view point, there is a must to reduce in interest rate in order to boost the stock market as well as economy.

### **2.1.3 Money Supply (MS)**

Money supply is one of the components of monetary policy for the Federal. There will be either anticipated or unanticipated of money supply by the people (Maskay & Chapman, 2007). Besides, money supply can be divided into multiple categories such as M1, M2 and M3. This is according to the type and the size of account in which the instrument is kept (Schwartz, 2008). M1 is currency held by public plus demand deposit. M2 is equal to M1 plus



savings and time deposits with licensed banks and held by the public. While for the M3 is equal to M2 plus deposits with restricted licensed banks and deposit taking companies and held by the public (Jess & Alfred, 2009).

However, Kraft, J. and Kraft, A. (1977) have found that there is no causal relationship between US money supply and stock return. However, Maghayereh (2003) found negative but not statistically significant relationship stock return and money supply in Jordan. Moreover, Ozbay (2009) has also proved that the relationship between stock return and money supply is found to be insignificant in Turkey case.

The money supply is an important instrument for controlling the inflation by economists. Maskay and Chapman (2007) declare that there is a positive relationship between changes in the money supply and stock prices. The results support the real activity theorists arguments that an increase in the money supply increase stock prices and vice versa. Changes in the stock price are predominantly set by changes in money supply intuitively makes sense to argue that an increase in the rate of growth of money supply strengthens the rate and finally increase in stock prices (Shiblee, 2009).

According to Fama (1981), he has concluded that the degree of excess liquidity influences the stock market. The impact of the change in monetary policy is relatively quick and direct. Monetary expansion reduced short-term interest rate as far as the liquidity effect dominates the combined expected price effect and income effect. In turn, bolsters stock market as stock price and interest rate should be negatively correlated. Sellin (2001) has proved that an unexpected money supply increase indicates higher money demand given an accommodating monetary policy. Higher money demand will lead to

increase in risk. As a result, investors demand higher risk premium for holding stocks making them less attractive, which causes equity prices to fall.

#### **2.1.4 Consumer Price Index (CPI)**

A price index is a measure of the aggregate price level relative to a selected base year. CPI is a principle measure of price fluctuations at retail level and it shows the cost of purchasing a goods and service consumed by private household (Subhani, Osman & Gul, 2010). In other words, CPI is a proxy of inflation because the annual percentage changes in a CPI act as inflation. Besides, government also could implement to determine how to adjust the consumer payment to help them in meeting their needs.

The relationship between inflation and common stock returns has been studied long time ago. Theoretically, stocks are assumed to be inflation neutral for unexpected inflation which means always have a negative relationship with stock prices. For example, Schwert (1981) found that stock market and unexpected inflation in the Consumer Price Index(CPI) were showing negatively relationship although only small reaction. This statement has been agreed by Cohn and Lessard (1980), Geske and Roll (1983), Kaul (1987), Gan et al. (2006), Quayes and Jamal (2008) and Pereira-Garmendia (2010) whose show that the shock of CPI or inflation has a negative impact on the stock return.

In contrast, Fisher effect predicts that stock returns should be positively related to expected inflation. Hasan (2008) has found that regression results show positive and statistically significant relationship between stock returns

and inflation in United Kingdom which are consistent with the Fisherian hypothesis. The result is similar with Al-Zoubi and Al-Sharkas (2011) who found that inflation shock was having a positive relationship which made a good inflation in stock in the long run period. In addition, the long run equilibrium also indicates that there is a positive relationship between inflation rate (CPI) and stock prices in Malaysia (Asmy et al., 2009).

The finding from previous researcher of inflation are inconsistent and contradictory with Pearce and Roley (1985) which reveal that CPI has no significant relationship on the stock price on the day of announcement.

### **2.1.5 Crude Oil Price (OP)**

Oil price become important factor in estimating the stock return in recent year because it affects many sector in the industry such as manufacturing, servicing, tourism and others as will be affecting their transportation cost as well as their selling price. It constitutes the major part of the input for manufacturing costs. Inflation will happen when there is a raise of production costs due to the extra increase in cost will be transposed to consumers which eventually reduce their purchasing power. During oil crisis in 1973-1974, a decline of stock prices is explained by the rise in oil prices and it shows that change in oil price may cause the stock return to fluctuate (Bina & Vo, 2007). Furthermore, stock returns may differ greatly depending on the cause of the oil price shock. The negative response of stock prices to oil price shocks is found only when the oil price rises due to an increase in avoiding demand driven by fears about the potential accessibility of crude oil. In contrast, if higher oil prices are driven by a global economic expansion and it will cause a positive effect on cumulative stock returns (Kilian & Park, 2007).

According to Arouri and Fouquau (2009), they found that GCC stock market react positively to oil prices. Similarity, Ghorbel and Younes (2010) have shown that an oil price shock has a positive affecting on real stock returns for US and some emerging country like Malaysia. Besides, Narayan,P. and Narayan,S. (2010) support their argument saying that oil prices have a positive and statistically significant influence on Vietnam stock price but the results is inconsistent with the theory. The result was impacted by changing in the preferences from holding foreign currency and domestic bank deposit to stock local market was increase the investment in stock and the rise the Vietnam's stock market. At last, Raheman et. al. (2012) show they have short run relationship between oil price fluctuations and stock return for Asia Pacific Countries by using Granger Causality Test.

In U.S. stock market, Rahman and Mustafa (2008) have found that there is a dropping effect on U.S. stock market from oil shock. Miller and Ratti (2009) have agreed with them by revealing the stock price and crude oil price have negative relationship in the long run.

However, standing from financial view, there is no causality relationship between the price of oil and stock prices among economists. For example, Huang, Masulis and Stoll (1996) and Sari and Soyatas (2006) have found there is no significant relationship between stock returns and change in the price of oil futures. The results is same with Al-Fayoumi (2009) who reveals that changes in oil prices do not adversely affect on oil importing countries' stock markets. But normally, positive shock will cause the oil price increase and thus increase stock prices. Thus, to expand this investigation, this paper will examine how the oil price affects the Malaysia stock return.

## **2.2 Review of Relevant Theoretical Models**

### **2.2.1 Stock Return**

#### **2.2.1.1 Efficient Market Theory**

In an efficient capital market, security prices fully reflect available information in a rapid and unbiased manner and thus provide unbiased estimates for the underlying values (Basu, 1977). In another words, no investors should be able to utilize readily available information in order to forecast stock price movements quickly enough so as to make a profit through trading shares (Maysami, Lee & Hamzah, 2004).

There are three forms of tests that have been carried out by Fama (1969) which includes weak form, semi-strong form and strong form. From him, weak form test represent the information set which include only available for historical prices. Besides, semi-strong form concern on whether the prices efficiently adjust to other information that is obviously public available such as stock splits while strong form reflects on whether information relevant for price formation are reviewed (Fama, 1969). With all these available information, it can helps investors to determine sufficient conditions for capital market efficiency. By fulfilling the three basic requirements, the market can be known as efficient. The basic requirements include no transaction costs in trading securities, all available information is costless available to all market participants and all agree on the implications of current information for the current price and distributions of future prices of each security (Fama, 1969).

### **2.2.1.2 Random Walk Theory**

According to Fama (1965), there are two methods that often can be used to forecast stock prices by market professionals which are “chartist” or “technical” theories and the theory of fundamental or intrinsic value analysis. He claimed that the basic assumption for chartist or technical theories is the history which tends to repeat itself (Fama, 1965). Therefore, the way to predict the stock price for technical theory is to build up a familiarity with past patterns of price behavior in order to recognize situations of likely recurrence (Fama, 1965).

Most of the market professionals doubted on the technical theory due to surrounded by the degree of the spirituality. Theory of fundamental or intrinsic value analysis adheres by the typical analysts. According to Fama (1965), the assumption of this theory is that at any point in time an individual security has an intrinsic value which depends on the earning potential of the security. However, there are some researchers found that the Random Walk model is strongly rejected for the entire period and for all sub period for a variety of aggregate indexes and size-sorted portfolios (Lo & MacKinlay, 1988). According to their empirical research, they cannot be attributed completely to the effects of infrequent trading or time-varying volatilities although the rejections are due to largely to the behavior of small stocks.

### 2.2.1.3 Modern Portfolio Model

Harry Markowitz is the developer for Modern portfolio model (MPT) since 1952 (Fabozzi, Gupta, & Markowitz, 2002). 50 years later, this theory is widely used based on the same principles due to armed with the investor's concepts and tools and also influenced by the financially sophisticated. It is most applicable to portfolio management. MPT provides a framework to construct and select portfolios based on the expected performance of the investments and the risk appetite of the investor (Fabozzi, Gupta & Markowitz, 2002).

Basically, this model assumes that the investors are risk averse and only two things they will care more which are mean and variance of their one-period investment return when they are choosing among portfolios (Fama & French, 2003). Because of this, MPT introduced a new terminology that based on the mean-variance analysis which now has become the norm if the area of investment management. He has proved the fundamental theorem of mean-variance portfolio theory, namely holding constant variance, maximize expected return and holding constant expected return minimize variance (Elton & Gruber, 1997). Investors can easily choose his or her preferred portfolio based on the formulation of an efficient frontier, depending on individual risk from preferences. The most important message of this theory is that the assets could not be selected only on characteristic that were unique to the security (Elton & Gruber, 1997). Instead, investors need to be aware of how each security co-moved with another.

#### **2.2.1.4 Capital Asset Pricing Model (CAPM)**

According to Fama & French (2003), CAPM is developed after Harry Markowitz's Modern Portfolio model. CAPM assumes that the investment opportunity set is common knowledge- prices reflect to the new information so as to fall along the new security pricing line (Kumar et al., 2006). However, various market professionals are not satisfied with this model of information absorption in security markets. CAPM brings up the assets pricing theory of William Sharpe and John Linther (Fama & French, 2003). CAPM is attracted by its powerfully simple logic and naturally pleasing predictions about how to measure risk and about the relation between expected return and risk. However, the empirical record of the model is poor probably due to its simplicity (Fama & French, 2003). Assets are priced based on the systematic intrinsic risk and their systematic estimation risk. It assumes that risk premium and volatility are information-dependent. According to Kumar et al. (2006), their empirical strongly support the prediction of market volatility innovations will be a priced risk factor in the cross-section of stock returns. From the expected pricing model, expected present value of the discounted future cash flows is belong to the equity price at any given point in time (Anoruo, 2011). Central bank would put some effect in reducing the future inflation increases interest rate as increasing of crude oil price leads to an upward trend of inflation. Interest rate always has closed relationship with discount rates that usually use in equity value calculation and finally lead to a decreasing in stock prices.



## 2.2.2 Interest Rate

A simple dividend-discount valuation model has been employed in explaining the impact of interest rate on stock returns in Malaysia.

$$P = D_1 / (k - g) \quad (1)$$

Where,

P= stock return in Malaysia,  $D_1$ =dividend after first period, g= constant growth rate and k= required rate of return on the stock

### 2.2.2.1 'Substitution Effect' Hypothesis

As we know, macroeconomic variables have some impacts on stock return. However, stock market also can be affected by the changes in the direction of monetary policy. From the restrictive policies, it will make the cash flow worth less with higher rate of interest or discount rates. Therefore, the attractiveness of the investment would be reduced which in turn shrinking the value of stock returns.

From the 'substitution effect' hypothesis, a raise in interest rate would increase the opportunity cost of holding cash, which later on leads to a substitution effect between stocks and other interest bearing securities like bonds. In summary, both the restrictive policy and the substitution effect hypothesis suggest that interest rate should be inversely related to stock market return (Rahman, Sidek & Tafri, 2009).

### **2.2.2.2 Taylor's Theory**

Most of the macroeconomists are interested in modeling the Federal Reserve's "reaction function". Federal Reserve's "reaction function" shows how Fed alters monetary policy in response to economic developments and provides a basis in forecasting the short-term interest rate (Judd & Rudebusch, 1998).

In short, Taylor's rule is important for policy maker. Taylor's rule is a simple model by determining how central bank should react to the changes of inflation, macroeconomic condition and output level by changing the nominal interest rate. In order to determine the central bank's operating target for a short-term nominal interest rate, both positive and normative accounts of monetary policy are usually expressed in terms of systematic rules (Giannoni & Woodford, 2002). Taylor's rule expresses the Fed's operating target for the federal funds rate as a linear function of a current inflation rate and a current measure of output relative to potential stock level (Taylor, 1993).

### **2.2.2.3 Arbitrage Pricing Theory (APT)**

Arbitrage pricing theory is an extension of Capital Asset Pricing Model (CAPM). This is due to the several drawbacks of CAPM such as having difficulty in measuring true market portfolio. From Iqbal and Haider (2005), they proposed that there are several sources of risk such as inflation and changes in aggregate output in the economy that cannot be eliminated through diversification. APT calculates a portfolio beta by estimating the sensitivity of an asset's return. With the increasing of the interest rate risk, it will lower the asset's return. Martikainen, Yli-Olli, and Gunasekaran (1991) used interest rate as one of the variables in testing the APT model. He explained that the

higher the interest rate, the higher the discount factor, and lower the stock prices.

## 2.2.3 Money Supply

### 2.2.3.1 Tobin's Q Theory

The Tobin's Q theory tries to relate the monetary policy (money supply) and share prices. According to Gonda (2003), economists expected that monetary policy might have an effect upon investment expenditure via share prices. From the theory, there is a confirmation of the existence mutual link between Coefficients of q and investment expenditure (Gonda, 2003). From his research, James Tobin defined q as the share of the market value of an enterprise (the sum of share prices) and the replacement cost of capital. He explained that when people have money supply in term of money, people will start to spend (Gonda, 2003). The demand for the security grows when some of them use their money to buy shares which also increase the stock value. The rising of the share prices (SP) increase a firm's market value and thus lead to a growth in the coefficient q and a growth in investment expenditures. The mechanism is as followed:

$$M \uparrow \Leftrightarrow SP \uparrow \Leftrightarrow q \uparrow \Leftrightarrow I \uparrow \Leftrightarrow Y \uparrow$$

### 2.2.3.2 Monetary Portfolio Model

The monetary portfolio model is developed by Brunner (1961) and Friedman (1961). They revealed in their analysis saying that they view money as an asset among other assets in investor's portfolios. Investors will attempt to reestablish their desired money holdings by substituting between money and other assets if there is a monetary supply shocks (Sellin, 2001). A monetary supply shock means that a permanent increase in nominal stock of M1 would generates a temporary drop in the interest rate that consistent with the liquidity effect, a temporary increase in real output and a permanent depreciation of the nominal exchange rate (Kasumovich, 1996).

According to Brunner (1961), Friedman (1961) and other researchers, investors will typically respond with a lag, which would imply that money could help predict stock return. Friedman's hypothesis which derived by Sellin (2001), stated that the real quantity of money demanded relative to income is positively related to the real and nominal equity price, but that the contemporaneous correlation is negative. He offers three explanations of an inverse relationship between price of equity and velocity with wealth effect, a risk spreading effect and transaction effect (Sellin, 2001).

The first explanation starts with rising in prices of equity lead to increase in nominal wealth which in turn raise the higher wealth to income ratio. The second rationale begins with higher equity prices and higher expected excess returns on equity could reflect higher risk. The last explanation from Sellin (2001) is that higher equity prices would imply a higher dollar volume of transactions, which would require increase money balances. All these offsetting effects are substitution effect which is contemporaneous, since it purely involves a rebalancing of investors' portfolios and thus explains the

negative contemporaneous correlation between money and equity prices (Sellin, 2001).

## **2.2.4 Consumer Price Index**

### **2.2.4.1 “Fed Model” of Equity Valuation**

The influence of the macroeconomic on the stock market is combining the different ideas and effort from academics, investment professionals, and monetary policymakers. Different practitioners have different contribution to the stock market. The leading practitioner model of equity valuation, which is known as “Fed model”, relates the yield on stocks (as measured by the ratio of dividends or earnings to stock prices) to the yield on nominal Treasury bonds (Campbell & Vuolteenaho, 2004).

The main idea behind this is that the stocks and bonds compete for space in investors’ portfolio. If the yield on bond increases, the yield on stocks must also have an upward trend in order to maintain the competitiveness of stocks.

According to Campbell and Vuolteenaho (2004), if the measured stock yield exceeds the normal yield defined by the Fed model, then stocks are attractively priced which is underpriced. However, if the measured yield falls below the normal yield, then stocks are overpriced. Inflation would be the major catalyst in influencing the nominal bonds yields. In short, Fed model concludes that stock yields are highly correlated with inflation. However, in the late 1990’s, practitioners often argued that falling stock yields, and rising

stock prices, were justified by declining inflation (Campbell & Vuolteenaho, 2004).

#### **2.2.4.2 Fisher Effect Theory**

From Fisher effect theory, it describes the long run relationship between inflation and interest rate ('Fisher Effect', 2011). It stated that inflation and interest rate will move in parallel with same amount or percentage. In this case, government plays an important role when they want to implement policy instrument. People do care about how government control on money supply because it would definitely have an impact on stock market. From Foote (2010), when government control on money supply, it would help to determine the inflation in long run at the same time it will move the nominal interest rate. Finally, the bond prices will be affected as well as demand for the stocks affected too because bond price moves with an inverse relationship with interest rate.

### **2.2.5 Crude Oil Price**

#### **2.2.5.1 Hotelling's Theory**

The hypothesis of this theory is simple. He proposes that the owner of nonrenewable resources is basically motivated by profit return. By assuming the markets are efficient, they will produce a limited supply of their goods if it yields more than bonds or interest bearing instruments. According to

Hotelling, the long term prices should increase year after year at the prevailing interest rate although short term market volatility is still a function of short-term supply and demand forces. If oil price is being included, considering the cost of production and storage and maintaining at the prevailing interest rate, there would be no restriction on supply. If owners believed that future oil prices were not going to keep up with interest rates, then they would be better off selling as much as possible for cash and then purchasing bonds (Stammers, 2008).

#### **2.2.5.2 Law of One Price**

According to Simpson (2010), he relates Law of One Price into gas stock market and oil price. Based on theory, the prices on homogenous goods should move together even though products come from different manufacturers and suppliers. The transportation costs and quality should be the only different from them. From him, the oil and gas share returns would be affected due to the differential of prices flow through to oil and gas stock market sector.

### 2.2.5.3 Dividend Discounted Model

Many researchers are using this model as a framework in understanding the relationship between stock prices (Adam & Tweneboah, 2008; Rault & Arouri, 2009). The dividend discounted model is shown as below:

$$P_0 = D_1 / (1+r)^1 + D_2 / (1+r)^2 + D_3 / (1+r)^3 + \dots + D_n / (1+r)^n \quad (2)$$

Where,  $P_0$  = Current price

$D_i$  = Expected dividend in period I

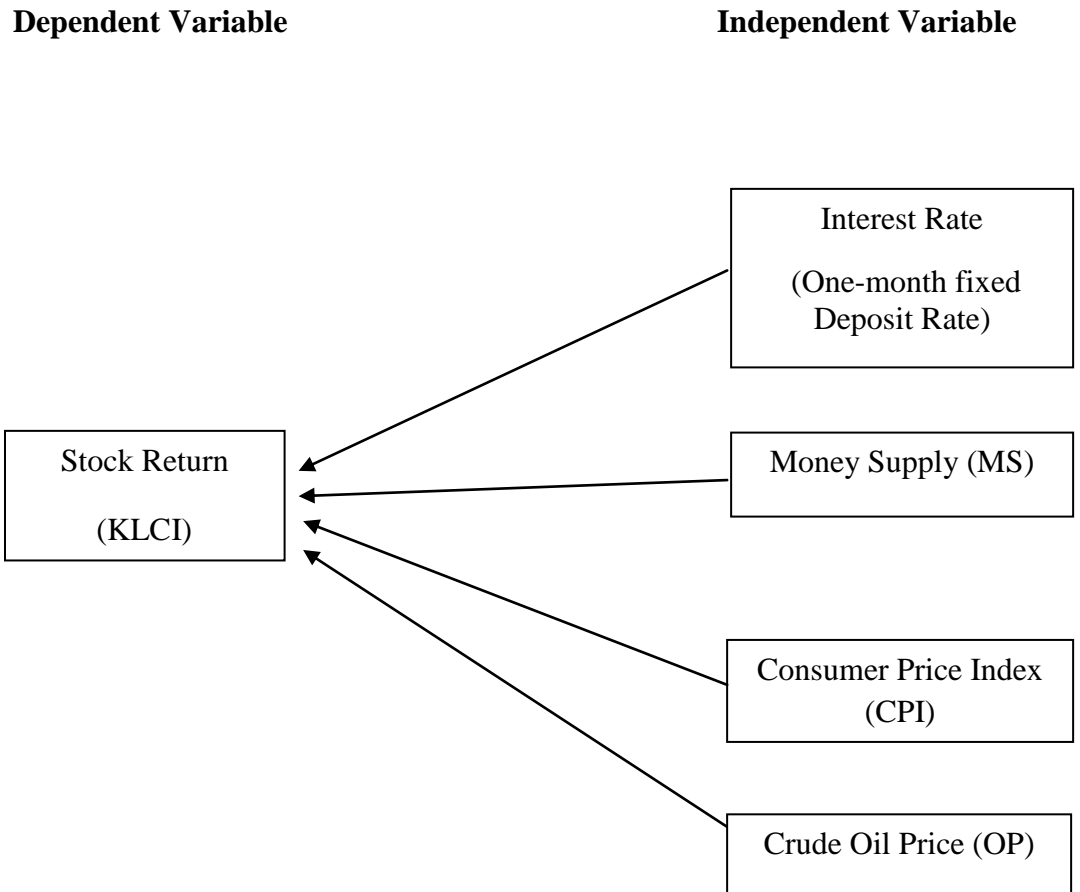
R = Required rate of return on the asset j

From Rault and Arouri (2009), one of the rationales is that by using this model in explaining the stock valuations. They relate this model into oil price and stock valuation. In theory, the stock value equals to the discounted sum of expected future cash flows (Rault & Arouri, 2009). Macroeconomic events will be a cause in affecting the cash flows which probably influenced by oil shocks. Therefore, stock prices may change due to change of the oil price in the market.



## 2.3 Proposed Theoretical / Conceptual Framework

Figure 1: Framework of factors affecting stock prices in Malaysia Financial Market  
from 1992-2011



## **2.4 Conclusion**

In a nutshell, this paper studies each of the independent variables from previous researchers' findings in Chapter 2. In another words, this paper will use previous researchers' findings to support this study. Besides, methodologies and theoretical model from previous researchers are reviewed. Lastly, this paper constructs a theoretical framework for the reader to have a clearer picture on our study.

## **CHAPTER 3: METHODOLOGY**

### **3.0 Introduction**

A total of four macroeconomics variables and stock return (KLCI) are used in this paper. The macroeconomic variables are monthly frequency from January 1992 to December 2011. There are a total of 240 monthly observations for each of the variables. In order to avoid the problem of thin trading and price limits of a stock market, monthly data has been used for these purposes (Banerjee & Adhikary, 2007). All variables are obtained from one source.

### **3.1 Research Design**

This paper is a quantitative research which involves a series of empirical techniques. The data set for each of the dependent and independent variables consists of 240 observations which obtained from same source. The empirical method has been used in this paper in order to investigate the relationship between the variables is E-views 6 software.

## 3.2 Data Collection Method

This paper is mainly focusing on secondary data which comes from same kind of sources. Besides, this paper is employed time-series data. Each of the variables consists of 240 observations. The reason of using secondary data is due to it is more reliable as obtaining quality data from different sources and time saving.

### 3.2.1 Secondary Data

The time-series data that covered from January 1992 to December 2011 of all the independent variables of consumer price index, money supply, interest rate, crude oil price and also dependent variable of stock index are extracted from datastream database.

Table 3.1: Source of Data

<b>Variables</b>	<b>Proxy</b>	<b>Explanation</b>	<b>units</b>	<b>Source of data</b>
Stock Market Return	KLCI	Composite market index in Malaysia	Index	Datastream
Interest Rate	IR	Fixed deposit rate of one-month in Malaysia	Percent (%)	Datastream
Money Supply	MS	Money circulation in Malaysia's market of Category 2	RM million	Datastream
Consumer Price Index	CPI	Consumer price index in Malaysia (as measure of inflation)	Index number	Datastream
Crude Oil Price	OP	Oil price of one barrel in Malaysia	RM	Datastream

## **3.3 Sampling Design**

### **3.3.1 Target Population- Malaysia**

This paper targets on Malaysia Financial Stock Market (KLSE). This paper tends to estimate the relationship between those macroeconomic variables and stock return in Malaysia which is still under developing country. As known, Kuala Lumpur Composite Index (KLCI) represents the top 30 companies and recognizes as a stock market index since 1986. As mentioned before, since 1964, Bursa Malaysia has been recognized as holding company in controlling a number of exchanges in Malaysia. It is now known as the FTSE Bursa Malaysia KLCI which acts as an accurate performance indicator of the Malaysian stock market as well as the worldwide economy. Besides, it plays an important role in expanding the Malaysian capital market's global reach by offering competitive services and infrastructure through adoption of internationally accepted standards which are globally relevant ('FTSE Bursa Malaysia KLCI', 2011).

### 3.3.2 Sampling Element-Formula

FTSE Bursa Malaysia KLCI is a stock market index it introduced in 1986 (that time called KLCI) which serves as accurate performance indicator on Malaysia Stock Market. KLCI contains selected 30 largest companies from main board by full market capitalization companies from bursa Malaysia and comprises multi-sectors companies.

FTSE Bursa Malaysia KLCI is calculated by FTSE and is using the real time and closing prices sourced from Bursa Malaysia. Calculation is based on a value weighted formula and adjusted by a free float factor. The FTSE Bursa Malaysia KLCI values are calculated on a real time basis every 15 seconds ('FTSE Bursa Malaysia KLCI', 2011).

The FTSE Bursa Malaysia KLCI is calculated using the following formula:

$$\sum \frac{(p^{n1} * e^{n1}) * s^{n1} * f^{n1} * c^{n1}}{d} \quad (3)$$

Where

- 1.) n is the number of securities, in KLCI there is contains 30 securities.
- 2.) P is the latest trade price of the component security. e is the exchange rate required to convert the security's home currency into the index based security.
- 3.) s is the number of share in issue used by FTSE for the security.
- 4.) f is free float factor to be applied to each security to allow amendment to its weighting, expressed as a number between 0 and 1 where 1 represent 100 percents free float. The free float factor for each security is published by FTSE.

- 5.)  $c$  is capping factor to be applied to each security to reduce its weighting in the index and if the security is not capped its capping factor is 1.
- 6.)  $d$  is divisor and the figure represents the total issue share capital of the index at the base date. The divisor can be adjusted to allow changes in the issue share capital of the individual securities to be made without distorting the index .

Source: ('Index Calculation', 2011)

### **3.3.3 Sampling Technique**

In this paper, E-views 6 will be adopted as a tool for analyzing the findings. Eview is a simple and interactive econometrics software package, providing data analysis, estimating and forecasting tools. E-views is the most frequently tool used in practical econometrics. E-views take advantages for visual features of modern windows software.

E-views 6 is used to perform these analyses. From the E-views 6, there are several empirical analyses will be carried out such as Ordinary Least Square (OLS), Unit Root test, Johansen Cointegration Tests, Granger Causality Tests, Variance Decomposition and Impulse Response Function. By using OLS, this paper can easily detect the economic problems from the empirical model. After detecting the economic problems, this paper would minimize the economic problems before testing for other relationship.

From the Unit Root Test, Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test test are used to investigate the presence of stationarity. The

reason of these models chosen to perform the analyses is combining the ideas and opinions from different previous researches and tries to fit those methods into Malaysia's case. After reviewing different journals and articles from different researchers in different places, these techniques (Unit Root, Johansen Cointegration, Granger Causality, Variance Decomposition and Impulse Response Function) are the best applying in this paper in order to investigate the relationship between those variables.

### **3.3.4 Sampling Size**

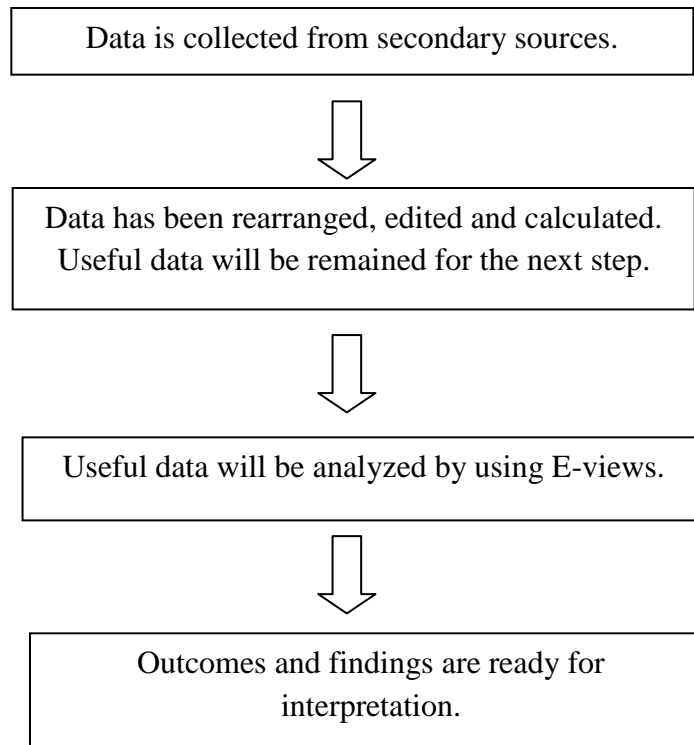
This research will be carried out from the monthly period of January 1992 to December 2011. There are 240 monthly observations have been introduced for each of the variables throughout the research.

Besides, there are 30 major stocks or top 30 largest companies listed under Malaysian Main Board that drive from FBM KLCI which are shown in Appendix 1.



### 3.4 Data Processing

Figure 3.2: Diagram of Data Processing



Basically, the data processing is based on these four simple steps. Firstly, the data will be gathered from one source which is datastream. Afterwards, the collected data will be first rearranged, edited and calculated it. The remaining data will be the most useful data for this paper. Next, useful data that has been transformed will be analyzed by using E-views. Lastly, the outcomes and findings are ready for interpretation.

### 3.5 Multiple Regression Model

Multiple regression is a method of data analysis that use to examine the significance relationship of a dependent variable to any other factors independent variables (Berger, 2003). The reason of transforming all the variables into natural logarithm due to all return data are calculated in monthly basis (Kandir, 2008). This can help to reduce the gap of the data between the variables.

#### Economic Function

$KLICI = f(\text{Interest Rate, Money Supply, Consumer Price Index, Crude Oil Price})$

#### Economic Model

$$LOGKLICI_t = \beta_0 + \beta_1 LOGIR_t + \beta_2 LOGMS_t + \beta_3 LOGCPI_t + \beta_4 LOGOP_t + \varepsilon_t$$

N=240 observations

Where,

LOGKLICI = Natural logarithm of stock market return in Malaysia at t year

LOGIR = Natural logarithm of one-month fixed interest rate of Malaysia at t year

LOGMS = Natural logarithm of money supply of Category 2 of Malaysia at t year

LOGCPI = Natural logarithm of consumer price index of Malaysia at t year

LOGOP = Natural logarithm of crude oil price of Malaysia at t year

## 3.6 Data Analysis

There will some of the tests will be carried out in order to investigate the relationship between independent variables and dependent variable such as Ordinary least square, Unit Root test, Johansen Cointegration, Granger Causality, Variance Decomposition and Impulse Response Function.

### 3.6.1 Ordinary Least Square (OLS)

According to Hoyt (2003), Ordinary Least Square is a statistical technique that uses sample data to estimate the true population relationship between two variables. The economic equation that appears in this paper would be first tested by using OLS method before getting depth of this research. The used OLS method helps to detect the economic problem as well as ensures this paper free from economic problems. There are some of the techniques will be used to check for the economic problems such as multicollinearity, heteroscedasticity, autocorrelation, and model specification error.

Multicollinearity can be defined as the conditions of independent variables are highly correlated with each other and it can be detected from R-Squared between the paired independent variables (Gujarati & Porter, 2009).

For the heteroscedasticity, it is a problem when the error terms do not have constant variances. Heteroscedasticity can be detected from Probability of F-statistic (Stock & Watson, 2006).

According to Stock and Watson (2006), autocorrelation is defined as a condition where residuals are related to each other and it can be confirmed from Probability of Chi-Square.

Last but not least, model specification error can be separated into several types of errors such as omission of a relevant variables, inclusion of an unnecessary variables, incorrect functional forms and so on. The economic model must free from these few types of econometric problem before getting into more advance tests (Gujarati & Porter, 2009).

### **3.6.2 Unit Root Test (Stationary test)**

Unit roots tests are aimed at establishing the order of integration of each variable. In order to analyze the effects of the several macroeconomic factors KLCI stock price change, the first step in this paper is to analyze the stationary properties of those variables by applying the unit root. In order to avoid bias result, testing stationarity of those variables are very important. Stationarity can be defined as one with a constant mean, constant variance and constant autocovariances for each given lag. The stronger the stationarity, the best for this paper because it would not lead to spurious regressions. There are several ways to test the presence of unit root. To check the stationarity of each variable, this paper is using unit root test Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test (Gan et al., 2006).

First, some previous researches such as Sari and Soytas (2006) are checking the data of stationary by using ADF unit root test in each of the variables which are performed by inserting lag value of dependant variable. Besides, it

is investigating on the coefficient of the regression. ADF consists a running regression of the first difference of the series against the series lagged once, lagged difference terms, and optionally, a constant and a time trend (Al-Zoubi & Al-Sharkas, 2011). On the other hand, ADF test was used by Asaolu and Ogunmuyiwa (2011) in order to avoid spurious regressions which might arises as a result of carrying out regressions on time series data without subjecting them for test whether they contain unit root by using E-views. However, ADF test has weaknesses. Paramaia and Akway (2008) claimed that the ADF test has good size but poor power properties.

PP test is under unit root test which conducted in a similar manner by using regression without the lagged first differenced terms. This test is similar to ADF test but incorporates automatic correlation to DF procedure and controls the higher-order serial correlation. PP test uses a non-parametric statistical method and avoid the use of adding lagged difference terms as in ADF test (Asmy et al., 2009). Ibrahim (1999) is using this test to correct for some serial correlation and heteroskedasticity in the residuals.

### **3.6.3 Johansen Cointegration Tests (Bound test)**

Once the order of the integration is established for each variable, this paper continues to evaluate the cointegration properties of the data series. Johansen & Juselius (1990) cointegration test is adopted to determine whether the linear combination of the series possesses a long run equilibrium relationship. Besides, Johansens co-integration test is explaining the relationship between dependent variable and independent variable in short run or long run period (Ali et al., 2010). Briefly stated, a set of variables is said to be cointegrated if they are individually non-stationary and integrated of the same order, yet their

linear combination is stationary (Ibrahim, 2000). In addition, the basic idea of cointegration is that the dependent and independent variables move closely together in the long run (Azizan & Sulong, 2011).

Cointegration means the data from a linear combination of two variables can be stationary. If there is at least one cointegrating relationship among the variables, then the causal relationship among these variables can be determined by estimating the VECM. For this purpose, a Johansen method of multivariate cointegration is applied (Asmy et al., 2009). The Johansen maximum likelihood method from Johansen and Juselius (1990) is utilized to examine the number of cointegrating vectors in the model (Chin & Jayaraman, 2007). Johansen VECM is a full information maximum likelihood estimation model which allows in testing the whole system in one step (Maysami, Lee & Hamzah, 2004).

### **3.6.4 Granger Causality Tests**

For the absence of any cointegration relationship between the above variables, Granger causality tests would be applied. In 1969, Clive Granger proposed Granger Causality technique in order to determine causality between two time series and whether one time series is useful in forecasting another (Harasheh & Abu-Libdeh, 2011). Granger Causality test is used to test on short run relationship between dependent and independent variables. In order to test the existence of short run relationship, stationary data is more important than non stationary data. In this technique, the methodology is sensitive to lag length used in order to investigate the stationary property of data.

Granger proposed to examine the relationship exists between variable, they also can be used to predict each other (Ali et al., 2010). This method is popular since many previous researches also used this analysis to test the relationship between stock price and macroeconomic factors in different countries around the world (Granger, Huang & Yang, 1998; Ali et al., 2010). For instance, Gan et al. (2006) are using this method to examine whether there are lead-lag relationship between NZSE returns and various macroeconomic variables. Granger causality test is also used by Kutty (2010) to determine the Mexico's stock prices lead to exchange rates in the short run and there is no long run relationship between them.

However, Ibrahim (1999) found that this Granger causality tests are not appropriate when the variables were being analyzed as a non-stationary and cointegrated. A relevant vector error-correction models are estimated to capture the long run and short run causal dynamics in terms of interactive feedbacks (lead-lag relationships) among the variables (Agrawalla & Tuteja, 2008). At the end, an augmented form of Granger causality test is involved the error-correction term (Shahbaz, Ahmed & Ali, 2008).

### **3.6.5 Variance Decomposition**

The variance decomposition is testing which macroeconomic factors explain a substantial part of the variation in stock prices over the short and medium-run, namely , one, four and eight years. The variance decomposition is constructed from vector autoregression (VAR) with orthogonal residuals. It can directly address the contribution of macroeconomic variable in forecasting the variance of stock price (Kazi, 2008).

According to Okuda and Shiiba (2010), variance decomposition methodology is a complementary approach that examines the information content of several earnings components. For example, Callen and Segal (2004) extend the variance decomposition framework by including the accruals and shows that news associated with accruals, cash flows, and expected future returns are all important in driving stock returns. Besides, others previous researches like Patelis (1997) and Sari and Soytas (2006) are using Variance decomposition to examine the relative importance of the various forecasting variables in causing unexpected stock returns.

### **3.6.6 Impulse Response Function**

Previous researches such as Gan et al. (2006) are using this method to investigate the short run dynamic linkages between NZSE40 and macroeconomic variable throughout the testing period. The impulse responses are estimated by regressing the series of interest on estimated innovations, which are the residuals obtained from a prior-stage 'long autoregression' (Chang & Sakata, 2007). This specific methodology avoids typical orthogonalization and ordering problems which would be hardly feasible in the case of highly interrelated financial time series observed at high frequencies (Panopoulou & Pantelidis, 2009).

Besides, the impulse response functions are reliable only with a stationary time series the data has been turned into stationary after the second difference. It acts as an econometric technique which has been employed to investigate the short-run impact caused by the vector auto regression model when it received some impulses. These approaches also provide a system consistent



solution for multivariate linear autoregressive models, with time varying second moments (Elder, 2003).

For instance, the Impulse response function has been chosen to check the existence of short run relationship between stock market prices and macroeconomic variables (Philinkus & Boguslauskas, 2009).

### **3.7 Conclusion**

In a nutshell, there are four macroeconomic variables which include money supply, interest rate, consumer price index and crude oil price that are being used to test on the relationship with stock return (KLCI). There are a set 240 monthly observations for each of the variable from January 1992 to December 2011. All these four variables and stock return are obtained from same source which is datastream. These four macroeconomic variables will be gone through several empirical tests to investigate the different relationship with stock return. It consists a list of tests which needed to be gone through such as Ordinary Least square, Unit Root test, Johansen Cointegration tests, Granger Causality test, Variance Decomposition and Impulse Response Function. Different tests have different purpose in testing the relationship. All these tests would be investigating the different relationship between these four main macroeconomic variables and stock return (KLCI). The empirical result would be discussed in the next chapter.

## CHAPTER 4: DATA ANALYSIS

### 4.0 Introduction

This paper will interpret and analyze the empirical result from the methodology of previous chapter in this chapter. In this chapter, it includes several empirical results such as Ordinary least square, Unit Root test, Johansen Cointegration, Granger Causality, Variance Decomposition and Impulse Response Function. A clear explanation will be discussed based on the findings that presented in table form.

### 4.1 Ordinary Least Square (OLS)

Table 4.1: LKLCI is explained by LIR, LMS, LCPI and LOP

Dependent Variable: LKLCI  
 Method: Least Squares  
 Sample: 1992M01 2011M12  
 Included observations: 240

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMS	2.450600	0.230897	10.61337	0.0000
LOP	0.043507	0.058173	0.747893	0.4553
LIR	-0.366186	0.068103	-5.376941	0.0000
LCPI	-11.63353	1.083515	-10.73684	0.0000
C	26.80144	2.092143	12.81052	0.0000
R-squared			0.511253	
F-statistics			61.45546	
Prob(F-statistics)			0.000000	
Durbin-Watson stat			0.159653	

## 4.2 Diagnostic Checking

### 4.2.1 Multicollinearity

**Hypothesis:**

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

*H<sub>1</sub> : There is a multicollinearity problem.*

**Decision rules:**

- 1.) We do not reject H<sub>0</sub> if VIF < 10, meaning that there is no multicollinearity problem.
- 2.) We reject H<sub>0</sub> if VIF > 10, meaning that there is a serious multicollinearity problem (Baum, 2006).

Table 4.2: Correlation Analysis

	LKLCI	LMS	LOP	LCPI	LIR
LKLCI	1.000000	0.505610	0.513510	0.461792	-0.472209
LMS	0.5055610	1.000000	0.937822	0.995348	-0.851659
LOP	0.513510	0.937822	1.000000	0.932511	-0.840346
LCPI	0.461792	<b>0.995348</b>	0.932511	1.000000	-0.866921
LIR	-0.472209	-0.851659	-0.840346	-0.866921	1.000000

From the table above, it shows that there is one pair of independent variable is highly correlated with each other which is LMS and LCPI of 0.995348. This paper would carry out the regression analysis by looking at the R-Square and calculating the Variance Inflation Factor (VIF).

Table 4.3: Correlation analysis of LMS and LCPI

Dependent Variable: LCPI

Method: Least Squares

Sample: 1992M01 2011M12

Included observations: 240

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMS	0.212035	0.001330	159.3840	0.0000
C	1.676142	0.017125	97.87675	0.0000
R-squared	0.990718			
Adjusted R-square	0.990679			
F-statistic	25403.27			
Prob(F-statistic)	0.000000			
Durbin-Watson stat	0.105694			

$$\begin{aligned}
 \text{VIF} &= (1 / 1 - R_{x_1, x_2}) \\
 &= (1 / 1 - 0.990718) \\
 &= 108
 \end{aligned}$$

**Conclusion:**

We can conclude that there is a serious multicollinearity problem between LCPI and LMS. According to Kaasa (2003), she reveals that it is common to have multicollinearity problem. This is due to the study uses a large number of factors in the analysis. Plus, the analysis with a number of factors would need a large data set which easily leads to multicollinearity problem. From Dimitrova (2005), Time-series macroeconomic data is notorious for its problematic nature as to meeting the classical assumptions of OLS estimation.

## 4.2.2 Autocorrelation

### Hypothesis:

$H_0$  : There is no autocorrelation problem.

$H_1$  : There is an autocorrelation problem.

### Decision rules:

- 1.) We do not reject  $H_0$  if P-value of the Chi-squared  $> 0.01$ , meaning that there is no autocorrelation problem.
- 2.) We reject  $H_0$  if P-value of the Chi-squared  $< 0.01$ , meaning that there is an autocorrelation problem (Stock & Watson, 2006).

Table 4.4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	8.959522	Prob. F	0.010281
Obs*R-squared	239.4191	Prob. Chi	0.321218

### Conclusion

Since the P-value of Chi-square is  $0.321218 > 0.01$ , we do not reject  $H_0$ . Thus, we have enough evidence to conclude that there is no autocorrelation problem.

### 4.2.3 Heteroscedasticity

**Hypothesis:**

$H_0$  : There is no heteroscedasticity problem.

$H_1$  : There is a heteroscedasticity problem.

**Decision rules:**

- 1.) We do not reject  $H_0$  if P-value of F-stat  $> 0.01$ , meaning that there is no heteroscedasticity problem.
- 2.) We reject  $H_0$  if P-value of F-stat  $< 0.01$ , meaning that there is a heteroscedasticity problem (Spanos, 1986).

Table 4.5: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.723493	Prob. F	0.046969
Obs*R-squared	116.3542	Prob. Chi-Square	0.211116

**Conclusion:**

Since P-value of F-stat is  $0.046969 > 0.01$ , we do not reject  $H_0$ . Thus, we have enough evidence to conclude that there is no heteroscedasticity problem.

## 4.2.4 Model Specification Test

### Hypothesis:

$H_0$  : The model is correctly specified.

$H_1$  : The model is not correctly specified.

### Decision rules:

- 1.) We do not reject  $H_0$  if P-value of F-stat  $> 0.01$ , meaning that the model is correctly specified.
- 2.) We reject  $H_0$  if P-value of F-stat  $< 0.01$ , meaning that the model is not correctly specified (Gujarati & Porter, 2009).

Table 4.6: Ramsey RESET Test

F-statistic	1.024583	Probability	0.312480
Log likelihood ratio	1.048560	Probability	0.305839

### Conclusion:

Since the P-value of F-statistic which shown in Table 4.6 is  $0.312480 > 0.01$ , we do not reject  $H_0$ . Thus, we have enough evidence to conclude that the model is correctly specified.



### 4.2.5 Normality Test

**Hypothesis:**

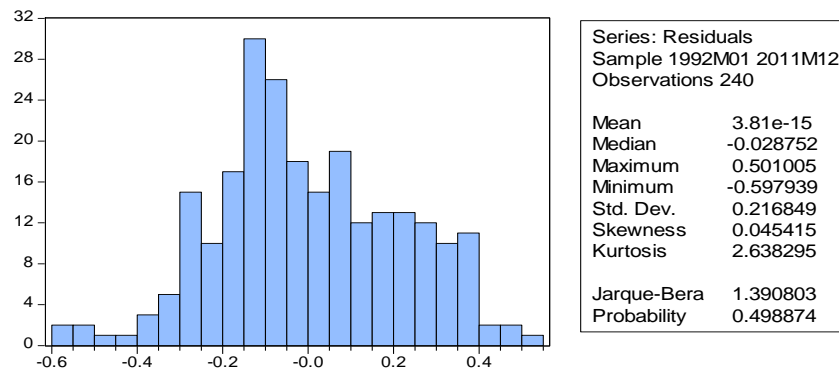
$H_0$  : Error term is normally distributed

$H_1$  : Error term is not normally distributed

**Decision rules:**

- 1.) We do not reject  $H_0$  if the P-value for JB-stats is  $> 0.01$ , meaning that the error term is normally distributed.
- 2.) We reject  $H_0$  if the P-value for JB-stats is  $< 0.01$ , meaning that the error term is not normally distributed (Brooks, 2008).

Table 4.7: Jarque-Bera Normality Test



**Conclusion:**

Since P-value of JB stat is  $0.498874 > 0.01$ , we do not reject  $H_0$ . Thus, we have enough evidence to conclude that the error term is normally distributed.

### 4.2.6 F-Stats

Furthermore, F-test will be used in this study in order to determine the overall significant of the economic model (Spanos, 1986).

#### **Hypothesis:**

$H_0 : \beta_i = 0$  (no linear relationship)

$H_1 : \beta_i \neq 0$  (at least one independent variable affects  $Y$ )

Where  $\beta_i = \beta_1, \beta_2, \dots, \beta_n$

#### **Decision rule:**

If the P-value of F-test is  $< 0.01$ , we reject  $H_0$  and conclude that at least one independent variable is important in explaining the dependent variable (Gujarati & Porter, 2009).

#### **Conclusion:**

By referring Table 4.1, it shows that the P-value of F-test is  $0.0000 < 0.01$ , we reject  $H_0$ . Thus, we can conclude that at least one independent variables is important in explaining the dependent variable.

### 4.3 Unit Root Test

In order to obtain the significant model and stationary relationship between the variables, testing the degree of stationarity of those variables is important. The next step in this paper is to analyze the stationary properties of those variables by applying the Unit Root test.

Table 4.3.1: Unit Root and Stationary Test Result

	<b>ADF</b>	<b>PP</b>
	<b>Level</b>	
LKLCI	-2.186944	-1.989762
LIR	-1.682928	-1.274218
LMS	-0.942500	-1.696032
LCPI	-1.393338	-1.507446
LOP	-1.769927	-0.069995
	<b>First Difference</b>	
LKLCI	-4.549075*	-13.64595*
LIR	-4.310654*	-12.67529*
LMS	-13.36415*	-13.40304*
LCPI	-11.74867*	-11.75586*
LOP	-14.98872*	-14.9837*

Note: \* significant at 1%.

Here, this paper has employed Augmented Dickey-Fuller and Phillips-Perron to test for stationary with the corresponding variables which shown in Table 4.3.1.

**Hypothesis:**

*H<sub>0</sub>: LKLCI / LIR / LMS / LCPI / LOP is not stationary and has a unit root.*

*H<sub>1</sub>: LKLCI / LIR / LMS / LCPI / LOP is stationary and do not contain unit root.*

As see from Table 4.3.1, all variables in ADF and PP test are not stationary and contain unit root in both test due to all variables are not significant at 1%. Thus, this paper does not reject H<sub>0</sub>. Proceeds to First Difference, all variables are significant at 1% that all variables must less than 0.01 (Brooks, 2008). Thus, this paper successful rejects H<sub>0</sub>. The result in first difference represent that all the variables are stationary and do not contain unit root which is supported by Gan et al. (2006).

## 4.4 Johansen Cointegration Tests

Once the order of the integration is established for each variable, this paper continues to evaluate the cointegration properties of the data series. Johansen & Juselius (1990) Cointegration test is adopted to determine whether the linear combination of the series possesses a long run equilibrium relationship.

Table 4.4.1: Johansen-Juselius Cointegration Tests

<b>Test statistic</b>				
$H_0$	Trace	5%	Maximum Eigenvalue	5%
r=0	85.04086*	69.81889	35.25343*	33.87687
r=1	49.78743*	47.85613	24.48057	27.58434
r=2	25.30686	29.79707	14.26625	21.13162
r=3	11.04062	15.49471	9.759422	14.26460
r=4	1.281193	3.841466	1.281193	3.841466

Notes: \* rejection of the hypothesis at the 5% significant level

Table 4.4.1 shows the result of cointegration test. Both Trace and maximum Eigenvalue indicates that at least one cointegration are significant at 5% and reject null hypothesis.

**Hypothesis:**

*H<sub>0</sub> : Long-run relationship does not exist between variables.*

*H<sub>1</sub> : Long-run relationship exists between variables.*

From Table 4.4.1, the result shows that trace test is cointegrated in  $r=1$  at 5% significance level and Max-Eigen is cointegrated in  $r=0$  at 5% significance level. It is common for the estimated test statistic to show different result (Gan et al., 2006). The inference is based on the evidence that calculated value of Trace and maximum Eigenvalue statistics should larger than their critical value at significant level of 5% (Rahman and Mustafa, 2008). Thus,  $H_0$  is being rejected and this paper concludes that there is the long run relationship between variables.

## 4.5 Granger Causality Tests

This study has applied Granger causality test which is proposed by C. J. Granger which states that if the causal relationship exists between variables, they can be used to predict each other (Ali et al., 2010). Thus, the results from Granger causality test are given in Table 4.5.1 and Table 4.5.2 as shown as below.

Table 4.5.1: Short- term Granger Causality Tests E-view Output

VAR Granger Causality/Block Exogeneity Wald Tests

Date: 02/16/12 Time: 23:01

Sample: 1992M01 2011M12

Included observations: 239

Dependent variable: LKLCI

Excluded	Chi-sq	df	Prob.
LMS	4.624725	1	0.0315
LOP	3.65E-05	1	0.9952
LIR	10.72505	1	0.0011
LCPI	6.024821	1	0.0141
All	12.86701	4	0.0119

Note: \*\*\* Significant at 1% significance level

\*\* Significant at 5% significance level

\* Significant at 10% significance level

Table 4.5.2: Short- term Granger Causality Tests Results

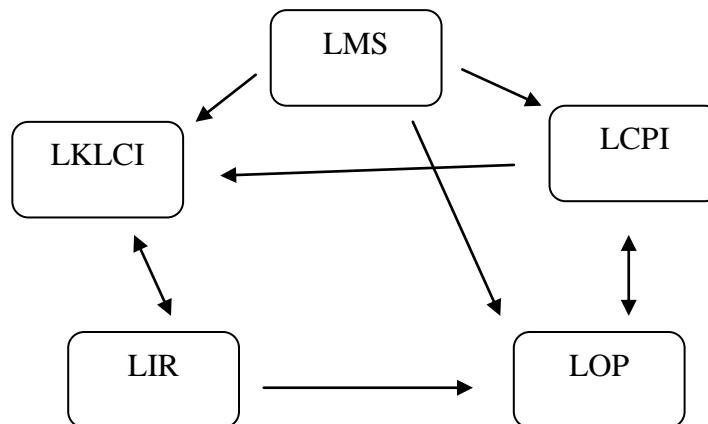
<b>Dependent Variable: LKLCI</b>		
<b>Independent Variable</b>	<b>P-Value</b>	<b>Result</b>
LIR (Interest Rate)	0.0011 ***	Significant
LMS (Money Supply,MS)	0.0315 **	Significant
LCPI (Consumer Price Index)	0.0141 **	Significant
LOP (Crude Oil Price)	0.9952	Insignificant

Note: \*\*\* Significant at 1% significant level  
 \*\* Significant at 5% significant level  
 \* Significant at 10% significant level

Table 4.5.3: Summary of Short-term Granger Causality Tests Results between all variables

<b>Variables</b>	<b>LKLCI</b>	<b>LIR</b>	<b>LMS</b>	<b>LCPI</b>	<b>LOP</b>
LKLCI		1%	5%	5%	-
LIR	5%		-	-	-
LMS	-	-		-	-
LCPI	-	-	1%		5%
LOP	-	1%	1%	1%	

Figure 4.5.1: The relationship between each variables for Granger Causality Tests





### 4.5.1 Interest Rate(IR)

**Hypothesis:**

*H<sub>0</sub> : There is no Granger cause relationship between LKLCI and LIR in short run.*

*H<sub>1</sub> : There is a Granger cause relationship between LKLCI and LIR in short run.*

From the Table 4.4.2, the result shows that LKLCI is affected by LIR in short run. This is because p-value of LIR (0.0011) is significant at 1% significance level and this means that interest rate has a very strong Granger cause impact on the LKLCI. Thus, this paper tends to reject H<sub>0</sub> and there is a relationship between both KLCI and interest rate for that period. These results are supported by previous researchers of Elton and Gruber (1998), Maysami, Lee and Hamzah (2004) and Ozbay (2009).

### 4.5.2 Money Supply (MS)

**Hypothesis:**

*H<sub>0</sub> : There is no Granger cause relationship between LKLCI and LMS in short run.*

*H<sub>1</sub> : There is a Granger cause relationship between LKLCI and LMS in short run.*

From the Table 4.5.2, the p-value for LMS is 0.0315 which is smaller than 5% significant level. Thus, this paper tends to reject H<sub>0</sub> and the result from Granger

Causality Tests Results shows that LMS has impact on the LKLCI value in the short run. Furthermore, this short-run causal flows result is consistent with previous researcher such as Rahman and Mustafa (2008), Ozbay (2009) and Hsing (2011). Therefore, money supply (MS) can be considered as one of the important indicators in estimating the KLCI stock return.

### 4.5.3 Consumer Price Index (CPI)

#### **Hypothesis:**

*H<sub>0</sub>: There is no Granger cause relationship between LKLCI and LCPI in short run.*

*H<sub>1</sub>: There is a Granger cause relationship between LKLCI and LCPI in short run.*

The result shows that P-value of LCPI is 0.0141 which is significant at 5% significance level. Thus, this paper rejects H<sub>0</sub> and there is a Granger cause relationship between LKLCI and Consumer Price Index (LCPI) in the short run period. Therefore, it can be inferred that Consumer Price Index (LCPI) affect stock returns and oil price. Moreover, these results are consistent with Cohn and Lessard (1980), Quayes and Jamal (2008) and Pereira-Garmendia (2010).

#### 4.5.4 Crude Oil Price (OP)

##### **Hypothesis:**

*H<sub>0</sub> : There is no Granger cause relationship between LKLCI and LOP in short run.*

*H<sub>1</sub> : There is a Granger cause relationship between LKLCI and LOP in short run.*

The test shows the P-value for oil price equal to 0.9952 which is not significant at 10% significance level. Thus, do not reject H<sub>0</sub> and there is no Granger cause relationship between LOP and LKLCI in short run. Even though there is no granger relationship with LKLCI, but there is a bilateral relationship with LCPI which might indirectly cause LKLCI to move.

But, the result from this paper is showing that no Granger cause relationship between oil price and stock return which backed by some others previous researchers such as Sari and Soytas (2006) and Al-Fayoumi (2009). However, there result is inconsistent with Raheman et. al. (2012) which investigates that oil price have short runs positively relationship with stock return. The result of oil price shows no granger causes relationship probably due to recent year of dramatically fluctuation.

After testing four macroeconomic independent variables, namely, LIR, LMS, LCPI and LOP in this paper, all variables are found to be the important variables in Granger cause the KLCI stock return in that period except oil price. However, some previous researches are stating that oil price is playing one of the major role in affecting the stock price, thus, these paper tend to use other test in order to investigate more accurately result.

## 4.6 Variance Decomposition

Table 4.6.1: Variance Decomposition of LKLCI towards LIR, LCPI, LMS & LOP

Period	S.E.	LKLCI	LMS	LOP	LIR	LCPI
1	0.071567	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.098947	99.61503	0.032295	<b>0.005422</b>	0.187890	0.159361
3	0.118783	98.78698	0.097867	0.021218	0.603909	0.490031
4	0.134742	97.59565	0.186594	0.050452	1.219347	0.947955
5	0.148265	96.12111	0.289380	0.095401	2.002138	1.491968
6	0.160090	94.43875	0.398516	0.157452	2.919517	2.085761
7	0.170643	92.61614	0.507816	0.237125	3.940028	2.698891
8	0.180187	90.71136	0.612594	0.334169	5.034849	3.307030
9	0.188898	88.77257	0.709526	0.447698	6.178524	3.891681
10	0.196891	86.83840	0.796464	0.576338	<b>7.349234</b>	4.439562

The impact on macroeconomic variable on stock return	
Small impact on short run	Crude Oil price (LOP)
Large impact on long run	Interest rate (LIR)

### Hypothesis:

$H_0$ : LIR/ LCPI/ LMS/ LOP does not have an impact on stock return (LKLCI).

$H_1$ : LIR/ LCPI/ LMS/ LOP has an impact on stock return (LKLCI).

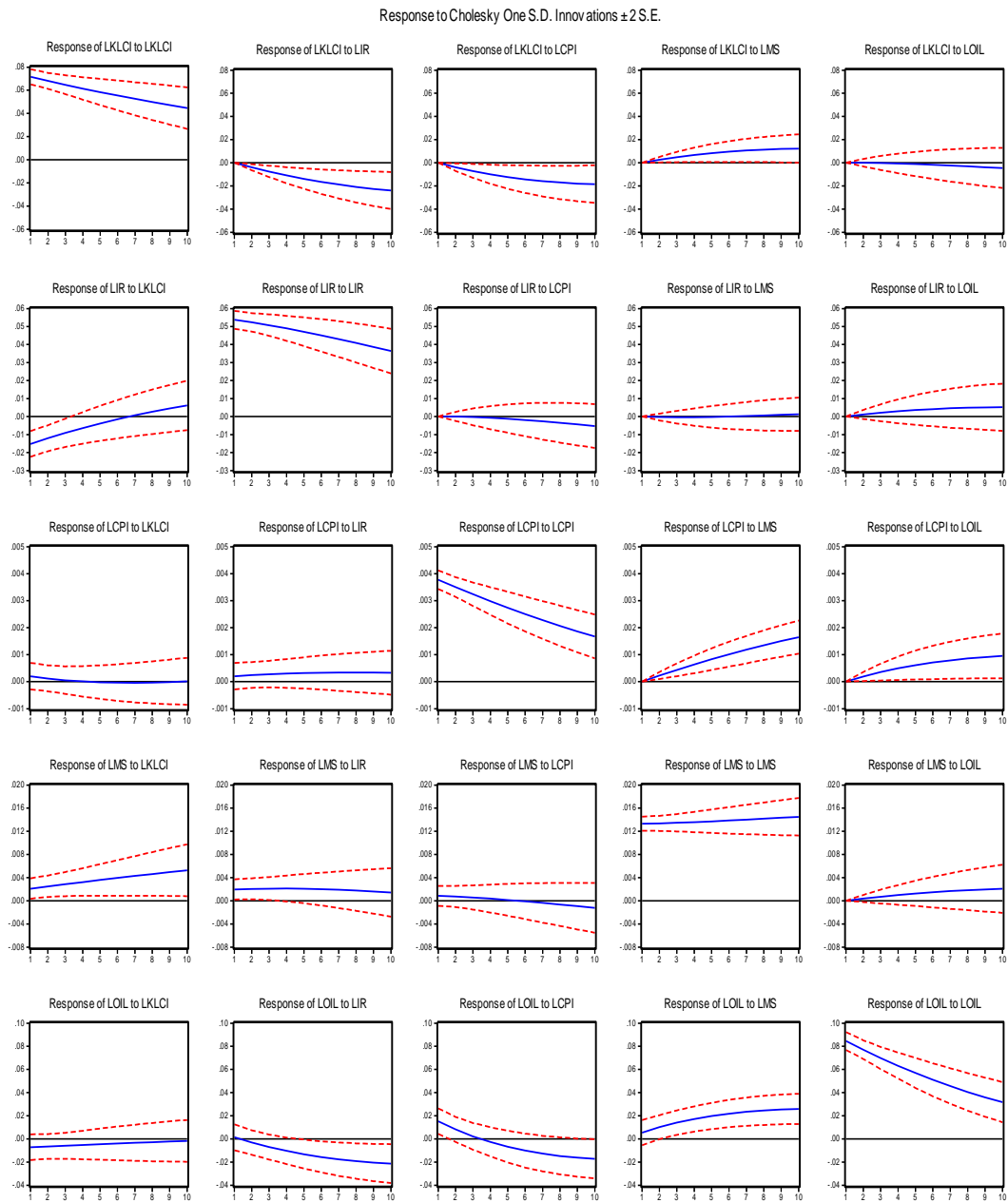
The Variance decomposition determines how much of the forecast error variance of each of the variables can be explained by independent shocks to the other variables (Brooks, 2008). The purpose of this test is to determine the proportion of the movement in the dependent variable (LKLCI) that is due to their “own” shocks, versus shocks to the other variables (Brooks, 2008). From the data above, the result show that shock in the interest rate is having a larger impact of 7.3492 percent in LKLCI in period 10 compared to oil price which has a small proportion of 0.0054 percent impact to LKLCI in period 2.

On the other hand, from the Table 4.6.1, this paper shows that the impact on independent variable to dependent variable is getting larger as it increases from period to period. In conclusion, the impact of independent variable in short run is little. Contrary, there will be a bigger impact in the long run towards dependent variable. The result is agreed by Maysami, Lee and Hamzah (2004). They have shown that there is a mix result of both short term and long term interest rates with Singapore’s stock market. While for the oil price, the result is consistent with Raheman et. al. (2012) whose prove that there is a short run relationship between oil price fluctuations and stock return for Asia Pacific Countries by using Granger Causality Test. From the result above, this paper tends to reject  $H_0$ , so each of macroeconomic variables has impact on stock return (LKLCI).

## 4.7 Impulse Response Function

The result of impulse response function of macroeconomic variables on LKLCI is shown in Figure 4.6.1. LKLCI responds to its own innovations but the effect is decreasing over time. Plus, the innovations to LIR and LCPI always have a negative shock on the LKLCI. This results are consistent with Gan et al. (2006) and Anari and Kolari (2001) respectively. While, it indicates that LMS has a positive shock on stock market. The result is agreed by Rahman, Sidek and Tafri (2009) and Asmy, Rohilina, Hassama and Fouad (2009). The main reason of having positive impact probably is that an increase in money supply would indirectly promote the economic growth which finally leads to increase in LKLCI. Lastly, LOP tends to be slight important and having a negative shock in those periods. This can be due to the inclusion of two economic crises of 1997 and 2007 to 2008. The result of negative impact is agreed by Rahman and Mustafa (2008) and Miller and Ratti (2009) are saying that there will be a negative impact in long run.

Figure 4.6.1: Impulse Response Function of LKLCI to Shocks in System  
Macroeconomic Variables



## **4.8 Conclusion**

In this chapter, all the empirical results have been shown clearly in table form as well as figure form. The precise and clear explanations have been written in this chapter. The summary of the whole research study will be presented in the next chapter.



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

### **5.0 Introduction**

In this chapter, this paper would first present the summary of the findings from previous chapter in table form with brief and clear explanation. Besides, validation on the research objectives and hypotheses would be derived based on the major findings. Furthermore, implications of this study, limitation and the recommendations for future research and conclusion would be discussed in a flow manner.

### **5.1 Summary of Statistical Analyses**

Table 5.1: Summary of Econometric Problems

<b>Econometric problems</b>	<b>Description on results</b>
Multicollinearity	Not Passed, serious multicollinearity problem
Autocorrelation	Passed, no autocorrelation problem
Heteroscedasticity	Passed, no autocorrelation problem
Model specification	Passed, no model specification problem
Normality test	Passed, model is normally distributed

Description: The econometric model passes through all the econometric problems test, except multicollinearity. This paper has dropped one of the highly correlated variables and also extends the period of the sample size. However, the problem still exists. According to Dimitrova (2005), this is the econometric nature between the variables. Thus, this paper proceeds to next step since it is common to have the multicollinearity problem.

Table 5.2: Summarize of Major Findings

Dependent variable	Independent Variable	Ordinary Least Square	Unit Root Test	Granger Causality Test	Impulse Response Function
LKLCI	LIR	Significant at 1% (Negative)	Stationary	Significant at 1%	Negative shock
LKLCI	LMS	Significant at 1% (Positive )	Stationary	Significant at 5%	Positive shock
LKLCI	LCPI	Significant at 1% (Negative )	Stationary	Significant at 5%	Negative shock
LKLCI	LOP	Not Significant (Positive )	Stationary	Not significant	Negative shock

Description: The table above shows the relationship of corresponding determinants and LKLCI. LMS and LOP are having positive relationship but LOP is not significant which is consistent with Huang, Masulis and Stoll (1996) and Al-Fayoumi (2009). While, LIR and LCPI have an inverse relationship with LKLCI and both are significant at 1%. All variables are stationary and do not contain unit root. In short run, LMS and LCPI are having short run relationship with LKLCI at significant 5%. While, LIR has short run relationship with LKLCI at 1% of significance level. On the other hand, LOP is showing no relationship with LKLCI in short run (Sari and Soytaş, 2006). For Impulse Response Function, all the independent variables are having negative shock, except LMS is having a positive shock towards LKLCI (Rahman, Sidek and Tafri, 2009).

Table 5.3: Summary of Long-run Relationship

<b>Long run relationship test: Johansen Cointegration Test</b>	
Trace test	Max Eigenvalue Test
Cointegrated at $r=1$	Cointegrated at $r=0$

Description: Trace test is cointegrated at  $r=1$ , Max Eigenvalue test is cointegrated at  $r=0$ , both tests indicate that there is existence of long run relationship in the model (Refer Table 4.4.1).

## 5.2 Discussion on Major Findings

By referring to the major findings presented above, the corresponding determinants are significantly well explained, except crude oil price. For the interest rate, there is an inverse relationship between interest and stock market return which is supported by Alam & Uddin (2009). The second determinant is money supply. According to Shiblee (2009), changes in the stock price are predominantly set by changes in money supply intuitively makes sense to argue that an increase in the rate of growth of money supply strengthens the rate and finally increase in stock prices which is consistent with our result of positive relationship. Next variable is consumer price index. It is a proxy of inflation. According to the findings, it states that there will be always a negative relationship between LCPI and LKLCI which is backed by Al-Zoubi and Al-Sharkas (2011) and Hasan (2008). Lastly, crude oil price becomes a popular indicator in determining the stock market return. The oil price has dramatically hiking since the Dato Seri Abdullah Badawi took the post of Prime Minister of Malaysia. However, the crude oil price has turned into insignificant relationship that not in expectation. Thus, this paper concludes that crude oil price is statically insignificant to stock return. It is supported by Huang, Masulis and Stoll (1996) and Sari and Soytas (2006).

Before going deep of the research, this paper has gone through the diagnostic checking by using Ordinary Least Square in order to identify the best model that free from econometric problems for this paper. This paper has found out that it is a best model by extending the period from 160 observations to 240 observations and inclusion of the natural logarithm. However, it is existence of the only problem of multicollinearity (Kaasa, 2003).

After found the best model for this paper, it proceeds to test on higher level of tests in order to determine the short run and long run relationship of between variables such as Bound Test, Unit root test, Granger Causality test, Variance Decomposition and Impulse Response function.

In short run, LIR is significant at 1% while the significant level for LMS and LCPI is 5%. However, LOP is not significant at any level of 1%, 5% or 10% (Sari & Soytas, 2006 and Al-Fayoumi, 2009). The insignificant level of oil might due to the inclusion of two economic crises in to the study. There are two pairs of variables in bilateral relationship which include LCPI & LOP and LKLCI & LIR. Only these two pair variables are affected each other in two ways relationship.

From the findings in Table 4.4.1, there is existence of long run relationship between the variables.

The main purpose of this paper is to investigate the short run and long run relationship between determinants in Malaysia. All those findings are powerful tools for stock market participants that will discuss detail in the following section. All of the determinants that have been employed are considered important variables to help out the stock market participant in determining the trend of the stock market.

## 5.3 Implications of the Study

### 5.3.1 Managerial Implications

The result of this paper show important information to public and it is useful to economy especially stock market investors. Policy maker, central bank (Bank Negara Malaysia), economist, and stock market participants should be more understand the situation in Malaysia Stock Market trend and the significant relationship between stock market return (KLCI), interest rate (one-month deposit rate), money supply (MS), consumer price index (inflation) and crude oil price.

Based on OLS result attached in Table 4.1, all of the variables have significant relationship with stock return, except crude oil price. Money supply and crude oil price have positive relationship with stock return. Besides, interest rate and inflation are having a downward relationship towards stock market return.

For interest rate, it shows a negative relationship. According to theory, when interest rate increases, stock market participants rather save money in the bank to earn interest income compared to invest in stock market. Vice versa, when interest rate is in downward trend, stock market participants are more willing to take risk in stock market to earn higher rate of return rather than saving in bank. Bank Negara Malaysia would normally take the decision in lowering down the discount rate that finally will reduce a financial institution's borrowing cost. With the lower borrowing cost, the financial institution does not need to increase their interest rate to pay for the extra discount loan. Thus, bank will lend out their money in lower interest rate and more loans will be

lent out to finance the projects. Lastly, it will indirectly improve the performance of the stock return in Malaysia.

Money supply is one of the important monetary policy tools that will be implemented by government in tighten or broaden the economic. Stock market participants should be more aware of any announcement from Ministry of Finance like reserve requirement ratio and open market purchase in selling or buying the bonds. With the increase or decreasing of the money supply in the economic, it will directly influence the fluctuation of stock market.

From the results in Table 4.1, consumer price index (LCPI) and LKLCI have significant negative relationship. Investors should put more caution about inflation in the market. As there is an inverse relationship between stock return and inflation, when the country is facing inflation, the purchasing power of customers would normally reduce. However, the cost of living would increase although they have tried to reduce their unnecessary expenditure. As a result, investors would hold for less money for investment due to higher living costs. Most of investors would sell out their portfolio investment such as shares or stocks that lead to price of stock drop due to supply is now more than demand. Policy maker should implement appropriate fiscal and monetary policy to control the inflation as well as minimize the impact to stock market.

As we know that, there is an oil price crisis during 2007. The oil price is too fluctuate and it has dramatically hiking up. Due to the hiking up of the oil price, the manufacturing overhead will normally increase due to oil is the main key input for a factory. The increase of the cost will normally be transposed to customers who need to bear a higher price of goods that finally will be experiencing inflation. As there is inflation in the country, the

government would lower down the discount rate in order to reduce the burden of the company and also have loan to finance their projects. Thus, unemployment will reduce eventually and promote economic growth as well as stock market. From the findings, oil price has some effect on stock market, but it is not significant in relationship. In short, stock market will be in upwards trend if there is a rising of the oil price.

Followed by the result shown in previous chapter, all of these variables have long run relationship at significant level of 5%. For stock market investor, they should consider the long run effect when they make the investment. Factor should be considered in long run are company stock characteristic, determine whether it is growing stock, income stock, speculative stock and economy performance in future indicates of stock return in long run. There some of the reasons that will affect economy performance in long term such as government developing project like Malaysia Economic Transformation Programme. This is a long term project and it will finally help in boosting up Malaysia's economy and achieve our mission of Wawasan 2020 by stepping into a developed country. Government should be ensuring the big projects are implemented smoothly in long term future.

Based on short run relationship result from Granger Causality Test, this paper explores that all of variables have a short run relationship to stock return, but oil price is not one of them. Furthermore, stock market participant should consider the short run effect about variables like money supply increase or decrease in market, inflation for short term and interest rate fluctuation in short term. Although there is no significant relationship in short, but there is a relationship in long run. Stock market participants shall employ oil price movement into consideration in long term future.

From the Table 4.6.1 of Variance Decomposition test, it shows that each of the variables is affecting each other in long run and short run. The period shown for the test is ten. Most of these variables will be affected by itself in short run and diluted in long run, the portion of affecting by other variables will increase in long run. Here, policy makers should publish out suitable policy to manage these variables to be constant because stable economic environment can help to improve stock market performance. By referring Figure 4.6.1, the result of Impulse Response Function is shown by telling whether it is having positive or negative impact to stock market return. The three determinants of LOP, LIR and LCPI have negative shock, except LMS is having a positive shock. In short, stock market participant can be ready to play in the stock market by looking the trend of these four corresponding determinants. However, it is not so easy to forecast a stock market trend due to uncertainty.

## **5.4 Limitations of the Study**

Like other researches, this research paper is also facing some limitations and difficulties. One of the major limitations of this paper is data constraint. As we know that, Malaysia is a developing country which some sets of data are not in full set such as the exchange rate. According to the datastream that collected before, the data only available from 1997:02 until 2012:02, but the period used for this research is from 1992:01 to 2011:12. Thus, it might limit the data period in this study. As a result exchange rate is not chosen as independent variable in this research paper. Additionally, this paper has found there is a limitation on monthly data due to oil price and stock prices are fluctuating everyday.



Moreover, this research paper only investigates in Malaysia. The result and information provided in this study is only useful for the Malaysia investor and policy maker. Due to the different status of country, culture, background, political factors and other causes, other countries like China, United State, Japan, Europe and India are encouraged to refer to this paper's finding but not to apply Malaysia case into their respective country's policy.

Besides, this research focuses on a single area which is testing on the relationship between each macroeconomic affect stock prices in the short run and long run. Plus, the other macroeconomic variable and industries that might be affecting on KLCI are not considered. This paper is too focusing on single area that might causes the result become less accurate and probably existence of bias at the end. Thus, the result might not useful for policy makers on their decision making.

In addition, times series data is employed for this study. It is a time-series data set in every variable in testing the causal effect with stock price changes. According to Dimitrova (2005), time-series macroeconomic data is notorious for its problematic nature as to meeting the classical assumptions of OLS estimation. In short, it might cause the result become inconsistent with real situation economic and the result will become bias.

Next, this research paper is facing the econometric problem of multicollinearity problem. However, it is very common to have multicollinearity problem due to a bigger set of data (Kaasa, 2003). In conclusion, this study continue to proceed since it is the nature of the data set.

Last but not least, time constraint is a normal limitation for undergraduate student. In the long way in completing this paper, all assignments, midterms and presentations

will normally clash together that reduce the time in doing this paper effectively and efficiently.

## **5.5 Recommendations for Future Research**

Future researchers are encouraged to solve the multicollinearity problem before investigating the relationship of the variables. This is to ensure the reliability of the study. Additionally, time-series data set has been employed in this study, but there are some disadvantages of using this data set, even though it has always been used by previous researchers. Thus, future researchers are suggested to use other structure of data like Panel data in order to avoid the problem of using time-series data. Furthermore, different frequency of the data set such as annually or daily can be used to test the consistency of the findings as well as increase the reliability of the study. Besides, different approaches such as Wald test and VAR are encouraged to use in the study. The consistency and validity can be increased by employing different tests in the study.

Future researchers are suggested to investigate the relationship of the macroeconomic variables in particular sectors such as service sector or manufacturing sector since these two sectors grow faster recently in Malaysia. The result will be more significant and focus since only focusing on few sectors compared to this paper in investigating the whole Malaysia sectors. Furthermore, future researchers are reminded that this paper is mainly focusing in Malaysia which is not so suitable for them to apply in their countries. Therefore, future researchers should gather the additional information or facts in investigating the relationship of the macroeconomic variables of interest rate, money supply, consumer price index, oil price in stock market return. They are encouraged to do comparison between their country and Malaysia in order to bring more financial information to their citizen as well as Malaysian.

## 5.6 Conclusion

In a nutshell, this paper has found that interest rate and consumer price index is negatively correlated while money supply has a positive relationship with stock price. However, oil price turns to become positive and insignificant in stock price. Besides, there are several tests are used to determine the short run and long run impact towards stock market return. Furthermore, this paper has discussed some of the limitations and recommendations in order to contribute to future researchers. In another word, this paper has achieved our main objective which is to investigate the significant relationship between interest rate, money supply, consumer price index and crude oil price towards stock market return (KLCI) as well as in the short run and long run dynamic impact.

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**APPENDICES**

Appendix 1

Table 1: Top 30 Companies Listed in Main Board of Bursa Malaysia

No	Company	Stock Code	Sector
1	AMMB HOLDINGS BHD	1015	Finance
2	AXIATA GROUP BERHAD	6888	Services
3	BRITISH AMERICAN TOBACCO (M)	4162	Consumer Products
4	CIMB GROUP HOLDINGS BERHAD	1023	Finance
5	DIGI.COM BHD	6947	IPC
6	GAMUDA BHD	5398	Construction
7	GENTING MALAYSIA BERHAD	4715	Services
8	GENTING BHD	3182	Services
9	HONG LEONG BANK BHD	5819	Finance
10	HONG LEONG FINANCIAL GROUP BHD	1082	Finance
11	IOI CORPORATION BHD	1961	Plantation
12	KUALA LUMPUR KEPONG BHD	2445	Plantation
13	MALAYSIAN AIRLINE SYSTEM BHD	3786	Services
14	MAXIS BERHAD	6012	Services
15	MALAYAN BANKING BHD	1155	Finance
16	MISC BHD	3816	Services

17	MMC CORPORATION BHD	2194	Services
18	PUBLIC BANK BHD	1295	Finance
19	PETRONAS CHEMICALS GROUP BHD	5183	Industrial Products
20	PETRONAS DAGANGAN BHD	5681	Services
21	PETRONAS GAS BHD	6033	Industrial Products
22	PLUS EXPRESSWAYS BHD	5052	Services
23	PPB GROUP BHD	4065	Consumer Products
24	RHB CAPITAL BHD	1066	Finance
25	SIME DARBY BHD	4197	Services
26	TENAGA NASIONAL BHD	5347	Services
27	TELEKOM MALAYSIA BHD	4863	Services
28	UMW HOLDINGS BHD	4588	Consumer Products
29	YTL CORPORATION BHD	4677	Construction
30	YTL POWER INTERNATIONAL BHD	6742	IPC

Source: FTSE Bursa Malaysia KLCI (2011), *Table 1: Top 30 companies listed in Bursa Malaysia.*